NGU RAPPORT 2021.028

Miljøgeokjemiske data og dateringsresultater fra Norskehavet – MAREANO

GEOLOGI FOR SAMFUNNET

SIDEN 1858

NORGES GEOLOGISKE UNDERSØKELSE

· NGU ·

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NGU RAPPORT
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- NGU -

RAPPORT

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Tittel:
Miljøgeokjemiske data og dateringsresultater fra Norskehavet - MAREANO.

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Sammendrag:
På MAREANO-toktene 2020104 og 2020110 med FF G.O. Sars i 2020 ble det tatt sedimentprøver for miljøundersøkelser på totalt 16 prøvetakingsstasjoner i Norskehavet; Frøyabanken, Sulatrekanten, Haltenbanken, Sklinnadjupet, Sklinnadjupet vest, Norskehavet øst-vest transekt, Trænabanken og Trænadjupet. Det er lave konsentrasjoner av halvmetallet arsen (As) og tungmetallene bly (Pb), kadmium (Cd), kobber (Cu), krom (Cr), kvikksølv (Hg), og sink (Zn), tilsvarende tilstandsklasse I i overflatesedimenter (bakgrunn), mens Ni er i tilstandsklasse II (god) for flere av stasjonene. Barium (Ba) er analysert for å sjekke om mulige spor av utslipp fra olje-/gassinstallasjoner i dette havområdet. ^{137}Cs er til stede i 4 av 5 analyserte sedimentkjerner; Haltenbanken, Sklinnadjupet vest, Trænabanken og Trænadjupet. Prøven fra Frøyabanken hadde ikke ^{137}Cs.

Åtte sedimentkjerner fra Frøyabanken, Sulatrekanten, Haltenbanken, Trænadjupet, Trænabanken, Sklinnadjupet, Sklinnadjupet vest og Norskehavet øst-vest transektene e og d ble valgt ut for kjemisk analyse i flere nåvåer. Fem av kjernene ble datert med bruk av ^{210}Pb og analysert for innhold av ^{137}Cs. ^{210}Pb-dateringsanalysene er av middels til god kvalitet. Lineære sedimentasjonsrater basert på ^{210}Pb-dataene gir sedimentasjonsrater fra 0,8 mm (Trænabanken) til 2,0 mm/år (Sklinnadjupet vest).

Samtlige tungmetaller er til stede i lave konsentrasjoner i de åtte sedimentkjernene. Hg og Pb øker i de øverste 10 cm, fra et lavere bakgrunnsnivå dypere i kjernene. De høyere verdiene av Hg og Pb mot toppen av kjernene tilskrives langtransportert forurensning primært knyttet til havstrømmer og atmosfærisk transport. Økningen knyttes primært til forbrenning av kull (Hg) og blyholdig bensin (Pb). For alle øvrige metaller og As er det relativt stabile og lave konsentrasjoner gjennom kjernene. Disse metallene vurderes å være på naturlig bakgrunnsnivå. Ba øker noe i de øverste centimeterne i flere av kjernene. Det gjelder spesielt en kjerne fra Frøyabanken (R2139) og en fra Norskehavet øst-vest transekt e (R2363). Økningen i Ba i den daterte sedimentkjernen R2139 fra Frøyabanken skjedde på 1980-tallet, trolig som resultat av utslipp av barytt fra boreslam og/eller Ba fra formasjonsvann fra olje-/gassboringer.

Mikroplast (MP) er analysert i overflatesediment på samtlige 11 prøvetakingsstasjoner tatt med multicorer, og i dypere lag i kjerner på 3 av de 11 stasjonene. Det er stor variasjon i antall MP-partikler/kg sediment, varierende fra 51 til 2187 partikler/kg sediment i overflateprøvene (0-2 cm). Mikroplast dypere i sedimentkjernene er til stede i alle tre analyserte kjerner. I de to daterte kjernene fra Sklinnadjupet vest og Trænabanken er det registrert mikroplast i sedimentlag som daterer tilbake til 1930-tallet. Årsak til at mikroplast er funnet så dypt er ikke avklart, men bioturbasjon kan være medvirkende til å dra mikroplast ned til dypere lag i sedimentene.

Emneord: Maringeologi	Sediment	Forurensning
Tungmetall	Prøvetaking	MAREANO
Geokjemi	Datering	Mikroplast

INNHOLD

VEDLEGG (Vedlegg 1-5 tilgjengelig digitalt ved nedlasting fra www.mareano.no/resultater/geokjemirapporter)

Vedlegg 1. Prøveliste og analyseresultater. Kornstørrelsesfordeling (Coulter), Leco (total S, total C og organisk C), HNO_3-ekstrahert og analysert med AAS (Hg) og ICP-OES (As, Ba, Cd, Cr, Cu, Ni, Pb og Zn). Naturlige standarder Hynne i Trondheimsfjorden og Nordkyn og Tana i Finnmark er inkludert i prøvelistene.

Vedlegg 2. Cd, Cr, Cu og Zn kart i prøvene 0-1 cm dyp og sedimentasjonsrater basert på ^{210}Pb-data

Vedlegg 3. XRI-bilder av sedimentkjerner.

Vedlegg 4. ^{210}Pb- og ^{137}Cs-analyserapporter fra fem sedimentkjerner. Leverandør av rapporter: Gamma Dating Center, Københavns Universitet, Danmark.

Vedlegg 5. Mikroplastrapport: Microplastics in sediment from the Norwegian Sea (NGI rapport 20210378-01-R), 135 sider.

1. INNLEDNING

MAREANO er et nasjonalt program for kartlegging av havbunnen. De første sedimentprøvene ble samlet inn i 2006. Resultater av målinger av uorganiske miljøgifter fra prøver innsamlet i 2006 - 2019 er rapportert tidligere (rapporter og kart er tilgjengelige på www.mareano.no). I tillegg er det rapportert prøver tatt av HI på tokt 2003 og 2004 i Barentshavet.

Sedimentprøver fra 16 stasjoner er analysert for innhold av tungmetaller, arsen, barium, kornstørrelse, total organisk karbon (TOC), totalkarbon (TC) og total svovel (TS) (Fig. 1). Fem utvalgte sedimentkjerner er i tillegg datert (^{210}Pb og ^{137}Cs). Sedimentkjerner fra 11 stasjoner er undersøkt med røntgen (XRI) for å studere strukturer i sedimentene, skjell og større partikler. Mikroplast (MP) er analysert i overflateprøver fra 11 stasjoner tatt med multicorer og bruk av stålrør for å unngå potensiell kontaminering fra PVC i plastrørene. Det er tatt ut prøver fra dypere lag på tre av disse stasjoner for analyse av MP.

2. TOKT OG PRØVETAKING

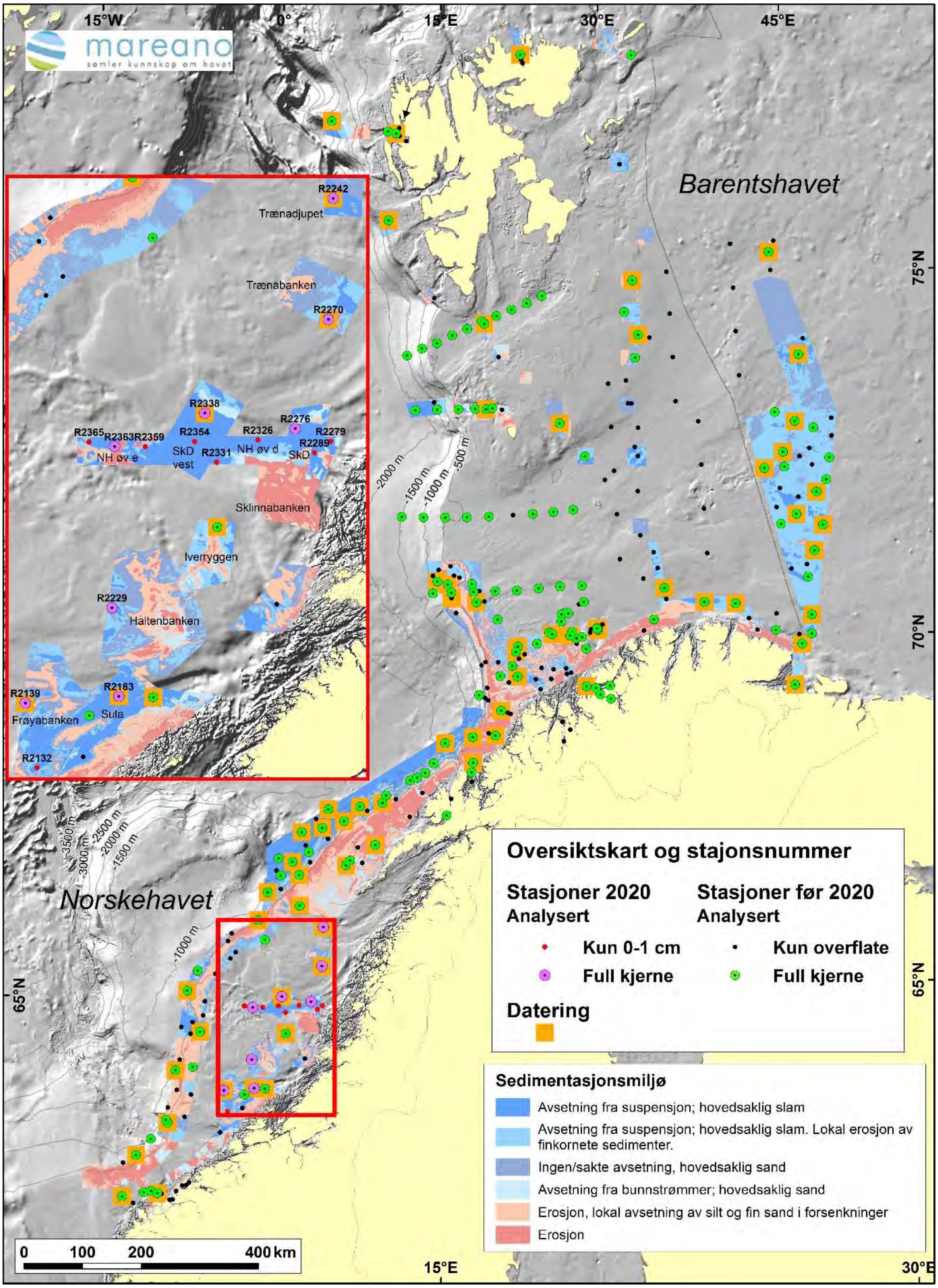
På toktene 2020104 og 2020110 ble det tatt prøver på totalt 16 stasjoner i Norskehavet; Frøyabanken, Sulatrekanten, Haltenbanken, Sklinnadjupet, Sklinnadjupet vest, Norskehavet øst-vest transekt d og e, Trænabanken og Trænadjupet (Figur 1). Tabell 1 gir en oversikt over havdyp, geografiske posisjoner og lengde på sedimentkjernene samt antall prøver tatt ut til analyse fra hver stasjon. Prøvetakingsutstyret består av en multicorer som har 4 PVC-rør og 2 stålrør for mikroplastprøver med 110 millimeter indre diameter og 60 cm lengde (Figur 2 og 3). Av de 16 stasjoner er 11 stasjoner tatt med multicorer, 1 stasjon med bokscorer og 4 stasjoner med van Veen grabb (Figur 4). For sistnevnte er det tatt overflateprøver direkte fra van Veen grabben (0.1 m^2).

Tabell 1a. Prøvetakingsstasjoner.

Stasjon	Område	Geografiske koordinater (WGS 84)		Havdyp [m]	Prøvetakings-utstyr
		Nord	Øst		
Tokt 2020104					
R2132MC006A	Frøyabanken	63.88470	7.57127	-235.6	Multicorer
R2139MC008A	Frøyabanken	64.19527	7.35512	-332.4	Multicorer
R2183MC009A	Sula trekant	64.28006	8.40502	-356.7	Multicorer
R2229MC010A	Haltenbanken	64.71354	8.22013	-238.0	Multicorer
Tokt 2020110					
R2242MC012A	Trænadjupet	66.83023	10.43077	-400.1	Multicorer
R2270MC013A	Trænabanken	66.23164	10.47961	-293.5	Multicorer
R2276MC014A	Sklinnadjupet	65.67928	10.17709	-395.8	Multicorer
R2279BC061	Sklinnadjupet	65.62976	10.61106	-377.8	Boxcorer
R2289MC015A	Sklinnadjupet	65.56744	10.42937	-410.8	Multicorer
R2326GR104	Norskehavet øst-vest tr. d	65.60868	9.74349	-424.53	Grabb
R2331MC016A	Norskehavet øst-vest tr. d	65.48132	9.27189	-368.3	Multicorer
R2338MC017A	Sklinnadjupet vest	65.71696	9.07689	-449.0	Multicorer
R2354GR125	Sklinnadjupet vest	65.57232	8.98882	-407.5	Grabb
R2359GR129	Norskehavet øst-vest tr. e	65.52309	8.40973	-341.4	Grabb
R2363MC019A	Norskehavet øst-vest tr. e	65.50794	8.04405	-372.9	Multicorer
R2365GR141	Norskehavet øst-vest tr. e	65.51556	7.73379	380.7	Grabb

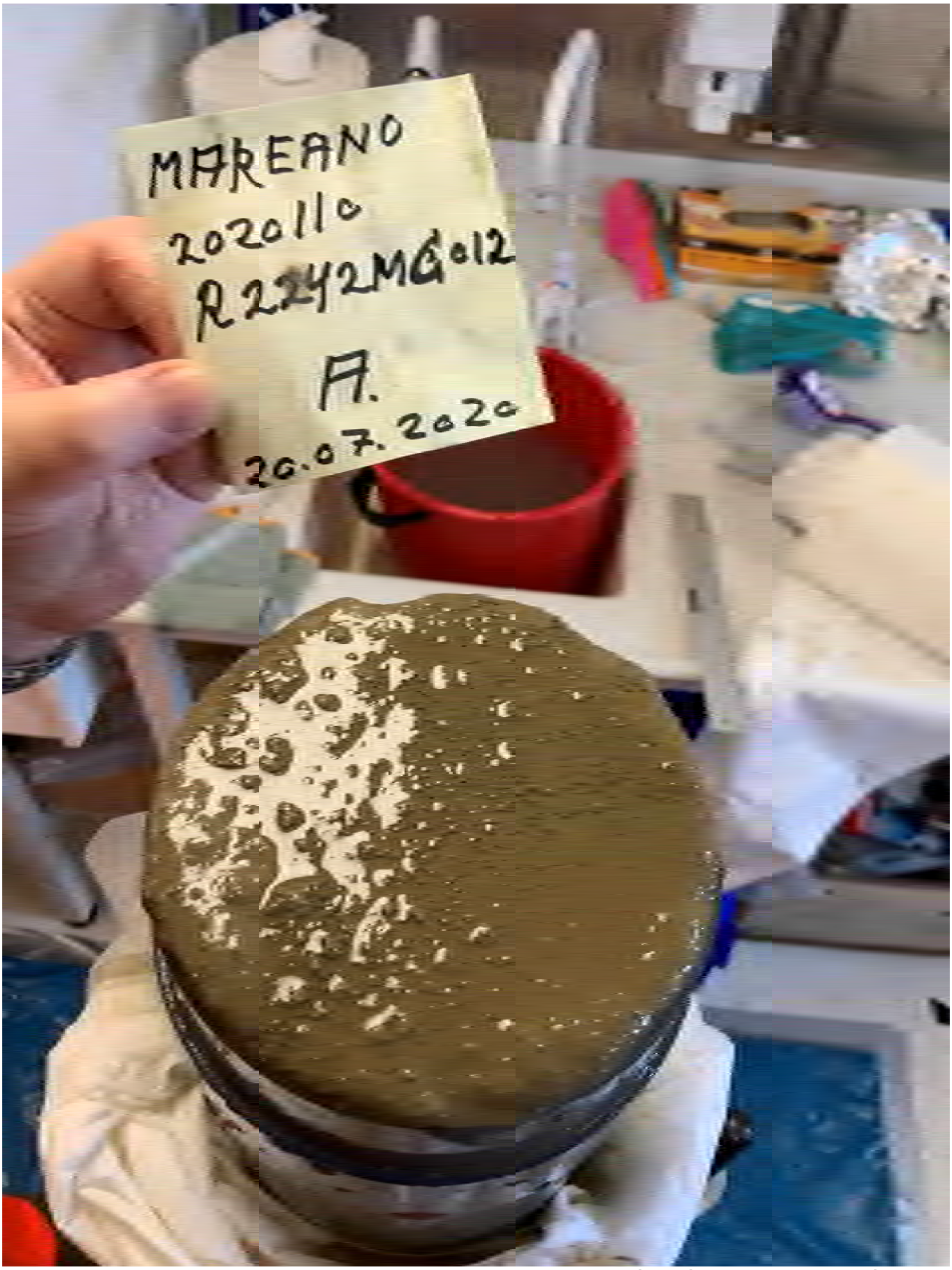
Tabell 1b. Prøvetakingsstasjoner med analyserte sedimentprøver.

Stasjon	Prøvetakings-utstyr	Kjernelengde Slicet [cm]	Antall prøver til kjemisk analyse
Tokt 2020104			
R2132MC006A	Multicorer	37	1
R2139MC008A	Multicorer	30	7
R2183MC009A	Multicorer	36	7
R2229MC010A	Multicorer	32	7
Tokt 2020110			
R2242MC012A	Multicorer	40	7
R2270MC013A	Multicorer	34	7
R2276MC014A	Multicorer	44	7
R2279BC060	Boxcorer	1	1
R2289MC015A	Multicorer	40	1
R2326GR104	Grabb	1	1
R2331MC016A	Multicorer	38	1
R2338MC017A	Multicorer	49	7
R2354GR125	Grabb	1	1
R2359GR129	Grabb	1	1
R2363MC019A	Multicorer	39	7
R2365GR141	Grabb	1	1



Figur 1. Kart over alle MAREANOs prøvetakingsstasjoner i perioden 2006-2020, samt stasjoner prøvetatt av HI i 2003 og 2004. De 16 stasjonene prøvetatt på toktene i 2020 er markert med stasjonsnummer i kartutsnittet vist oppe i venstre hjørne.

Figur 2. Sedimentkjerne fra Stasjon R2242 for kjemianalyse (Trænadjupet) stående i multicoreren. Røret er 60 cm langt og sedimentkjernen har vannsøyle på toppen og er dermed godkjent.



Figur 3. Toppen av sedimentkjerne A med med vannmettet overflate fra stasjon R2242 fra Trænadjupet, før sedimentkjernen deles opp i 1 cm tykke skiver til uorganiske kjemiske analyser. De øverste centimeterne i sedimentkjernen har høyt vanninnhold.

3. DATA OG METODIKK

Det ble gjennomført skiving av kjerner ombord for hver centimeter. Prøvetakingsrøret har en indre diameter på 110 mm. Sedimentkjernen ble presset ut av røret v.h.a. et stempel. Figur 3 viser toppen av en sedimentkjerne som blir presset ut, klar for å ta en sedimentprøve (0-1 cm). Prøvene ble pakket i polyetylenposer med ziplås før innfrysing til ÷18 ºC.

Ved NGU Lab ble frysetørking og uttak til følgende analyser gjennomført:

- Bestemmelse av TS, TC og TOC ved hjelp av Leco.
- Innvekt 1,1 g til 7M HNO_3-ekstraksjon etter NS 4770 for påfølgende analyse med ICP-OES (As, Ba, Cd, Cr, Cu, Ni, Pb og Zn) og CV-AAS (Hg).

Resultatene er rapportert som mg/kg tørrvekt sediment.

Det er brukt varierende prøvemengde for våtsikting, med sikteåpning 16, 8, 4, 2 og 1 mm, samt 500, 250, 125 og 63 µm (avhengig av antatt kornstørrelsesfordeling). Fraksjonen mindre enn 2 mm er så analysert for kornstørrelse med Coulter laserdiffraksjon, slik at kornfordelingskurve kan beregnes for kornstørrelse ned til 0,4 µm. Vedlegg 1 gjengir analyserapporten fra NGU Lab. Prøver til dateringsanalyse ble tatt ut fra samme sedimentkjerne som prøvene til uorganisk kjemiske analysene nevnt ovenfor. Prøver til mikroplast ble tatt ut fra et av de 2 stålrørene (2 cm skiver) med bruk av stålspatler. Nærmere beskrivelse av uttak samt analyse av sedimentprøver for innhold av mikroplast i sedimentprøver finnes i Vedlegg 5 (NGI mikroplast rapport).

4. KVALITETSKONTROLL

Kornstørrelse- og organisk kullstoff-analysene ved NGU-Lab er gjennomført i henhold til akkrediterte metoder. Syreekstraksjon og tungmetallanalysene samt Ba-analyse ble utført ved NGU-Lab, også etter akkrediterte metoder. Dateringsanalysene (^{210}Pb og ^{137}Cs) er ikke akkrediterte, men er etablerte metoder ved Gamma Dating Center presentert i vitenskapelige artikler (Andersen, 2017). Tabell 2 oppsummerer analytiske metoder, analyseusikkerhet og presisjon for parametrene vist i rapporten og som kart. De samme parametrene, i tillegg til flere elementer fra ICP-OES analysen som ikke rapporteres, kan ses i Vedlegg 1.

For kvalitetskontroll av de uorganiske kjemiske analysene er det i prøvesettet satt inn 3 naturlige prøver med stabil geokjemisk sammensetning; en sedimentprøve fra Trondheimsfjorden (Hynne), en standardprøve fra Nordkyn i Finnmark og en prøve fra Tana i Finnmark. Det er gjennomført i alt 2 parallelle analyser av hver av de tre innsatte sedimentprøvene. Analyseresultatene er presentert sammen med de øvrige resultatene i Vedlegg 1.

5. RESULTATER

Geokjemiske data fra samtlige analyser finnes i Vedlegg 1 og 2. I de fleste sammenhenger benyttes konsentrasjonsenheten mg/kg bortsett fra TOC, TC, TS (vektprosent), ^{210}Pb og ^{137}Cs. For å kunne operere med statistikk og kart for alle observasjoner er alle analyseresultater rapportert "< deteksjonsgrense" satt til verdien 0,5 × deteksjonsgrensen for det gjeldende stoff.

5.1 Sedimentklassifikasjon og beregning av vektprosent karbonat

NGU har etablert en sedimentklassifikasjon (Bøe m. fl., 2010), som revideres ved behov. Deler av sedimentklassifikasjonen relevant i MAREANO-sammenheng for kjemiske analyser er presentert i Tabell 3.

Tabell 2. Oversikt over analytiske metoder, kvalitetssikring og akkreditering.

Parameter	Instrument	Akkreditering	Analytisk usikkerhet	Nedre detekt.
Opparbeiding av prøver til analyser: Frysetørker FreeZone 6L med FreeZone Bulk Tray Dryer (BTD) fra Labconco (- 55 grd), med Vacuubrand RC-6 pumpe. Er akkreditert.				
Sedimentkarakteristikk – analysemetoder				
Total karbon (TC)	Leco SC-632	Ja	±15 %	0,06
Total organisk karbon (TOC)	"	Ja	±25 %	0,1
Total svovel (TS)	"	Ja	±30 %	0,02
Kornstørrelsesanalyse	Coulter LS 13320	Ja	±10 %	Ikke angitt
Opparbeiding av prøver til kjemiske elementanalyser: Syreekstraksjon av 1,1 gr tørket sediment 30 minutt i autoklav med 20 ml 7M HNO_3,				
As	ICP-OES: Perkin Elmer Optima 4300 Dual View	Ja	±20 %	0,5 mg/kg
Ba	"	ja	±25 %	0,5 mg/kg
Cd	"	ja	±25 %	0,01 mg/kg
Cr	"	ja	±25 %	0,5 mg/kg
Cu	"	ja	±25 %	0,5 mg/kg
Ni	"	ja	±25 %	0,5 mg/kg
Pb	"	ja	±25 %	0,5 mg/kg
Zn	"	ja	±25 %	2,0 mg/kg
Hg	FIMS 100 Flow Injection Mercury System fra Perkin Elmer	ja	±20 %	0,002 mg/kg
^{210}Pb	Canberra ultralow-background Ge-detector	Nei	Ikke relevant	Ikke relevant
^{137}Cs	"	Nei	Ikke relevant	Ikke relevant
Mikroplast	Bauta Microplastic Sediment Separator	Nei	Felt-, metodeblank og gjenvinning	Ikke relevant

Tabell 3. Sedimentklassifikasjon og kornstørrelser. Klassifikasjonen er i henhold til NGUs sedimentklassifikasjon (Geonorge.no, 2021).

Kornstørrelse	**Definisjon/beskrivelse**
Leir	Leir:silt > 2:1 og leir+silt > 90 %, sand < 10 %, grus < 2%
Organisk slam	Leir:silt fra 1:2 til 2:1 og leir+silt > 90 %, sand < 10 %, grus < 2 %. Høyt innhold av organisk material
Slam	Leir:silt fra 1:2 til 2:1 og leir +silt > 90 %, sand < 10%, grus < 2%.
Sandholdig leir	Leir+silt > 2:1 og leir+silt > 50 %, sand < 50 %, grus < 2 %.
Sandholdig slam	Leir:silt = fra 1:2 til 2:1 og leir+silt > 50%, sand < 50%, grus < 2%.
Silt	Leir:silt < 1:2 og leir+silt > 90 %, sand < 10%, grus < 2 %.
Sandholdig silt	Silt:leir >2:1 og leir+silt > 50 %, sand < 50 %, grus < 2 %.
Leirholdig sand	Sand > 50 %, leir:silt > 2:1 og leir+silt < 50 %, grus < 2 %.
Slamholdig sand	Sand > 50 %, leir:silt = fra 1:2 til 2:1og leir+silt < 50 %, grus < 2 %.
Siltholdig sand	Sand > 50 %, silt:leir > 2:1 og leir+silt < 50 %, grus < 2 %.
Fin sand	Sand > 90 %, inkluderer fin og veldig fin sand (Wentworth, 1922).
Sand	Sand > 90 %, leir+silt < 10 %, grus < 2 %.
Grov sand	Sand > 90 %, inkluderer medium, grov og veldig grov sand (Wentworth, 1922).
Grusholdig slam	Sand:silt+leir < 1:9, grus 2 – 30 %.
Grusholdig sandholdig slam	Sand:silt+leir fra 1:9 til 1:1, grus 2 – 30 %.
Grusholdig slamholdig sand	Sand:silt+leir fra 1:1 til 9:1, grus 2 – 30 %.
Grusholdig sand	Sand:silt+leir > 9:1, grus 2 – 30 %.
Slamholdig grus	Grus 30 – 80 %, sand:silt+leir < 1:1.
Slamholdig sandholdig grus	Grus 30 – 80 %, sand:silt+leir fra 1:1 til 9:1.
Sandholdig grus	Grus 30 – 80 %, sand:silt+leir>9:1.
Grus	Grus > 80 %.
Grus, stein og blokk	Dominans av grus, stein og blokk.
Stein og blokk	Dominans av stein og blokk.
Sand og blokk	Dominans av sand og blokk.
Diamikton	Sediment med blandede kornstørrelser og dårlig sortering.

Innholdet av karbonat i sedimentene beregnes fra analyser med LECO, og gjøres ut fra antakelsen om at karbon (C) som ikke er av organisk opprinnelse er bundet i karbonat ($CaCO_3$). Karbonatverdiene i vektprosent beregnes fra følgende formel:

$$(TC - TOC) \times (CaCO_3/C) = (TC - TOC) \times 8{,}33$$

TC er innholdet av totalt karbon, mens TOC er innhold av total organisk karbon.

Karbonat i sedimentene antas hovedsaklig å ha opprinnelse i biologisk materiale – mest fra skjell, mikroorganismer og større bunnlevende dyr, for eksempel foraminiferer, kråkeboller, brakiopoder og koraller. I tillegg kan karbonat stamme fra eroderte bergarter/mineraler med innhold av karbonat.

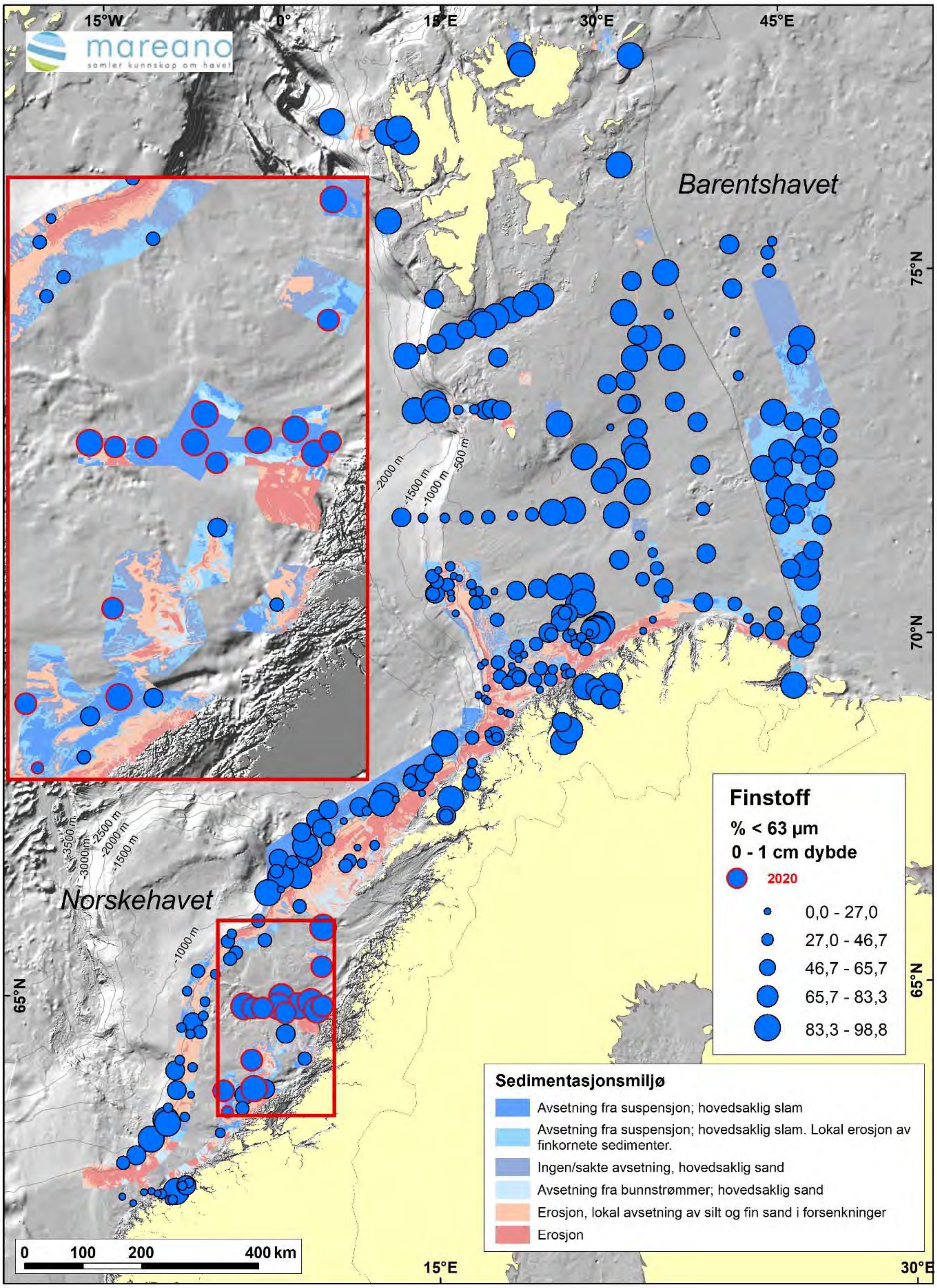
5.2 Overflateprøver (0-1 cm)

De geokjemiske resultatene for overflateprøvene (0-1 cm) rapporteres for å gi oversikt over dagens miljøtilstand. Parametrene som presenteres her er sedimentenes finstoffandel (<63 µm), innhold av TOC, innhold av karbonat og innholdet av tungmetallene kadmium (Cd), kobber (Cu), krom (Cr), kvikksølv (Hg), nikkel (Ni), bly (Pb), sink (Zn), halvmetallet arsen (As) samt barium (Ba). Kart for de nevnte parametrene finnes i Vedlegg 2. Videre rapporteres radioaktiv ^{137}Cs, som blir analysert i forbindelse med dateringsanalysene utført på sedimentkjerner fra fem utvalgte stasjoner. Mikroplast rapporteres fra overflateprøver (0-2 cm) tatt ut fra egne kjerner i stålrør.

5.2.1 Kornstørrelsesfordeling, organisk karbon, karbonat og svovel

I utgangspunktet er prøvetaking for miljøanalyser gjennomført i områder med finkornige sedimenter. De fleste prøvetakingsstasjonene er valgt ut før tokt på bakgrunn av blant annet multistråledata (dybde og bunnreflektivitet). Metodikken for geologisk havbunnskartlegging er gitt i Bøe m. fl. (2010) og Bellec m. fl. (2017). Prøvetaking planlegges der en forventer at det avsettes slamholdige sedimenter, typisk i dype områder eller områder med svake havstrømmer. Andel finstoff (<63µm) i overflateprøvene er vist i Figur 4. Tabell 3 viser sedimentklassifikasjonen som er brukt for beskrivelse av overflateprøvene.

Tabell 4 viser kornstørrelsesfordelingen i leir-, silt-, sand- og grusfraksjoner for overflateprøvene for de 16 stasjonene. Tre av de 16 prøvene består av silt (R2276, R2326 og R2338). Langt de fleste prøvene (12) består av sandholdig silt mens en prøve, R2131 fra Frøyabanken, består av siltholdig sand som den mest grovkornete prøven av alle analyserte prøver. Siltfraksjonen utgjør 60 – 87 %, mens sandfraksjonen varierer fra 6,6 til 63,4 %. Andelen leir utgjør 2,8 til 9,7 %. Finstoff, bestående av leir + silt, utgjør 36,6 til 93,4 % av prøvene. Andel finstoff er vist i Figur 4. Det er viktig å merke seg at kornfordelingsanalyse med Coulter gir lavere leirinnhold og høyere siltinnhold enn andre tradisjonelle metoder for kornfordelingsanalyse (Rise og Brendryen, 2013). Andelen leir kan i enkelte tilfeller ganges med fire og siltandelen deles med fire, slik at for eksempel sandholdig silt kan klassifiseres som sandholdig slam (Tabell 4).



Figur 4. Andel finstoff (<63µm) i overflateprøvene. Prøvene fra toktene 2020104 og 2020110 er markert med rød ring og vist i detalj i kartutsnittet.

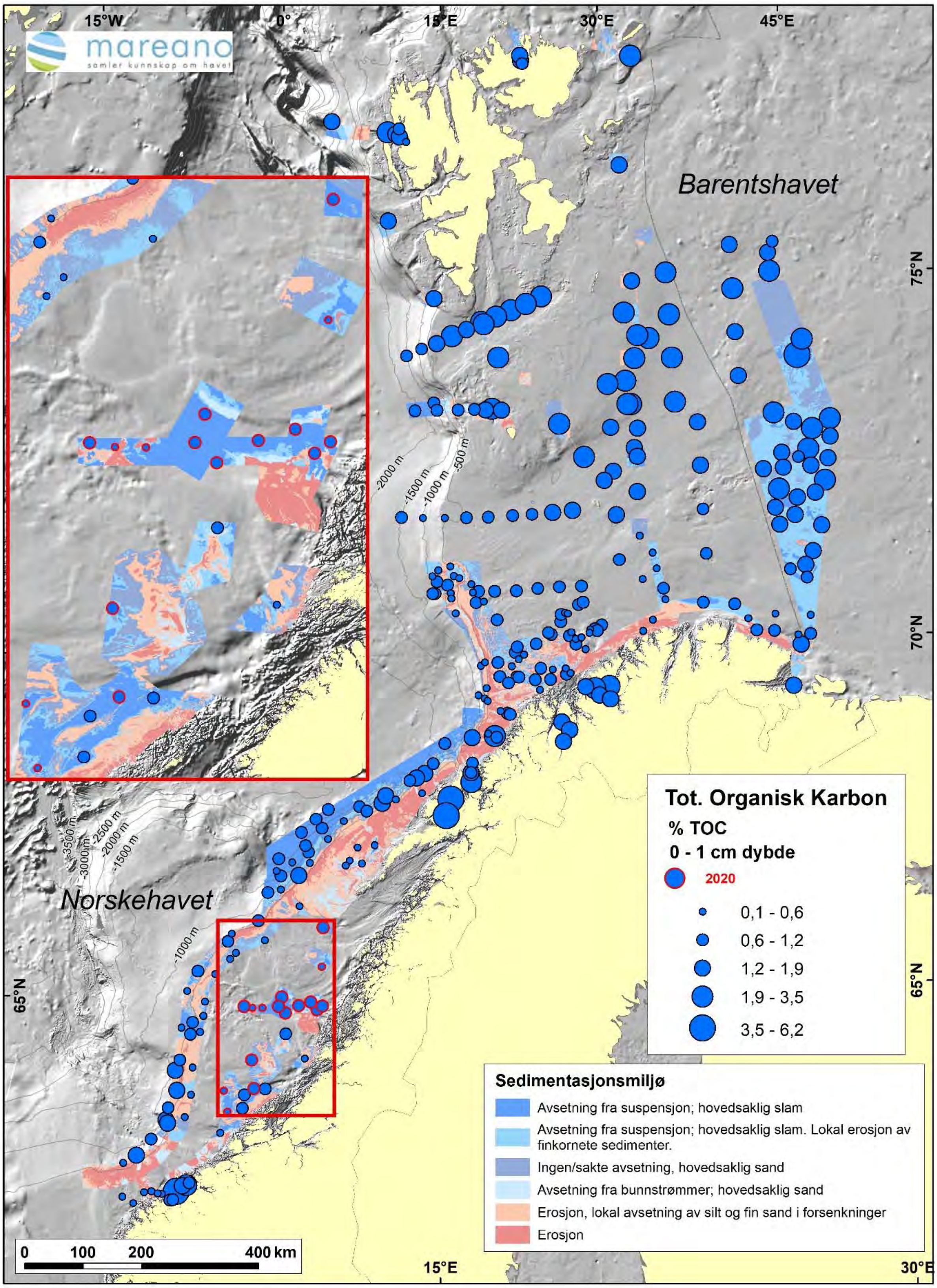
Tabell 4. Kornstørrelsesfordeling og sedimentklassifikasjon for overflateprøvene (0-1 cm dybde) basert på Coulter-data.

Stasjon	Område	Leir < 2 µm [%]	Silt 2- 63 µm [%]	Finstoff <63µm [%]	Sand 63-2000 µm [%]	Grus >2000 µm [%]	NGU sediment Klassifikasjon
R2132MC006A	Frøyabanken	2,8	33,8	36,6	63,4	0,0	Siltholdig sand
R2139MC008A	Frøyabanken	5,6	72,3	77,9	22,1	0,0	Sandholdig silt
R2183MC009A	Sulatrekanten	8,.2	79,9	88,1	11,9	0,0	Sandholdig silt
R2229MC010A	Haltenbanken	6,1	75,9	82,0	18,0	0,0	Sandholdig silt
R2242MC012A	Trænadjupet	8,7	79,5	88,2	11,8	0,0	Sandholdig silt
R2270MC013A	Trænabanken	6,2	66,7	72,9	27,1	0,0	Sandholdig silt
R2276MC014A	Sklinnadjupet	9,1	81,0	90,1	9,9	0,0	Silt
R2279BC060	Sklinnadjupet	6,4	62,8	69,3	30,7	0,0	Sandholdig silt
R2289MC015A	Sklinnadjupet	8,4	76,0	84,4	15,6	0,0	Sandholdig silt
R2326GR104	Norskehavet	9,6	83,1	92,7	6,7	0,0	Silt
R2331MC016A	Norskehavet	7,7	67,4	75,1	24,9	0,0	Sandholdig silt
R2338MC017A	Sklinnad. Vest	9,7	83,7	93,4	6,6	0,0	Silt
R2354GR125	Sklinnad. Vest	9,0	76,8	85,8	14,2	0,0	Sandholdig silt
R2359GR129	Norskeh. ø-v.	8,1	74,4	82,5	17,5	0,0	Sandholdig silt
R2363MC019A	Norskeh. ø-v	7,7	75,6	83,3	16,7	0,0	Sandholdig silt
R2365GR141	Norskeh. ø-v.	8,4	78,2	82,6	13,4	0,0	Sandholdig silt

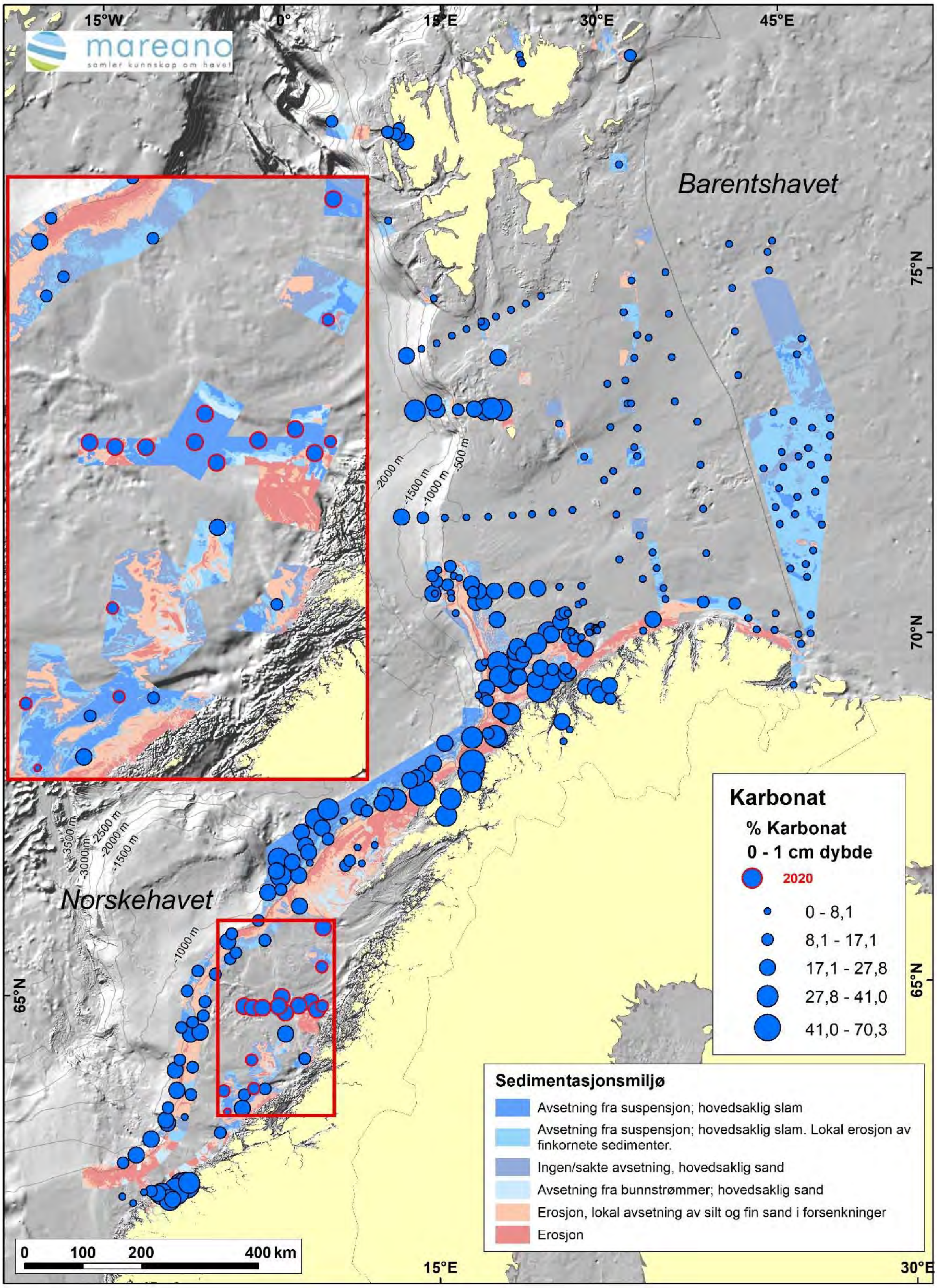
TOC i overflateprøvene er presentert i Figur 5. Prøvene har TOC variererende fra 0,32 (R2132, Frøyabanken) til 0,91 vektprosent (R2331, Norskehavet øst-vest transekt d) (Figur 5). Generelt er det relativt lave TOC-konsentrasjoner på samtlige 16 stasjoner i det kartlagte området, når de rapporterte prøvene sammenliknes med TOC-verdier fra nærliggende stasjoner på skråningen (Figur 5).

Innhold av kalsiumkarbonat varierer fra 7,2 til 22,5 vektprosent (Figur 6). Høyest karbonatinnhold er i R2365 i Norskehavet øst-vest transekt e, mens den laveste andel karbonat er i Sulatrekanten (R2132), som også er den mest grovkornete prøven, bestående av siltholdig sand (Figur 6).

Total svovel (TS) har generelt lave nivåer i samtlige 16 analyserte overflateprøver, varierende fra 0,05 vektprosent (R2132) til 0,19 vektprosent (R2331). De lave TS verdiene er sannsynligvis knyttet til de relativt lave TOC-nivåene i de samme prøvene.



Figur 5. TOC i overflateprøver. Prøvene fra toktene 2020104 og 2020110 er markert med rød ring og vist i detalj i kartutsnittet.



Figur 6. Karbonat i overflateprøver (vektprosent). Prøvene fra toktene 2020104 og 2020110 er markert med rød ring og vist i detalj i kartutsnittet.

5.2.2 Innhold av tungmetaller, arsen, barium, cesium-137 og mikroplast

Det er analysert for tungmetallene bly (Pb), kadmium (Cd), kobber (Cu), krom (Cr), kvikksølv (Hg), nikkel (Ni), sink (Zn) og halvmetallet arsen (As) i overflateprøvene fra de 16 prøvetakingsstasjonene. Tungmetall- og arsenkonsentrasjonene i sedimentprøvene er sammenlignet med Miljødirektoratets klassifikasjonssystem for forurensningsnivåer i sedimenter i kyst- og fjordområder (Molvær m. fl., 1997; SFT, 2007) og sist justert i 2016 (Miljødirektoratet Veileder M-608). Klassifikasjonssystemet er delt inn i følgende tilstandsklasser:

tilstandsklasse I: bakgrunn; tilstandsklasse II: god; tilstandsklasse III: moderat; tilstandsklasse IV: dårlig; tilstandsklasse V: svært dårlig

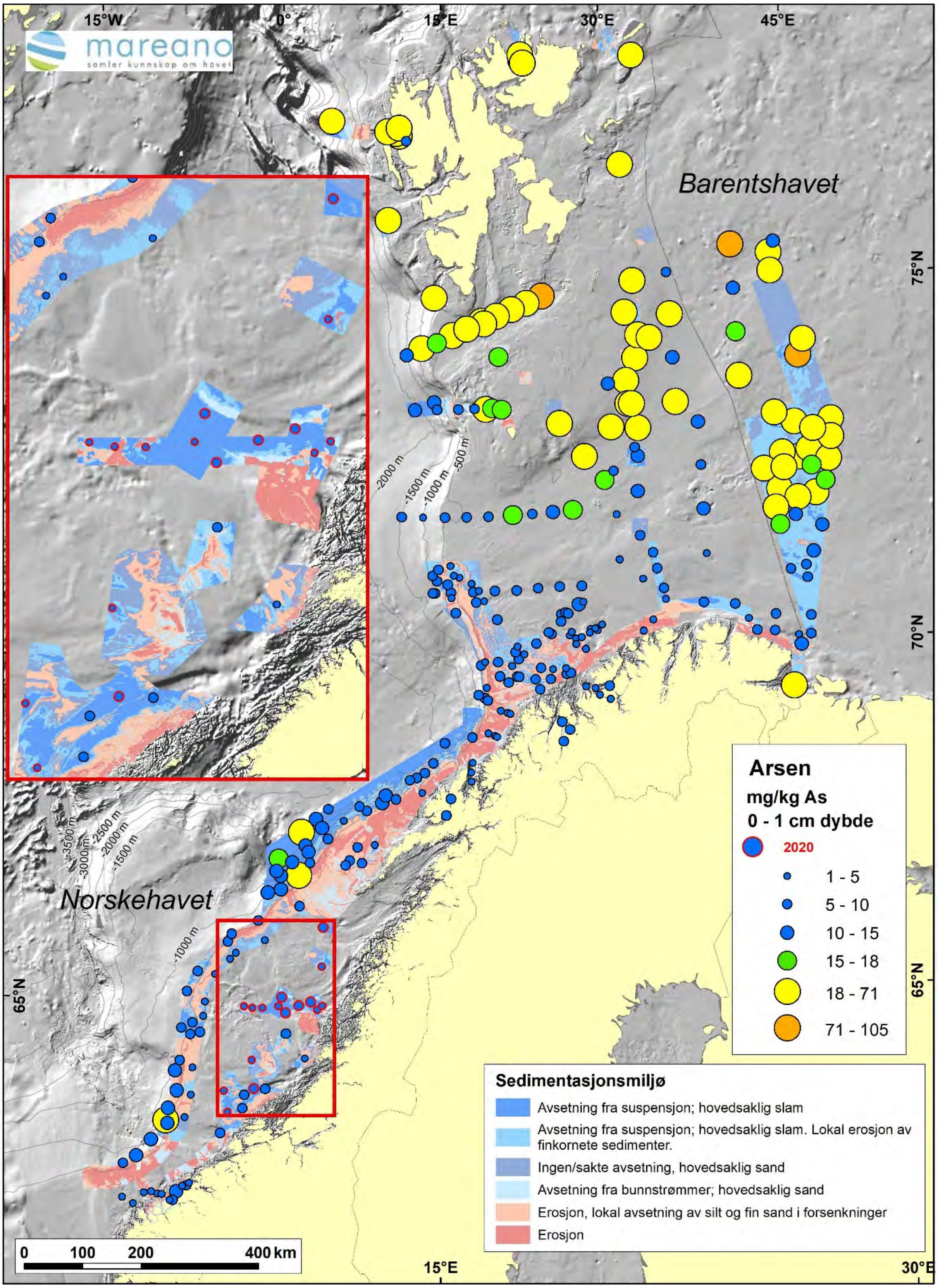
Barium (Ba) er også inkludert selv om Ba ikke er et toksisk element. Olsgård og Gray (1995) og Rye (1996) har rapportert om utslipp av barytt fra norsk offshorevirksomhet i Nordsjøen. Ba i sedimenter i Skagerrak er rapportert, og de forhøyede verdiene øverst i havbunnen er tolket som tilførsel av barium fra boreslam brukt i Nordsjøen og transportert med havstrømmer til Skagerrak (Sæther m. fl., 1996; Thorsnes og Klungsøyr, 1997; Lepland m. fl., 2000). Dehairs m. fl. (1980) og Nuernberg m. fl. (1997) beskriver andre prosesser for forekomst av Ba i sedimenter; det dannes små baryttkrystaller i mikronisjer i organisk materiale som brytes ned i vannsøylen, spesielt i områder med høy biologisk produktivitet. Kart som viser konsentrasjoner av tungmetallene, halvmetall arsen og barium i overflatesedimentene finnes også i Vedlegg 3. Radioaktivt ^{137}Cs er rapportert for overflatesedimentene. ^{137}Cs analyseres sammen med den radioaktive ^{210}Pb-isotopen, som brukes for datering av sedimentkjerner (avsnitt 5.3.4).

Arsen (As)

Prøvene varierer fra 2,7 til 6,4 mg/kg sediment, med lavest verdi i R2132 (Frøyabanken) og høyest i Sklinnadjupet (R2326). As-konsentrasjonen i de 16 prøvene er alle i klasse I, tilsvarende naturlig bakgrunn i Miljødirektoratets klassifisering. Figur 7 viser As-konsentrasjonen i toppsedimentene.

Bly (Pb)

Prøvene varierer fra 10,7 til 24,3 mg/kg, med høyeste konsentrasjon på stasjon R2183 (Sulatrekanten) og lavest konsentrasjon i R2132 (Frøyabanken) (Figur 8). Samtlige 16 stasjoner har Pb-konsentrasjoner i tilstandsklasse I, bakgrunn for kyst og fjordsedimenter (tilstandsklasse I: <25 mg/kg) som vist i Figur 8.



Figur 7. As-konsentrasjon i overflateprøver (0-1 cm). Blå punkt angir tilstandsklasse I (<15 mg/kg sediment). Grønne punkt angir tilstandsklasse II (15-18 mg/kg). Gule punkt angir tilstandsklasse III (18 – 71 mg/kg). Oransje punkt angir tilstandsklasse IV (71 – 580 mg/kg). Prøvene fra 2020 er markert med rød ring og vist i detalj i kartutsnittet.

Kadmium (Cd)

Prøvene har lave kadmiumkonsentrasjoner fra under deteksjonsgrensen på 0,10 mg/kg sediment (7 stasjoner) til 0,18 mg/kg sediment. Alle de 16 prøvene er i tilstandsklasse I - bakgrunn for kyst- og fjordsedimenter (<0,25 mg/kg). Kart med Cd er i Vedlegg 2.

Kobber (Cu)

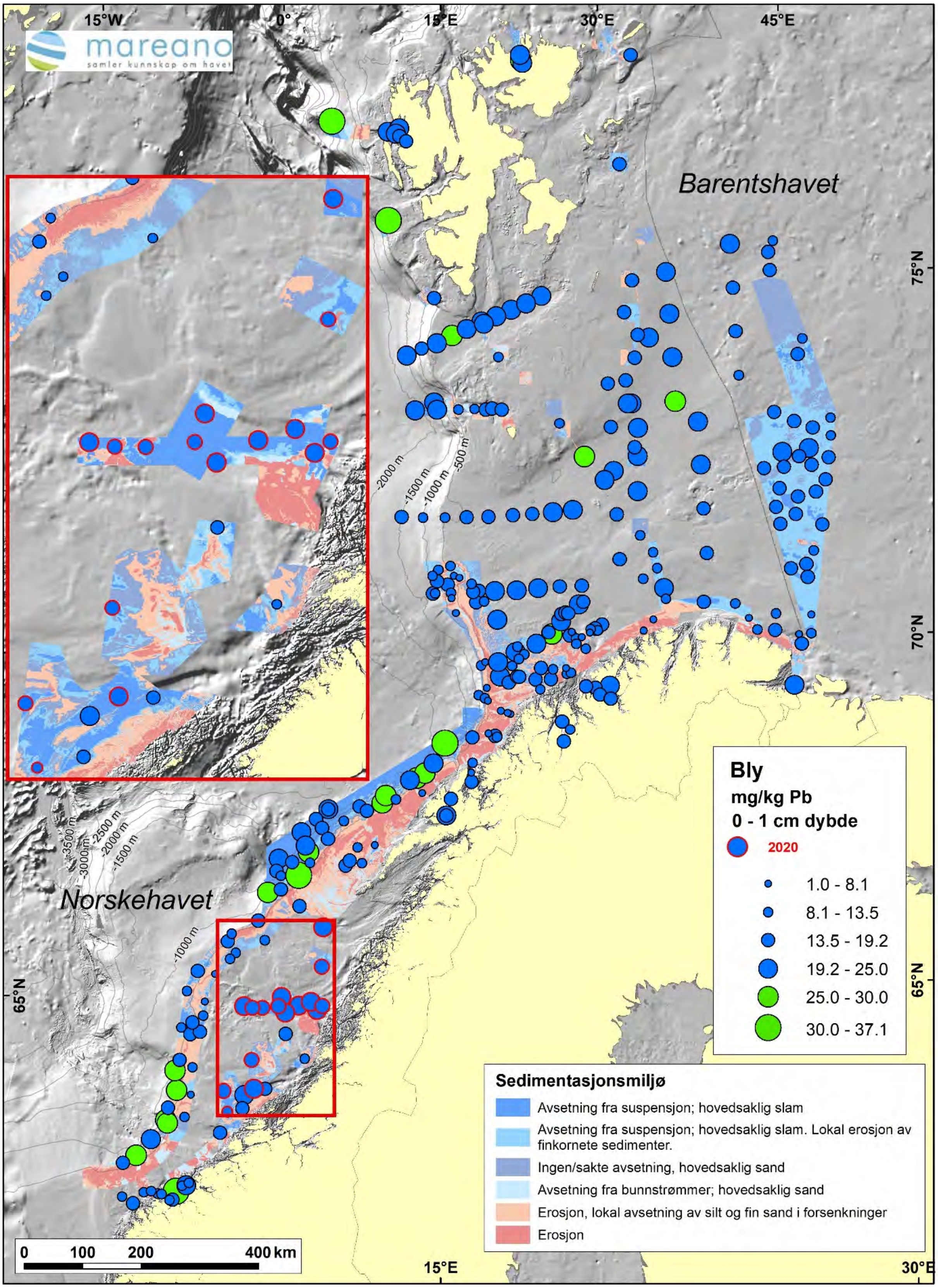
Prøvene har Cu-konsentrasjoner varierende fra 4,7 til 15,6 mg/kg med høyest konsentrasjon i R2326 og R2338 (Sklinnadjupet vest). Samtlige 16 prøver er i tilstandsklasse I - bakgrunn for kyst og fjordsedimenter (< 20 mg/kg sediment). Cu-kartet er i Vedlegg 2.

Krom (Cr)

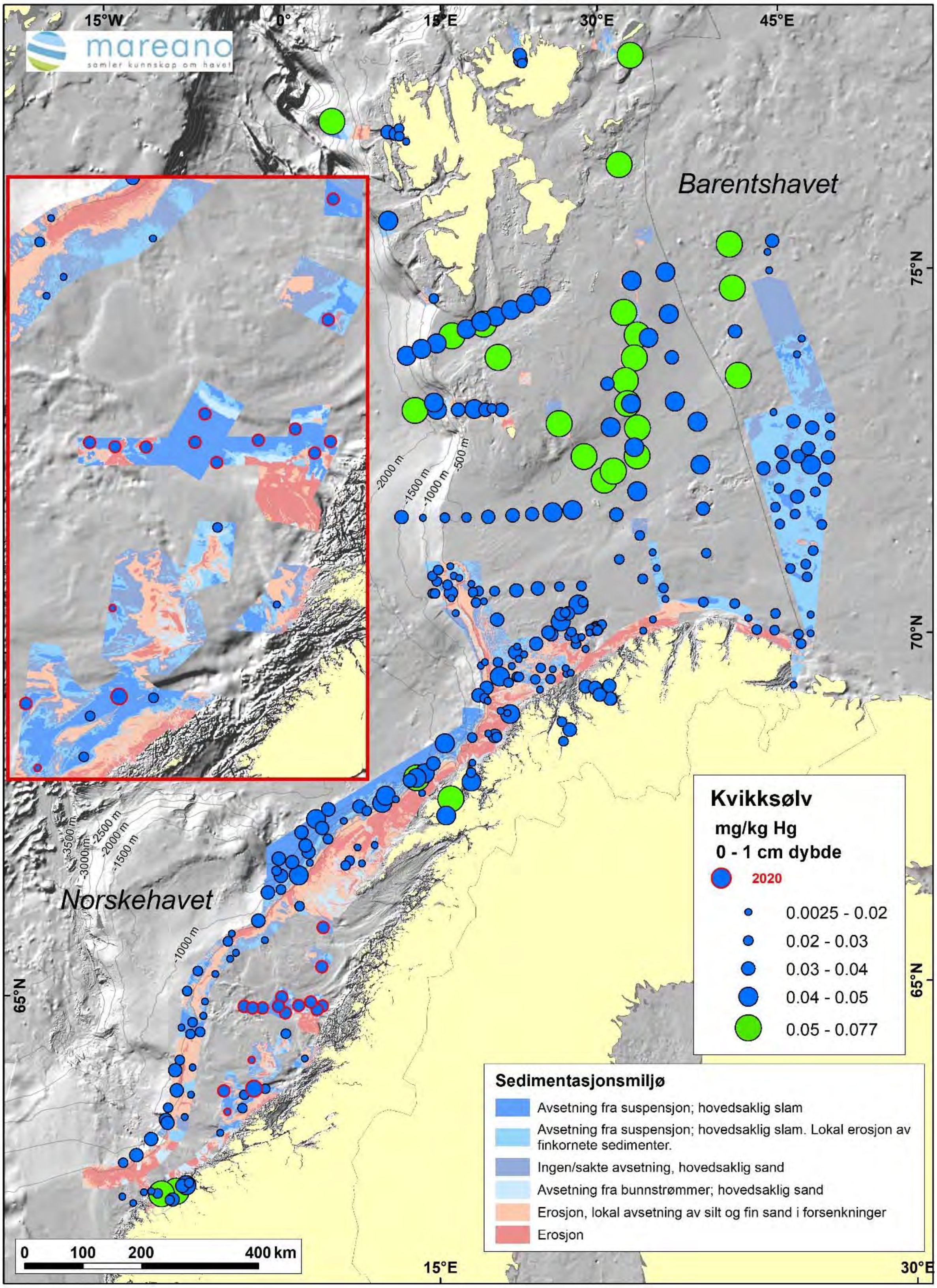
Prøvene har Cr-konsentrasjoner varierende fra 15,4 til 47,3 mg/kg med høyest konsentrasjon i R2338 (Sklinnadjupet vest). Samtlige 16 overflateprøver har konsentrasjoner i tilstandsklasse I (<60 mg/kg). Cr-konsentrasjon i overflateprøvene er i Vedlegg 2.

Kvikksølv (Hg)

Hg i overflateprøvene er vist i Figur 9. Prøvene har Hg-konsentrasjoner varierende fra 0,013 til 0,035 mg/kg. Samtlige 16 prøver er i tilstandsklasse I - bakgrunn (<0,050 mg/kg sediment) for fjord og kystsedimenter.



Figur 8. Pb-konsentrasjon i overflateprøver (0-1 cm). Blå punkt angir tilstandsklasse I for kyst- og fjordsedimenter (<25 mg/kg). Grønne punkt angir tilstandsklasse II (25-150 mg/kg). Prøvene fra toktene 2020104 og 2020110 er markert med rød ring og vist i detalj i kartutsnittet.



Figur 9. Hg i overflateprøvene. Blå punkt angir tilstandsklasse I for kyst- og fjordsedimenter (<0,05 mg/kg). Grønne punkt angir tilstandsklasse II (0,05- 0,52 mg/kg). Prøvene fra toktene 2020104 og 2020110 er markert med rød ring og vist i detalj i kartutsnittet.

Nikkel (Ni)

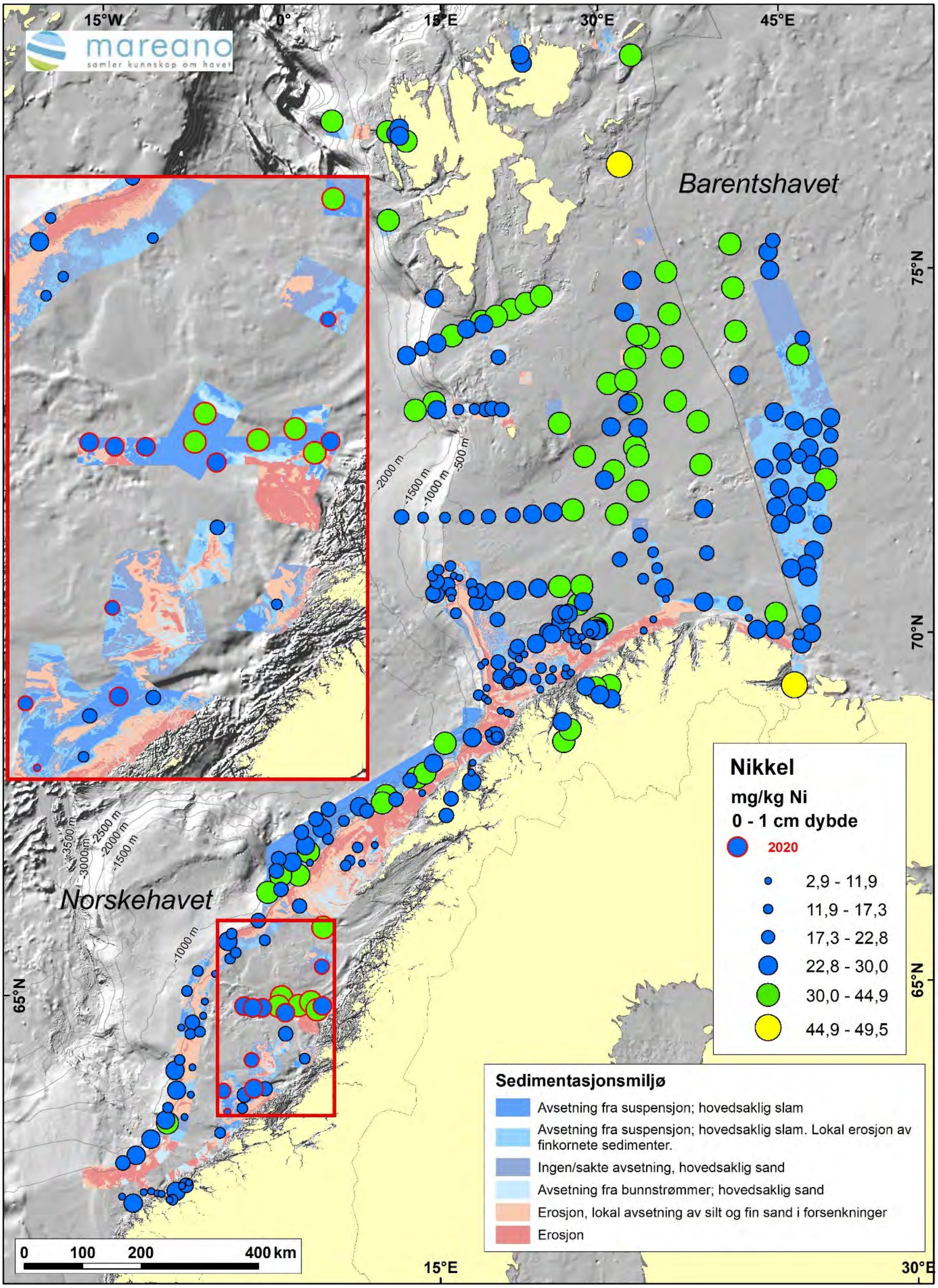
Figur 10 viser Ni-konsentrasjon i overflateprøvene. Prøvene har Ni-konsentrasjoner varierende fra 10,6 til 35,9 mg/kg med den høyeste konsentrasjonen i R2338 (Sklinnadjupet vest). Av de 16 prøvene er 10 i tilstandsklasse I - bakgrunn (< 30 mg/kg sediment), mens 6 prøver er i tilstandsklasse II – god (30 – 42 mg/kg sediment). De 6 prøvene i tilstandsklasse II er lokalisert i Sklinnadjupet, Norskehavet øst-vest transekt d, Sklinnadjupet vest og Trænadjupet og slik sett lokalisert sammen geografisk.

Sink (Zn)

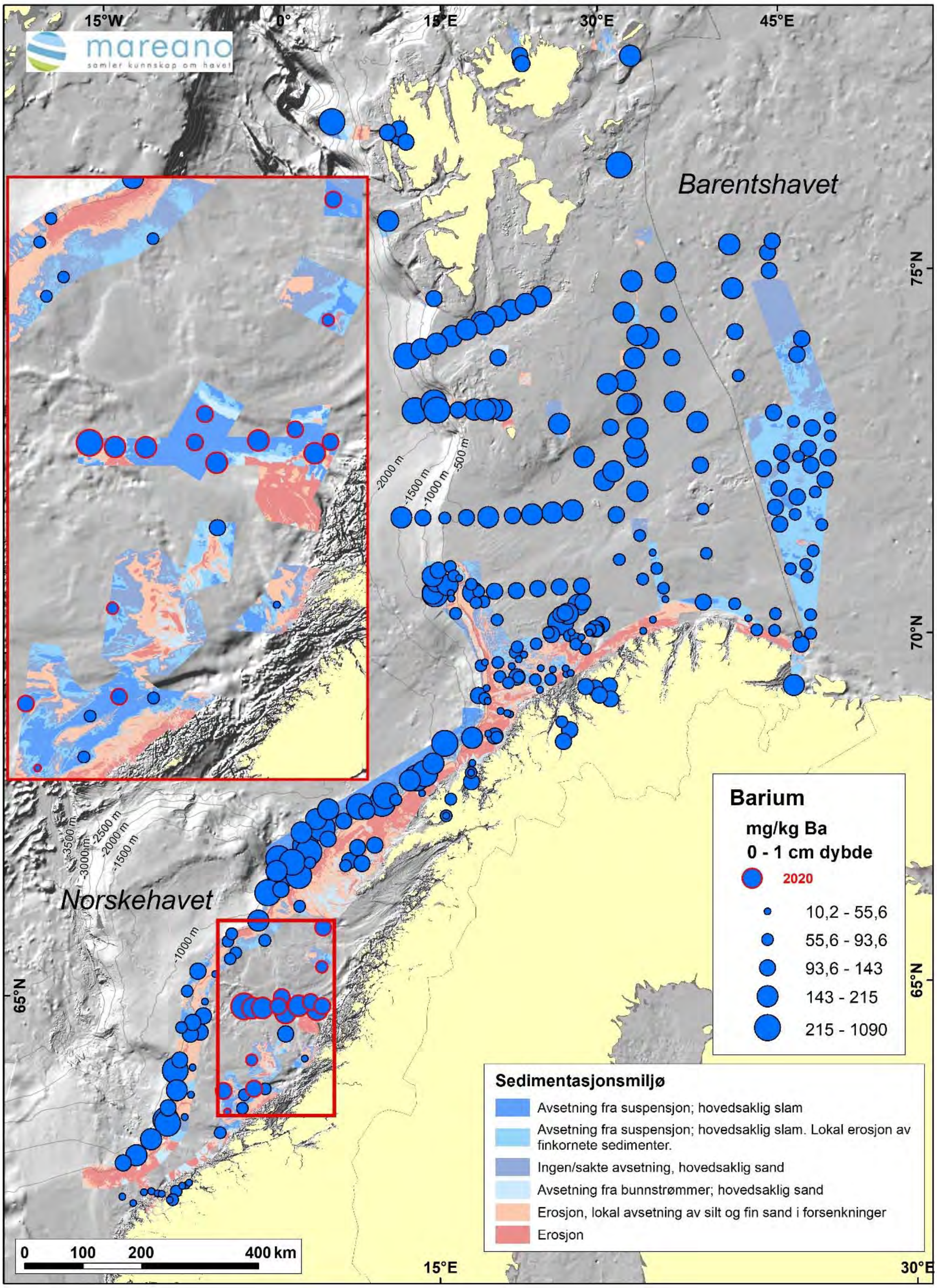
Sink varierer fra 21,9 til 71,7 mg/kg med den høyeste konsentrasjon i R2338 (Sklinnadjupet vest). Samtlige 16 prøver er i tilstandsklasse I (<90 mg/kg). Kart med Zn konsentrasjon i overflatesedimenter finnes i Vedlegg 2.

Barium (Ba)

Ba analyseres for å vurdere om eventuelle utslipp fra olje- og gassboringer kan spores i sedimentene, men det er viktig å være klar over at også naturlige kilder kan gi forhøyde verdier. Ba i overflatesedimentene er presentert i Figur 12. Prøvene har konsentrasjoner varierende fra 50 mg/kg sediment (R2132) til 293 mg/kg i R2365 (Norskehavet øst-vest transekt e).



Figur 10. Nikkel i overflateprøver. Blå punkt angir tilstandsklasse I for kyst- og fjordsedimenter. Grønne punkter angir tilstandsklasse II (30-42 mg/kg). Gule punkt angir tilstandsklasse III (42 – 271 mg/kg TS). Prøvene fra toktene 2020104 og 2020110 er markert med rød ring og vist i detalj i kartutsnittet.



Figur 11. Barium i overflatesedimenter. Prøvene fra toktene 2020104 og 2020110 er markert med rød ring og vist i detalj i kartutsnittet.

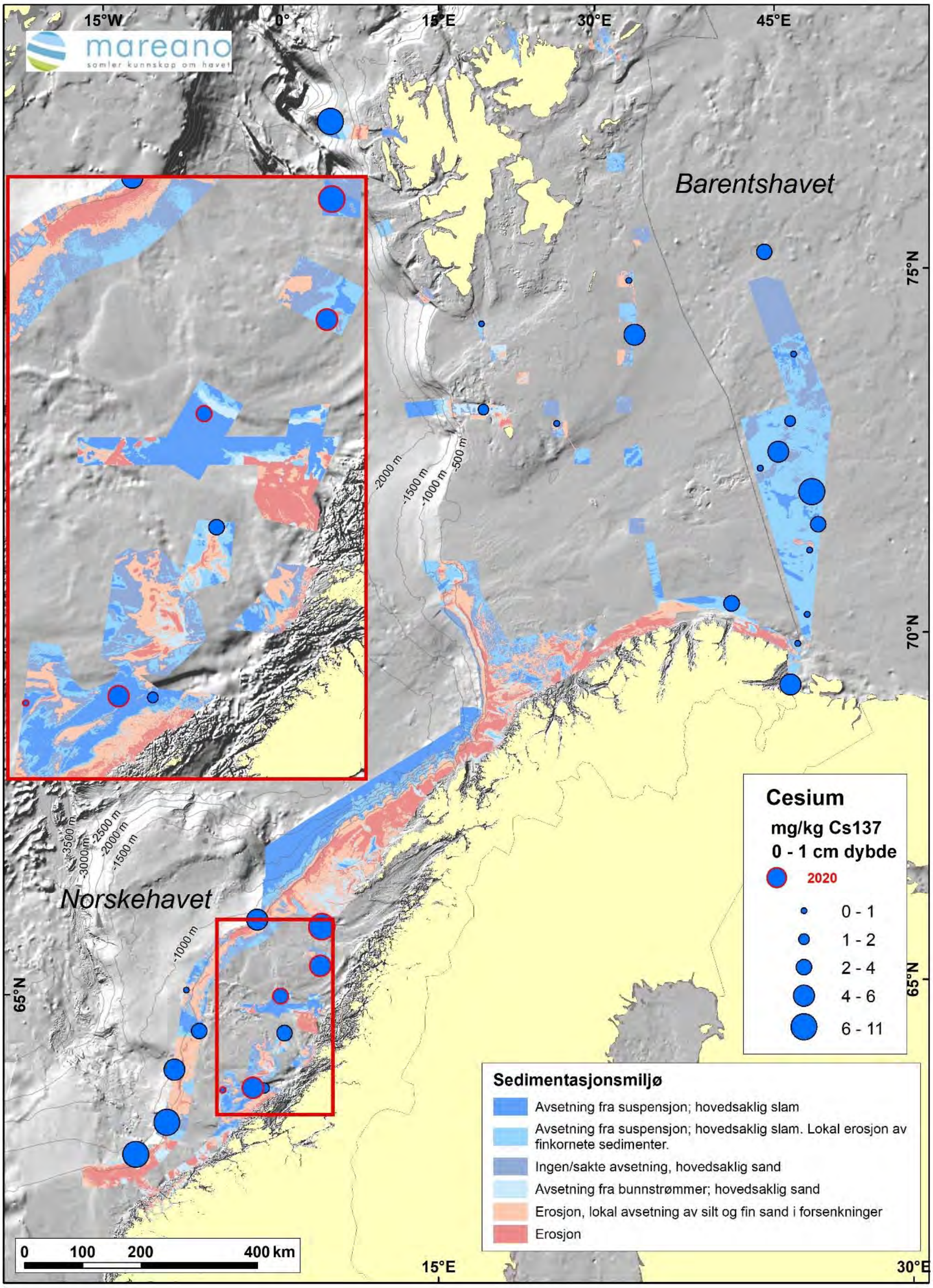
Cesium-137 (^{137}Cs)

^{137}Cs er et menneskeskapt radioaktivt element. De viktigste kildene er utslippet fra Tsjernobyl (1986) og de atmosfæriske atomprøvesprengningene på Novaja Zembla på 1950- og 1960-tallet. Resultatene fra ^{137}Cs er presentert på kart i Vedlegg 2. Det er analysert for ^{137}Cs på 5 stasjoner R2139, R2183, R2242, R2270 og R2338, de samme fem som er datert ved hjelp av ^{210}Pb. ^{137}Cs varerierer fra 0 til 9 bequerel/kg sediment tørrvekt. Overflateprøven fra R2242 (Trænadjupet) har høyst ^{137}Cs konsentrasjon med 9 Bq/kg sediment tørrvekt. Nest høyst konsentrasjon er i R2270 (Trænabanken) med 5 Bq/kg sediment tørrvekt. R2183 fra Sulatrekanten har 4 Bq/kg sediment tørrvekt. R2338 i Sklinnadjupet vest har 3 Bq/kg sediment tørrvekt. Lavest (0 Bq/kg sediment tørrevekt) er i R2139 på Frøyabanken (Figur 12). Sammenliknet med andre resultater så er nivåene i Trænadjupet og Trænabanken sammenlignbare (Heldal m. fl., 2020). Se kapittel 5.3.4 for mer detaljer vedr. ^{137}Cs resultatene i de 5 daterte sedimentkjernene.

Resultatene fra metallanalysene av overflatesedimentene er oppsummert i Tabell 5, hvor tilstandsklassene for metallene er vist, samt antall prøver innenfor hver av tilstandsklassene i henhold til Miljødirektoratets klassifikasjonssystem for sedimenter (Miljødirektoratet, M-608, 2016) (https://www.miljodirektoratet.no/globalassets/publikasjoner/M608/M608.pdf)

Tabell 5. Metaller og arsen (16 stasjoner fra tokt 2020104 og 2020110) i henhold til Miljødirektoratets tilstandsklasser for marine overflatesedimenter. Uthevet skrift viser antall prøver i overflateprøver i hver av klassene I-V.

Parametere	Forurensningsnivåer				
	I Bakgrunn	II God	III Moderat	IV Dårlig	V Svært dårlig
Arsen (mg/kg) As	<15 **16**	15-18 **0**	18-71 **0**	71 – 580 **0**	>580 **0**
Bly (mg/kg) Pb	<25 **16**	25 -150 **0**	150-1480 **0**	1480-2000 **0**	>2000 **0**
Kadmium (mg/kg) Cd	<0,25 **16**	0,25 – 2,5 **0**	2,5 –16 **0**	16 – 157 **0**	>157 **0**
Kobber (mg/kg) Cu	<20 **16**	20-84 **0**	84 **0**	84-114 **0**	>114 **0**
Krom (mg/kg) Cr	<60 **16**	60 – 660 **0**	660 – 6000 **0**	6000 – 15500 **0**	>15500 **0**
Kvikksølv (mg/kg) Hg	<0,050 **16**	0,05 – 0,52 **0**	0,52 – 0,75 **0**	0,75 – 1,45 **0**	>1,45 **0**
Nikkel (mg/kg) Ni	<30 **10**	30 – 42 **6**	42 – 271 0	271 – 533 0	>533 **0**
Sink (mg/kg) Zn	<90 **16**	90 – 139 **0**	139 – 750 **0**	750 – 6690 **0**	>6690 **0**



Figur 12. ^{137}Cs i overflatesedimenter (0-1 cm). Prøvene fra 2020 er markert med rød ring og vist i detalj i kartutsnittet.

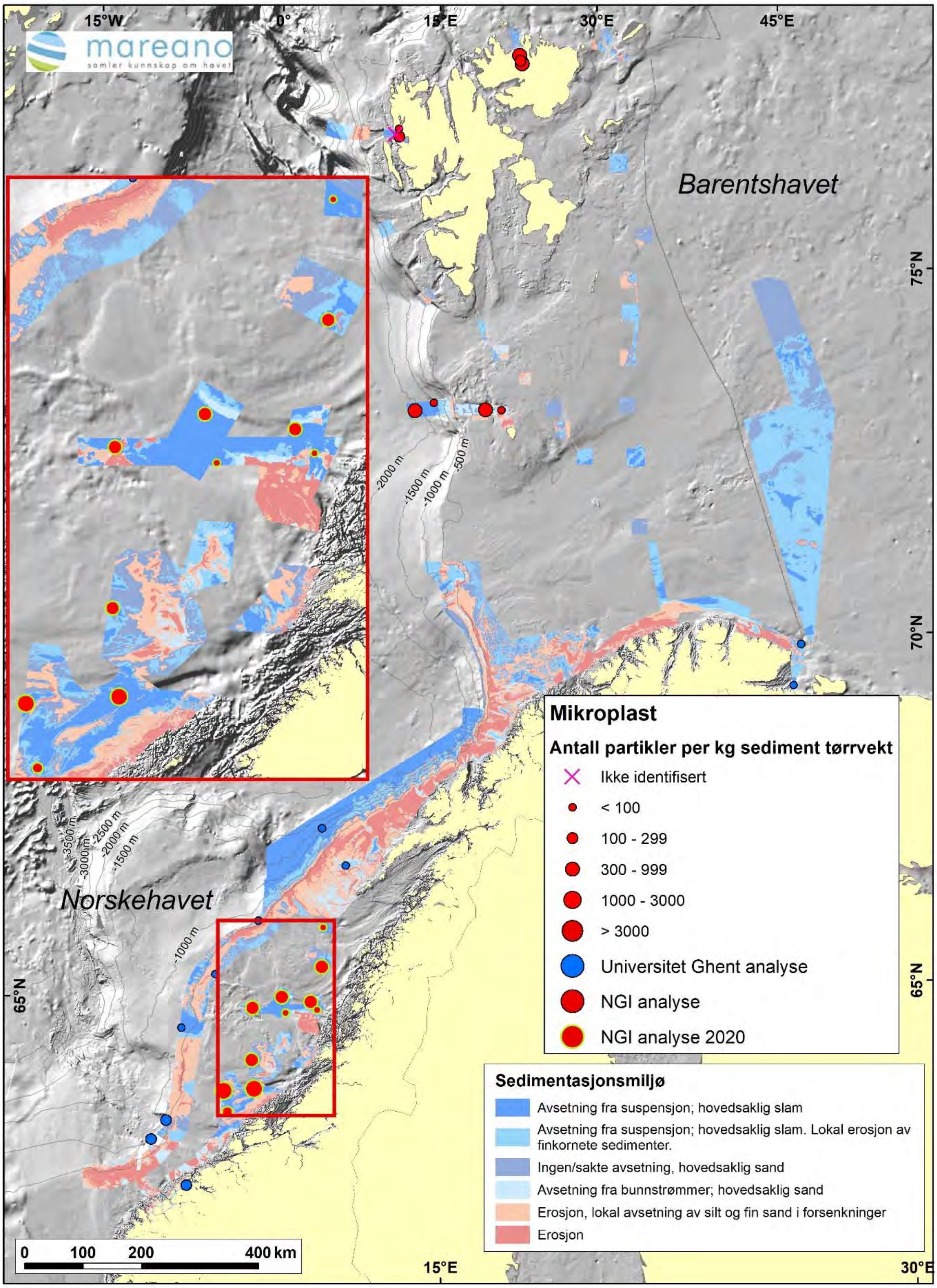
Mikroplast

Mikroplast i overflatesedimenter fra 11 stasjoner tatt med multicorer er analysert på 2 cm tykke prøveskiver for å ha nok materiale. Resultatene, rapportert som antall mikroplastpartikler pr. kg sediment viser stor variasjon, fra 51 partikler til 2187 partikler/kg sediment (Figur 14). Mer detajlerte beskrivelse av resultatene finnes i mikroplastrapporten fra NGI (Tjønneland 2021, Vedlegg 5). Tidligere analyser og rapportering av resultater finnes i Jensen og Cramer (2017) og Jensen og Bellec (2019).

Det er stor variasjon i antall MP-partikler pr. kg sediment i overflateprøvene, fra 51 partikler/kg sediment (R2242, Trænadjupet) til 2187 partikler pr. kg sediment i R2139 (Frøyabanken). R2139 er stasjonen med høyest antall MP-partikler pr. kg sediment av samtlige prøver analysert i regi av MAREANO så langt (totalt 31 overflateprøver). Tabell 6 viser antall partikler pr. kg sediment for de 11 stasjonene. MP-partikler pr. kg sediment er vist i Figur 13. Det er store forskjeller i antall mellom geografisk nærliggende stasjoner (R2276 med 666 partikler og R2289 med 52 partikler pr. kg sediment). Årsaken til dette er ikke kjent, men kan skyldes lokalt dannet MP fra plast i nærheten av enkelte stasjoner. Mer detaljert gjennomgang av metoder er gitt i mikroplastrapporten fra NGI i Vedlegg 5.

Tabell 6. Antall MP-partikler pr. kg sediment i overflateprøver (0-2 cm).

Stasjon	Område	Antall MP-partikler/kg sediment
R2131MC006	Frøyabanken	194
R2139MC008	Frøyabanken	2187
R2183MC009	Sulatrekanten	1369
R2229MC010	Haltenbanken	692
R2242MC012	Trænadjupet	51
R2270MC013	Trænabanken	867
R2276MC014	Sklinnadjupet	666
R2289MC015	Sklinnadjupet	52
R2331MC016	Norskehavet øst-vest transekt d	94
R2338MC017	Sklinnadjupet vest	301
R2363MC019	Norskehavet øst-vest transekt e	992



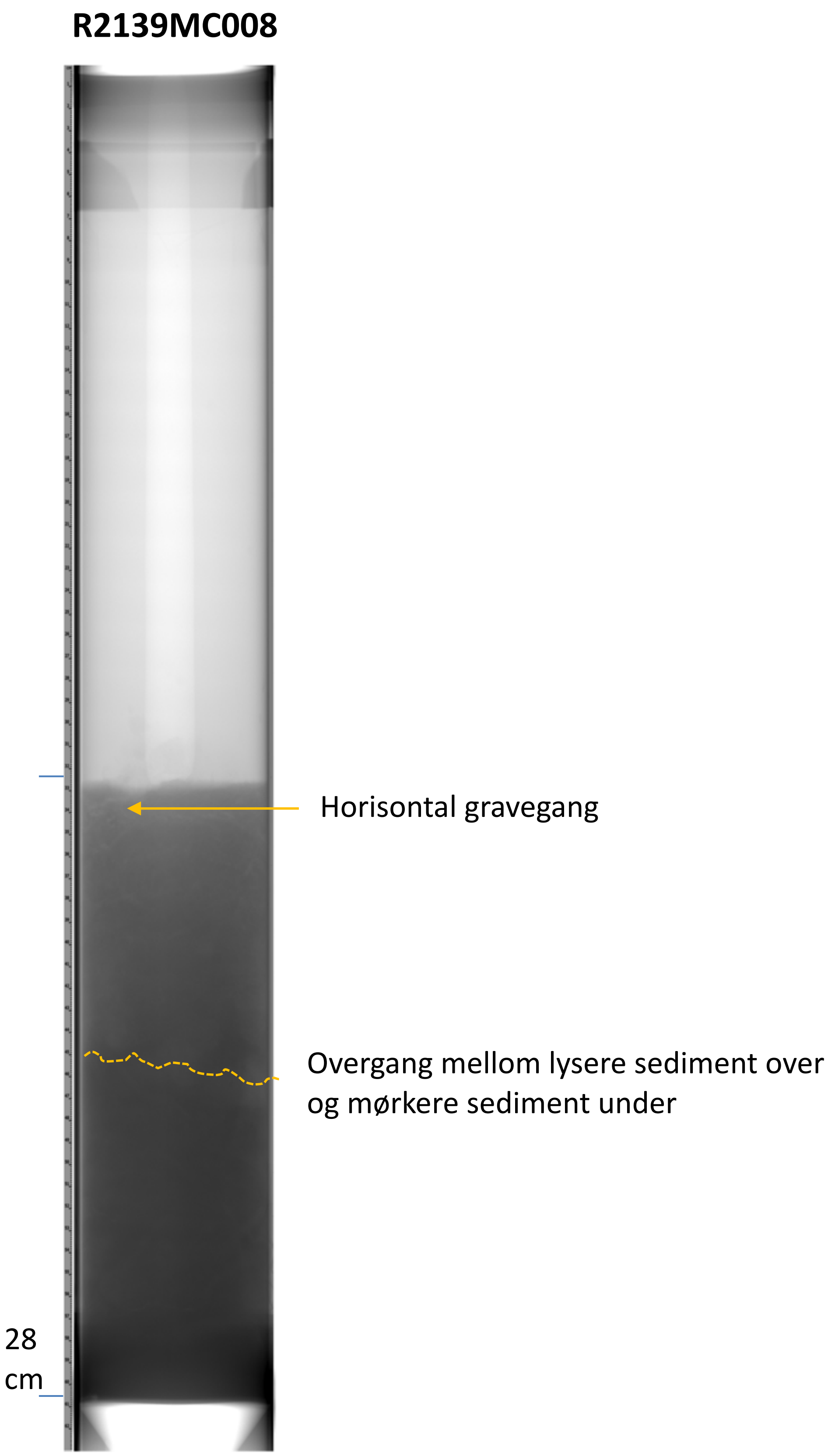
Figur 13. Mikroplast i overflateprøver (0-2 cm). Prøver fra toktene 2020104 og 2020110 er markert med gul ring og vist i detalj i kartutsnittet.

5.3 Analyser av sedimentkjerner

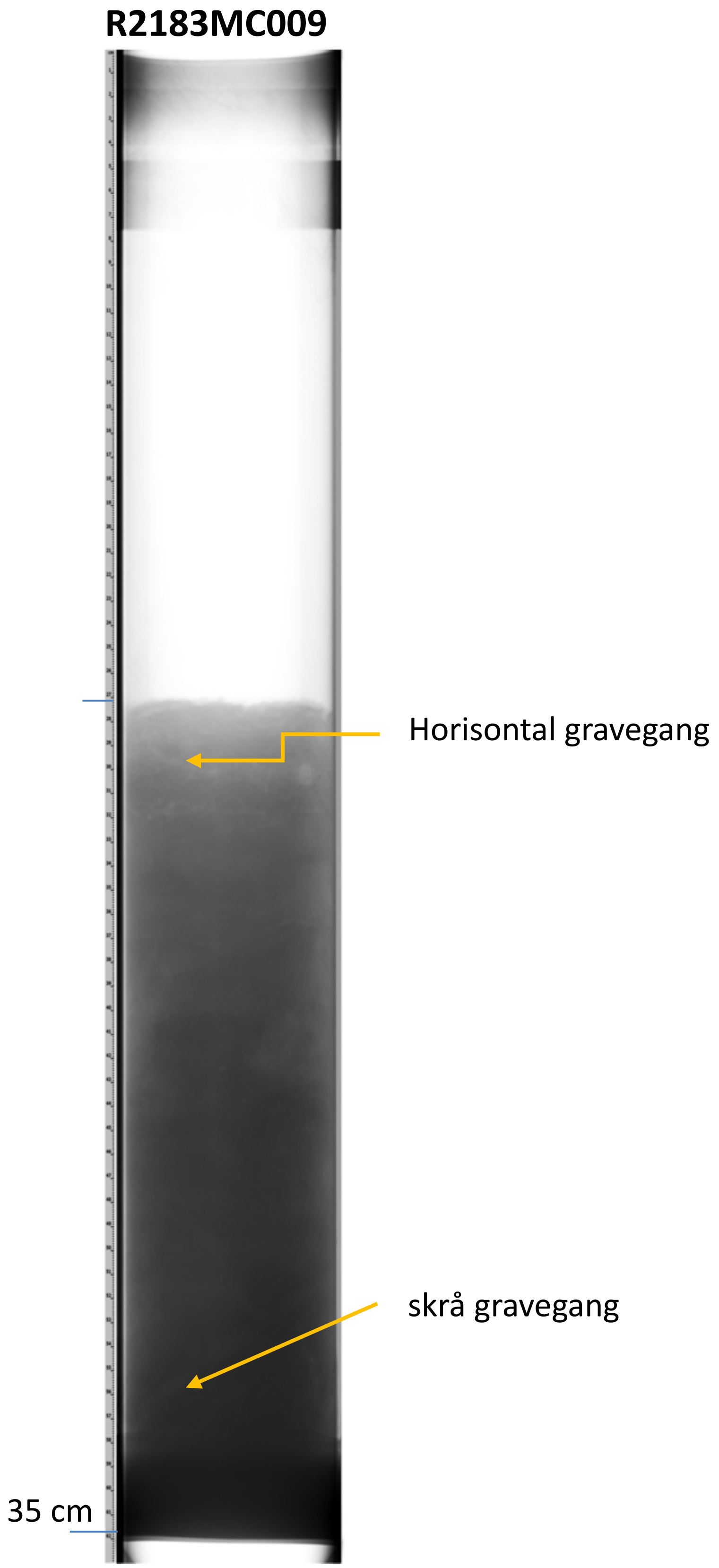
5.3.1 Visuell bedømmelse og XRI-analyser

Sedimentkjernene beskrives om bord samtidig som de deles opp i 1 cm tykke skiver. I tillegg tas hele sedimentkjerner med til laboratoriet på NGU, hvor de analyseres med røntgen (XRI). Dette gjøres for å få en kvalitativ vurdering for valg av stasjoner for dateringsanalyse og geokjemisk analyse av hele sedimentkjerner. XRI-utstyret er et Geotek-instrument med tilhørende programvare, som med røntgenstråler gjør det mulig å se gjennom sedimentkjernene og på den måten få et inntrykk av om det finnes sedimentære strukturer, bioturbasjon, skallfragmenter eller større sedimentære partikler som grus. XRI-bildene er presentert i Vedlegg 4. Bilder fra røntgenanalyseneer presentert for kjerner fra stasjonene der det er gjennomført dateringsanalyser (kapittel 5.3.4) og metall, TOC, karbonat og kornstørrelsesanalyser av sedimentkjerner (kapittel 5.4). Her presenteres de 8 stasjonene i figurene 14 – 21. Det er lagt til noen observasjoner fra sedimentkjernene. Dette gjelder stasjonene R2139 (Frøyabanken), R2183 (Sulatrekanten), R2229 (Haltenbanken), R2242 (Trænadjupet), R2270 (Trænabanken), R2276 (Sklinnadjupet), R2338 (Sklinnadjupet vest) og R2363 (Norskehavet øst-vest transekt e).

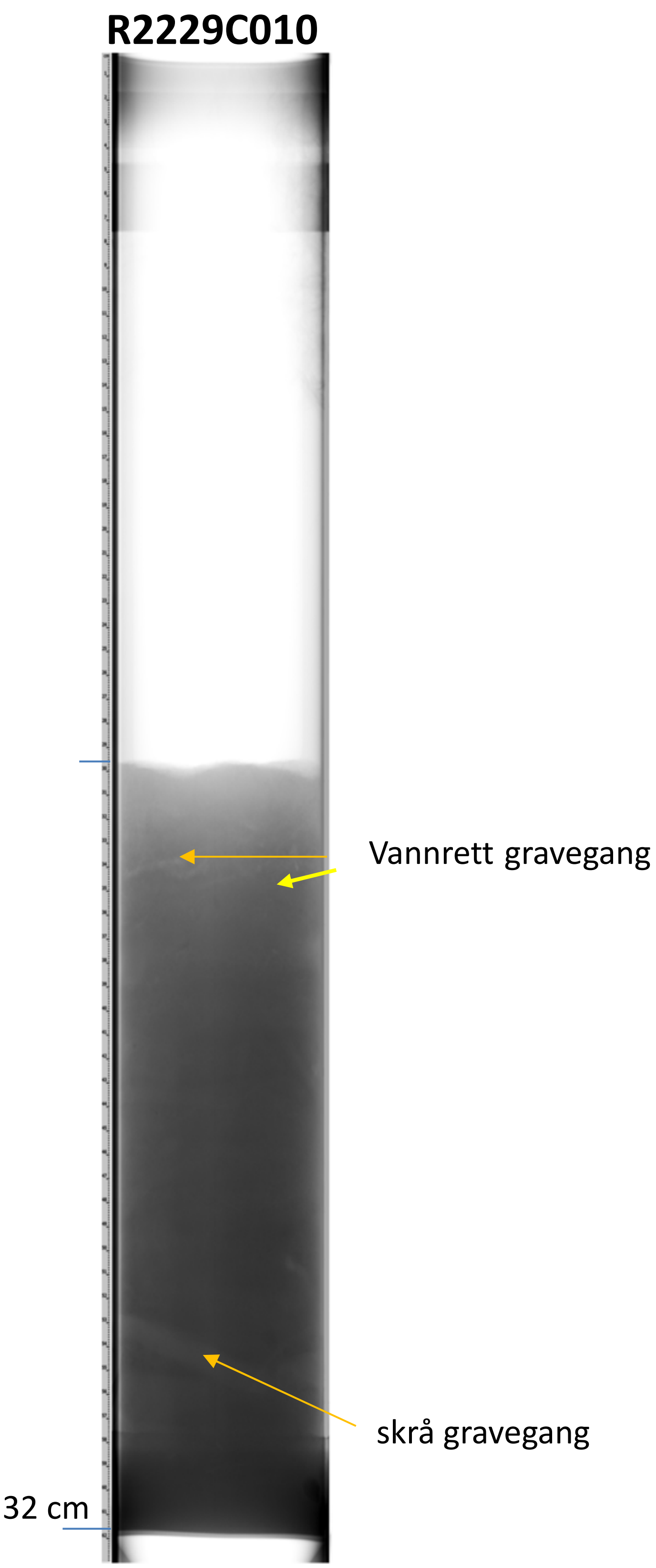
Sedimentene i samtlige 8 kjerner er fullstendig bioturbert. Graveganger, med orientering i mange forskjellige retninger, kommer fram som lysere sedimenter med lavere tetthet i en matriks med mørkere sedimenter med høyere tetthet. I samtlige kjerner er det mulig å se mm-brede til cm-brede graveganger (bioturbasjon), som kan være flere centimeter lange, og i ett tilfelle er det oppservert en 21 cm lang, loddrett gravegang (R2270, Trænabanken) fra ca. 11 cm under toppen (Figur 18). Denne kjernen er ^{210}Pb-datert, og det er analysert prøver for innhold av mikroplast i flere nivåer (kapittel 5.5). Bioturasjon fører til at sedimenter fra forskjellige dyp blandes, for eks. i R2276 og R2338 (Figur 19 og 20). Markante fordypinger i toppen av sedimentkjernene kan skyldes lekkasje av vann fra kjernen etter forsegling, eller fysisk forstyrrelse under prøvetaking.



Figur 14. XRI-bilde av sedimentkjerne R2139MC008 fra Frøyabanken. Sedimentkjernen er 28 cm lang (målestokk med 1 cm enhet til venstre).

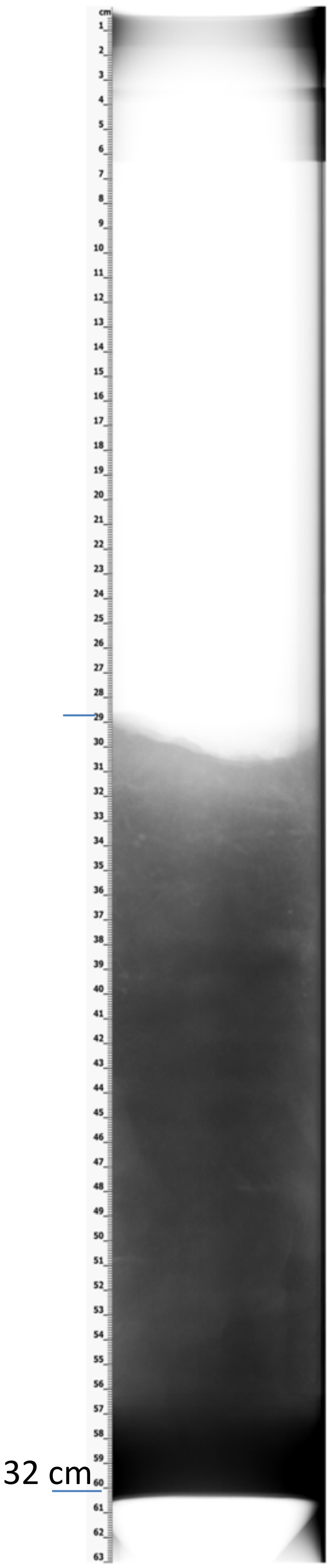


Figur 15. XRI-bilde av sedimentkjerne R2183MC008 fra Sulatrekanten. Bioturbasjon ses tydelig i den øvre delen av sedimentkjernen. Sedimentkjernen er 35 cm lang (målestokk med 1 cm enhet til venstre).



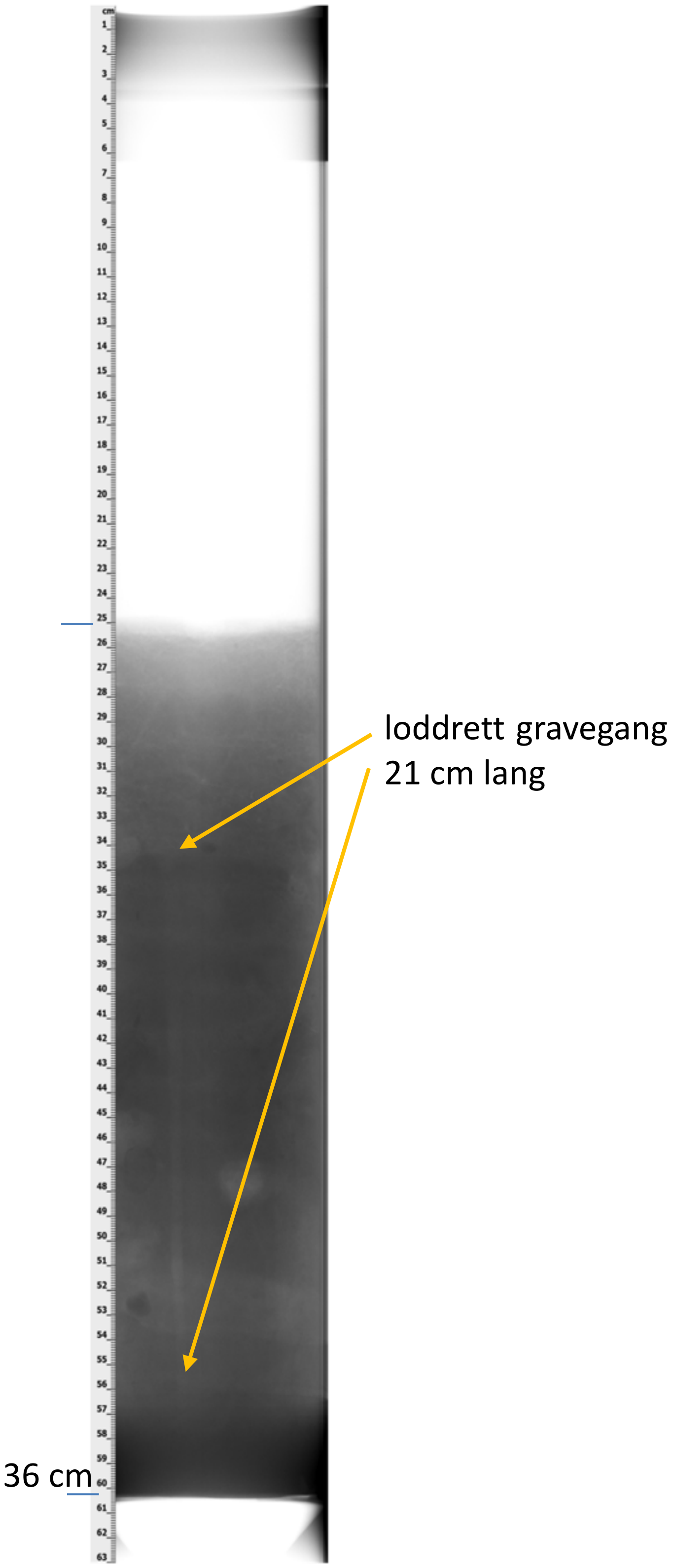
Figur 16. XRI-bilde av sedimentkjerne R2229MC010, Haltenbanken. Sedimentkjernen er 32 cm lang (målestokk med 1 cm enhet til venstre).

R2242C012

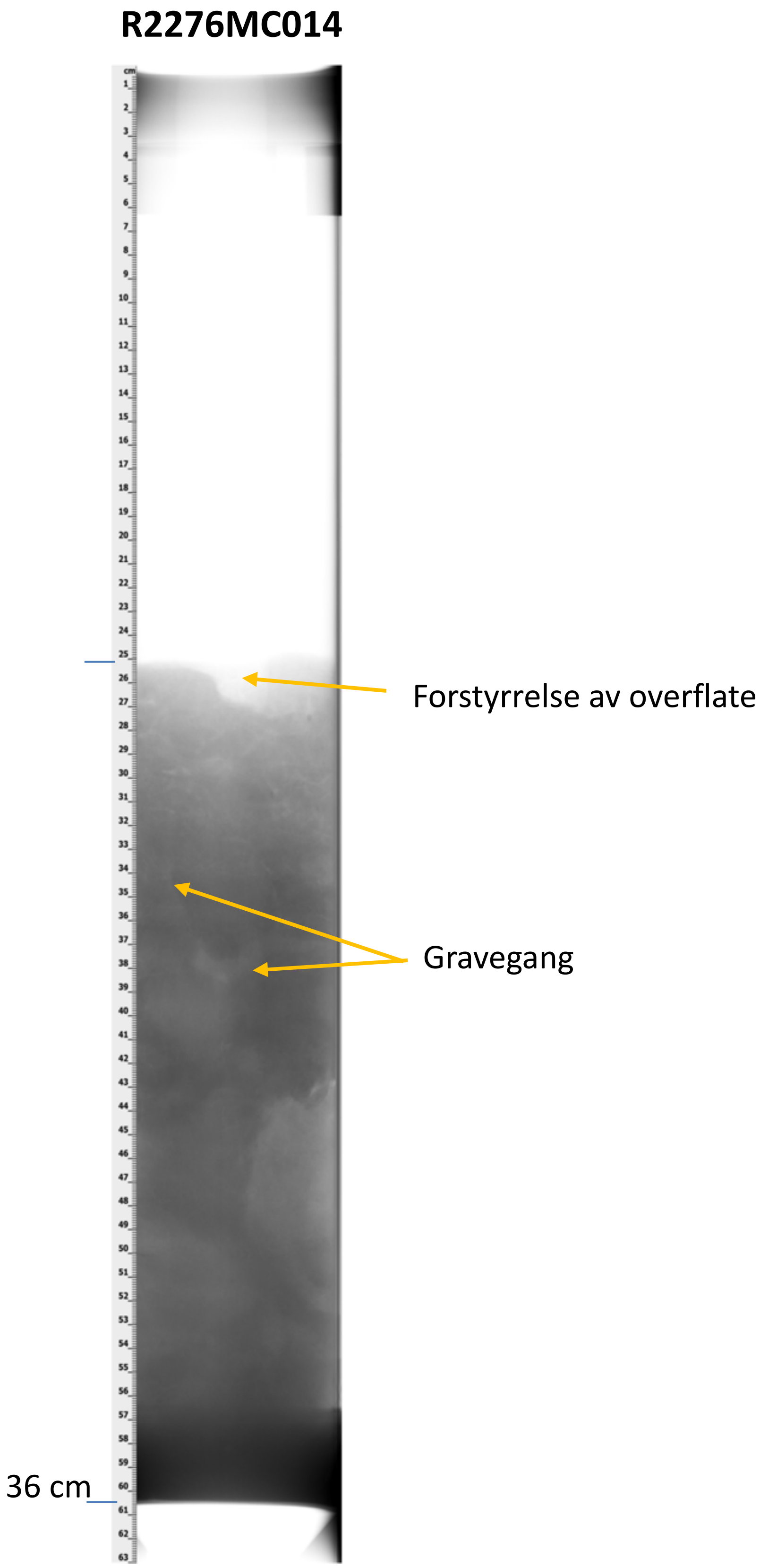


Figur 17. XRI-bilde av sedimentkjerne R2242MC012, Trænadjupet. Sedimentkjernen er 32 cm lang (målestokk med 1 cm enhet til venstre).

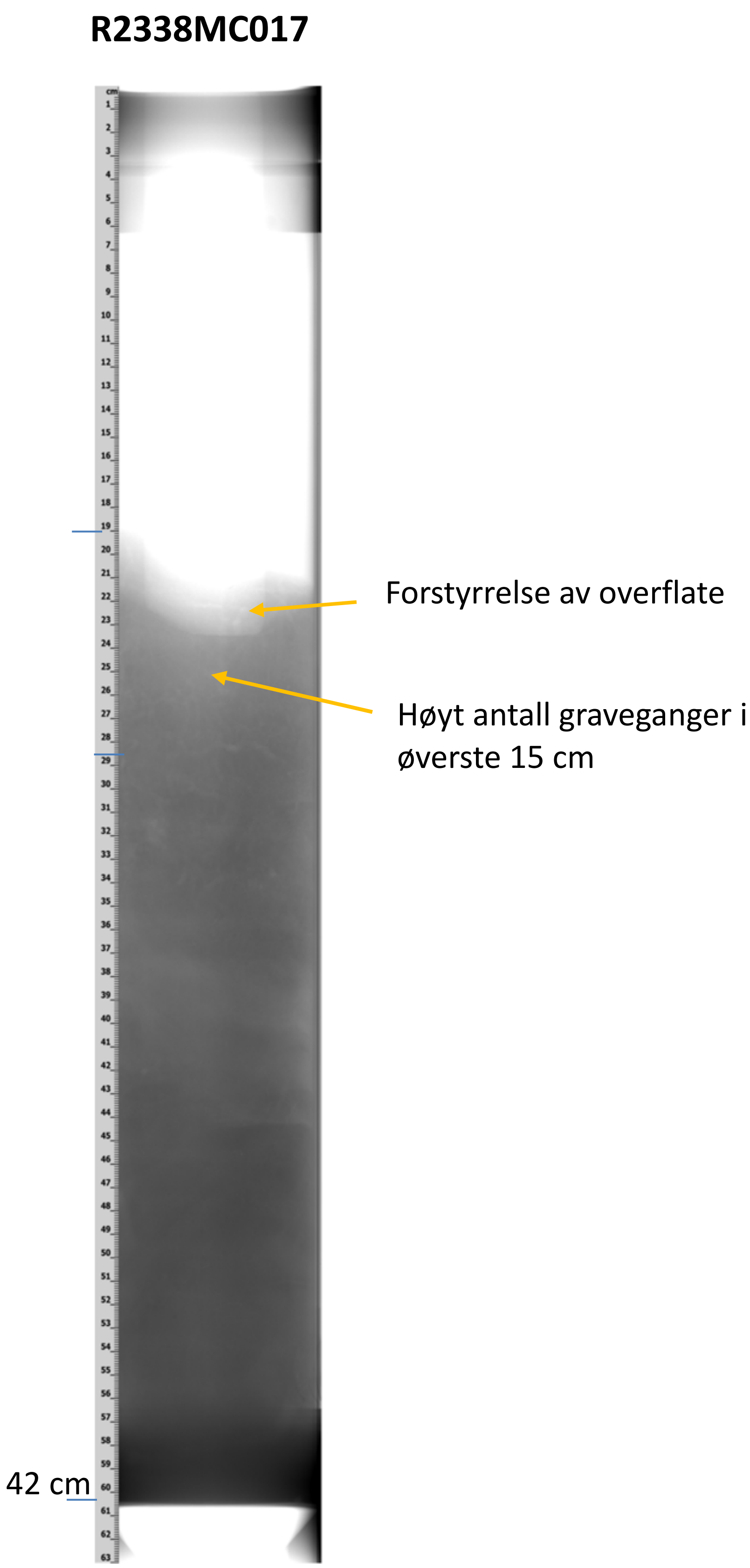
R2270MC013



Figur 18. XRI-bilde av sedimentkjerne R2270MC013, Trænabanken. Sedimentkjernen er ca. 36 cm lang (målestokk med 1 cm enhet til venstre).

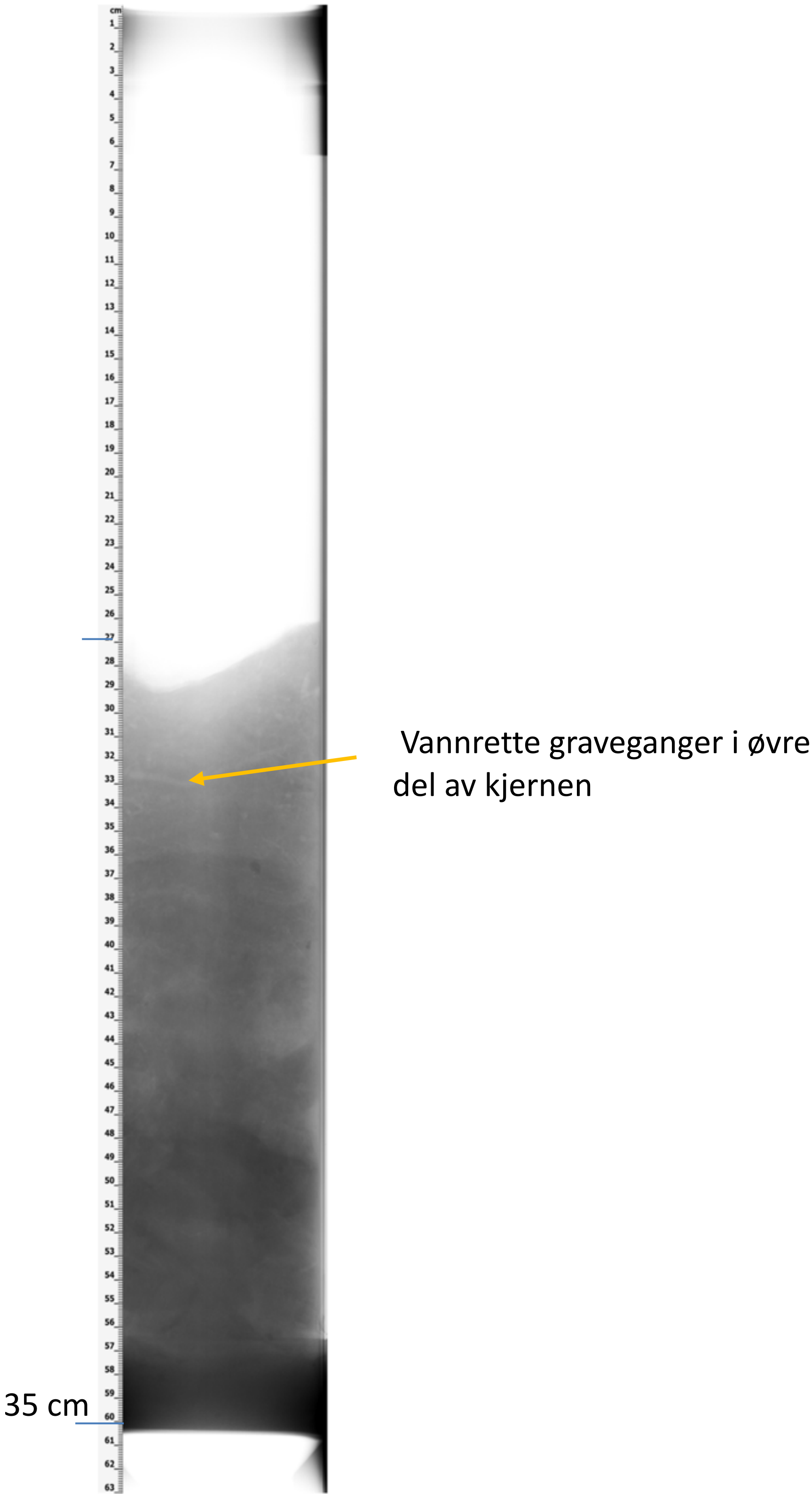


Figur 19. XRI-bilde av sedimentkjerne R2276MC014, Sklinnadjupet. Sedimentkjernen er ca. 36 cm lang (målestokk med 1 cm enhet til venstre).



Figur 20. XRI-bilde av sedimentkjerne R2338MC017, Sklinnadjupet vest. Sedimentkjernen er ca. 42 cm lang (målestokk med 1 cm enhet til venstre).

R2363MC019



Figur 21. XRI-bilde av sedimentkjerne R2363MC019 Norskehavet øst-vest transekt e. Sedimentkjernen er ca. 35 cm lang (målestokk med 1 cm enhet til venstre).

5.3.2 Kornstørrelsesfordeling i sedimentkjerner

De 8 sedimentkjernene fra 2139 (Frøyabanken), R2183 (Sulatrekanten), R2229 (Haltenbanken), R2242 (Trænadjupet), R2270 (Trænabanken), R2276 (Sklinnabanken), R2338 (Sklinnadjupet vest), R2363 (Norskehavet øst-vest transekt e) er analysert for kornstørrelsesfordeling (Figur 22). Det er overveiende slamholdige sedimenter i samtlige sedimentkjerner, med varierende sandinnhold. Høyest sandinnhold i samtlige 8 sedimentkjerner er observert i R2139 fra Frøyabanken (ca. 20 % sand i hele sedimentkjernen) og R2229 (Haltenbanken), med gradvis avtakende andel sand, fra ca. 30 % sand nederst til mindre enn 20 % sand øverst (Figur 22). Sedimentkjernen fra Trænadjupet, R2242 har stabilt slaminnhold på ca. 90 %. R2270 (Trænabanken) har økende andel sand mot toppen av kjernen – slaminnholdet går fra over 90 % nederst til mindre enn 80 % øverst. Dette kan tyde på sterkere strøm på stasjon R2270 (Trænabanken – 293 m dyp), som ligger grunnere enn R2242 (Trænadjupet – 400 m dyp). R2276 (400 m dyp) fra Sklinnadjupet har konstant kornstørrelsesfordeling, med ca. 90 % slam. Stasjonen R2338 fra Sklinnadjupet vest har høyt slaminnhold på mer enn 90 % gjennom hele kjernen, men med en svak nedgang og tilsvarende økning i sand mot toppen av kjernen. R2363 fra Norskehavet øst-vest transekt e, vest for Sklinnadjupet, har slaminnhold på litt over 82-86 %, sandinnhold på 14-18 %. Sammenliknet med den nærmeste stasjonen R2338 fra Sklinnadjupet vest, så har R2363 litt grovere sedimentsammensetning. R2363 er på 379 m dyp, mens R2338 er på 449 m dyp.

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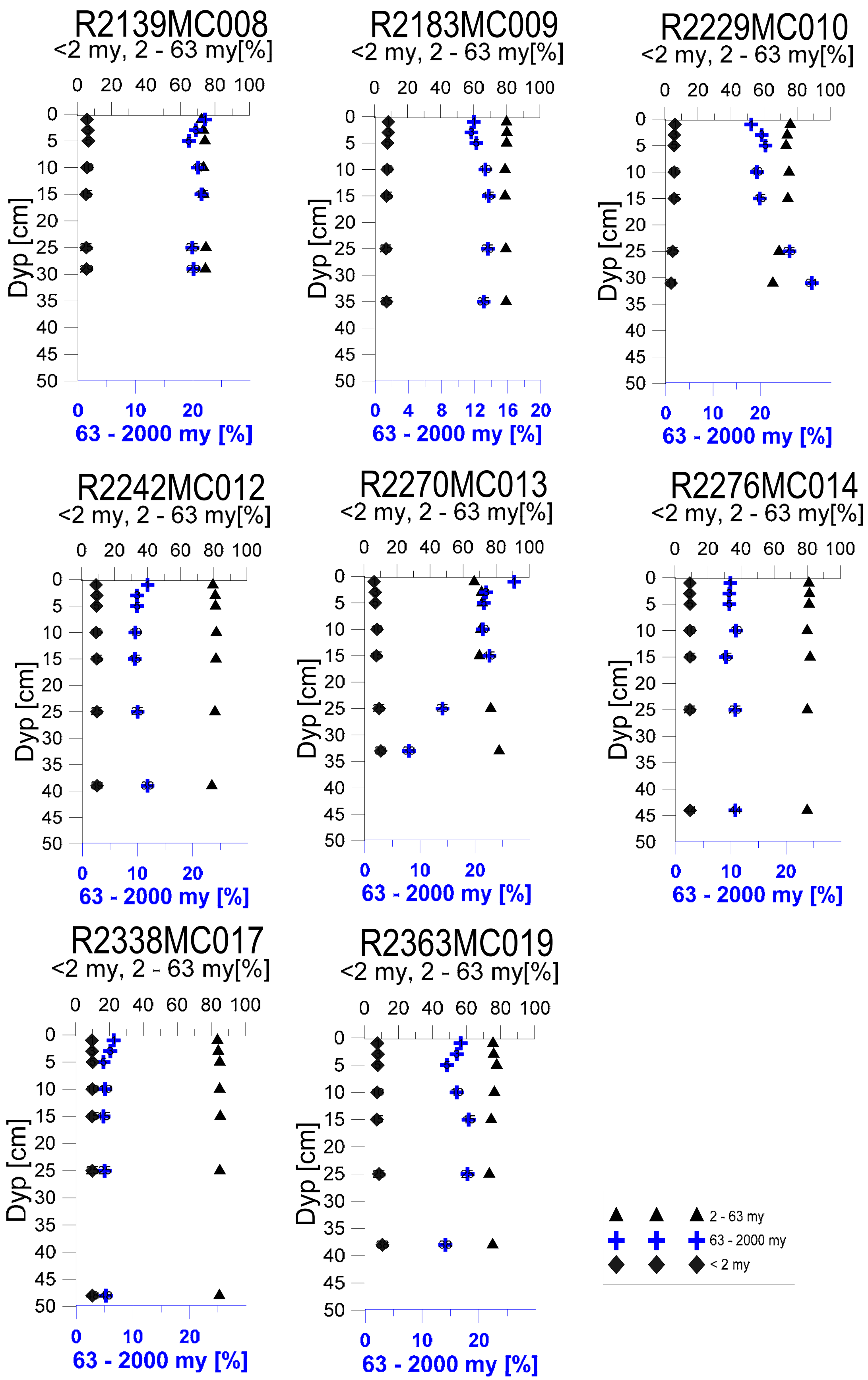


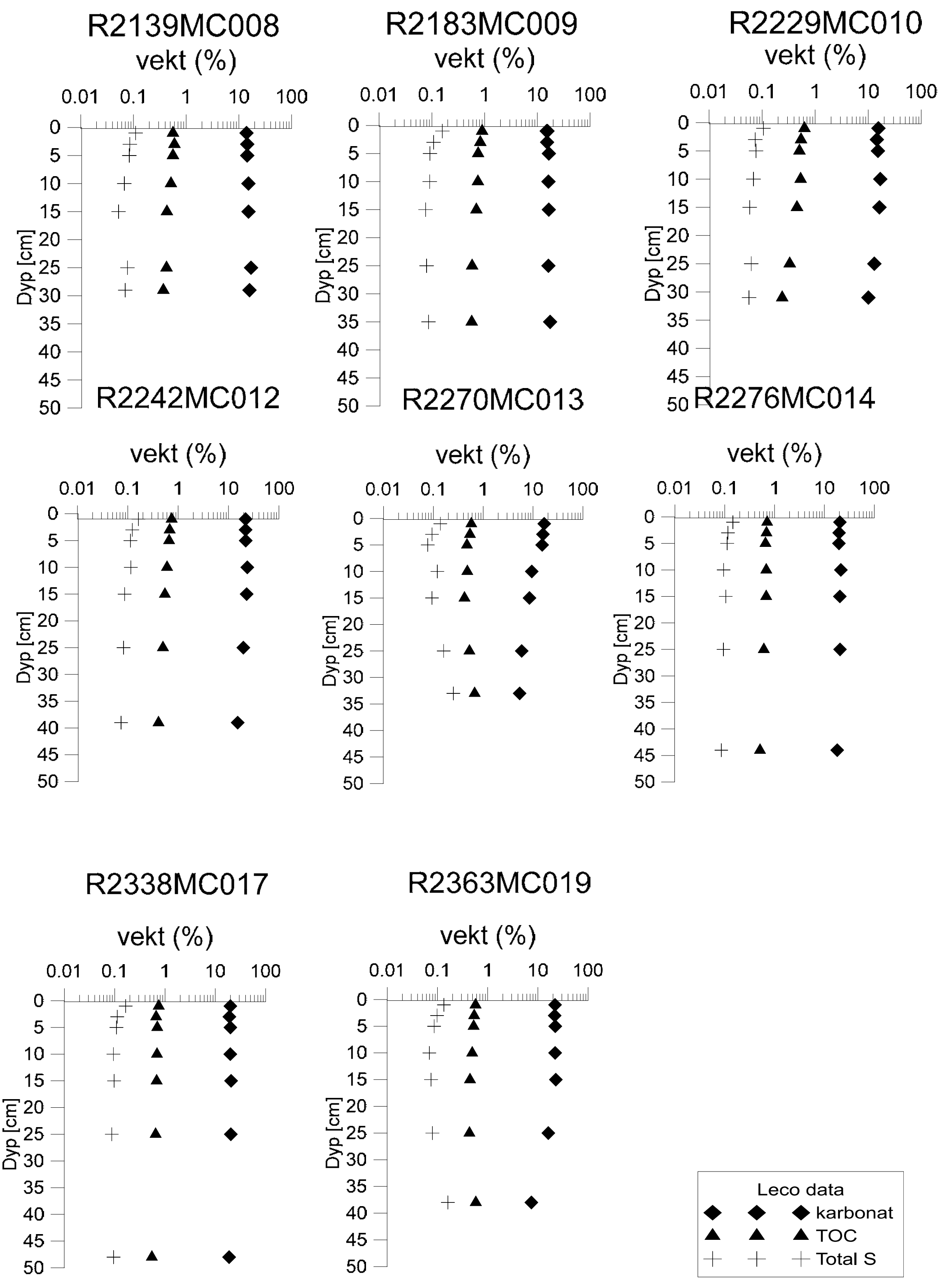
Figur 22. Kornfordelingskurver for 8 sedimentkjerner inndelt i leir, silt og sand (fraksjonene <2 µm, 2-63 µm og 63-2000 µm). Dybdeskalaen er i cm. Leir og silt er markert med svarte symboler, mens sand er markert med blå symbol og med en annen skala (0-30 %) enn leir og silt (0-100 %).

5.3.3 Total organisk karbon, karbonat og svovel

Innholdet av total organisk karbon (TOC), total svovel (TS) og karbonat ($CaCO_3$) varierer i de 8 sedimentkjernene R2139 (Frøyabanken), R2183 (Sulatrekanten), R2229 (Haltenbanken), R2242 (Trænadjupet), R2270 (Trænabanken), R2276 (Sklinnadjupet), R2338 (Sklinnadjupet vest) og R2363 (Norskehavet øst-vest transekt e) (Figur 23). Det er mindre enn 1 vektprosent TOC i samtlige sedimentkjerner, med lavest TOC i R2139, R2183 og R2229.

Karbonatinnholdet er 10-20 vektprosent, med laveste verdier i R2139, R2183 og R2229; de øvrige stasjonene har ca. 20 vektprosent og relativt stabile konsentrasjoner gjennom kjernene. Unntak er R2270 fra Trænabanken, hvor karbonatinnholdet øker mot toppen av kjernen, fra 5,4 nederst til 16 vektprosent øverst, samt R2363 fra Norskehavet øst-vest transekt e som øker fra 7,4 nederst til 22 vektprosent øverst. Høyere andel karbonat i 5 av sedimentkjenene kan sannsynligvis knyttes til høyere innhold av kalkskall fra planktoniske organismer.

Svovelinnholdet er generelt litt høyere i sedimentkjernene R2242, R2270, R2276, R2338 og R2363 (0,1 - 0,2 vektprosent) enn på de 3 sørligste stasjonene R2139, R2183 og R2229 (TS-innhold <0,1 vektprosent for de fleste prøvene). De lavere TS-verdiene i R2139, R2183 og R2229 kan sannsynligvis knyttes til lave TOC-verdiene i de samme sedimentkjernene (Figur 23). Bakteriell nedbryting av organisk material fører til dannelse av sulfider i sedimentene gjennom sulfatreduserende bakteriell nedbryting av organisk materiale. Mengde organisk materiale og dermed TOC kan brukes som indikator for hvor mye svovel som bindes til sedimentene.



Figur 23. Variasjon i TOC, karbonat ($CaCO_3$) og svovel (TS) i 8 sedimentkjerner. Dybdeskalaen til venstre er i centimeter. Vektprosentskala for de 8 sedimentkjernene er logaritmisk.

5.3.4 Blyisotop 210 (^{210}Pb) -datering, ^{137}Cs-målinger og akkumulasjonsrater

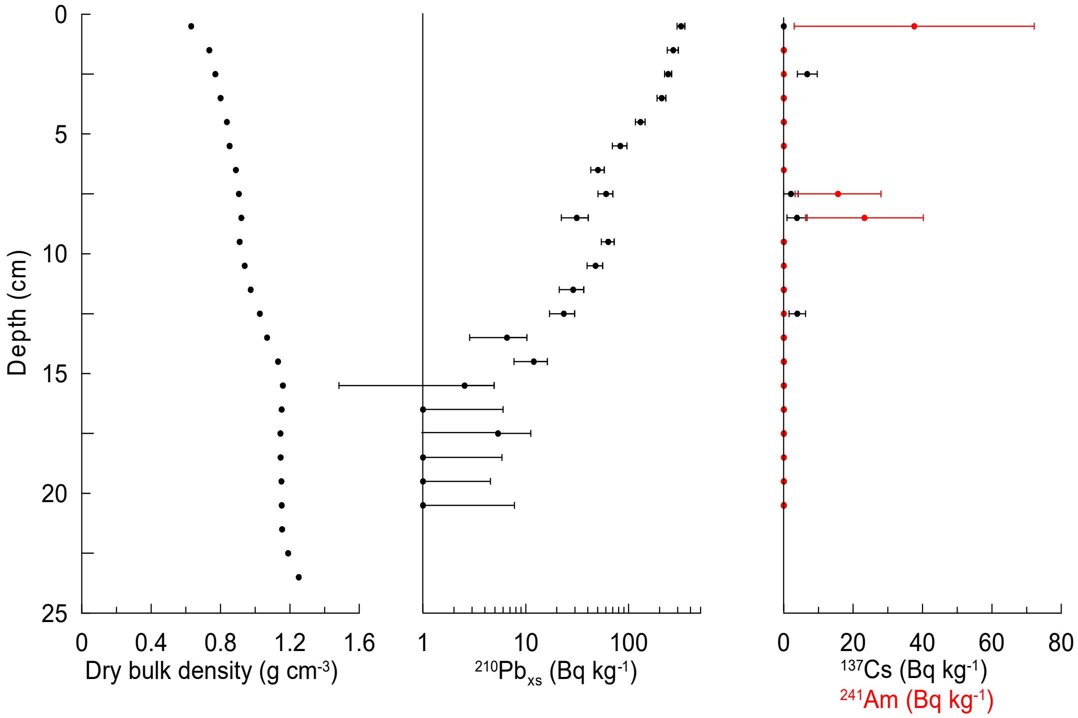
Bestemmelse av akkumulasjonsrater i sedimentkjernene er viktig for å vurdere om det skjer en tilførsel av sedimenter, og hvorvidt denne tilførselen er stabil eller preget av perioder med manglende avsetning eller erosjon. Daterte sedimentkjerner gir også informasjon om mengden tilførsel av forurensende stoffer i moderne tid. Alderen på de øverste sedimentlagene og akkumulasjonsrater kan bestemmes ved måling av ^{210}Pb-aktiviteten i sedimentene. Isotopen ^{210}Pb har en halveringstid på 22,3 år. Bakgrunnsverdien for ^{210}Pb bestemmes ut fra mengden av bakgrunnsstråling ^{210}Pb ("supported" ^{210}Pb), som er uavhengig av sedimentasjon. Bestemmelsen av ^{210}Pb-bakgrunnsstråling skjer fra de dypere sjiktene i sedimentet, hvor konsentrasjonen er konstant fordi all ^{210}Pb ("unsupported" ^{210}Pb) fra atmosfærisk nedfall er nedbrutt. I tillegg til ^{210}Pb-datering, er cesiumisotoper (^{137}Cs) målt i alle kjernene for å identifisere begynnelsen av atomprøvesprengninger i 1950- og 1960 årene. I moderne tid er disse sprengningene den største kilden til radioaktiv forurensning av miljøet og det største utslaget er i 1963. Økte konsentrasjoner av ^{137}Cs i marine sedimenter kan ikke bare indikere begynnelsen av atomprøvesprengninger, men også radioaktive ulykker i Tsjernobyl (Ukraina) i 1986, og Fukushima (Japan) i 2011.

Datering og bestemmelse av akkumulasjonsrater ble gjennomført på 5 sedimentkjerner; R2139 (Frøyabanken), R2189 (Sulatrekanten), R2242 (Trænadjupet), R2270(Trænabanken) og R2338 (Sklinnadjupet vest). Analysene er gjennomført på Gamma Dating Center (GDC), Universitet i København. ^{210}Pb- og ^{137}Cs-analyserapporten inkludert analytiske metoder, og usikkerheter er presentert i Vedlegg 4 inkludert data og GDC sin tolkning av data for hver av de 5 analyserte sedimentkjernene.

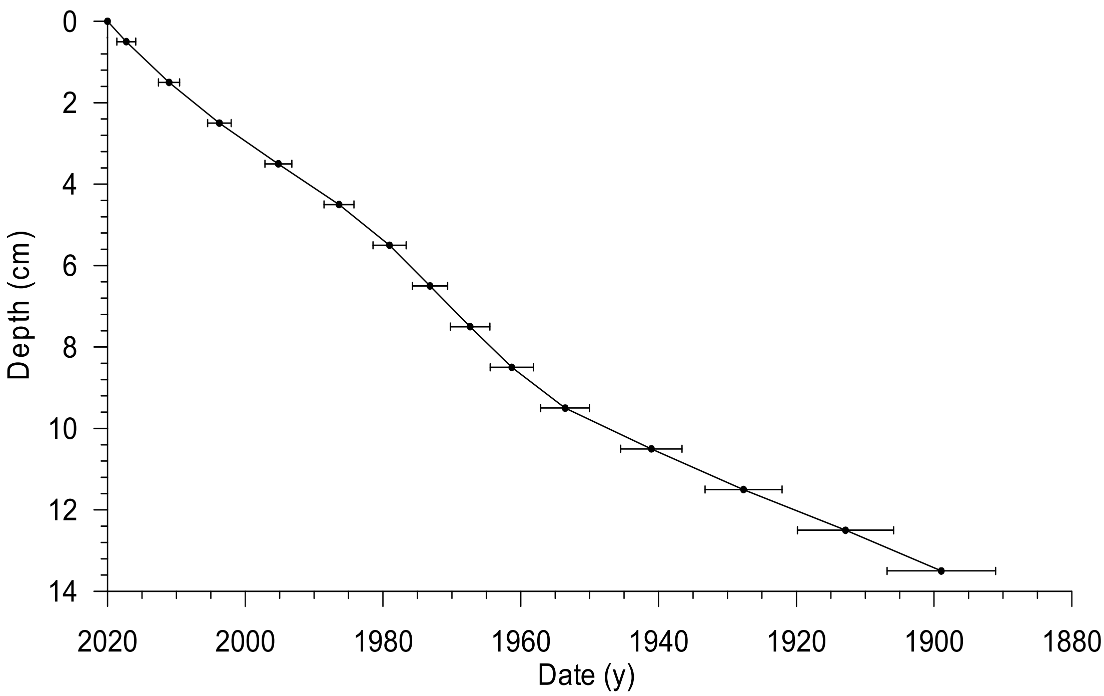
Sedimentakkumulasjonsrater i denne rapporten baseres på ^{210}Pb- og ^{137}Cs-analyseresultater.

R2139MC002, Frøyabanken.

R2139 fra Frøyabanken har middels høy ^{210}Pb-aktivitet (Figur 24) med en klar tendens til eksponentielt lavere verdier i de øverste 14 cm. Alder versus dyp i Figur 25 er tolket ned til 13-14 cm tilsvarende 1899 (Vedlegg 4). Basert på alder og dyp i sedimentene er den gjennomsnittlige sedimentasjonsraten ca. 1,15 millimeter pr. år (Figur 22). ^{137}Cs-innholdet er ikke målbart i denne sedimentkjerne (Figur 24). Dette gjør det umulig å bruke ^{137}Cs for dateringsformål, eksempelvis Tsjernobyl utslippet 1986. I stedet er ^{241}Am målt i lave konsentrasjoner i enkelte intervaller.



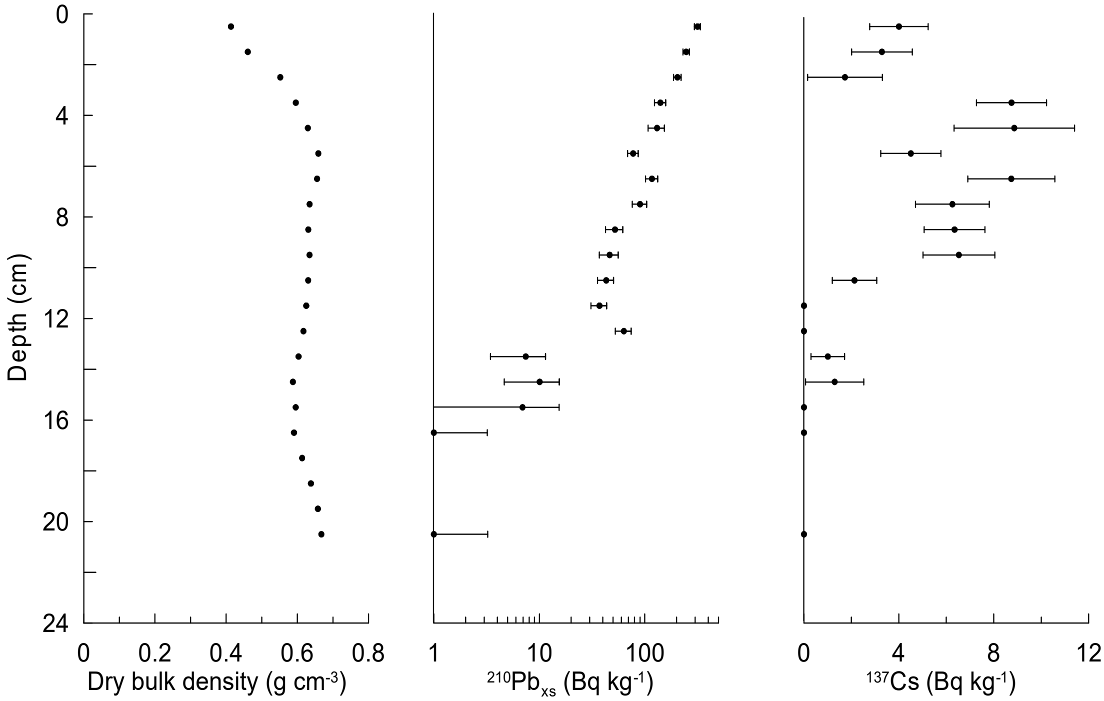
Figur 24. Tetthet, ^{210}Pb, ^{137}Cs og ^{214}Am (rødt) aktivitetsmålinger i R2139, Frøyabanken.



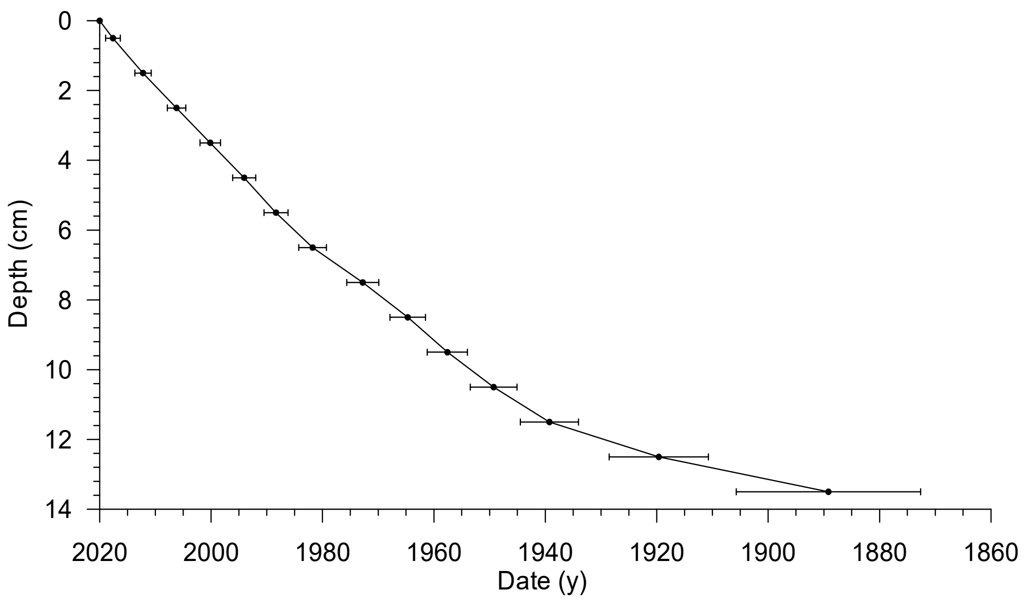
Figur 25. Alder versus dyp i sedimentene i R2139MC008, Frøyabanken..

R2183MC009, Sulatrekanten

R2183 har høy ^{210}Pb-aktivitet (Figur 26) med en tendens til eksponentielt lavere verdier med dybden i de øverste 10 cm, noe som indikerer sedimentmiksing og bioturbasjon. Alder versus dyp i Figur 27 er tolket ned til 9-10 cm tilsvarende 1887. Basert på alder og dyp i sedimentene er den gjennomsnittlige sedimentasjonsraten på ca. 1,1 millimeter pr. år for hele denne perioden, mens den øvre delen fra 0 – 10 cm har en høyere sedimentasjonsrate på ca. 1,5 mm. ^{137}Cs-toppen ved 4–5 cm (Figur 23) tilsvarer sannsynligvis 1986 (Tsjernobyl-utslippet). ^{137}Cs-dataene gir en sedimentasjonsrate på ca. 1,5 mm pr. år. Bioturbasjon bidrar til blanding av sedimentene, hvilket synes i ^{137}Cs-kurven (Figur 26).



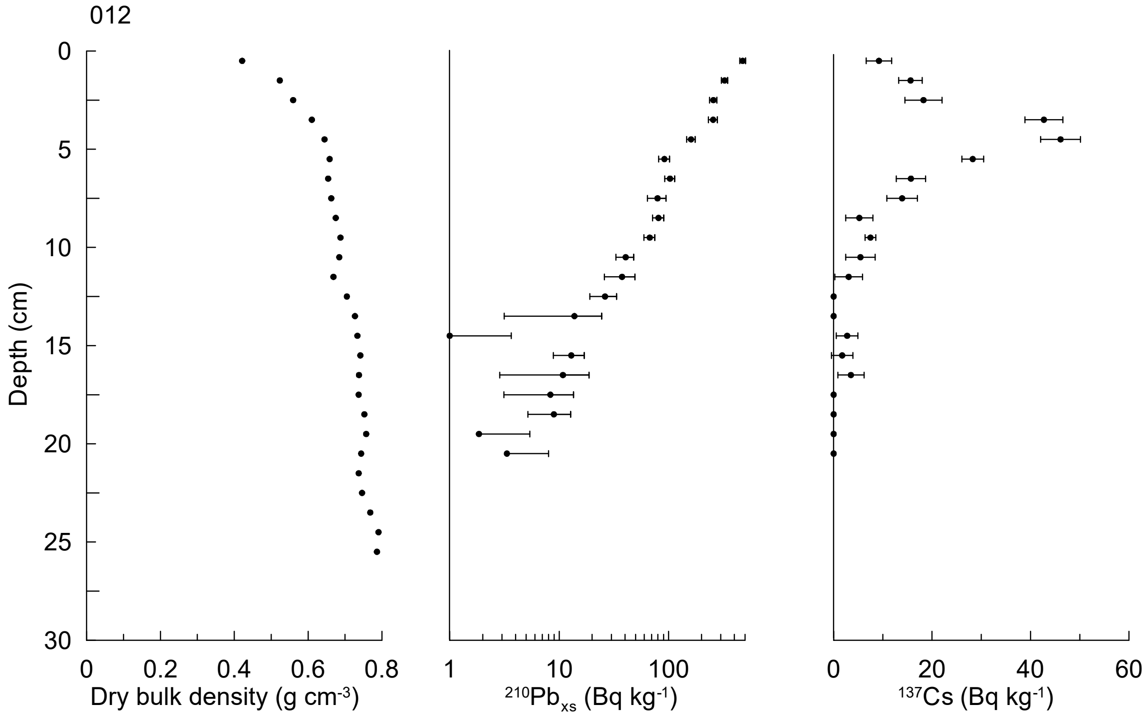
Figur 26. Tetthet, ^{210}Pb- og ^{137}Cs-aktivitetsmålinger i R2183MC009, Sulatrekanten.



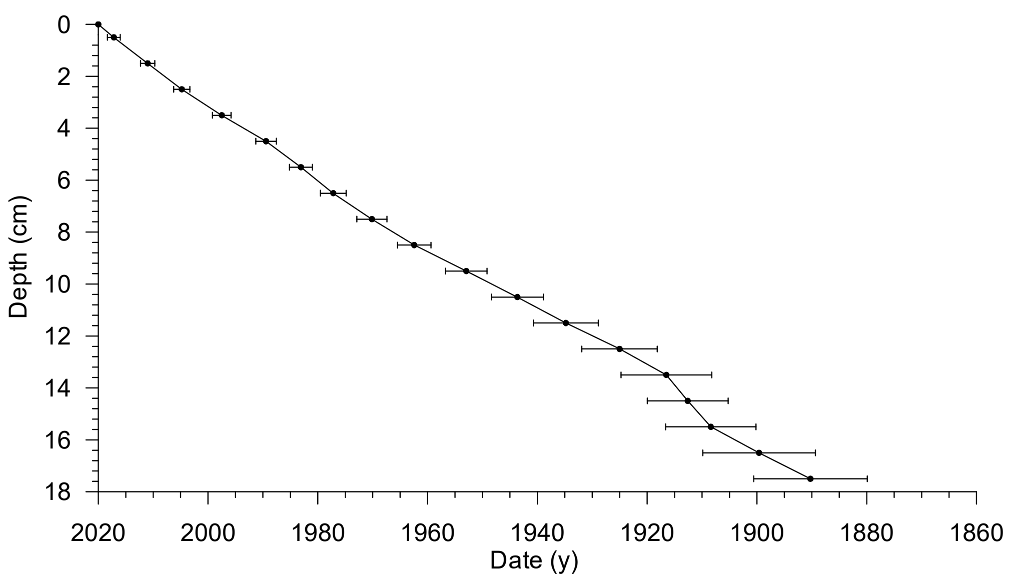
Figur 27. Alder versus dyp i sedimentene i R2183MC009, Sulatrekanten.

R2242MC012, Trænadjupet

R2242 har høy ^{210}Pb-aktivitet og en regelmessig reduksjon med dyp fra toppen av sedimentkjernen. Pålitelige ^{210}Pb-målinger finnes i intervallet 0 – 13 cm under toppen (Figur 28). Dateringen gir en alder på 1925 i prøven 12 – 13 cm fra toppen (Figur 29). Det gir en sedimentasjonsrate på 1,4 mm/år. ^{137}Cs-kurven i Figur 28 viser en tydelig maksimal konsentrasjon på 46 Bq/kg sediment tørrvekt i prøven ved 4-5 cm. Denne toppen tilsvarer sannsynligvis Tsjernobylutslippet 1986. Dette gir en sedimentasjonsrate på 1,5 mm/år i de øverste centimeterne i kjernen. Det er dermed relativ godt samsvar mellom ^{210}Pb- og ^{137}Cs-dateringsanalysene.



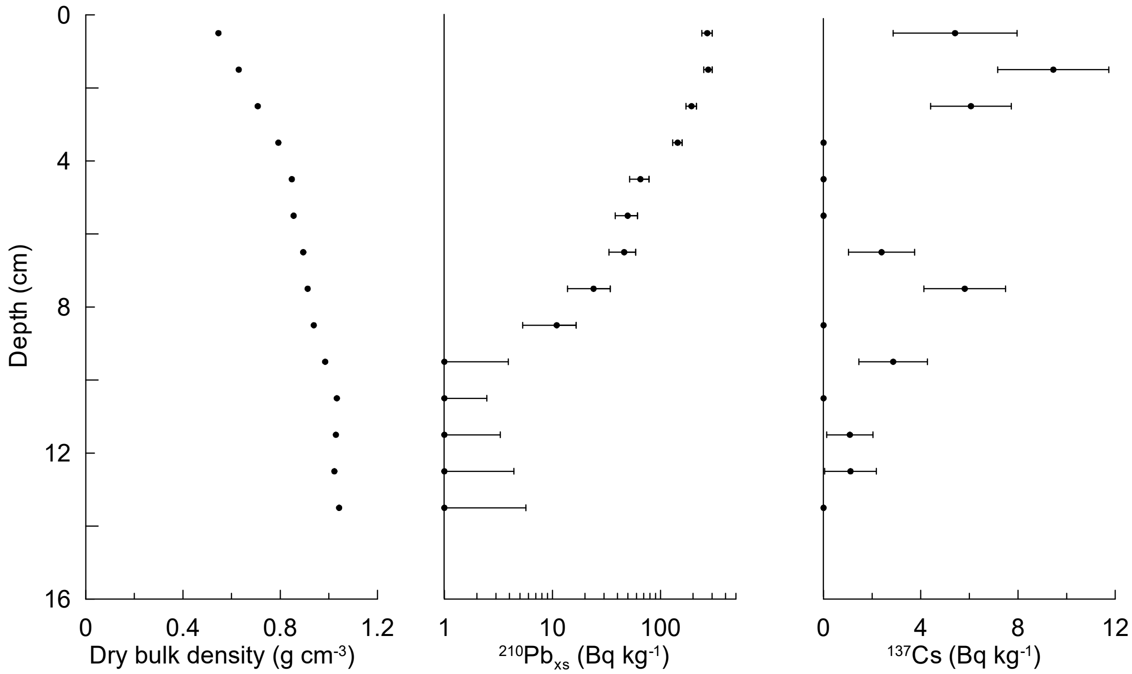
Figur 28. Tetthet, ^{210}Pb- og ^{137}Cs-aktivitetsmålinger i R2242MC012, Trænadjupet.



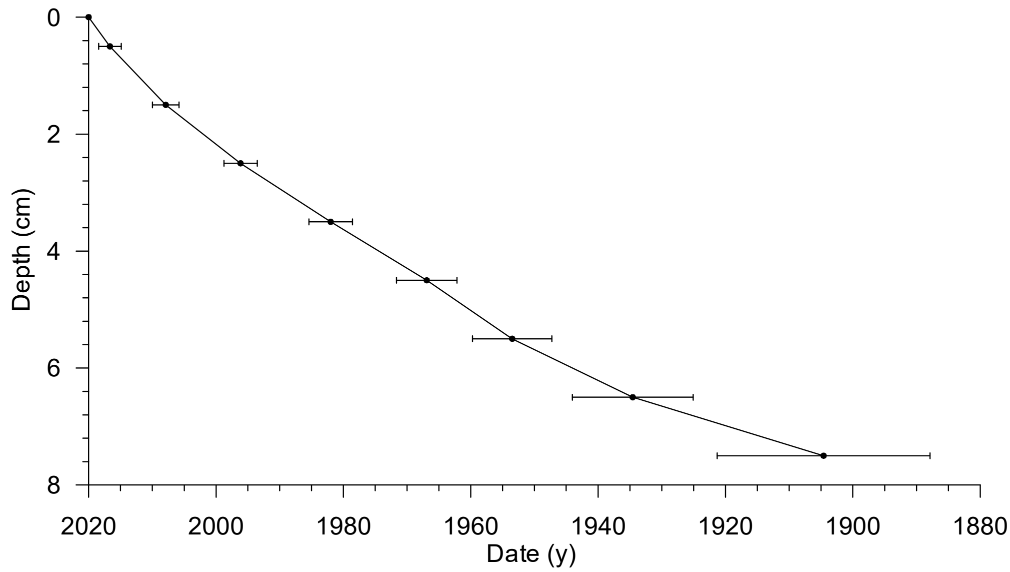
Figur 29. Alder versus dyp i sedimentene i R2242MC012, Trænadjupet.

R2270MC013, Trænabanken.

Denne sedimentkjernen viser pålitelige ^{210}Pb-analyseresultater i intervallet 0-8 cm (Figur 30). Den eksponentielt avtakende ^{210}Pb-kurven gir en sedimentasjons rate på ca. 0,8 mm/år i dette intervallet. ^{137}Cs-aktivitetskurven viser at det er maksimalt nivå i prøven 1–2 cm på 9 Bq/kg sediment tørrvekt. Bioturbasjon har sannsynligvis ført til at ^{137}Cs er blandet inn i sedimenter i de øverste 3 cm i sedimentkjernen. Alder versus dyp basert på ^{210}Pb-analysedataene er vist i Figur 31. Sammenliknet med R2242, Trænadjupet, er sedimentasjonsraten i R2270 betydelig lavere.



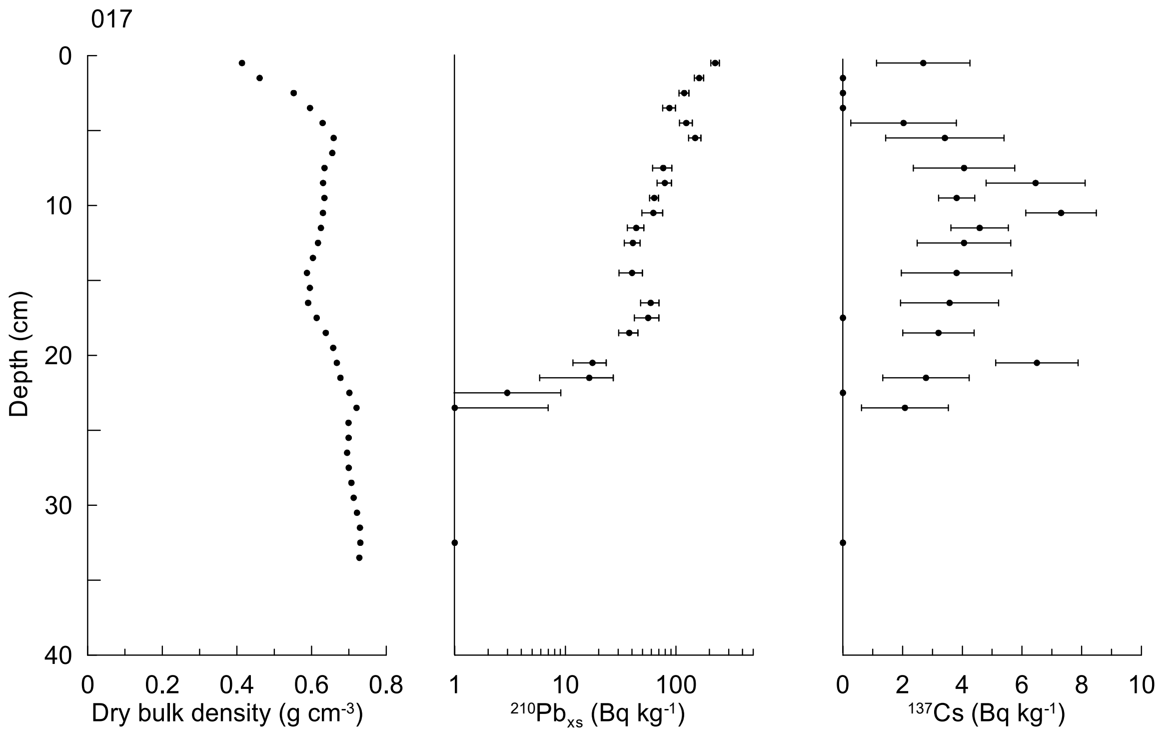
Figur 30. Tetthet, ^{210}Pb- og ^{137}Cs-aktivitetsmålinger i R2270MC013, Trænabanken.



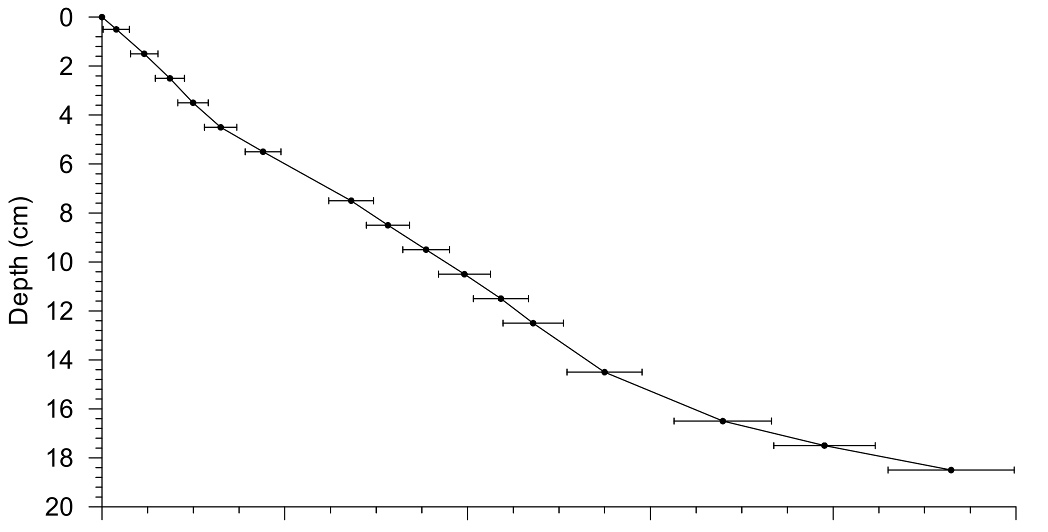
Figur 31. Alder versus dyp i sedimentene i R2270MC013, Trænabanken.

R2338MC017, Sklinnadjupet vest

Denne sedimentkjerne har unsupported ^{210}Pb-dateringsdata som rekker 19 cm ned i kjernen (Figur 30). Det er generelt avtakende ^{210}Pb-nivåer ned gjennom sedimentkjernen, men med noe variasjon (Figur 32). ^{137}Cs viser en maksimal verdi på 7 Bq/kg sediment tørrvekt i prøven ved 10 – 11 cm, som kan svare til 1986. Alternativt kan ^{137}Cs ved 8-9 cm tilsvare 1986, med en oppblanding av ^{137}Cs i dypere sjikt forårsaktet av bioturbasjon. Alder versus dyp i sedimentene er vist i Figur 33, basert på ^{210}Pb-analysene. Her er nivået for 1986 ved 9-10 cm. Den liniære sedimentasjonsrate er satt til 2 mm/år i de øverste 19 cm basert på ^{210}Pb-dataene.



Figur 32. Tetthet, ^{210}Pb- og ^{137}Cs-aktivitetsmålinger i R2338MC017, Sklinnabanken vest.



Figur 33. Alder versus dyp i sedimentene i R2338MC017, Sklinnabanken vest.

Oppsummert viser dateringsanalysene fra de 5 sedimentkjernene R2139, R2183, R2242, R2270 og R2338 påvirkning av bioturbasjon og dermed en viss utvisking med unntak av R2242, som har en tydelig ^{137}Cs-profil og en relativ sikker datering (1986) i nivået 4-5 cm fra toppen av sedimentkjernen.

Sedimentasjonsrater og vurdering av dateringenes kvalitet basert på ^{210}Pb- og ^{137}Cs-dateringsanalysene er oppsummert i Tabell 7.

Tabell 7. Daterte sedimentkjerner fra MAREANO-tokt 2020104 og 2020110. LSR: Lineær sedimentasjonsrate for intervaller karakterisert som pålitelig basert på ^{210}Pb-aktivitetskurver. Dateringskvalitet karakteriseres av aldersmodeller som viser en tydelig eksponensiell nedgang av ^{210}Pb-aktivitet og langsom utflating av ^{137}Cs-konsentrasjon.

Stasjon	Område	LSR (mm/år)	Dateringens kvalitet
R2139MC008	Frøyabanken	1,15	Middels
R2183MC009	Sulatrekanten	1,5	Middels
R2242MC012	Trænadjupet	1,4	God
R2270MC013	Trænabanken	0,8	Middels
R2338MC017	Sklinnadjupet vest	2,0	Middels

5.4 Tungmetaller og barium i fem ^{210}Pb-daterte sedimentkjerner og 3 udaterte sedimentkjerner

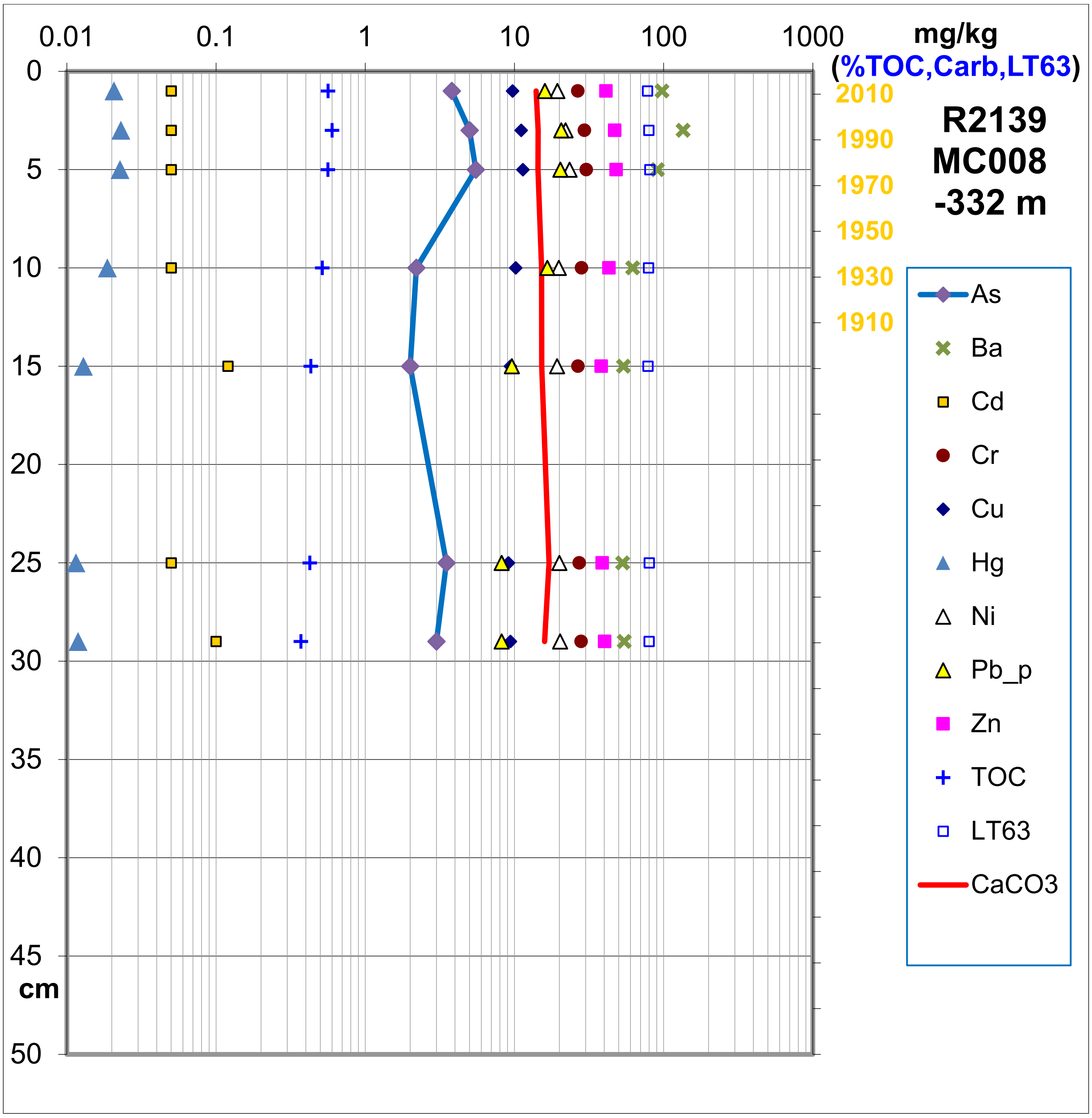
For å vurdere dagens forurensningstilstand sammenlignet med tidligere tider er de fem ^{210}Pb-daterte sedimentkjernene R2139, R2183, R2242, R2270 og R2338, samt de tre udaterte sedimentkjernene R2229, R2276 og R2363 analysert for innhold av tungmetaller, arsen og barium. Analyseresultatene finnes i Vedlegg 1.

R2139, Frøyabanken

R2139MC008 er lokalisert på Frøyabanken (Figur 1). Syv prøver er analysert i intervallet 0 – 29 cm. Minimum, gjennomsnitt, median og maksimum konsentrasjoner for en rekke tungmetaller og barium er vist i Tabell 8. Cr, Cu, Ni og Zn har svakt minkende konsentrasjoner mot toppen av kjernen (Figur 34) og anses for å være på naturlig bakgrunnsnivå. Den minkende konsentrasjon kan muligvis knyttes til tilsvarende svak reduksjon i andel slam (<63 µm). Ba har en enkelt høy verdi på 135 mg/kg sediment i intervallet 2-3 cm tilsvarende ca. 1990 (basert på resultatene av dateringsanalysene og da primært ^{210}Pb-dataene (avsnitt 5.3)). Ba-konsentrasjonene over og rett under 2-3 cm er begge lavere enn 100 mg/kg sediment. Dypere i sedimentkjernen er Ba-konsentrasjonen 50 – 60 mg/kg sediment, trolig tilsvarende naturlige bakgrunnsnivå. Hg øker fra et naturlig bakgrunnsnivå på 0.012 – 0.015 mg/kg sediment nederst (28-29 cm og 24-25 cm) til maksimalt 0,023 mg/kg sediment ved 2-3 cm. Økning av Hg skjer mellom 14-15 cm og 9-10 cm, dvs. rundt år 1900. Pb øker fra et bakgrunnsnivå på mindre enn 10 mg/kg sediment i de nederste 3 prøvene (14-15 cm – 28-29 cm) til høyeste konsentrasjon på 20,6 mg/kg sediment ved 2-3 for så å reduseres til 16 mg/kg sediment øverst. Dette indikerer antropogen tilførsel av Pb i den øvre delen. As varierer mellom 2 mg/kg sediment og maksimalt 5 mg/kg sediment ved 4-5 (se avsnitt 5.5 for nærmere diskusjon). Cd har lave konsentrasjoner på maksimalt 0,12 mg/kg sediment dypt i sedimentkjernen. Flere av prøvene hadde ikke målbare Cd-verdier (deteksjonsgrense: 0,1 mg/kg sediment). Analyseresultatene viser at Hg og Pb øker svakt fra rundt år 1900, fra lave bakgrunnsnivåer (Figur 34).

Tabell 8. Sedimentkjerne R2139MC008 (0-29 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium (mg/kg). i.d.: ikke data

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	2,0	53,1	<0,1	26,6	9,4	0,012	19,3	8,2	38,2
	Gns.	3,6	78,1	i.d.	28,1	10,0	0,017	20,6	14,2	42,4
	Med.	3,5	62,0	i.d.	28,0	9,7	0,019	20,0	16,0	41,1
	Max.	5,5	135,0	0,120	30,3	11,4	0,023	23,4	20,6	48,1



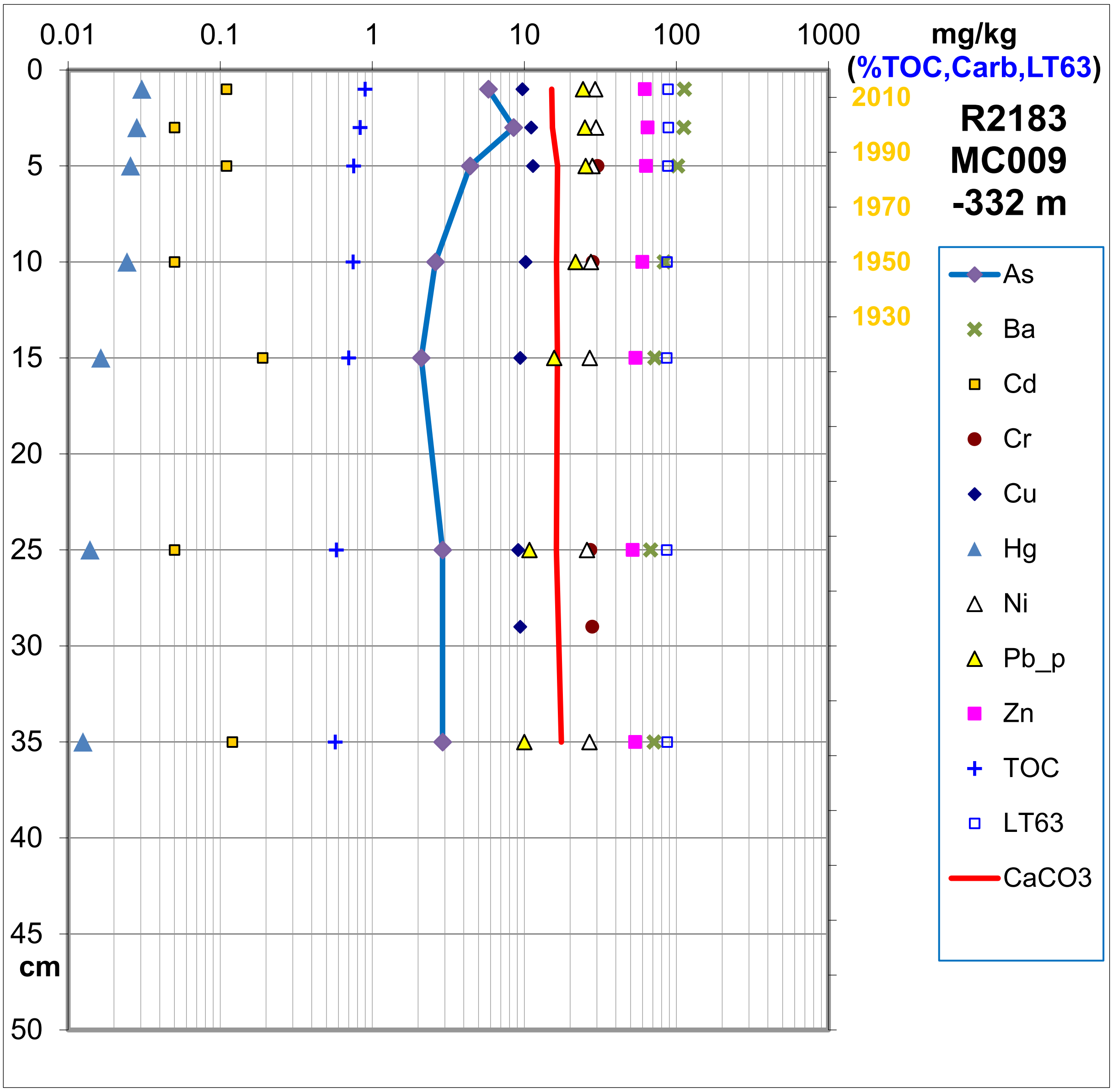
Figur 34. Tungmetall, arsen, barium, TOC, karbonat og finstoff i den ^{210}Pb-daterte sedimentkjernen R2139MC008 (0-29 cm). X-skalaen (konsentrasjoner) er logaritmisk. Cd: halv deteksjonsgrense (0,05 mg/kg sediment) brukt for aktuelle prøver med analyseresultat under deteksjonsgrense på 0,1 mg/kg sediment. Årstallene til høyre er basert på ^{210}Pb-dateringsanalysene presentert i avsnitt 5.3.4.

R2183MC009, Sulatrekanten

R2183 er lokalisert i Sulatrekanten (Figur 1). Den ^{210}Pb-daterte sedimentkjernen er analysert i 0 – 35 cm med 7 prøver (1 cm prøveskiver) fra dette intervallet. Minimum, gjennomsnitt, median og maksimum konsentrasjoner for en rekke tungmetaller barium er vist i Tabell 10. Cr, Ni og Zn har relativt stabile konsentrasjoner gjennom hele kjernen med svakt økende konsentrasjoner mot toppen (Figur 35). Ba øker i konsentrasjon mot toppen av sedimentkjernen fra et nivå på 68 – 87 mg/kg sediment til mer enn 100 mg/kg sediment i de øverste 3 prøvene (0-5 cm). Denne økningen kan dateres til ca. 1985 og kan muligvis knyttes til ekstra tilførsel og således ikke bare naturlige bidrag. Hg øker gradvis fra en naturlig bakgrunnskonsentrasjon på 0,013 mg/kg sediment dypest i 34-35 cm til maksimalt 0.031 mg/kg sediment ved 0-1 cm. Den mest markante økning finner sted mellom 9-10 cm og 14-15 cm, og da tidsmessig mellom 1915 og 1950 (Figur 35). Pb øker gradvis fra et bakgrunnsnivå på 10 mg/kg i den nederste prøven (34-35 cm) til maksimalt 24-25 mg/kg sediment i de øverste 3 prøvene (Figur 35). Det er ikke mulig å si helt presist i hvilket intervall i kjernen økningen finner sted, men for Pb synes den mest markante øknigen å finne sted mellom 14-15 cm og 9-10 cm. Cd har generelt lav konsentrasjon gjennom hele kjernen varierende fra mindre enn deteksjonsgrensen på 0,10 mg/kg sediment til maksimalt 0,19 mg/kg sediment ved 14-15 cm (Tabell 9, Figur 35). As har lave konsentrasjoner varierende fra 2,1 mg/kg sediment ved 14-15 cm og høyst 8,5 mg/kg sediment ved 2-3 cm. Ser man Cd og As sammen så øker Cd der As minker og omvendt. Det betyr at det sannsynligvis er de samme prosessene i sedimentene som dels fører til mobilisering og utfelling av Cd og As.

Tabell 9. Sedimentkjerne R2183MC009 (0-35 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium (mg/kg). i.d.: ikke data.

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	2,1	67,7	<0,1	37,7	12,1	0,013	25,8	10,0	51,6
	Gns.	4,2	88,8	i.d.	39,8	13,9	0,022	27,7	19,0	58,4
	Med.	2,9	83,2	i.d.	39,6	14,1	0,024	27,4	21,7	59,7
	Max.	8,5	113,0	0,19	42,1	15,4	0,031	29,6	25,3	64,7



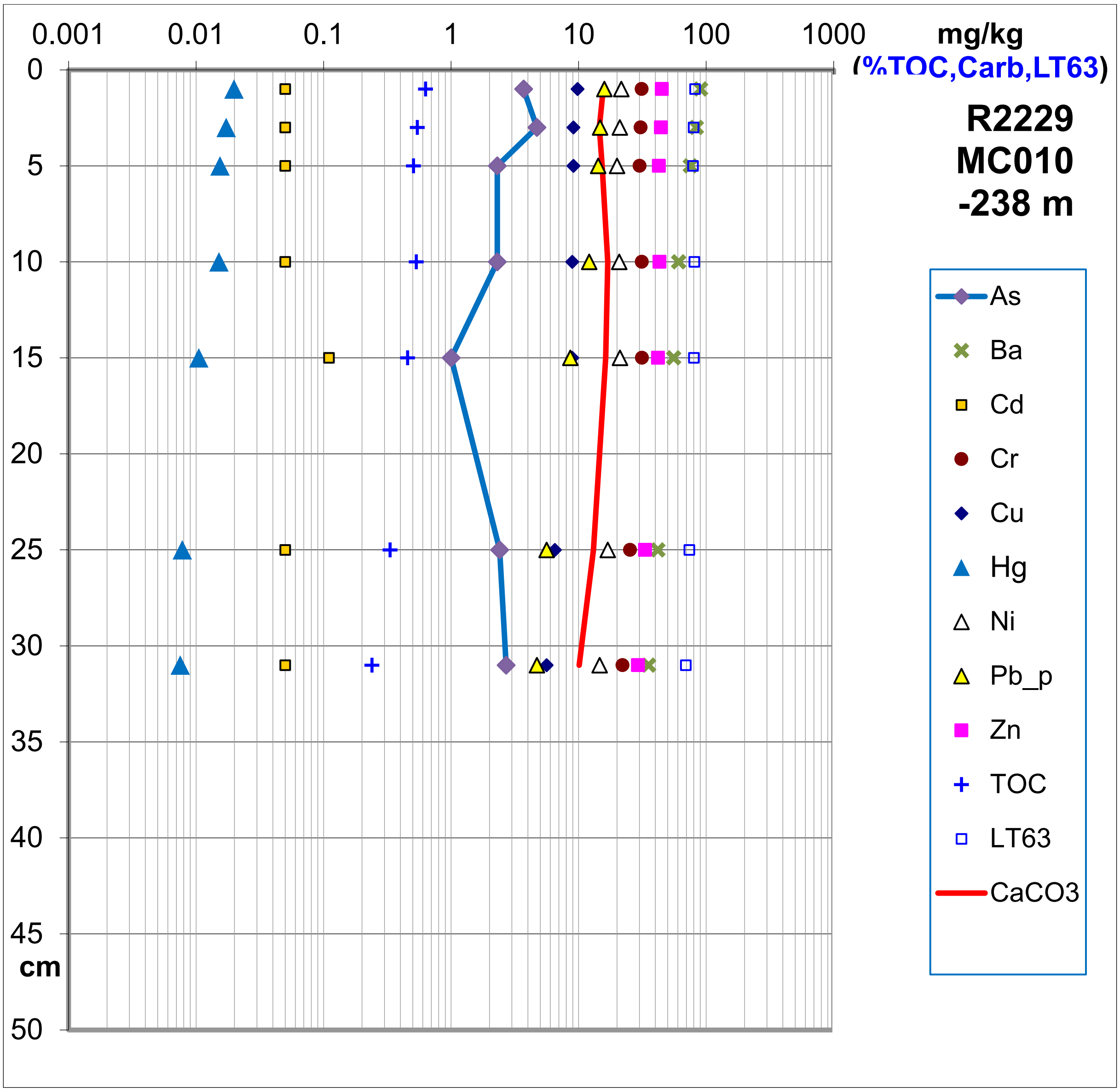
Figur 35. Tungmetall, arsen, barium, TOC, karbonat og finstoff i den ^{210}Pb daterte sedimentkjerne R2183MC004 fra Sulatrekanten (0-35 cm). X-skalaen (konsentrasjon) er logaritmisk. Cd: halv deteksjonsgrense (0,05 mg/kg sediment) brukt for aktuelle prøver med analyseresultat under deteksjonsgrense på 0.1 mg/kg sediment. Årstallene til høyre er basert på ^{210}Pb-dateringsanalysene presentert i avsnitt 5.3.4.

R2229MC010, Haltenbanken

R2229 er analysert i intervallet 0 - 31 cm med 7 prøver. Minimum, gjennomsnitt, median og maksimum konsentrasjoner for en rekke tungmetaller, arsen og barium er vist i Tabell 10. Metallene Cr, Cu, Hg, Ni, Pb og Zn, samt Ba har relativt stabile konsentrasjoner gjennom sedimentkjernen (Figur 36), noe som også er reflektert i minimum-, gjennomsnitt-, median- og maksimumverdiene (Tabell 10). Figur 36 viser at Hg øker fra en bakgrunnskonsentrasjon på 0,008 mg/kg sediment nederst (30-31 cm) til maksimalt 0,02 mg/kg sediment ved 0-1 cm. Hg er relativ stabil i de øverste 3 prøvene fra 0-1 cm til 4-5 cm (Tabell 10). Pb har relativt stabil konsentrasjon i hele sedimentkjernen varierende fra 4,7 – 8,6 mg/kg sediment i de 3 nederste prøvene 30-31 cm – 14-15 cm til en maksimal konsentrasjon på 15,9 mg/kg sediment ved 0-1 cm. Cd har konsentrasjoner fra <0.1 mg til 0,19 mg/kg sediment, generelt avtakende fra bunn til topp i kjernen, og laveste verdi i prøven ved 2-3 cm. As-konsentrasjonen er 2,7 mg/kg sediment nederst til 3,7 mg/kg sediment øverst og med høyst konsentrasjon i 2-3 cm med 4,7 mg/kg sediment. Prøven 14-15 cm er under deteksjonsgrensen på 2,0 mg/kg sediment, vist med halve deteksjonsgrense på 1,0 mg/kg sediment i Figur 36.

Tabell 10. Sedimentkjerne R2229MC010 (0-31 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium. i.d.: ikke data.

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	<2,0	35,4	<0,1	22,1	5,6	0,008	14,6	4,7	29,2
	Gns.	3,0	63,3	i.d.	28,9	8,3	0,013	19,4	19,4	39,9
	Med.	2,6	60,9	i.d.	30,7	8,9	0,015	20,8	20,8	42,6
	Max.	4.7	90,5	0,19	31,4	9,8	0,020	21,6	21,6	45,0



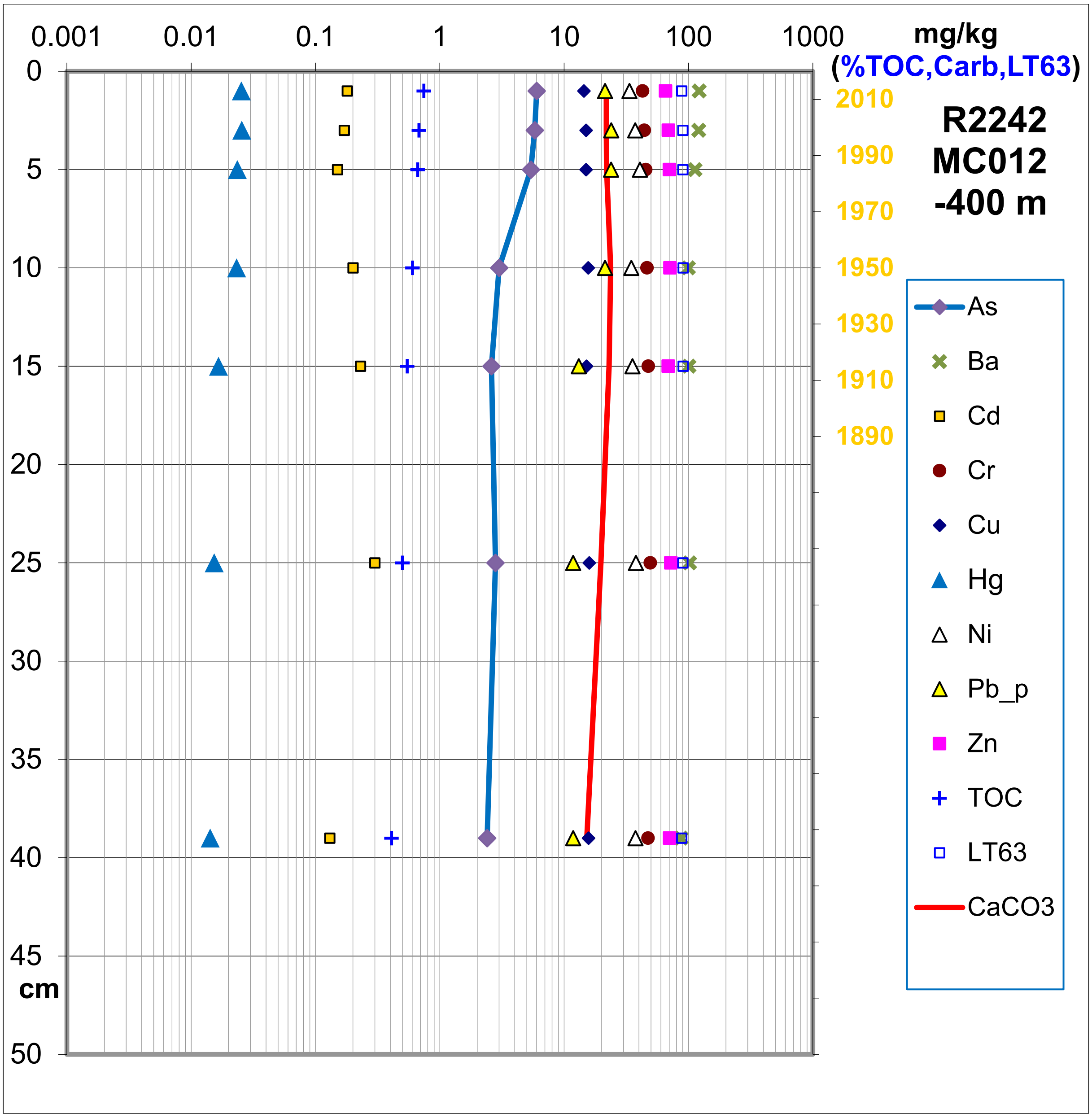
Figur 36. Tungmetall, arsen, barium, TOC, karbonat og finstoff i sedimentkjerne R2229MC005 (0 - 31 cm), Haltenbanken. X-skalaen (konsentrasjon) er logaritmisk. Cd: halv deteksjonsgrense (0.05 mg/kg sediment) brukt for aktuelle prøver med analyseresultat under deteksjonsgrense på 0.1 mg/kg sediment.

R2242MC012, Trænadjupet

R2242 fra Trænadjupet er analysert i intervallet 0 - 39 cm med 7 prøver. Minimum, gjennomsnitt, median og maksimum konsentrasjoner for en rekke tungmetaller, arsen og barium er vist i Tabell 11. Metallene Cr, Cu, Ni, Pb og Zn har relativt stabile konsentrasjoner gjennom sedimentkjernen (Figur 37), noe som også er reflektert i minimum-, gjennomsnitt-, median- og maksimumverdiene (Tabell 11). Ba øker litt mot toppen av sedimentkjernen fra en konsentrasjon på 87 – 100 mg kg sediment i de 4 prøvene fra 9-10 cm til 38-39 cm, til 113 – 122 mg/kg sediment i de øverste 3 prøvene i intervallet 0 – 5 cm. Denne økningen skjer fra rundt 1985 til 2020, og kan muligvis knyttes til ekstra tilførsel utover naturlig bidrag. Hg øker fra et bakgrunnsnivå på 14 – 17 mg/kg sediment i de nederste 3 prøvene i intervallet 14-15 cm til 38-39 cm, til 23 – 26 mg/kg sediment i de 4 øverste prøvene i intervallet 0-1 til 9-10 cm. Økning i Hg konsentrasjon skjer i intervallet 10 – 15 cm, som kan dateres til en gang mellom 1910 og 1950 (Figur 37). Pb har en stabil bakgrunnkonsentrasjon i hele sedimentkjernen varierende fra 16 mg/kg sediment nederst ved 34-35 cm til en maksimal konsentrasjon på 18,6 mg/sediment ved 4-5 cm, og så svakt avtakende øverst på 15,6 mg/kg sediment. Cd har konsentrasjoner fra 0.13 mg til 0.35 mg/kg sediment, generelt avtakende fra bunn til topp i kjernen, og laveste verdi i prøven ved 2-3 cm. As har et bakgrunnsnivå på 2-3 mg/kg sediment i de 4 prøvene fra 34-35 cm til 9-10 cm, og øker til 5-6 mg/kg sediment i de øverste 3 prøvene i intervallet fra 0-1 cm til 4-5 cm.

Tabell 11. Sedimentkjerne R2242MC012 (0-39 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium.

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	2,4	87,4	0,130	42,7	14,4	0,014	33,5	11,8	65,5
	Gns.	4,0	106,6	0,194	46,1	15,2	0,021	36,7	18,1	69,6
	Med.	3,0	102,0	0,180	46,4	15,1	0,023	37,2	21,3	70,3
	Max.	6,0	122,0	0,300	49,3	15,9	0,026	40,7	23,9	72,2



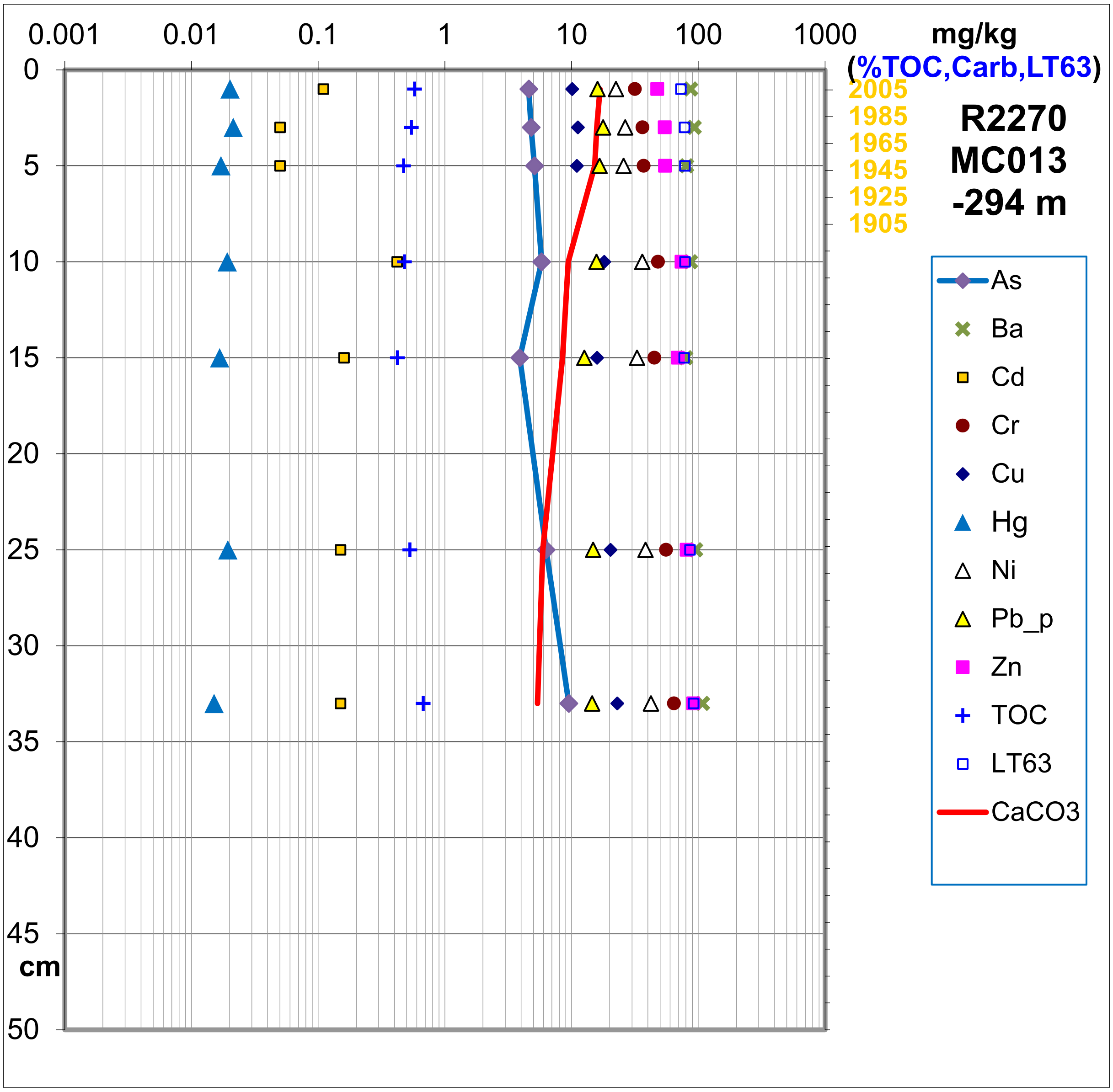
Figur 37. Tungmetall, arsen, barium, TOC, karbonat og finstoff i sedimentkjerne R2242MC012 (0 - 39 cm), Trænadjupet. X-skalaen (konsentrasjon) er logaritmisk. Årstallene til høyre er basert på ^{210}Pb-dateringsanalysene presentert i avsnitt 5.3.4.

R2270MC013, Trænabanken

R2270 er lokalisert på Trænabanken (Figur 1). Den 33 cm lange sedimentkjernen er datert med ^{210}Pb (Avsnitt 5.3.4). Resultatene av metallanalysene i sedimentkjernen inkludert årstall fra dateringsanalysen er vist i Figur 38. Det er relativ konstant andel finstoff på <80 % i de øverste 5 prøvene (0-1 cm til 14-15 cm) og gradvis økende TOC mot toppen. Sammenliknet med andre analyserte kjerner så har R2270 mindre andel finstoff og økt andel sand (avsnitt 5.3.2). R2270 kan derfor ha vært utsatt for sterkere havstrøm enn andre stasjoner med høyere andel av slam og mindre andel sand, som f.eks. R2242. Metallene Cr, Cu, Cr, Ni og Zn har relativt konstante nivåer (Figur 38, Tabell 12), med svakt minkende konsentrasjoner øverst, samsvarende med minkende andel finstoff mot toppen av kjernen. Det tyder på at disse elementene er knyttet til sedimentene og har naturlig geologiske opprinnelse. Ba har relativt stabil konsentrasjon i hele sedimentkjernen. Hg har relativt stabile konsentrasjon varierende fra 0,015 til 0,021 mg/kg sediment, og med en svak økning mot toppen. Pb varierer fra 12,6 mg til 17,7 mg/kg sediment med høyst konsentrasjon ved 2-3 cm. Den svake økning av Pb mot toppen er sammenfallende med en tilsvarende økning i TOC. Det er derfor ikke mulig å si at det er skjedd ekstra tilførsel av Pb til det marine miljøet, men hellere at høyere konsentrasjon av organisk karbon kan ha ført til økt binding av Pb til sedimentert organisk karbon. For Hg sitt vedkommende er det en økning helt mot toppen av sedimentkjernen, noe som tyder på at det fremdeles tilføres langtransportert Hg i helt moderne tid. As har høyst konsentrasjon i den dypeste prøven ved 32-33 cm med 9,5 mg/kg sediment, og ellers svakt avtakende konsentrasjon mot toppen, med 4,6 mg/kg sediment øverst. Cd har høyst konsentrasjon ved 9-10 cm med 0,42 mg/kg sediment, hvilket er betydelig høyere konsentrasjon enn de øvrige 6 analyserte prøvene fra kjernen. Markante skift i konsentrasjon i de øverste 10 cm fra under deteksjonsgrensen på 0,10 mg/kg sediment til 0,42 mg/kg sediment kan sannsynligvis knyttes til prosesser i sedimentene som fører til mobilisering og utfelling av Cd. Den målte konsentrasjon på 0,42 mg/kg sediment er den høyste målte konsentrasjon av samtlige analyserte prøver fra de 8 sedimentkjerner.

Tabell 12. Sedimentkjerne R2270MC013 (0-33 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium. i.d.: ikke data.

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	3,9	79,7	<0,1	31,6	10,1	0,015	22,4	12,6	47,5
	Gns.	5,7	90,1	i.d.	45,5	15,6	0,018	32,0	15,4	67,4
	Med.	5,1	87,1	i.d.	45,3	15,9	0,019	32,8	15,9	69,1
	Max.	9,5	108,0	0,42	64,4	22,9	0,021	42,3	17,7	91,4



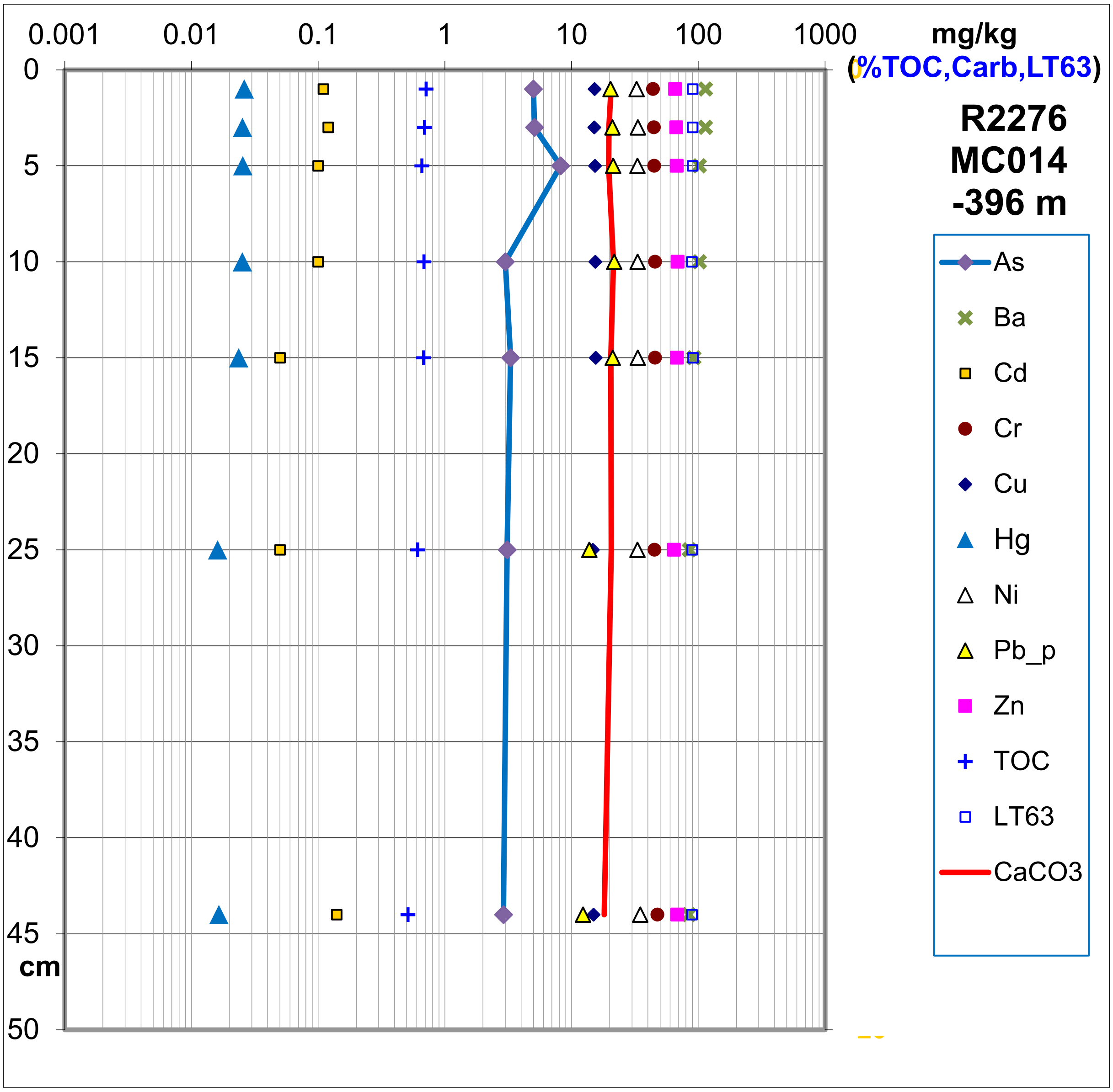
Figur 38. Tungmetall, arsen, barium, TOC, karbonat og finstoff i sedimentkjerne R2270MC013 (0 - 34 cm), Trænabanken. X-skalaen (konsentrasjon) er logaritmisk. Cd: halv deteksjonsgrense (0,05 mg/kg sediment) brukt for aktuelle prøver med analyseresultat under deteksjonsgrense på 0,1 mg/kg sediment. Årstallene til høyre er basert på ^{210}*Pb-dateringsanalysene presentert i avsnitt 5.3.4.*

R2276MC014, Sklinnadjupet

R2276 er lokalisert i Sklinnadjupet (Figur 1). Resultatene av metallanalysene i sedimentkjernen inkludert årstall fra dateringsanalysen er vist i Figur 39. Minimum, gjennomsnitt, medianverdi og maksimum-verdier er vist i Tabell 13. Det er relativ konstant andel finstoff i sedimentkjernen og gradvis økende TOC mot toppen. Barium og metallene Cr, Cu, Cr, Ni og Zn har relativ konstante nivåer som vist i Figur 39 og Tabell 13. Det tyder på at disse elementene er knyttet til sedimentene og har naturlig geologiske opprinnelse. Hg øker svakt fra bakgrunnsnivå på 0.016 mg/kg sediment dypere i sedimentkjernen til 0,023 – 0,026 mg/kg sediment i de øverste 4 prøvene (0-1 cm til 14-15 cm). Tilsvarende øker Pb fra et naturlig bakgrunnsnivå på mindre enn 15 mg/kg sediment fra bunnen av sedimentkjernen (24-25 cm og 43-44 cm) til mer enn 20 mg/kg sediment i de øverste 15 cm av sedimentkjernen. For Hg og Pb er den svake økningen med stor sannsynlighet knyttet til menneskelige kilder knyttet til forbrenning av kull, som fører til utslipp av Hg, og forbrenning av Pb fra blyholdig bensin. Pb minker litt i konsentrasjon i de øverste prøvene (Figur 39). For Hg er det en økning helt mot toppen av sedimentkjernen, hvilket tyder på at det fremdeles tilføres langtransportert Hg i moderne tid. As har en stabil konsentrasjon i intervallet 9-10 cm til 43-44 cm med et bakgrunnsnivå på ca. 3 mg/kg sediment i den nedre del av sedimentkjernen til 8,2 mg/kg sediment ved 4-5 cm og 5,0 mg/kg sediment i den øverste prøven (0-1 cm). Cd har lave nivåer varierende fra under deteksjonsgrensen på 0,1 mg/kg sediment til 0,14 mg/kg sediment (nederst i sedimentkjernen, 43-44 cm).

Tabell 12. Sedimentkjerne R2276MC014 (0-44 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium. i.d.: ikke data.

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	2,9	84,3	<0,10	44,0	14,7	0,016	32,6	12,3	64,4
	Gns.	4,4	99,1	i.d.	45,4	15,2	0,023	33,4	18,8	67,2
	Med.	3,3	102,0	i.d.	45,2	15,2	0,025	33,2	21,0	67,7
	Max.	8,2	114,0	0,14	47,6	15,5	0,026	34,2	21,7	68,8



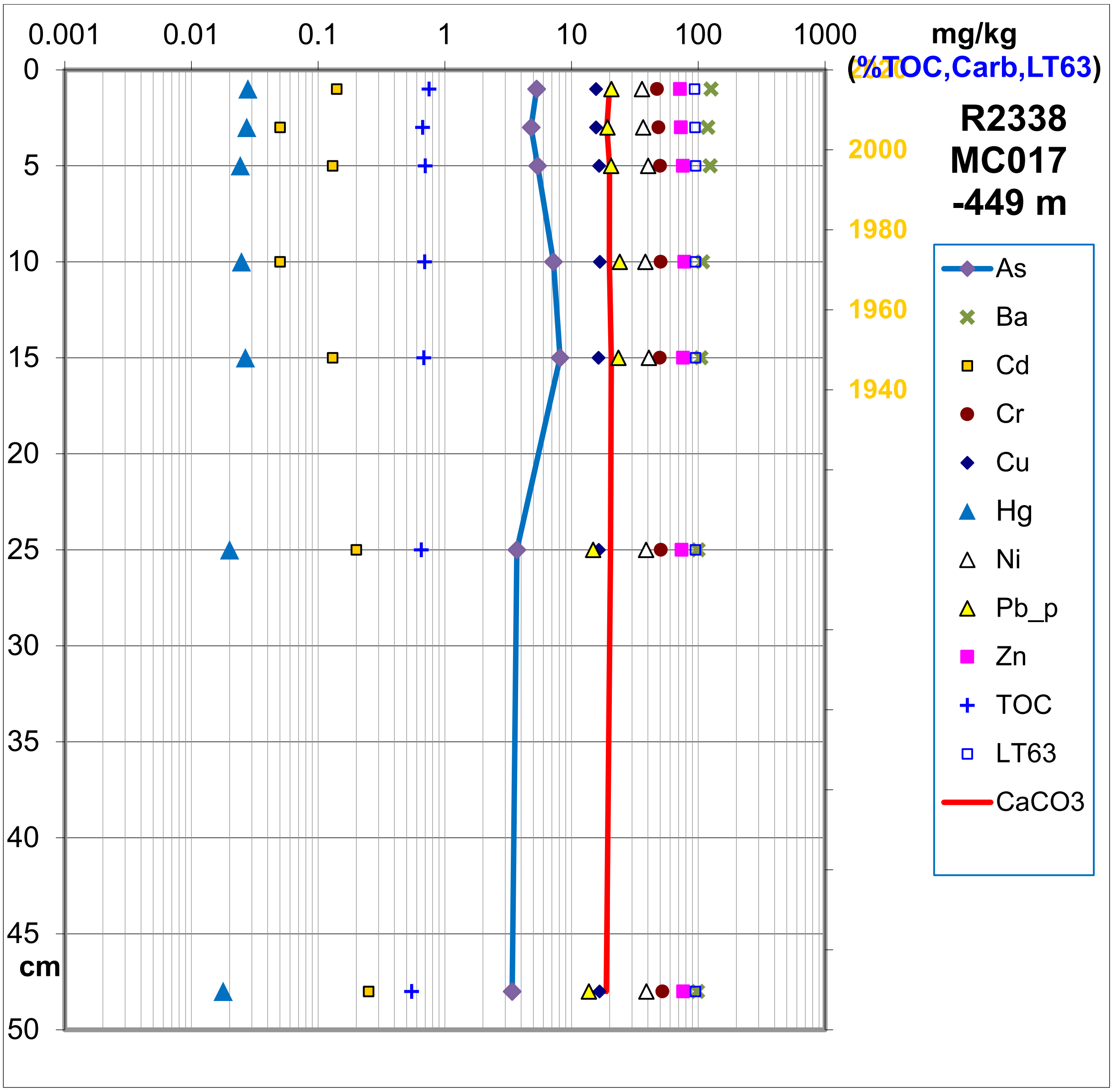
Figur 39. Tungmetall, arsen, barium, TOC, karbonat og finstoff i sedimentkjerne R2276MC014 (0 - 44 cm), Sklinnadjupet (konsentrasjon) er logaritmisk. Cd: halv deteksjonsgrense (0,05 mg/kg sediment) brukt for aktuelle prøver med analyseresultat under deteksjonsgrense på 0,1 mg/kg sediment.

R2338MC017, Sklinnadjupet vest

R2338 er lokalisert på nordflanken av Sklinnadjupet vest (Figur 1). Den 48 cm lange sedimentkjernen er datert med ^{210}Pb. Resultatene av metallanalysene inkludert årstall fra dateringsanalysen er vist i Figur 40. Det er relativ konstant andel finstoff og TOC gjennom sedimentkjernen. Barium og metallene Cr, Cu, Cr, Ni og Zn har relativ konstante nivåer som vist i Figur 40 og Tabell 13. Det tyder på at disse elementene er knyttet til sedimentene og har naturlig geologiske opprinnelse. Hg øker fra bakgrunnsnivå på ca. 0,020 mg/kg sediment nederst i sedimentkjernen (24-25 cm og 47-48 cm) til 0,025 – 0,028 mg/kg sediment i de 5 prøvene i de øverste 15 cm. Økningen i Hg skjer i intervallet 14-15 – 24-25 cm under overflaten, hvilket betyr at økningen har funnet sted engang før 1940 (5 cm) og litt tidligere enn 1900 (25 cm under overflaten). Tilsvarende øker Pb fra et naturlig bakgrunnsnivå på mindre enn 15 mg/kg sediment nederste 24-25 cm til 47-48 cm til 19 – 24 mg/kg sediment i de øverste 15 cm i sedimentkjernen. Økningen i Pb skjer sannsynligvis mellom 1900 og 1940 (Figur 40). For Hg og Pb er denne økningen i de siste årtiene med stor sannsynlighet knyttet til forbrenning av primært kull, som fører til utslipp av Hg, og utslipp av Pb fra blyholdig bensin. Pb minker litt i konsentrasjon i de øverste prøvene (Figur 40). Dette kan knyttes til at Pb ble fjernet fra bensin på 1970-tallet i en rekke vestlige industriland. For Hg er det en økning helt mot toppen av sedimentkjernen, hvilket tyder på at det fremdeles tilføres langtransportert Hg. As har varierende konsentrasjon fra 3,4 til 8,1 mg/kg sediment med høyst konsentrasjon ved 14-15 cm. Naturlig bakgrunnsnivå er mindre enn 5 mg/kg sediment. Cd varierer fra mindre enn 0,1 mg/kg sediment til 0,25 mg/kg sediment (nederst i sedimentkjernen), og med gradvis mindre Cd øverst. Den markante økningen skjer i intervallet mellom 4-5 cm og 9-10 cm.

Tabell 13. Sedimentkjerne R2338MC017 (0-48 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium. i.d.: ikke data.

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	3,4	98,7	<0,1	47,3	15,6	0,018	35,9	13,7	71,7
	Gns.	5,4	111,5	i.d.	49,8	16,2	0,024	38,5	19,5	74,8
	Med.	5,3	108,0	i.d.	50,0	16,4	0,025	38,7	20,5	75,8
	Max.	8,1	126,0	0,250	52,1	16,7	0,028	40,7	24,0	77,7



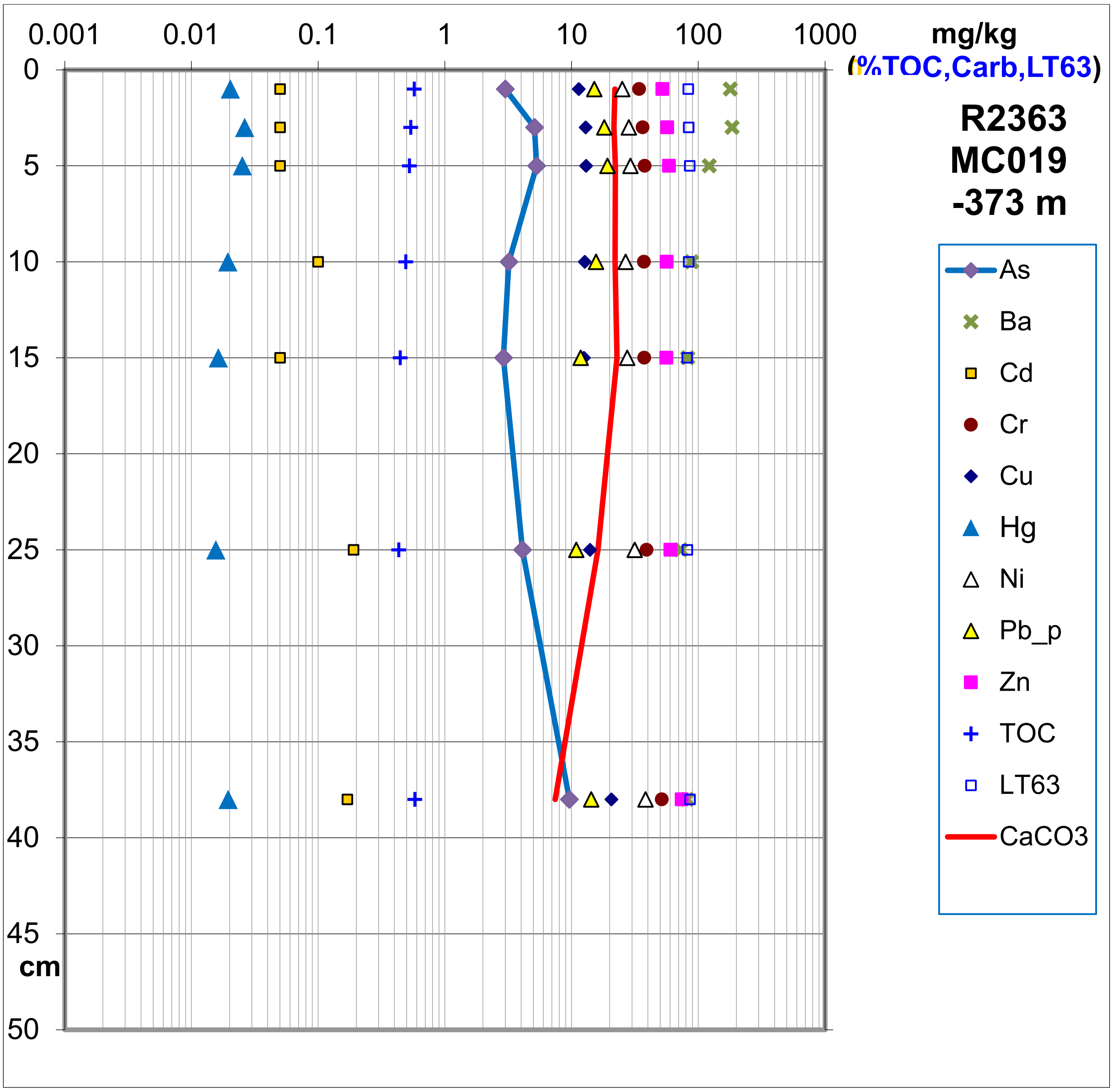
Figur 40. Tungmetall, arsen, barium, TOC, karbonat og finstoff i sedimentkjerne R2338MC017 (0 - 48 cm), Sklinnadjupet vest. X-skalaen (konsentrasjon) er logaritmisk. Cd: halv deteksjonsgrense (0,05 mg/kg sediment) brukt for aktuelle prøver med analyseresultat under deteksjonsgrense på 0,1 mg/kg sediment. Årstallene til høyre er basert på ^{210}Pb-dateringsanalysene presentert i avsnitt 5.3.4.

R2363MC019, Sklinnadjupet Norskehavet øst-vest transekt e

R2363 er lokalisert i Norskehavet øst-vest transekt e (Figur 1). Resultatene av metallanalysene i sedimentkjernen er vist i Figur 41. Det er relativ konstant andel finstoff i sedimentkjernen og gradvis økende TOC mot toppen. Metallene Cr, Cu, Cr, Ni og Zn har relativt konstante nivåer som vist i Figur 41 med litt avtakende konsentrasjoner øverst. Det tyder på at disse elementene er knyttet til sedimentene og har naturlig geologiske opprinnelse. Ba har relativt konstant konsentrasjon i de 4 nederste prøvene (9-33 cm) på mindre enn 90 mg/kg sediment. Konsentrasjonen dobles til ca. 180 mg/kg sediment i de øverste 2 prøvene (0-1 cm og 2-3 cm). Denne økning må knyttet til ekstraordinær tilførsel da ikke noen andre data tilsier markant endring i sedimentene som blir avsatt. Med antatt sedimentasjonsrate på 1 mm pr. år så kan økningen ha skjedd de siste 30 årene. Det er tidligere registrert høye Ba-konsentrasjoner i datert sedimentkjerne fra dette området (Jensen m. fl., 2016). Hg øker mot toppen av sedimentkjernen fra bakgrunnsnivå på mindre enn 0,020 mg/kg sediment i de nederste 4 prøvene (9-10 cm til 32-33 cm) til 0,026 mg/kg sediment ved 2-3 cm. Økningen i Hg skjer i intervallet 4-5 cm – 9-10 cm under overflaten, hvilket betyr at økningen har funnet sted engang mellom 1950 (5 cm) og litt tidligere enn 1900 (10 cm under overflaten). Dette svarer omtrent til andre observerte økninger i daterte sedimentkjerner fra dette havområde (Jensen m. fl., 2014). Pb øker fra et naturlig bakgrunnsnivå på 10-15 mg/kg sediment i de nederste 4 prøvene (9-33 cm) til i underkant av 20 mg/kg sediment i 2 prøver ved 2-5 cm og avtar til 15,6 mg/kg sediment øverst. For Hg og Pb er økningen med stor sannsynlighet knyttet til forbrenning av kull, som fører til utslipp av Hg, og forbrenning av Pb fra blyholdig bensin. Pb minker litt i konsentrasjon i de øverste prøvene (Figur 41). Dette kan knyttes til at Pb ble fjernet fra bensin på 1970-tallet i en rekke vestlige industriland. For Hg sitt vedkommende er det en økning helt mot toppen av sedimentkjernen, hvilket tyder på at det fremdeles tilføres langtransportert Hg. As har en markant økning fra et naturlig bakgrunnsnivå på mindre enn 10 mg/kg sediment i den nedre del av sedimentkjernen til mer enn 50 mg/kg sediment i prøven 2-3 cm under toppen og 21,5 mg/kg sediment i den øverste prøven. Den markante økning skjer i intervallet mellom 4-5 cm og 9-10 cm.

Tabell 14. Sedimentkjerne R2363MC019 (0-38 cm): minimums-, gjennomsnitts-, median- og maksimumsverdier for tungmetaller, arsen og barium. i.d.: ikke data.

Antall prøver		As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
N = 7	Min.	2,9	72,9	<0,1	34,2	11,4	0,016	25,1	10,9	52,2
	Gns.	4,7	116,0	i.d.	39,1	13,9	0,020	29,1	15,0	59,3
	Med.	4,1	88,8	i.d.	37,5	12,9	0,020	28,3	15,1	57,0
	Max.	9,6	185,0	0,19	51,6	20,6	0,026	38,3	19,2	74,1



Figur 41. Tungmetall, arsen, barium, TOC, karbonat og finstoff i sedimentkjerne R2363MC019 (0 - 38 cm), Norskhavet øst-vest transekt e. X-skala (konsentrasjon) er logaritmisk. Cd: halv deteksjonsgrense (0,05 mg/kg sediment) brukt for aktuelle prøver med analyseresultat under deteksjonsgrense på 0,1 mg/kg sediment.

5.5 Mikroplast i 3 sedimentkjerner

Det er analysert for innhold av mikroplast i 3 sedimentkjerner, R2270 (Trænabanken), R2338 (Sklinnadjupet vest) og R2363 (Norskehavet øst-vest transekt e). Tabell 15 viser prøver og antall MP-partikler i de analyserte prøvene.

Tabell 15. Mikroplast i 3 sedimentkjerner R2270 (Trænabanken), R2338 (Sklinnadjupet vest) og R2363 (Norskehavet øst-vest transekt e).

	Dybde i kjernen	Antall MP-partikler/kg sediment
R2270MC013	0-2 cm	867
	2-4 cm	725
	4-6 cm	0
	6-8 cm	1084
	8-10 cm	133
R2338MC017	0-2 cm	301
	2-4 cm	352
	4-6 cm	292
	6-8 cm	179
	8-10 cm	41
	20-22 cm	281
R2363MC019	0-2 cm	992
	2-4 cm	1579
	4-6 cm	1064
	6-8 cm	1055
	8-10 cm	654

R2270 har høyest andel MP ved 6-8 cm dybde, mens det også er relativ stor andel MP i de to øverste prøvene. Det høye antal MP ved 6-8 cm kan skyldes bioturbasjon, som har trukket sediment fra overflaten ned i dypere lag. Anomalien i ^{137}Cs-konsentrasjon ved 7-8 cm kan også skyldes bioturbasjon, som har dradd ^{137}Cs dypere ned i sedimentene (Kap. 5.3.4). De andre kjernene (R2338 og R2363) har høyest andel mikroplast i nivået 2-4 cm under overflaten (Figur 42). I lavere nivå reduseres antall MP i alle tre sedimentkjerner, noe som kan tyde på økende tilførsel av MP i de senere årene. Det er imidlertid bemerkelsesverdig at det er et høyt antall MP på 281 MP/kg sediment ved 20-22 cm i R2338. Dette nivået tilsvarer omtrent 1920 eller tidligere, altså før plast ble benyttet i stor skala. En mulig forklaring kan være bioturbasjon som har dradd MP ned i dypere nivå. R2363 har en fordeling av MP som viser økt tilførsel i de senest avsatte sedimentene. Det stemmer godt med økt bruk og tilførsel av plast til det marine miljøet (www.blueoceansociety.org). Det relativt høye antall MP-partikler (Tabell 15) ved 8-10 cm sammenlignet med prøvene øverst i sedimentkjernen kan tyde på at bioturabasjon spiller en rolle for omfordeling av MP, slik at de blir ført dypere ned i sedimentene. Vi har ikke dateringsdata for R2363, men det er rimelig å anta at sedimentasjonsraten er på nivå med de andre daterte sedimentkjernene i området (Tabell 7, avsnitt 5.3.4), dvs. 1-2 mm/år. Da er intervallet 8 – 10 cm avsatt i et tidsrom på mellom 80 –

100 år (1 mm/år) og 40 – 50 år (2 mm/år), og da mest sannsynlig nærmere 80 -100 år (1920 – 1940), altså før plast ble tatt i større bruk.

Det er tydelige forskjeller i antall MP-partikler mellom de 3 sedimentkjernene, med klart størst antall MP-partikler i R2363, fulgt av R2270 og R2338 (Tabell 15). Det tyder på en klar forskjell i tilførsel av partikler til sedimentene på de 3 stasjonene. Det er flest forskjellige typer MP-partikler i prøver med høyt antall partikler, dvs. i R2363 og enkelte nivåer i R2270, mens det i R2338, med færrest antall MP-partikler, også er færrest forskjellige typer partikler (Tjønneland, 2021, Vedlegg 5).

Dateringene av R2270 og R2338 viser at MP-partikler finnes tilbake før introduksjon av plast; henholdsvis 1930-tallet i R2270 og tidlig 1900-tallet i R2338 (NGI rapport i Vedlegg 5). At det er MP-partikler i sedimenter avsatt før plast ble introdusert fra 1950-tallet skyldes trolig at bioturbasjon har «trukket» partikler ned i dypere sjikt i vertikale eller skrå graveganger. Vertikale gravegange på mer enn 20 cm er observert i R2270 (kapittel 5.3.1).

6. OPPSUMMERING

Tungmetallkonsentrasjoner i overflatesedimenter fra Frøyabanken, Sulatrekanten, Haltenbanken, Sklinnadjupet, Sklinnadjupet vest, Norskehavet øst-vest transekter d og e, Trænabanken og Trænadjupet fra i alt 16 prøvetakingsstasjoner er analysert. Metallene Cd, Cu, Cr, Hg, Pb, Zn og As er til stede i lave konsentrasjoer tilsvarende tilstandsklasse I (bakgrunn). Ni er til stede i lave til litt høyere konsentrasjoner tilsvarende tilstandsklasse I (bakgrunn) og II (god) for noen prøver fra Sklinnadjupet, Sklinnadjupet vest og Norskehavet øst-vest transekt. Ba er analysert i overflatesedimentene. Her er det ikke angitt noen tilstandsklasse, men Ba er viktig å analysere som en indikator utslipp fra olje-/gass boreaktiviteter.

^{137}Cs fra 5 daterte sedimentkjerner viser stor variasjon i konsentrasjon i overflateprøvene, varierende fra 0 Bq/kg sediment i prøve fra Frøyabanken til 9 Bq/kg sediment i prøve fra Trænadjupet.

Åtte analyserte sedimentkjernene fra Frøyabanken, Sulatrekanten, Haltenbanken, Trænadjupet, Trænabanken, Sklinnadjupet, Sklinnadjupet vest og Norskehavet transekt øst – vest viser lave tungmetall- og As-konsentrasjoner gjennom hele kjernene. Hg og Pb viser en svak økning fra ca. år 1900 øverst i kjernene, men fremdeles med konsentrasjoner i tilstandsklasse I (bakgrunn) i Miljødirektoratets klassifikasjonssystem. De øvrige tre sedimentkjernene som ikke er datert har også økende Hg og Pb i øverste del, men fortsatt lave metallkonsentrasjoner (Cd, Cr, Cu, Hg, Ni, Pb, og Zn) og As tilsvarende tilstandsklasse I. Cd har lavere konsentrasjoner i toppen av kjernene (<0,10-0,15 mg/kg sediment) enn i dypere lag (maksimalt 0,42 mg/kg sediment i sedimentkjernen fra Trænabanken).

Ba øker mot toppen i flere av sedimentkjernene, med mest økning i R2139 på Frøyabanken og R2363 fra Norskehavet øst-vest transekt vest, mens det for de øvrige stasjonene er tale om mindre økning mot toppen. ^{210}Pb-dateringene viser at økningen starter på 1980-tallet. Det er sannsynlig at Ba er tilført sedimentene som barytt fra boreslam fra olje/gass boringer i Norskehavet eller Ba fra utslipp av formasjonsvæske. Det er tidligere registrert en slik økning i Ba i topplagene i Norskehavet (Jensen m. fl., 2016). TOC-verdiene er mindre enn 1 vektprosent i samtlige analyserte kjerner, mens kornstørrelsen er overveiende sandholdig silt. Litt grovere sedimenter finnes på Frøyabanken der vi finner siltholdig sand.

Det er registrert mikroplast i samtlige 11 overflateprøver (0-2 cm), varierende fra 51 MP-partikler/kg sediment i Trænadjupet til 2187 MP-partikler/kg sediment på Frøyabanken. Tre sedimentkjerner fra Trænabanken, Sklinnadjupet vest og Norskehavet øst-vest transekt vest viser at det er mikroplast et stkke nedover i kjernene. Antall MP-partikler avtar med dypet med unntak av kjernen fra Trænabanken, der det er et høyere antall MP-partikler i et dypere lag. Dette kan muligens skyldes bioturbasjon der gravende organismer har ført MP-partikler dypere ned i sedimentene.

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Vedlegg 1

Prøveliste og analyseresultater. Kornstørrelsesfordeling (Coulter analyse), Leco (total S, total C, organisk C samt karbonat (beregnet)), HNO_3-ekstrahert og analysert med ICP-OES og CV-AAS (Hg) ved NGU-Laboratorier. Naturlige standarder Hynne, Nordkyn og Tana er inkludert i prøvelistene.

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Kornfordelingsanalyser: Coulter laser partikkelteller
GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031

NORSK AKKREDITERING TEST 020

INSTRUMENT: **Coulter LS 13320**

METODE: **Metodeoppsettet er beskrevet i LABdok_K01: Kornfordelingsanalyse: metode basert på laser partikkelteller, måleområdet 0.400 µm - 2000 µm.**

Kornfordelingsbestemmelse basert på laserdiffraksjon. Laserlys brytes i ulike vinkler avhengig av størrelsen på partiklene, og registreres så av en rekke detektorer.
De registrerte vinklene tilsvarer gitte partikkelstørrelser, og antall partikler er relatert til den intensiteten som den korresponderende detektoren registrerer.
Kornfordelingen bestemmes således på volum-basis, med antagelse om ens tetthet på materialet vil kumulativ volum% være identisk med kumulativ masse%.

Beregning på volum/masse-basis er basert på antagelse om sfæriske partikler.

MÅLEOMRÅDE : Måleområdet varierer avhengig av type detektorer som benyttes under målinger. Til vanlig gjøres målingene i området 0.4 µm - 2000 µm*.
Måleområdet kan på forespørsel utvides til 0.017 µm - 2000 µm ved hjelp av den såkalte PIDS-detektoren. Dette området omfattes ikke av akkreditering.
NB! Metoden normaliserer alle data i måleområdet til sum 100 % (kumulativ %), hvor den laveste målegrensen settes som nullpunkt mht. kumulativ %.
Hvis prøvene inneholder materiale finere enn det laveste målegrense, er disse ikke detekterbare og dermed ikke tatt i beregning av kumulativ %.

***omfattes av akkreditering**

ANALYSEUSIKKERHET: **± 10 % [kumulativ masse(volum) %]** *Usikkerheten er oppgitt med dekningsfaktor 2, tilsvarende et konfidensintervall på 95 %*
Bestemmelse av usikkerhet er basert på sammenligning av oppnådde resultater med sertifikatverdier for kvartsstandard BCR-131, samt presisjonsdata.
MERK! Metoden tar utgangspunkt i antagelse om sfæriske partikler. For prøver som avviker fra dette kan usikkerheten være større.

PRESISJON: **Det analyseres rutinemessig kontrollprøver som føres i kontrolldiagram (X-diagram). Disse kan forevises om ønskelig.**

Analysekontrakt nr.: 2021.0031 **Prøvetype/prøvematrise:** GEOLOGISK MATERIALE/sediment
Antall prøver: 121
Prøveforbehandling: Ganske mange av prøvene inneholdt mye finstoff og hadde sammenkittet materiale som var vanskelig å løsne. Disse ble bløtlagt og frysetørket på nytt. Dette gjelder prøvene med løpenr 5, 6, 12, 14-25, 28-41, 55, 58-62, 66-71, 76-87, 88-106, 107-118.

Anmerkninger: Ingen

Delrapport som består av forside med informasjon om metode ("Forside_Coulter"), sider med analysedata ("Data") og tilleggsinformasjon ("Prove_info").
Fullstendig analyserapport finnes kun i papirformat. Gjengivelse av analysedata skal skje på en slik måte at meningsinnholdet i rapporten ikke endres.
For informasjon om metode for databeregning (Optical Mode) og statistiske parametre henvises til arket Prove_info.

Forbehandlet av:	Marit Sigrid Halle
Rapportert av:	Marit Sigrid Halle

Forbehandling fullført (dato):	07.04.2021
Analysert fullført (dato):	12.04.2021

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Kornfordelingsanalyser: Coulter laser partikkelteller
GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031

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File ID:	21.0031_001_Hynne#1	21.0031_002_MINN#1	21.0031_003_TANA#1	21.0031_004#2	21.0031_005#2	21.0031_006#1	21.0031_007#1	21.0031_008#1	21.0031_009#1	21.0031_010#1	21.0031_011#2	21.0031_012#2	21.0031_013#1
Sample ID:	21.0031_Hynne_40107	21.0031_MINN_Split 1	21.0031_TANA (2)	21.0031_188003_R2132MC006A 0-1 cm	21.0031_188042_R2139MC008A 0-1 cm	21.0031_188044_R2139MC008A 2-3 cm	21.0031_188046_R2139CMC008A 4-5 cm	21.0031_188051_R2139CMC008A 9-10 cm	21.0031_188056_R2139CMC008A 14-15 cm	21.0031_188066_R2139CMC008A 24-25 cm	21.0031_188070_R2139CMC008A 28-29 cm	21.0031_188076_R2183MC009A 0-1 cm	21.0031_188078_R2183MC009A 2-3 cm
Operator:	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH
Comment 1:	0,154 g + disp.middel, springvann	0,334 g + disp.middel, Springvann	0,140 g + disp.middel, Springvann	0,451 g + disp.middel, springvann	0,182 g + disp.middel, springvann	0,185 g + disp.middel, springvann	0,185 g + disp.middel, springvann	0,186 g + disp.middel, springvann	0,187 g + disp.middel, springvann	0,189 g + disp.middel, springvann	0,191 g + disp.middel, springvann	0,150 g + disp.middel, springvann	0,151 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	ultralyd, probe 2 (naken), 5 ampl-5 min,Fraunhofer	ultralyd, Probe 2 (naken), 5 ampl-5 min	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Instrument:	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module
Run number:	4	4	4	4	4	4	4	4	4	4	4	4	4
Start time:	19.03.2021	19.03.2021	19.03.2021	19.03.2021	19.03.2021	19.03.2021	19.03.2021	19.03.2021	19.03.2021	19.03.2021	22.03.2021	22.03.2021	22.03.2021
Run length:	60	60	60	60	60	60	60	60	60	60	60	60	60
Optical model:	Leire-1-65.rf780d	Fraunhofer.rf780d	Fraunhofer.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d
Obscuration:	10	10	10	10	9	10	10	9	9	9	9	10	10
PIDS Obscur:													
Obscuration:	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Serial Number:	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834
From	0.375	0.38	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
To	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Volume	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean:	60.71	68.7	37.6	76.64	40.09	38.25	36.94	38.97	40.26	38.76	39.15	28.69	28.62
Median:	17.54	43.7	17.04	77.81	35.64	32.87	30.61	34.09	36.02	34.41	34.48	20.08	19.77
D(3,2):	7.245	14.53	3.847	18.36	9.362	8.708	8.344	9.186	9.928	9.632	9.578	6.838	6.774
Mean/Median ratio:	3.462	1.57	2.207	0.985	1.125	1.164	1.207	1.143	1.118	1.126	1.135	1.429	1.448
Mode:	9.37	55.1	87.9	96.49	55.13	55.13	55.13	55.13	55.13	50.22	50.22	41.68	41.68
S.D.:	109.1	95.86	45.03	42.84	32.08	31.97	32.18	31.6	31.18	30.23	30.98	27.82	28.44
Variance:	11893	9.19E+03	2028	1835	1.03E+03	1022	1036	998.7	972.3	913.7	959.7	773.9	808.7
C.V.:	179.6	139.60	119.8	55.9	80.03	83.58	87.12	81.1	77.44	77.99	79.13	96.96	99.36
Skewness:	3.389	4.74	1.461	0.102	0.903	0.969	1.122	0.936	0.865	0.864	0.952	1.401	1.589
Kurtosis:	13.17	31.19	1.537	-0.407	0.718	0.778	1.393	0.756	0.572	0.502	0.822	2.159	3.314
d10:	2.504	8.24	1.14	11.43	3.366	3.022	2.864	3.318	3.781	3.64	3.587	2.313	2.29
d50:	17.54	43.68	17.04	77.81	35.64	32.87	30.61	34.09	36.02	34.41	34.48	20.08	19.77
d90:	155	136.70	107.5	131.9	83.39	82.03	80.79	81.97	82.61	80.35	81.1	67.8	67.31
Specific Surf. Area:	8281	4130.00	15595	3268	6409	6890	7190	6532	6044	6229	6264	8774	8857
%<	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
10	2.5	8.24	1.14	11.4	3.37	3.02	2.86	3.32	3.78	3.64	3.59	2.31	2.29
25	6.01	20.10	3.8	47.2	11.7	9.91	8.93	11.2	13.4	12.7	12.8	6.29	6.18
50	17.5	43.70	17	77.8	35.6	32.9	30.6	34.1	36	34.4	34.5	20.1	19.8
75	65.4	80.60	59.1	106	60	57.8	56	58.4	59.4	57.3	57.5	43.3	42.9
90	155	137.00	108	132	83.4	82	80.8	82	82.6	80.4	81.1	67.8	67.3

File name:	21.0031_014#1_04.$ls	21.0031_015#1_04.$ls	21.0031_016#1_04.$ls	21.0031_017#1_04.$ls	21.0031_018#1_04.$ls	21.0031_019#2_04.$ls	21.0031_020#1_04.$ls	21.0031_021#1_04.$ls	21.0031_022#1_04.$ls	21.0031_023#1_04.$ls	21.0031_024#2_04.$ls	21.0031_025#1_04.$ls	21.0031_026_Hynne#1_04.$ls
File ID:	21.0031_014#1	21.0031_015#1	21.0031_016#1	21.0031_017#1	21.0031_018#1	21.0031_019#2	21.0031_020#1	21.0031_021#1	21.0031_022#1	21.0031_023#1	21.0031_024#2	21.0031_025#1	21.0031_026_Hynne#1
Sample ID:	21.0031_188080_R2183MC009A 4-5 cm	21.0031_188085_R2183MC009A 9-10 cm	21.0031_188090_R2183MC009A 14-15 cm	21.0031_188100_R2183MC009A 24-25 cm	21.0031_188110_R2183MC009A 34-35 cm	21.0031_188123_R2229MC009A 0-1 cm	21.0031_188125_R2229MC009A 2-3 cm	21.0031_188127_R2229MC009A 4-5 cm	21.0031_188132_R2229MC009A 9-10 cm	21.0031_188137_R2229MC009A 14-15 cm	21.0031_188147_R2229MC009A 24-25 cm	21.0031_188153_R2229MC009A 30-31 cm	21.0031_Hynne_40107
Operator:	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH
Comment 1:	0,151 g + disp.middel, springvann	0,151 g + disp.middel, springvann	0,151 g + disp.middel, springvann	0,151 g + disp.middel, springvann	0,151 g + disp.middel, springvann	0,188 g + disp.middel, springvann	0,188 g + disp.middel, springvann	0,190 g + disp.middel, springvann	0,190 g + disp.middel, springvann	0,191 g + disp.middel, springvann	0,241 g + disp.middel, springvann	0,240 g + disp.middel, springvann	0,154 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Instrument:	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module
Run number:	4	4	4	4	4	4	4	4	4	4	4	4	4
Start time:	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021	22.03.2021
Run length:	60	60	60	60	60	61	60	60	61	60	60	60	60
Optical model:	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d
Obscuration:	10	10	9	9	9	10	9	10	9	10	10	8	9
PIDS Obscur:													
Obscuration:	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Serial Number:	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834
From	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
To	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Volume	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean:	29.34	30.89	32.41	31.81	31.47	37.09	39.32	40.5	38.4	39.03	45.59	50.99	68.66
Median:	21.2	22.83	24.09	25.18	24.47	28.53	31.21	32.69	30.52	30.74	38.19	44.09	18.15
D(3,2):	7.056	7.23	7.506	7.772	7.539	8.638	9.141	9.39	9.129	9.057	10.67	12.67	7.38
Mean/Median ratio:	1.384	1.353	1.346	1.263	1.286	1.3	1.26	1.239	1.258	1.27	1.194	1.157	3.783
Mode:	41.68	41.68	41.68	45.75	41.68	45.75	50.22	50.22	45.75	45.75	55.13	60.52	9.37
S.D.:	27.98	29.67	33.88	28.21	28.97	34.7	35.38	36.22	34.45	35.36	38.15	39.91	132.4
Variance:	782.8	880.5	1148	795.8	839.2	1204	1252	1312	1187	1250	1455	1593	17530
C.V.:	95.36	96.07	104.5	88.68	92.06	93.55	89.98	89.43	89.72	90.59	83.68	78.26	192.8
Skewness:	1.417	1.576	3.049	1.222	1.439	1.537	1.402	1.391	1.431	1.436	1.226	1.147	3.5
Kurtosis:	2.515	3.587	19.28	1.708	2.769	2.866	2.297	2.268	2.491	2.424	1.652	1.454	13.31
d10:	2.396	2.453	2.574	2.698	2.58	3.108	3.354	3.278	3.404	3.338	4.234	5.801	2.552
d50:	21.2	22.83	24.09	25.18	24.47	28.53	31.21	32.69	30.52	30.74	38.19	44.09	18.15
d90:	68.4	70.61	71.59	70.69	69.75	82.42	86.18	88.26	83.57	85.67	96.57	104.6	163.5
Specific Surf. Area:	8503	8299	7993	7720	7958	6946	6564	6390	6573	6625	5622	4737	8130
%<	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
10	2.4	2.45	2.57	2.7	2.58	3.11	3.35	3.28	3.4	3.34	4.23	5.8	2.55
25	6.65	7.02	7.58	8.18	7.8	9.76	11	11.3	11	11	15.1	20.4	6.13
50	21.2	22.8	24.1	25.2	24.5	28.5	31.2	32.7	30.5	30.7	38.2	44.1	18.2
75	44.3	46.3	47	47.9	46.8	53.2	56.7	57.9	55.2	56.1	65.1	71.1	68.5
90	68.4	70.6	71.6	70.7	69.7	82.4	86.2	88.3	83.6	85.7	96.6	105	164

Particle Diameter	21.0031_001_Hynne#1_04.$ls	21.0031_002_MINN#1_04.$ls	21.0031_003_TANA#1_04.$ls	21.0031_004#2_04.$ls	21.0031_005#2_04.$ls	21.0031_006#1_04.$ls	21.0031_007#1_04.$ls	21.0031_008#1_04.$ls	21.0031_009#1_04.$ls	21.0031_010#1_04.$ls	21.0031_011#2_04.$ls	21.0031_012#2_04.$ls	21.0031_013#1_04.$ls
um	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <
0.4	0	0.014	0.12	0.0042	0.004	0.0022	0.0012	0.0039	0.0052	0.0055	0.0055	0	0
0.5	0	0.120	0.98	0.036	0.032	0.019	0.01	0.033	0.044	0.047	0.047	0.00057	0.00054
1	0.66	1.100	8.3	0.67	1.110	1.14	1.14	1.13	1.1	1.14	1.17	1.27	1.28
1.5	3.6	1.910	13.4	1.75	3.350	3.66	3.8	3.4	3.12	3.22	3.31	4.67	4.72
2	7.05	2.540	16.9	2.78	5.590	6.18	6.48	5.67	5.1	5.28	5.4	8.17	8.27
5	21.1	5.850	29.2	6.33	13.900	15.4	16.4	14.2	12.6	13	13	20.9	21.1
10	37.1	12.300	41	9.38	22.700	25.1	26.8	23.4	20.7	21.4	21.3	34.3	34.7
15	46.6	18.80	47.8	11.3	28.70	31.5	33.5	29.6	26.7	27.7	27.6	43	43.4
20	52.7	24.80	52.8	12.9	33.80	36.7	38.9	34.9	32.1	33.3	33.2	49.9	50.3
25	57	30.60	56.8	14.6	38.70	41.7	44.1	40.1	37.4	38.9	38.8	56	56.4
50	70.1	55.50	71.5	26.7	65.50	67.8	69.7	67.1	65.8	67.8	67.7	80.2	80.5
60	73.4	63.20	75.3	33.9	75.00	76.7	78.1	76.3	75.5	77.3	77.1	86.3	86.6
63	74.3	65.20	76.4	36.3	77.60	79.1	80.4	78.8	78.1	79.8	79.6	87.9	88.2
70	76.3	69.60	78.9	42.5	82.80	83.9	84.9	83.8	83.3	84.7	84.5	90.9	91.1
75	77.6	72.30	80.6	47.3	85.80	86.7	87.5	86.7	86.3	87.5	87.2	92.6	92.7
90	81	78.90	85.4	61.8	92.40	92.8	93.1	92.9	92.7	93.5	93.1	96.2	96.1
100	82.9	82.3	88.2	70.6	95.1	95.3	95.5	95.4	95.3	95.9	95.4	97.6	97.4
125	86.7	88.2	93.5	86.9	98.4	98.4	98.4	98.5	98.6	98.9	98.5	99.2	99
150	89.5	91.6	96.9	95.4	99.5	99.6	99.4	99.6	99.7	99.8	99.7	99.8	99.6
170	91.2	93.4	98.4	98.3	99.9	99.9	99.8	99.9	99.9	99.97	99.9	99.9	99.8
180	91.9	94.1	99	99.1	99.9	99.96	99.9	99.96	99.98	99.99	99.98	99.98	99.9
200	92.9	95.1	99.6	99.8	99.99	99.99	99.97	99.99	99.998	100	99.999	99.997	99.98
225	93.8	95.9	99.9	99.98	99.999	100	99.996	100	100	100	100	100	99.998
250	94.3	96.4	99.99	99.999	100	100	100	100	100	100	100	100	100
400	97	98.2	100	100	100	100	100	100	100	100	100	100	100
500	98.3	98.9	100	100	100	100	100	100	100	100	100	100	100
750	99.9	99.6	100	100	100	100	100	100	100	100	100	100	100
1000	100	99.9	100	100	100	100	100	100	100	100	100	100	100
2000	100	100	100	100	100	100	100	100	100	100	100	100	100

Particle Diameter	21.0031_014#1_04.$ls	21.0031_015#1_04.$ls	21.0031_016#1_04.$ls	21.0031_017#1_04.$ls	21.0031_018#1_04.$ls	21.0031_019#2_04.$ls	21.0031_020#1_04.$ls	21.0031_021#1_04.$ls	21.0031_022#1_04.$ls	21.0031_023#1_04.$ls	21.0031_024#2_04.$ls	21.0031_025#1_04.$ls	21.0031_026_Hynne#1_04.$ls
um	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <
0.4	0	0.00061	0.0018	0.0028	0.0025	0.0029	0.0037	0	0.0045	0.0046	0.005	0.0056	0
0.5	0.00066	0.0049	0.015	0.024	0.022	0.024	0.031	0.00047	0.038	0.039	0.042	0.047	0
1	1.25	1.31	1.3	1.28	1.33	1.14	1.11	0.87	1.14	1.17	1.01	0.89	0.63
1.5	4.51	4.47	4.27	4.08	4.28	3.56	3.37	3.14	3.35	3.44	2.86	2.35	3.48
2	7.83	7.65	7.25	6.9	7.25	6	5.62	5.53	5.55	5.68	4.68	3.75	6.84
5	20	19.2	18.2	17.3	18	15.1	14	14.3	13.9	14	11.4	8.94	20.7
10	33	31.7	30.1	28.6	29.5	25.4	23.5	23.3	23.5	23.5	18.9	14.9	36.5
15	41.6	39.9	38.1	36.6	37.5	33	30.6	29.6	30.7	30.7	24.9	20	45.9
20	48.5	46.5	44.9	43.5	44.3	39.5	36.7	35.2	37.1	37	30.3	24.7	51.9
25	54.6	52.6	51.1	49.8	50.7	45.7	42.6	40.9	43.2	43.1	35.6	29.5	56.2
50	79.5	78	77.4	76.8	77.7	72.4	69.5	68.4	70.7	70.1	62.2	56.3	69.3
60	85.9	84.7	84.3	84.2	84.9	79.7	77.4	76.4	78.5	77.8	71.1	66.1	72.5
63	87.6	86.4	86.1	86.1	86.7	81.6	79.4	78.6	80.5	79.8	73.5	68.8	73.4
70	90.7	89.8	89.4	89.7	90.1	85.3	83.5	82.7	84.4	83.8	78.4	74.3	75.4
75	92.5	91.7	91.3	91.7	92	87.4	85.9	85.2	86.8	86.1	81.3	77.6	76.8
90	96.2	95.6	95.2	95.8	95.7	92	91.1	90.5	91.8	91.2	88	85.3	80.3
100	97.6	97.2	96.7	97.4	97.1	94	93.4	92.9	94	93.4	91	88.8	82.3
125	99.2	98.8	98.4	99.2	98.8	97	96.7	96.4	97.1	96.7	95.4	94.1	86.1
150	99.7	99.4	99.1	99.8	99.5	98.6	98.5	98.3	98.7	98.5	97.8	97.1	88.8
170	99.9	99.7	99.4	99.9	99.8	99.3	99.3	99.2	99.4	99.3	99	98.5	90.5
180	99.9	99.8	99.5	99.97	99.9	99.6	99.6	99.5	99.7	99.6	99.4	99.1	91.1
200	99.98	99.9	99.6	99.99	99.99	99.9	99.9	99.9	99.9	99.9	99.8	99.7	92
225	99.998	99.99	99.7	99.999	99.999	99.99	99.99	99.98	99.99	99.99	99.97	99.9	92.7
250	100	100	99.7	100	100	99.999	99.999	99.999	99.999	99.999	99.998	99.99	93.2
400	100	100	99.99	100	100	100	100	100	100	100	100	100	96
500	100	100	100	100	100	100	100	100	100	100	100	100	97
750	100	100	100	100	100	100	100	100	100	100	100	100	99.3
1000	100	100	100	100	100	100	100	100	100	100	100	100	99.996
2000	100	100	100	100	100	100	100	100	100	100	100	100	100

Kornfordelingsanalyser: Coulter laser partikkelteller
GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031

File name:	21.0031_027_MINN#1_04.$ls	21.0031_028#1_04.$ls	21.0031_029#1_04.$ls	21.0031_030#2_04.$ls	21.0031_031#1_04.$ls	21.0031_032#1_04.$ls	21.0031_033#1_04.$ls	21.0031_034#1_04.$ls	21.0031_035#2_04.$ls	21.0031_036#1_04.$ls	21.0031_037#1_04.$ls	21.0031_038#1_04.$ls	21.0031_039#1_04.$ls	21.0031_040#1_04.$ls	21.0031_041#1_04.$ls	21.0031_042#1_04.$ls	21.0031_043#1_04.$ls	21.0031_044#1_04.$ls	21.0031_045#1_04.$ls	21.0031_046#1_04.$ls	21.0031_047#1_04.$ls	21.0031_048#1_04.$ls	21.0031_049#2_04.$ls	21.0031_050#2_04.$ls	21.0031_051_Hynne#1_04.$ls	21.0031_052_MINN#1_04.$ls
File ID:	21.0031_027_MINN#1	21.0031_028#1	21.0031_029#1	21.0031_030#2	21.0031_031#1	21.0031_032#1	21.0031_033#1	21.0031_034#1	21.0031_035#2	21.0031_036#1	21.0031_037#1	21.0031_038#1	21.0031_039#1	21.0031_040#1	21.0031_041#1	21.0031_042#1	21.0031_043#1	21.0031_044#1	21.0031_045#1	21.0031_046#1	21.0031_047#1	21.0031_048#1	21.0031_049#2	21.0031_050#2	21.0031_051_Hynne#1	21.0031_052_MINN#1
Sample ID:	21.0031_MINN_Split 1	21.0031_188164_R2242MC012A 0-1 cm	21.0031_188166_R2242MC012A 2-3 cm	21.0031_188168_R2242MC012A 4-5 cm	21.0031_188173_R2242MC012A 9-10 cm	21.0031_188178_R2242MC012A 14-15 cm	21.0031_188188_R2242MC012A 24-25 cm	21.0031_188202_R2242MC012A 38-39 cm	21.0031_188208_R2270MC013A 0-1 cm	21.0031_188210_R2270MC013A 2-3 cm	21.0031_188212_R2270MC013A 4-5 cm	21.0031_188217_R2270MC013A 9-10 cm	21.0031_188222_R2270MC013A 14-15 cm	21.0031_188232_R2270MC013A 24-25 cm	21.0031_188241_R2270MC013A 32-33 cm	21.0031_188246_R2276MC014A 0-1 cm	21.0031_188248_R2276MC014A 2-3 cm	21.0031_188250_R2276MC014A 4-5 cm	21.0031_188255_R2276MC014A 9-10 cm	21.0031_188260_R2276MC014A 14-15 cm	21.0031_188270_R2276MC014A 24-25 cm	21.0031_188289_R2276MC014A 43-44 cm	21.0031_188293_R2279BC060 0-1 cm	21.0031_188294_R2289MC015A 0-1 cm	21.0031_Hynne_40107	21.0031_MINN_Split 1
Operator:	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH
Comment 1:	0,335 g + disp.middel, Springvann	0,157 g + disp.middel, springvann	0,156 g + disp.middel, springvann	0,130 g + disp.middel, springvann	0,129 g + disp.middel, springvann	0,128 g + disp.middel, springvann	0,129 g + disp.middel, springvann	0,128 g + disp.middel, springvann	0,184 g + disp.middel, springvann	0,184 g + disp.middel, springvann	0,184 g + disp.middel, springvann	0,184 g + disp.middel, springvann	0,158 g + disp.middel, springvann	0,159 g + disp.middel, springvann	0,125 g + disp.middel, springvann	0,155 g + disp.middel, springvann	0,153 g + disp.middel, springvann	0,150 g + disp.middel, springvann	0,147 g + disp.middel, springvann	0,144 g + disp.middel, springvann	0,140 g + disp.middel, springvann	0,136 g + disp.middel, springvann	0,183 g + disp.middel, springvann	0,153 g + disp.middel, springvann	0,154 g + disp.middel, springvann	0,334 g + disp.middel, springvann
Comment 2:	ultralyd, probe 2 (naken), 5 ampl-5 min,Fraunhofer	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Instrument:	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module
Run number:	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Start time:	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	23.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021
Run length:	60	60	60	60	61	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	61	60	60	60
Optical model:	Fraunhofer.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Fraunhofer.rf780d
Obscuration:	11	11	12	11	10	10	10	10	10	11	11	12	10	12	11	11	11	12	11	11	11	12	10	10	10	11
PIDS Obscur:																										
Obscuration:	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Serial Number:	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834
From	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
To	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Volume	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean:	76.2	29.17	25.33	26.7	25.28	25.53	25.47	27.2	47.44	39.06	38.93	42.17	41.88	30.79	23.07	26.02	25.87	25.53	29.03	24.77	28.44	27.33	46.35	32.75	65.48	57.75
Median:	44.17	16.02	14.22	13.99	14.42	13.87	14.15	15.33	31.31	26.17	25.75	20.14	21.36	13.62	11.5	15.42	15.65	15.38	15.61	14.6	15.83	13.55	34.49	18.91	18.65	42.4
D(3,2):	14.68	6.352	6.038	6.059	6.161	6.003	6.016	6.11	8.704	7.948	7.944	7.081	7.316	6.07	5.55	6.184	6.244	6.168	6.202	6.086	6.211	5.993	8.669	6.694	7.418	14.18
Mean/Median ratio:	1.725	1.821	1.781	1.908	1.754	1.841	1.8	1.775	1.515	1.492	1.512	2.094	1.961	2.261	2.005	1.687	1.653	1.66	1.86	1.696	1.797	2.017	1.344	1.732	3.512	1.362
Mode:	55.14	34.58	31.5	31.5	31.5	31.5	31.5	31.5	66.44	55.13	55.13	34.58	34.58	10.29	10.29	31.5	34.58	34.58	34.58	31.5	31.5	34.58	80.07	37.97	9.37	55.14
S.D.:	130.4	39.27	29.7	37.72	29.55	33.62	30.33	31.15	54.15	39.67	40.07	58.44	52.09	44.07	32.33	29.62	28.6	28.18	41.66	27.97	39.29	38.3	42.96	40.79	122.1	58.34
Variance:	17013	1542	882.3	1422	873.5	1130	919.9	970.1	2933	1574	1605	3415	2714	1943	1045	877.2	818.1	794.3	1735	782.5	1543	1467	1846	1664	14915	3403
C.V.:	171.2	134.6	117.3	141.3	116.9	131.7	119.1	114.5	114.2	101.6	102.9	138.6	124.4	143.1	140.2	113.8	110.6	110.4	143.5	112.9	138.1	140.1	92.7	124.6	186.5	101
Skewness:	5.449	3.778	2.218	4.106	2.263	3.716	2.251	1.91	2.678	1.45	1.513	2.944	2.177	2.898	3.18	2.208	2.039	2.029	4.189	2.187	4.063	3.731	1.021	3.243	3.575	2.763
Kurtosis:	36.72	22.28	6.105	25.57	6.41	23.56	6.148	3.932	11.48	1.942	2.212	11.53	5.704	10.86	12.86	6.406	5.333	5.416	25.19	6.491	24.65	21.09	0.484	17.3	14.54	11.6
d10:	8.341	2.208	2.124	2.146	2.185	2.126	2.109	2.101	2.999	2.716	2.727	2.377	2.454	2.119	1.993	2.152	2.174	2.144	2.152	2.136	2.148	2.111	2.89	2.273	2.56	8.089
d50:	44.17	16.02	14.22	13.99	14.42	13.87	14.15	15.33	31.31	26.17	25.75	20.14	21.36	13.62	11.5	15.42	15.65	15.38	15.61	14.6	15.83	13.55	34.49	18.91	18.65	42.4
d90:	139.5	69.73	62.98	62.93	62.29	61.7	63.48	69.31	110.1	95.57	95.39	108.6	110.5	83.96	54.82	63.24	62.69	62.61	66.49	60.93	65.35	66.41	108.7	78.94	159.6	121.6
Specific Surf. Area:	4087	9446	9937	9903	9739	9994	9974	9819	6894	7549	7553	8473	8201	9884	10811	9703	9610	9727	9675	9859	9661	10012	6921	8963	8088	4232
%<	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
10	8.34	2.21	2.12	2.15	2.18	2.13	2.11	2.1	3	2.72	2.73	2.38	2.45	2.12	1.99	2.15	2.17	2.14	2.15	2.14	2.15	2.11	2.89	2.27	2.56	8.09
25	20.4	5.58	5.2	5.19	5.33	5.13	5.12	5.24	9.13	7.84	7.79	6.3	6.58	5.02	4.51	5.39	5.46	5.38	5.41	5.25	5.44	4.58	8.84	5.91	6.19	19.8
50	44.2	16	14.2	14	14.4	13.9	14.2	15.3	31.3	26.2	25.8	20.1	21.4	13.6	11.5	15.4	15.7	15.4	15.6	14.6	15.8	13.5	34.5	18.9	18.6	42.4
75	81.3	38.2	34.6	34.1	34.4	33.5	34.4	37.7	67.4	57.9	57.3	54.6	57.6	36.2	28.2	36.4	36.7	36.3	37.5	34.8	37.2	36	73.4	46	69	76.1
90	140	69.7	63	62.9	62.3	61.7	63.5	69.3	110	95.6	95.4	109	110	84	54.8	63.2	62.7	62.6	66.5	60.9	65.4	66.4	109	78.9	160	122
Particle Diameter	21.0031_027_MINN#1_04.$ls	21.0031_028#1_04.$ls	21.0031_029#1_04.$ls	21.0031_030#2_04.$ls	21.0031_031#1_04.$ls	21.0031_032#1_04.$ls	21.0031_033#1_04.$ls	21.0031_034#1_04.$ls	21.0031_035#2_04.$ls	21.0031_036#1_04.$ls	21.0031_037#1_04.$ls	21.0031_038#1_04.$ls	21.0031_039#1_04.$ls	21.0031_040#1_04.$ls	21.0031_041#1_04.$ls	21.0031_042#1_04.$ls	21.0031_043#1_04.$ls	21.0031_044#1_04.$ls	21.0031_045#1_04.$ls	21.0031_046#1_04.$ls	21.0031_047#1_04.$ls	21.0031_048#1_04.$ls	21.0031_049#2_04.$ls	21.0031_050#2_04.$ls	21.0031_051_Hynne#1_04.$ls	21.0031_052_MINN#1_04.$ls
um	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <
0.4	0.014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.015
0.5	0.12	0.00069	0.00064	0.00054	0.00057	0.0006	0.00047	0.00053	0.00056	0.00053	0.00049	0.000032	0.000025	0.000018	0.000029	0.00071	0.00069	0.00068	0.00079	0.00059	0.00082	0	0.00025	0.00044	0	0.12
1	1.09	1.37	1.43	1.37	1.35	1.4	1.37	1.41	0.99	1.08	1.06	1.05	0.97	1.11	1.27	1.42	1.4	1.42	1.45	1.4	1.46	0.73	0.93	1.26	0.66	1.13
1.5	1.89	4.98	5.25	5.12	5	5.18	5.2	5.28	3.54	3.9	3.86	4.33	4.09	4.93	5.49	5.16	5.08	5.19	5.2	5.18	5.21	4.49	3.57	4.73	3.5	1.97
2	2.51	8.67	9.16	9.01	8.78	9.12	9.23	9.29	6.13	6.79	6.74	7.81	7.46	9.12	10.1	8.99	8.85	9.04	9	9.07	9.02	9.06	6.32	8.33	6.83	2.61
5	5.79	22.7	24.2	24.2	23.6	24.5	24.5	24	15.8	17.5	17.5	20.7	20	24.9	27.3	23.5	23.2	23.5	23.4	24	23.3	27	16.4	21.8	20.6	5.99
10	12.2	38.5	41.1	41.4	40.6	41.5	41	39.6	26.5	29.5	29.7	34.6	33.5	41.9	45.9	39.4	39.1	39.5	39.3	40.5	38.9	43.3	26.9	36.2	36.1	12.6
15	18.5	48.3	51.3	51.8	51	52.1	51.5	49.5	33.7	37.4	37.7	43.5	42.2	52.5	57.7	49.3	48.9	49.4	49	50.7	48.6	52.2	33.3	44.8	45.4	19.1
20	24.5	55.8	58.9	59.4	58.8	59.8	59.3	56.8	39.3	43.5	43.9	49.8	48.5	59.9	65.7	56.8	56.4	56.9	56.3	58.3	56.1	58.8	38.1	51.3	51.4	25.3
25	30.2	62	65.2	65.7	65.1	66.1	65.5	62.8	44.2	48.8	49.2	55	53.6	65.4	71.7	63.1	62.7	63.2	62.5	64.6	62.3	64.4	42.4	56.8	55.7	31.2
50	55.1	82.7	85.1	85.3	85.3	85.8	85.1	82.7	64.6	70.1	70.5	72.8	71.4	81.9	88.6	84.3	84.3	84.5	83.4	85.5	83.7	84	60.8	77.5	69	57
60	62.8	87	89	89.1	89.3	89.5	88.9	87	70.9	76.1	76.5	77.2	76	85	91.3	88.8	89	89	87.8	89.7	88.2	88.1	67.1	82.8	72.3	65
63	64.9	88	90	90	90.2	90.4	89.9	88.1	72.6	77.8	78.1	78.4	77.2	85.8	91.9	89.9	90.1	90.1	88.9	90.7	89.3	89.1	69	84.2	73.2	67.1
70	69.2	90.1	91.9	91.7	92.1	92.1	91.7	90.2	76.3	81.2	81.5	80.9	79.9	87.4	93.1	92.1	92.3	92.3	91	92.7	91.4	90.9	73.1	87.1	75.3	71.6
75	72	91.3	93	92.7	93.3	93.1	92.8	91.4	78.7	83.3	83.6	82.5	81.5	88.4	93.8	93.3	93.5	93.6	92.2	93.9	92.5	92	75.9	88.8	76.6	74.4
90	78.6	94	95.5	94.9	95.7	95.4	95.2	94.2	84.6	88.5	88.6	86.4	85.8	90.9	95.4	95.9	96.1	96.3	94.7	96.5	95	94.5	83.2	92.8	80.3	81.2
100	82	95.4	96.6	95.9	96.7	96.4	96.3	95.6	87.6	91.1	91.1	88.5	88	92.3	96.2	97	97.1	97.3	95.8	97.5	96	95.7	87.2	94.6	82.3	84.7
125	87.8	97.4	98.3	97.6	98.2	98	98	98	92.6	95.3	95.1	92.3	92.2	95.1	97.5	98.3	98.5	98.7	97.3	98.7	97.4	97.5	93.9	97.1	86.2	90.6
150	91.3	98.3	99.2	98.5	99.1	98.9	99.1	99.3	95.5	97.7	97.6	94.8	94.9	97	98.4	99.1	99.4	99.4	98	99.4	98.3	98.4	97.4	98.3	89.1	94.1
170	93	98.8	99.6	99	99.6	99.3	99.6	99.8	96.9	99	98.8	96.2	96.4	98	99	99.6	99.8	99.7	98.4	99.7	98.7	98.8	98.9	98.8	90.8	95.9
180	93.7	98.9	99.8	99.1	99.8	99.4	99.8	99.9	97.5	99.4	99.2	96.7	96.9	98.3	99.2	99.7	99.9	99.9	98.6	99.8	98.9	98.9	99.3	99	91.5	96.5
200	94.6	99.2	99.9	99.2	99.9	99.6	99.9	99.99	98.2	99.8	99.7	97.5	97.8	98.8	99.5	99.9	99.98	99.96	98.8	99.9	99.1	99.1	99.8	99.2	92.5	97.4
225	95.3	99.3	99.99	99.3	99.99	99.7	99.99	99.999	98.7	99.97	99.96	98	98.5	99.1	99.8	99.99	99.999	99.996	99	99.99	99.2	99.3	99.97	99.3	93.4	98
250	95.6	99.4	100	99.4	100	99.7	100	100	98.9	99.998	99.996	98.3	99.1	99.4	99.9	100	100	100	99.2	100	99.3	99.4	99.998	99.4	93.9	98.4
400	97.3	99.96	100	99.97	100	99.98	100	100	99.8	100	100	99.8	99.997	99.996	100	100	100	100	99.9	100	99.97	99.98	100	99.98	96.5	99.6
500	98.1	100	100	100	100	100	100	100	99.99	100	100	99.997	100	100	100	100	100	100	100	100	100	100	100	100	97.7	99.98
750	98.9	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.5	100
1000	99.5	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.997	100
2000	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

NORGES GEOLOGISKE UNDERSØKELSE NGU

Kornfordelingsanalyser: Coulter laser partikkelteller
GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031

File name:	21.0031_053_TANA#1_04.$ls	21.0031_054#1_04.$ls	21.0031_055#1_04.$ls	21.0031_056#1_04.$ls	21.0031_057#1_04.$ls	21.0031_058#1_04.$ls	21.0031_059#1_04.$ls	21.0031_060#1_04.$ls	21.0031_061#1_04.$ls	21.0031_062#1_04.$ls	21.0031_063#1_04.$ls	21.0031_064#1_04.$ls	21.0031_065#1_04.$ls	21.0031_066#1_04.$ls	21.0031_067#1_04.$ls	21.0031_068#1_04.$ls	21.0031_069#1_04.$ls	21.0031_070#1_04.$ls	21.0031_071#1_04.$ls	21.0031_072#1_04.$ls	21.0031_073_Hynne#1_04.$ls	21.0031_074_MINN#1_04.$ls	21.0031_075#1_04.$ls	21.0031_076#1_04.$ls	21.0031_077#1_04.$ls	21.0031_078#1_04.$ls
File ID:	21.0031_053_TANA#1	21.0031_054#1	21.0031_055#1	21.0031_056#1	21.0031_057#1	21.0031_058#1	21.0031_059#1	21.0031_060#1	21.0031_061#1	21.0031_062#1	21.0031_063#1	21.0031_064#1	21.0031_065#1	21.0031_066#1	21.0031_067#1	21.0031_068#1	21.0031_069#1	21.0031_070#1	21.0031_071#1	21.0031_072#1	21.0031_073_Hynne#1	21.0031_074_MINN#1	21.0031_075#1	21.0031_076#1	21.0031_077#1	21.0031_078#1
Sample ID:	21.0031_TANA (4)	21.0031_188339_R2326GR104 0-1 cm	21.0031_188340_R2331MC016A 0-1 cm	21.0031_188381_R2338MC017A 0-1 cm	21.0031_188383_R2338MC017A 2-3 cm	21.0031_188385_R2338MC017A 4-5 cm	21.0031_188390_R2338MC017A 9-10 cm	21.0031_188395_R2338MC017A 14-15 cm	21.0031_188405_R2338MC017A 24-25 cm	21.0031_188428_R2338MC017A 47-48 cm	21.0031_188486_R2354GR125 0-1 cm	21.0031_188487_R2359GR129 0-1 cm	21.0031_188488_R2363MC019A 0-1 cm	21.0031_188490_R2363MC019A 2-3 cm	21.0031_188492_R2363MC019A 4-5 cm	21.0031_188497_R2363MC019A 9-10 cm	21.0031_188502_R2363MC019A 14-15 cm	21.0031_188512_R2363MC019A 24-25 cm	21.0031_188525_R2363MC019A 37-38 cm	21.0031_188531_R2365GR141 0-1 cm	21.0031_Hynne_40107	21.0031_MINN_Split 1	21.0031_188433_R2339MC018A 0-1 cm	21.0031_188434_R2339MC018A 1-2 cm	21.0031_188435_R2339MC018A 2-3 cm	21.0031_188436_R2339MC018A 3-4 cm
Operator:	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH
Comment 1:	0,140 g + disp.middel, Springvann	0,141 g + disp.middel, springvann	0,136 g + disp.middel, springvann	0,137 g + disp.middel, springvann	0,133 g + disp.middel, springvann	0,129 g + disp.middel, springvann	0,124 g + disp.middel, springvann	0,119 g + disp.middel, springvann	0,119 g + disp.middel, springvann	0,120 g + disp.middel, springvann	0,123 g + disp.middel, springvann	0,126 g + disp.middel, springvann	0,130 g + disp.middel, springvann	0,141 g + disp.middel, springvann	0,143 g + disp.middel, springvann	0,143 g + disp.middel, springvann	0,144 g + disp.middel, springvann	0,146 g + disp.middel, springvann	0,147 g + disp.middel, springvann	0,147 g + disp.middel, springvann	0,154 g + disp.middel, springvann	0,334 g + disp.middel, Springvann	0,145 g + disp.middel, springvann	0,122 g + disp.middel, springvann	0,122 g + disp.middel, springvann	0,120 g + disp.middel, springvann
Comment 2:	ultralyd, Probe 2 (naken), 5 ampl-5 min	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	ultralyd, probe 2 (naken), 5 ampl-5 min,Fraunhofer	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Instrument:	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module
Run number:	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Start time:	24.03.2021	24.03.2021	24.03.2021	24.03.2021	24.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	25.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021
Run length:	60	61	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Optical model:	Fraunhofer.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Fraunhofer.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d
Obscuration:	10	11	10	11	11	11	11	10	10	10	9	9	8	10	10	10	9	10	11	10	10	10	12	10	11	11
PIDS Obscur:																										
Obscuration:	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Serial Number:	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834
From	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
To	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Volume	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean:	39.1	23.23	78.47	23.18	21.8	19.48	20.08	19.43	19.96	20.3	33.18	37.17	36.2	34.35	31.73	34.9	37.43	35.87	30.17	31.96	66.73	72.89	18.92	18.61	18.03	17.84
Median:	17.6	12.92	20.94	12.62	12.13	11.6	11.64	11.6	11.78	12.04	14.04	17.59	19.85	18.95	18.24	19.2	20.64	17.66	11.1	17.19	18.04	43.28	11.37	11.12	10.78	10.46
D(3,2):	3.88	5.803	7.25	5.719	5.63	5.49	5.538	5.553	5.556	5.564	6.107	6.734	7.047	6.844	6.831	7.061	7.293	6.567	5.469	6.557	7.333	14.52	5.448	5.415	5.333	5.215
Mean/Median ratio:	2.222	1.799	3.748	1.838	1.797	1.679	1.726	1.675	1.694	1.686	2.362	2.114	1.824	1.813	1.739	1.818	1.813	2.031	2.718	1.859	3.698	1.684	1.664	1.674	1.673	1.706
Mode:	87.9	31.5	31.5	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	31.5	31.5	31.5	31.5	31.5	31.5	31.5	8.536	31.5	9.37	55.14	28.7	28.7	28.7	8.536
S.D.:	48.18	29.73	150.3	33.01	29	21.71	23.84	21.52	23.42	24.17	51.69	52.01	46.82	43.43	38.47	44.64	47.42	46.32	46.48	43.42	125	120.6	21.91	22.01	21.03	20.99
Variance:	2321	883.8	22593	1089	840.9	471.3	568.4	463	548.5	584.2	2672	2705	2193	1886	1480	1993	2249	2146	2161	1885	15634	14554	480.2	484.4	442.3	440.5
C.V.:	123.2	128	191.5	142.4	133	111.4	118.7	110.7	117.4	119.1	155.8	139.9	129.3	126.4	121.2	127.9	126.7	129.1	154	135.8	187.4	165.5	115.8	118.3	116.6	117.6
Skewness:	1.786	3.249	3.03	4.138	3.673	2.214	2.753	2.173	2.778	2.869	3.168	2.736	2.66	2.533	2.477	2.622	2.608	2.316	2.789	3.145	3.431	5.129	2.699	3.027	2.946	2.751
Kurtosis:	4.018	15.7	9.293	23.81	19.59	6.34	10.86	6.008	11.51	12.06	12.17	9.15	9.096	8.273	8.826	8.958	9.213	6.431	8.999	13.57	13.09	31.33	10.34	13.86	13.56	10.62
d10:	1.145	2.075	2.451	2.047	2.029	1.986	2.008	2.023	2.015	2.005	2.156	2.35	2.464	2.382	2.402	2.486	2.548	2.225	1.944	2.286	2.534	8.251	1.98	1.986	1.962	1.915
d50:	17.6	12.92	20.94	12.62	12.13	11.6	11.64	11.6	11.78	12.04	14.04	17.59	19.85	18.95	18.24	19.2	20.64	17.66	11.1	17.19	18.04	43.28	11.37	11.12	10.78	10.46
d90:	109.7	54.53	224.4	51.31	49.43	46.09	46.84	45.97	46.48	46.85	90.07	99.55	92	87.69	80.56	88.88	96.58	97.65	86.9	78.66	165.4	133.6	43.34	42.57	41.59	41.35
Specific Surf. Area:	15463	10340	8275	10492	10656	10929	10834	10805	10800	10783	9825	8910	8514	8767	8783	8497	8227	9137	10971	9151	8182	4133	11014	11080	11251	11506
%<	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
10	1.15	2.07	2.45	2.05	2.03	1.99	2.01	2.02	2.01	2	2.16	2.35	2.46	2.38	2.4	2.49	2.55	2.23	1.94	2.29	2.53	8.25	1.98	1.99	1.96	1.92
25	3.87	4.93	6.54	4.86	4.75	4.61	4.64	4.65	4.65	4.64	5.22	6.02	6.56	6.29	6.21	6.49	6.78	5.75	4.23	5.86	6.1	20.1	4.58	4.53	4.44	4.32
50	17.6	12.9	20.9	12.6	12.1	11.6	11.6	11.6	11.8	12	14	17.6	19.8	18.9	18.2	19.2	20.6	17.7	11.1	17.2	18	43.3	11.4	11.1	10.8	10.5
75	61.1	30.8	62.9	29.5	28.5	27.2	27.4	27.1	27.3	27.6	35.2	43.5	45.2	43.6	41.3	43.7	47.7	46.1	33.2	39.2	68.4	79	25.9	25.4	24.7	24.2
90	110	54.5	224	51.3	49.4	46.1	46.8	46	46.5	46.8	90.1	99.6	92	87.7	80.6	88.9	96.6	97.7	86.9	78.7	165	134	43.3	42.6	41.6	41.4

Particle Diameter	21.0031_053_TANA#1_04.$ls	21.0031_054#1_04.$ls	21.0031_055#1_04.$ls	21.0031_056#1_04.$ls	21.0031_057#1_04.$ls	21.0031_058#1_04.$ls	21.0031_059#1_04.$ls	21.0031_060#1_04.$ls	21.0031_061#1_04.$ls	21.0031_062#1_04.$ls	21.0031_063#1_04.$ls	21.0031_064#1_04.$ls	21.0031_065#1_04.$ls	21.0031_066#1_04.$ls	21.0031_067#1_04.$ls	21.0031_068#1_04.$ls	21.0031_069#1_04.$ls	21.0031_070#1_04.$ls	21.0031_071#1_04.$ls	21.0031_072#1_04.$ls	21.0031_073_Hynne#1_04.$ls	21.0031_074_MINN#1_04.$ls	21.0031_075#1_04.$ls	21.0031_076#1_04.$ls	21.0031_077#1_04.$ls	21.0031_078#1_04.$ls
um	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <
0.4	0.12	0	0	0	0	0	0	0	0	0	0	0	0.0015	0.0012	0	0	0	0	0	0	0	0.014	0	0	0	0
0.5	0.97	0.00069	0.00047	0.00073	0.0007	0.00073	0.00063	0.00059	0.00066	0.00059	0.00064	0.00082	0.012	0.0098	0.00088	0.00081	0.00073	0.00048	0.000004	0.00084	0	0.12	0.00067	0.00074	0.00071	0.00077
1	8.25	1.47	1.17	1.52	1.52	1.58	1.52	1.49	1.51	1.49	1.39	1.32	1.34	1.39	1.31	1.25	1.19	1.29	1.18	1.38	0.66	1.1	1.56	1.57	1.59	1.67
1.5	13.3	5.4	4.36	5.53	5.57	5.78	5.65	5.57	5.61	5.62	5.09	4.64	4.45	4.66	4.54	4.34	4.18	4.86	5.6	4.84	3.55	1.91	5.79	5.77	5.87	6.14
2	16.7	9.47	7.61	9.66	9.78	10.1	9.94	9.82	9.88	9.96	8.94	8.01	7.59	7.93	7.8	7.48	7.25	8.56	10.5	8.32	6.92	2.53	10.2	10.1	10.3	10.7
5	28.9	25.3	19.9	25.6	26.2	26.9	26.7	26.7	26.6	26.7	24.1	21.3	19.9	20.6	20.7	19.9	19.3	22.3	28.9	21.8	20.9	5.85	27.1	27.3	27.8	28.5
10	40.5	43.1	33.9	43.6	44.6	45.8	45.7	45.7	45.3	44.8	41.1	36.5	33.9	35.1	35.6	34.5	33.1	36.9	47.3	37.1	36.6	12.3	46.2	46.8	47.7	48.7
15	47.2	54	42.5	54.8	56	57.3	57.2	57.4	56.9	56.4	51.7	46	43	44.2	45.1	43.8	42.1	46.1	57.5	46.6	46.1	18.8	58.2	58.9	59.9	60.8
20	52.2	62.1	48.9	63.1	64.3	65.7	65.5	65.8	65.5	65	59.4	53.3	50.2	51.4	52.5	51.1	49.2	53	64.1	54	52.1	24.9	66.9	67.6	68.6	69.3
25	56.2	68.6	54.3	69.8	71	72.4	72.2	72.5	72.2	71.9	65.5	59.4	56.5	57.7	59	57.5	55.3	58.6	68.8	60.5	56.3	30.7	73.9	74.5	75.4	76
50	70.8	88.3	71	89.5	90.2	91.7	91.3	91.7	91.4	91.3	82.4	78	77.7	78.5	80.2	78.5	76.2	76.9	82.6	81.6	69.4	56	92.7	93	93.5	93.5
60	74.6	91.7	74.2	92.6	93.2	94.5	94.2	94.5	94.3	94.1	85	81.5	81.9	82.7	84.4	82.7	80.6	80.8	85.2	85.5	72.6	63.8	95.2	95.5	95.8	95.7
63	75.7	92.5	75	93.3	93.9	95.2	94.8	95.2	94.9	94.7	85.7	82.3	83	83.8	85.5	83.8	81.7	81.8	85.8	86.4	73.5	65.9	95.8	96	96.3	96.2
70	78.1	94	76.7	94.6	95.1	96.2	95.9	96.2	96.1	95.8	87	84.2	85.1	85.9	87.5	85.9	84	83.9	87.2	88.2	75.4	70.3	96.7	96.9	97.1	97
75	79.8	94.8	77.7	95.2	95.7	96.8	96.5	96.8	96.7	96.5	87.9	85.3	86.4	87.2	88.8	87.1	85.4	85.2	88.1	89.3	76.7	73	97.1	97.4	97.6	97.5
90	84.7	96.5	80.3	96.5	97	98.1	97.7	98.1	97.9	97.8	90	88.4	89.6	90.4	91.8	90.2	88.8	88.6	90.4	91.8	80.2	79.7	98.1	98.4	98.5	98.3
100	87.6	97.3	81.7	97.1	97.6	98.7	98.2	98.7	98.4	98.3	91.2	90.1	91.3	92.1	93.4	91.8	90.6	90.4	91.7	93.2	82.1	83	98.5	98.7	98.9	98.7
125	93.1	98.4	84.4	98.1	98.4	99.6	99.1	99.7	99.2	99	93.6	93.1	94.3	95.1	96.2	94.7	94	94	94.3	95.6	86	88.6	99.3	99.2	99.4	99.4
150	96.4	99	86.5	98.6	98.9	99.9	99.6	99.97	99.6	99.5	95.6	95.2	96.3	96.8	97.9	96.6	96.3	96.2	96.1	97.2	88.7	91.9	99.8	99.6	99.7	99.8
170	98	99.3	87.8	98.8	99.2	99.99	99.8	99.997	99.8	99.7	96.7	96.4	97.3	97.8	98.8	97.7	97.5	97.4	97.2	98	90.3	93.6	99.9	99.8	99.9	99.97
180	98.5	99.4	88.4	98.9	99.3	99.999	99.9	100	99.9	99.8	97.2	96.9	97.7	98.2	99.1	98.1	97.9	97.9	97.6	98.3	91	94.2	99.97	99.9	99.9	99.99
200	99.1	99.6	89.3	99.1	99.5	100	99.96	100	99.95	99.9	97.8	97.7	98.3	98.8	99.5	98.7	98.5	98.6	98.4	98.7	91.9	95.1	99.996	99.97	99.97	99.999
225	99.5	99.8	90	99.4	99.7	100	99.99	100	99.99	99.99	98.3	98.4	98.9	99.2	99.7	99.1	99	99.1	99	99.1	92.8	95.8	100	99.997	99.996	100
250	99.7	99.9	90.5	99.6	99.9	100	100	100	99.999	99.999	98.7	98.8	99.2	99.6	99.8	99.4	99.3	99.5	99.4	99.3	93.4	96.1	100	100	100	100
400	99.996	100	94.2	100	100	100	100	100	100	100	99.96	99.98	99.996	99.999	99.99	99.997	99.99	99.999	99.998	99.99	96.2	97.5	100	100	100	100
500	100	100	96.1	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	97.5	98.1	100	100	100	100
750	100	100	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.5	98.9	100	100	100	100
1000	100	100	99.99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.998	99.7	100	100	100	100
2000	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

File name:	21.0031_079#1_04.$ls	21.0031_080#1_04.$ls	21.0031_081#1_04.$ls	21.0031_082#1_04.$ls	21.0031_083#1_04.$ls	21.0031_084#1_04.$ls	21.0031_085#1_04.$ls	21.0031_086#1_04.$ls	21.0031_087#1_04.$ls	21.0031_088#1_04.$ls	21.0031_089#1_04.$ls	21.0031_090#1_04.$ls	21.0031_091#1_04.$ls
File ID:	21.0031_079#1	21.0031_080#1	21.0031_081#1	21.0031_082#1	21.0031_083#1	21.0031_084#1	21.0031_085#1	21.0031_086#1	21.0031_087#1	21.0031_088#1	21.0031_089#1	21.0031_090#1	21.0031_091#1
Sample ID:	21.0031_188437_ R2339MC018A 4-5 cm	21.0031_188438_ R2339MC018A 5-6 cm	21.0031_188439_ R2339MC018A 6-7 cm	21.0031_188440_ R2339MC018A 7-8 cm	21.0031_188441_ R2339MC018A 8-9 cm	21.0031_188442_ R2339MC018A 9-10 cm	21.0031_188443_ R2339MC018A 10-11 cm	21.0031_188444_ R2339MC018A 11-12 cm	21.0031_188445_ R2339MC018A 12-13 cm	21.0031_188446_ R2339MC018A 13-14 cm	21.0031_188447_ R2339MC018A 14-15 cm	21.0031_188448_ R2339MC018A 15-16 cm	21.0031_188449_ R2339MC018A 16-17 cm
Operator:	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH
Comment 1:	0,110 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Instrument:	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module
Run number:	4	4	4	4	4	4	4	4	4	4	4	4	4
Start time:	26.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021	26.03.2021	06.04.2021	06.04.2021	06.04.2021	06.04.2021	06.04.2021	06.04.2021	06.04.2021
Run length:	60	60	60	60	60	60	60	60	60	60	60	60	60
Optical model:	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d
Obscuration:	9	10	10	10	10	10	10	10	10	10	10	10	10
PIDS Obscur:													
Obscuration:	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Serial Number:	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834
From	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
To	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Volume	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean:	19.54	19.6	18.62	18.94	19.33	19.49	20.16	19.71	19.65	17.2	19.84	20.4	19.68
Median:	10.95	11.24	10.77	10.79	11.03	10.92	10.99	11.34	11.29	10.22	11.06	10.96	10.93
D(3,2):	5.36	5.439	5.32	5.346	5.362	5.375	5.321	5.478	5.459	5.097	5.354	5.321	5.326
Mean/Median ratio:	1.785	1.744	1.729	1.756	1.753	1.785	1.835	1.737	1.74	1.682	1.794	1.861	1.801
Mode:	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	8.536	28.7	28.7	26.14
S.D.:	26.93	26.44	22.77	24.58	25.69	25.86	29.94	25.72	25.77	19.39	27.42	30.42	28.41
Variance:	725.5	699	518.5	604	659.8	668.5	896.4	661.3	664.3	376.1	751.7	925.1	807
C.V.:	137.9	134.9	122.3	129.7	132.9	132.7	148.5	130.5	131.2	112.8	138.2	149.1	144.3
Skewness:	4.432	4.633	3.125	3.845	4.408	3.803	4.906	4.029	3.998	2.431	4.116	4.575	4.824
Kurtosis:	30.66	35.14	14.38	22.62	31.88	21.15	34.2	25.37	25	8.261	23.73	28.43	34.34
d10:	1.966	1.991	1.952	1.965	1.96	1.972	1.939	2.004	1.998	1.878	1.956	1.941	1.946
d50:	10.95	11.24	10.77	10.79	11.03	10.92	10.99	11.34	11.29	10.22	11.06	10.96	10.93
d90:	43.14	43.55	42.71	42.82	43.43	43.52	43.62	44.29	43.74	40.41	43.69	43.98	42.91
Specific Surf. Area:	11194	11032	11278	11224	11189	11162	11276	10954	10990	11771	11206	11276	11266
%<	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
10	1.97	1.99	1.95	1.97	1.96	1.97	1.94	2	2	1.88	1.96	1.94	1.95
25	4.47	4.56	4.42	4.44	4.47	4.46	4.45	4.59	4.57	4.19	4.46	4.41	4.42
50	10.9	11.2	10.8	10.8	11	10.9	11	11.3	11.3	10.2	11.1	11	10.9
75	25.3	25.8	25	25	25.6	25.4	25.5	26.1	25.9	23.8	25.6	25.5	25.2
90	43.1	43.5	42.7	42.8	43.4	43.5	43.6	44.3	43.7	40.4	43.7	44	42.9

File name:	21.0031_092#1_04.$ls	21.0031_093#1_04.$ls	21.0031_094#1_04.$ls	21.0031_095#1_04.$ls	21.0031_096#1_04.$ls	21.0031_097#1_04.$ls	21.0031_098#1_04.$ls	21.0031_099#1_04.$ls	21.0031_100#1_04.$ls	21.0031_101#1_04.$ls	21.0031_102#1_04.$ls	21.0031_103#1_04.$ls	21.0031_104#1_04.$ls
File ID:	21.0031_092#1	21.0031_093#1	21.0031_094#1	21.0031_095#1	21.0031_096#1	21.0031_097#1	21.0031_098#1	21.0031_099#1	21.0031_100#1	21.0031_101#1	21.0031_102#1	21.0031_103#1	21.0031_104#1
Sample ID:	21.0031_188450_ R2339MC018A 17-18 cm	21.0031_188451_ R2339MC018A 18-19 cm	21.0031_188452_ R2339MC018A 19-20 cm	21.0031_188453_ R2339MC018A 20-21 cm	21.0031_188454_ R2339MC018A 21-22 cm	21.0031_188455_ R2339MC018A 22-23 cm	21.0031_188456_ R2339MC018A 23-24 cm	21.0031_188457_ R2339MC018A 24-25 cm	21.0031_188458_ R2339MC018A 25-26 cm	21.0031_188459_ R2339MC018A 26-27 cm	21.0031_188460_ R2339MC018A 27-28 cm	21.0031_188461_ R2339MC018A 28-29 cm	21.0031_188462_ R2339MC018A 29-30 cm
Operator:	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH
Comment 1:	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, springvann	0,114 g + disp.middel, spr.vann	0,114 g + disp.middel, spr.vann	0,114 g + disp.middel, spr.vann	0,114 g + disp.middel, spr.vann	0,114 g + disp.middel, spr.vann	0,114 g + disp.middel, vann type III	0,114 g + disp.middel, spr.vann	0,114 g + disp.middel, spr.vann	0,114 g + disp.middel, spr.vann	0,115 g + disp.middel, spr.vann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL- Probe 2 (naken), 5 ampl, 5 min, Leire
Instrument:	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module
Run number:	4	4	4	4	4	4	4	4	4	4	4	4	4
Start time:	06.04.2021	06.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021	09.04.2021
Run length:	60	60	60	60	60	60	60	60	60	60	60	60	60
Optical model:	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d
Obscuration:	10	10	10	10	10	10	10	9	10	10	10	10	10
PIDS Obscur:													
Obscuration:	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Serial Number:	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834
From	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
To	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Volume	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean:	19.58	19.3	18.86	19.13	18.74	19.29	19.19	20.16	19.54	19.45	19.06	19.98	19.68
Median:	10.86	10.94	10.78	10.86	10.77	11.16	11.23	11.31	11.31	10.93	10.88	11.03	10.92
D(3,2):	5.291	5.323	5.272	5.28	5.265	5.407	5.424	5.408	5.407	5.334	5.308	5.349	5.34
Mean/Median ratio:	1.802	1.763	1.749	1.762	1.739	1.728	1.708	1.782	1.728	1.779	1.751	1.812	1.802
Mode:	28.7	28.7	28.7	28.7	28.7	26.14	28.7	28.7	28.7	26.14	28.7	28.7	28.7
S.D.:	27.42	25.68	24.53	26.64	23.52	25.68	24.23	28.9	25.28	26.63	25.34	28.36	27.78
Variance:	751.9	659.3	601.8	709.9	553.1	659.3	586.9	835.4	639.2	709	642.4	804.5	771.7
C.V.:	140.1	133.1	130.1	139.3	125.5	133.1	126.3	143.3	129.4	136.9	133	142	141.2
Skewness:	4.223	3.992	3.795	4.885	3.418	4.248	3.706	4.569	3.795	4.267	4.151	4.371	4.67
Kurtosis:	24.83	23.89	21.29	36.89	17.63	27.38	21.54	28.84	21.55	27.78	26.75	26.83	33.01
d10:	1.934	1.944	1.928	1.931	1.924	1.979	1.984	1.972	1.972	1.954	1.942	1.954	1.952
d50:	10.86	10.94	10.78	10.86	10.77	11.16	11.23	11.31	11.31	10.93	10.88	11.03	10.92
d90:	43.04	43.19	42.49	42.63	42.71	42.94	43.22	43.69	43.84	43.03	42.67	43.75	43.49
Specific Surf. Area:	11339	11271	11380	11363	11395	11097	11063	11094	11096	11249	11304	11218	11235
%<	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
10	1.93	1.94	1.93	1.93	1.92	1.98	1.98	1.97	1.97	1.95	1.94	1.95	1.95
25	4.38	4.41	4.36	4.37	4.35	4.51	4.53	4.54	4.52	4.42	4.39	4.42	4.41
50	10.9	10.9	10.8	10.9	10.8	11.2	11.2	11.3	11.3	10.9	10.9	11	10.9
75	25.1	25.3	24.9	25.1	25.1	25.4	25.6	25.8	25.9	25.1	25	25.5	25.3
90	43	43.2	42.5	42.6	42.7	42.9	43.2	43.7	43.8	43	42.7	43.7	43.5

Particle Diameter	21.0031_079#1_04.$ls	21.0031_080#1_04.$ls	21.0031_081#1_04.$ls	21.0031_082#1_04.$ls	21.0031_083#1_04.$ls	21.0031_084#1_04.$ls	21.0031_085#1_04.$ls	21.0031_086#1_04.$ls	21.0031_087#1_04.$ls	21.0031_088#1_04.$ls	21.0031_089#1_04.$ls	21.0031_090#1_04.$ls	21.0031_091#1_04.$ls
um	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <
0.4	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	0.00086	0.00081	0.00076	0.00067	0.00083	0.00067	0.00097	0.00075	0.00076	0.0011	0.00088	0.00084	0.00074
1	1.63	1.59	1.62	1.58	1.63	1.57	1.7	1.55	1.56	1.81	1.65	1.65	1.62
1.5	5.89	5.76	5.94	5.85	5.92	5.81	6.06	5.68	5.71	6.4	5.94	6.01	5.96
2	10.3	10.1	10.4	10.3	10.3	10.2	10.5	9.97	10	11.1	10.4	10.5	10.5
5	27.6	27.2	27.9	27.9	27.6	27.7	27.8	27	27.1	29.3	27.7	27.9	27.9
10	47.3	46.6	47.7	47.7	47.1	47.4	47.2	46.3	46.4	49.3	47	47.3	47.4
15	59.3	58.5	59.8	59.7	58.9	59.3	59.1	58.2	58.4	61.4	58.9	59.2	59.4
20	67.9	67.2	68.3	68.3	67.5	67.8	67.7	66.8	67	69.9	67.5	67.8	68
25	74.7	74.1	75	75	74.3	74.5	74.4	73.7	73.9	76.5	74.3	74.4	74.8
50	92.6	92.5	92.9	92.8	92.6	92.5	92.4	92.3	92.4	94	92.4	92.2	92.8
60	94.9	94.9	95.3	95.1	95.1	94.8	94.7	94.8	94.9	96.1	94.9	94.5	95.1
63	95.4	95.5	95.8	95.6	95.7	95.3	95.2	95.3	95.4	96.6	95.4	95	95.6
70	96.3	96.4	96.7	96.5	96.6	96.1	96.1	96.3	96.3	97.4	96.3	95.9	96.5
75	96.8	96.9	97.1	97	97	96.6	96.6	96.8	96.8	97.8	96.7	96.4	96.9
90	97.7	97.9	98	98	98	97.7	97.6	97.8	97.9	98.7	97.6	97.4	97.6
100	98.1	98.3	98.4	98.5	98.4	98.2	98	98.3	98.3	99.1	98	97.8	97.9
125	98.7	99	99.1	99.1	99	98.8	98.5	99	98.8	99.7	98.6	98.3	98.6
150	99.1	99.3	99.6	99.3	99.3	99.1	98.8	99.3	99.2	99.96	98.9	98.6	99.1
170	99.4	99.5	99.8	99.5	99.5	99.4	99	99.4	99.4	99.99	99.1	98.9	99.3
180	99.5	99.5	99.9	99.5	99.6	99.5	99.1	99.5	99.6	99.999	99.3	99	99.4
200	99.7	99.6	99.9	99.7	99.7	99.7	99.3	99.6	99.7	100	99.5	99.2	99.5
225	99.8	99.7	99.99	99.9	99.8	99.9	99.5	99.8	99.9	100	99.8	99.5	99.6
250	99.9	99.8	99.999	99.97	99.8	99.95	99.7	99.9	99.9	100	99.9	99.7	99.7
400	99.999	99.999	100	100	99.999	100	99.998	100	100	100	100	100	99.999
500	100	100	100	100	100	100	100	100	100	100	100	100	100
750	100	100	100	100	100	100	100	100	100	100	100	100	100
1000	100	100	100	100	100	100	100	100	100	100	100	100	100
2000	100	100	100	100	100	100	100	100	100	100	100	100	100

Particle Diameter	21.0031_092#1_04.$ls	21.0031_093#1_04.$ls	21.0031_094#1_04.$ls	21.0031_095#1_04.$ls	21.0031_096#1_04.$ls	21.0031_097#1_04.$ls	21.0031_098#1_04.$ls	21.0031_099#1_04.$ls	21.0031_100#1_04.$ls	21.0031_101#1_04.$ls	21.0031_102#1_04.$ls	21.0031_103#1_04.$ls	21.0031_104#1_04.$ls
um	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <
0.4	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	0.00085	0.00077	0.0008	0.0009	0.00081	0.00072	0.00076	0.00098	0.00089	0.00078	0.00075	0.00075	0.00059
1	1.67	1.63	1.66	1.68	1.67	1.57	1.57	1.65	1.63	1.62	1.62	1.6	1.56
1.5	6.04	5.97	6.07	6.06	6.09	5.78	5.77	5.88	5.86	5.92	5.97	5.91	5.89
2	10.6	10.5	10.6	10.6	10.7	10.2	10.1	10.2	10.2	10.4	10.5	10.4	10.4
5	28.1	27.9	28.2	28.2	28.3	27.4	27.3	27.2	27.3	27.9	28.1	27.9	28
10	47.5	47.3	47.7	47.6	47.8	46.7	46.6	46.4	46.4	47.3	47.5	47.1	47.4
15	59.5	59.3	59.8	59.6	59.7	58.8	58.6	58.4	58.4	59.4	59.5	59	59.4
20	68.1	67.9	68.4	68.2	68.3	67.7	67.4	67.2	67.1	68.1	68.2	67.6	68
25	74.9	74.7	75.1	74.9	74.9	74.6	74.3	74	74	74.9	75	74.4	74.7
50	92.7	92.7	92.9	93	92.9	92.8	92.7	92.4	92.4	92.6	92.8	92.3	92.4
60	95	95	95.2	95.4	95.3	95.2	95.1	94.8	94.8	94.9	95.1	94.6	94.8
63	95.5	95.5	95.7	95.9	95.8	95.7	95.6	95.3	95.3	95.4	95.6	95.1	95.3
70	96.4	96.4	96.6	96.9	96.6	96.6	96.5	96.3	96.3	96.2	96.6	96	96.1
75	96.8	96.9	97.1	97.4	97.1	97.1	97	96.8	96.8	96.7	97	96.5	96.6
90	97.7	97.9	98.2	98.3	98	98.1	98	97.8	98	97.7	98	97.6	97.6
100	98.1	98.3	98.6	98.5	98.4	98.5	98.5	98.2	98.5	98.1	98.4	98.1	98
125	98.6	98.8	98.9	98.8	99.1	99	99.1	98.6	99	98.7	98.9	98.7	98.9
150	98.9	99.2	99.2	99.1	99.4	99.2	99.4	98.8	99.2	99.1	99.2	98.9	99.3
170	99.1	99.4	99.4	99.4	99.7	99.3	99.5	98.9	99.4	99.4	99.4	99	99.4
180	99.2	99.5	99.5	99.4	99.7	99.4	99.6	99	99.5	99.5	99.5	99.1	99.4
200	99.5	99.7	99.8	99.6	99.9	99.6	99.8	99.3	99.7	99.6	99.7	99.4	99.5
225	99.8	99.8	99.9	99.7	99.96	99.8	99.9	99.6	99.9	99.8	99.8	99.6	99.6
250	99.9	99.9	99.98	99.8	99.99	99.9	99.97	99.8	99.97	99.9	99.9	99.8	99.7
400	100	100	100	99.999	100	100	100	100	100	99.999	100	100	100
500	100	100	100	100	100	100	100	100	100	100	100	100	100
750	100	100	100	100	100	100	100	100	100	100	100	100	100
1000	100	100	100	100	100	100	100	100	100	100	100	100	100
2000	100	100	100	100	100	100	100	100	100	100	100	100	100

File name:	21.0031_105#1_04.$ls	21.0031_106#1_04.$ls	21.0031_107#1_04.$ls	21.0031_108#1_04.$ls	21.0031_109#1_04.$ls	21.0031_110#1_04.$ls	21.0031_111#1_04.$ls	21.0031_112#1_04.$ls	21.0031_113#1_04.$ls	21.0031_114#1_04.$ls	21.0031_115#1_04.$ls	21.0031_116#1_04.$ls	21.0031_117#1_04.$ls	21.0031_118#1_04.$ls	21.0031_119_Hynne#1_04.$ls	21.0031_120_MINN#1_04.$ls	21.0031_121_TANA#1_04.$ls
File ID:	21.0031_105#1	21.0031_106#1	21.0031_107#1	21.0031_108#1	21.0031_109#1	21.0031_110#1	21.0031_111#1	21.0031_112#1	21.0031_113#1	21.0031_114#1	21.0031_115#1	21.0031_116#1	21.0031_117#1	21.0031_118#1	21.0031_119_Hynne#1	21.0031_120_MINN#1	21.0031_121_TANA#1
Sample ID:	21.0031_188463_R2339MC018A 30-31 cm	21.0031_118464_R2339018A 31-32 cm	21.0031_118465_R2339018A 32-33 cm	21.0031_188466_R2339018A 33-34 cm	21.0031_188467_R2339018A 34-35 cm	21.0031_188468_R2339018A 35-36 cm	21.0031_188469_R2339018A 36-37 cm	21.0031_188470_R2339018A 37-38 cm	21.0031_188471_R2339018A 38-39 cm	21.0031_188472_R2339018A 39-40 cm	21.0031_188473_R2339018A 40-41 cm	21.0031_188474_R2339018A 41-42 cm	21.0031_188475_R2339018A 42-43 cm	21.0031_188476_R2339018A 43-44 cm	21.0031_Hynne_40107	21.0031_MINN_Split 1	21.0031_TANA (3)
Operator:	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH	MSH
Comment 1:	0,115 g + disp.middel, spr.vann	0,115 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,116 g + disp.middel, springvann	0,154 g + disp.middel, springvann	0,334 g + disp.middel, Springvann	0,140 g + disp.middel, Springvann
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL Probe 2 (naken), 5 ampl, 5 min, Leire	UL probe 2 (naken), 5 ampl-5 min,Fraunhofer	ultralyd, Probe 2 (naken), 5 ampl-5 min
Instrument:	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module	LS 13 320, Aqueous Liquid Module
Run number:	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Start time:	09.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021	12.04.2021
Run length:	60	60	60	60	60	60	60	60	60	60	60	60	61	61	60	60	60
Optical model:	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Leire-1-65.rf780d	Fraunhofer.rf780d	Fraunhofer.rf780d
Obscuration:	10	10	10	10	10	10	10	10	10	10	10	10	11	10	10	10	10
PIDS Obscur:																	
Obscuration:	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Serial Number:	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834	9834
From	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
To	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Volume	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean:	19.42	18.7	18.28	18.95	18.09	18.23	18.32	18.65	18.5	19.22	19.37	19.28	18.79	18.62	60.76	68.68	36.87
Median:	10.92	11.03	10.85	10.91	10.86	10.8	10.89	11.07	10.7	11.08	11.26	11.39	11.28	11.03	16.85	42.61	16.66
D(3,2):	5.325	5.353	5.302	5.284	5.305	5.27	5.296	5.31	5.153	5.313	5.35	5.42	5.41	5.333	7.143	14.37	3.821
Mean/Median ratio:	1.779	1.696	1.684	1.736	1.666	1.689	1.681	1.684	1.729	1.735	1.721	1.694	1.666	1.688	3.607	1.612	2.213
Mode:	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	9.37	55.14	87.9
S.D.:	26.67	23.26	21.52	25.08	20.78	21.69	21.42	22.28	23.51	24.99	25.11	23.01	21.59	22.17	118.3	103.2	44.2
Variance:	711.3	541.2	462.9	628.9	431.6	470.3	458.7	496.4	552.8	624.4	630.6	529.6	466.1	491.3	13992	10646	1954
C.V.:	137.3	124.4	117.7	132.3	114.9	118.9	116.9	119.4	127.1	130	129.6	119.3	114.9	119.1	194.7	150.2	119.9
Skewness:	4.475	4.032	2.826	4.346	2.639	3.115	2.789	3.021	3.799	3.991	4.107	2.911	2.588	2.99	3.795	5.146	1.452
Kurtosis:	31.82	31.02	11.58	31.24	10.02	15.73	11.52	13.62	23.13	26.21	28.63	12.47	9.398	13.59	16.34	35.11	1.445
d10:	1.949	1.96	1.94	1.93	1.945	1.93	1.938	1.933	1.873	1.934	1.946	1.972	1.971	1.951	2.484	8.161	1.135
d50:	10.92	11.03	10.85	10.91	10.86	10.8	10.89	11.07	10.7	11.08	11.26	11.39	11.28	11.03	16.85	42.61	16.66
d90:	43.13	42.76	42.03	42.44	41.78	42.15	42.3	42.82	42.25	43.17	43.5	44.28	43.34	42.8	145	133.8	106.5
Specific Surf. Area:	11268	11208	11317	11355	11309	11384	11329	11300	11645	11293	11214	11071	11091	11252	8399	4174	15702
%<	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
10	1.95	1.96	1.94	1.93	1.95	1.93	1.94	1.93	1.87	1.93	1.95	1.97	1.97	1.95	2.48	8.16	1.14
25	4.39	4.42	4.37	4.36	4.37	4.33	4.35	4.38	4.24	4.39	4.44	4.5	4.49	4.4	5.91	19.8	3.75
50	10.9	11	10.9	10.9	10.9	10.8	10.9	11.1	10.7	11.1	11.3	11.4	11.3	11	16.8	42.6	16.7
75	25.2	25.2	24.9	25.1	24.8	24.8	25	25.4	24.9	25.5	25.8	26.2	25.8	25.3	61.4	77.9	57.5
90	43.1	42.8	42	42.4	41.8	42.2	42.3	42.8	42.2	43.2	43.5	44.3	43.3	42.8	145	134	107

Particle Diameter	21.0031_105#1_04.$ls	21.0031_106#1_04.$ls	21.0031_107#1_04.$ls	21.0031_108#1_04.$ls	21.0031_109#1_04.$ls	21.0031_110#1_04.$ls	21.0031_111#1_04.$ls	21.0031_112#1_04.$ls	21.0031_113#1_04.$ls	21.0031_114#1_04.$ls	21.0031_115#1_04.$ls	21.0031_116#1_04.$ls	21.0031_117#1_04.$ls	21.0031_118#1_04.$ls	21.0031_119_Hynne#1_04.$ls	21.0031_120_MINN#1_04.$ls	21.0031_121_TANA#1_04.$ls
um	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <	% <
0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.014	0.12
0.5	0.00072	0.00066	0.00062	0.00081	0.00065	0.00073	0.00071	0.00076	0.0011	0.00082	0.0009	0.00076	0.00064	0.00077	0	0.12	0.98
1	1.6	1.57	1.58	1.65	1.58	1.62	1.61	1.63	1.83	1.65	1.66	1.58	1.55	1.61	0.67	1.11	8.34
1.5	5.92	5.85	5.95	6.04	5.92	6.01	5.97	6.01	6.43	6.03	5.98	5.82	5.8	5.92	3.63	1.93	13.5
2	10.4	10.3	10.5	10.6	10.5	10.6	10.5	10.6	11.1	10.6	10.5	10.2	10.2	10.4	7.11	2.56	17
5	28	27.9	28.2	28.2	28.2	28.4	28.2	28.1	28.8	28	27.7	27.4	27.5	28	21.4	5.91	29.5
10	47.4	47.1	47.6	47.4	47.5	47.7	47.5	47	48	47	46.6	46.2	46.5	47.1	37.7	12.5	41.3
15	59.4	59.1	59.6	59.4	59.7	59.8	59.5	58.9	59.9	58.9	58.5	58.1	58.4	59.1	47.4	19	48.2
20	68.1	67.9	68.3	68.1	68.4	68.5	68.2	67.7	68.5	67.6	67.2	66.8	67.1	67.8	53.6	25.2	53.3
25	74.8	74.7	75.2	74.9	75.2	75.3	75	74.5	75.2	74.5	74	73.6	74	74.7	58	31.1	57.4
50	92.6	93	93.2	93	93.3	93.1	93.1	92.9	93.1	92.7	92.5	92.2	92.7	92.9	71.4	56.7	72
60	94.9	95.4	95.4	95.2	95.6	95.4	95.5	95.3	95.5	95	95	94.8	95.2	95.3	74.6	64.5	75.9
63	95.4	95.9	95.9	95.7	96.1	95.9	96	95.9	96	95.5	95.5	95.3	95.7	95.8	75.5	66.6	77.1
70	96.3	96.8	96.8	96.5	97	96.8	96.8	96.8	96.9	96.4	96.5	96.3	96.7	96.7	77.5	70.9	79.5
75	96.8	97.2	97.3	97	97.4	97.3	97.3	97.3	97.3	96.9	97	96.8	97.1	97.2	78.8	73.6	81.2
90	97.7	98.2	98.3	98.2	98.4	98.5	98.3	98.3	98.3	97.8	98	98	98.1	98.2	82.3	80	85.8
100	98.2	98.6	98.7	98.6	98.8	99	98.7	98.7	98.7	98.3	98.4	98.5	98.6	98.7	84.2	83.2	88.5
125	98.8	99.4	99.3	99.1	99.5	99.5	99.4	99.2	99.2	99	98.9	99.2	99.4	99.3	87.9	88.6	93.7
150	99.2	99.7	99.7	99.3	99.8	99.6	99.8	99.6	99.4	99.4	99.3	99.6	99.8	99.6	90.4	91.9	97.1
170	99.4	99.8	99.9	99.4	99.96	99.8	99.9	99.8	99.6	99.6	99.6	99.8	99.96	99.8	91.9	93.6	98.7
180	99.5	99.8	99.96	99.5	99.98	99.8	99.9	99.9	99.6	99.7	99.7	99.9	99.98	99.9	92.5	94.3	99.2
200	99.7	99.8	99.99	99.7	99.998	99.9	99.98	99.98	99.8	99.8	99.8	99.96	99.998	99.96	93.4	95.2	99.7
225	99.8	99.9	100	99.8	100	99.98	99.998	99.998	99.9	99.8	99.9	99.99	100	99.99	94.1	95.9	99.95
250	99.8	99.9	100	99.9	100	99.998	100	100	99.97	99.9	99.9	100	100	99.999	94.5	96.3	99.995
400	99.999	99.999	100	99.998	100	100	100	100	100	100	99.999	100	100	100	96.7	98.1	100
500	100	100	100	100	100	100	100	100	100	100	100	100	100	100	97.8	98.8	100
750	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.5	99.4	100
1000	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.997	99.9	100
2000	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

NORGES GEOLOGISKE UNDERSØKELSE - NGU -

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Kornfordelingsanalyser: Coulter laser partikkelteller
GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031

NORSK AKKREDITERING TEST 020

INSTRUMENT: **Coulter LS 13320**

METODE: **Metodeoppsettet er beskrevet i LABdok_K01: Kornfordelingsanalyse: metode basert på laser partikkelteller, måleområdet 0.400 µm - 2000 µm.**

Kornfordelingsbestemmelse basert på laserdiffraksjon. Laserlys brytes i ulike vinkler avhengig av størrelsen på partiklene, og registreres så av en rekke detektorer.
De registrerte vinklene tilsvarer gitte partikkelstørrelser, og antall partikler er relatert til den intensiteten som den korresponderende detektoren registrerer.
Kornfordelingen bestemmes således på volum-basis, med antagelse om ens tetthet på materialet vil kumulativ volum% være identisk med kumulativ masse%.

Beregning på volum/masse-basis er basert på antagelse om sfæriske partikler.

MÅLEOMRÅDE : Måleområdet varierer avhengig av type detektorer som benyttes under målinger. Til vanlig gjøres målingene i området 0.4 µm - 2000 µm*.
Måleområdet kan på forespørsel utvides til 0.017 µm - 2000 µm ved hjelp av den såkalte PIDS-detektoren. Dette området omfattes ikke av akkreditering.
NB! Metoden normaliserer alle data i måleområdet til sum 100 % (kumulativ %), hvor den laveste målegrensen settes som nullpunkt mht. kumulativ %.
Hvis prøvene inneholder materiale finere enn det laveste målegrense, er disse ikke detekterbare og dermed ikke tatt i beregning av kumulativ %.

***omfattes av akkreditering**

ANALYSEUSIKKERHET: **± 10 % [kumulativ masse(volum) %]** *Usikkerheten er oppgitt med dekningsfaktor 2, tilsvarende et konfidensintervall på 95 %*
Bestemmelse av usikkerhet er basert på sammenligning av oppnådde resultater med sertifikatverdier for kvartsstandard BCR-131, samt presisjonsdata.
MERK! Metoden tar utgangspunkt i antagelse om sfæriske partikler. For prøver som avviker fra dette kan usikkerheten være større.

PRESISJON: **Det analyseres rutinemessig kontrollprøver som føres i kontrolldiagram (X-diagram). Disse kan forevises om ønskelig.**

Analysekontrakt nr.: 2021.0031 **Prøvetype/prøvematrise:** GEOLOGISK MATERIALE/sediment

Antall prøver: 121

Prøveforbehandling: Ganske mange av prøvene inneholdt mye finstoff og hadde sammenkittet materiale som var vanskelig å løsne. Disse ble bløtlagt og frysetørket på nytt. Dette gjelder prøvene med løpenr 5, 6, 12, 14-25, 28-41, 55, 58-62, 66-71, 76-87, 88-106, 107-118.

Anmerkninger: Ingen

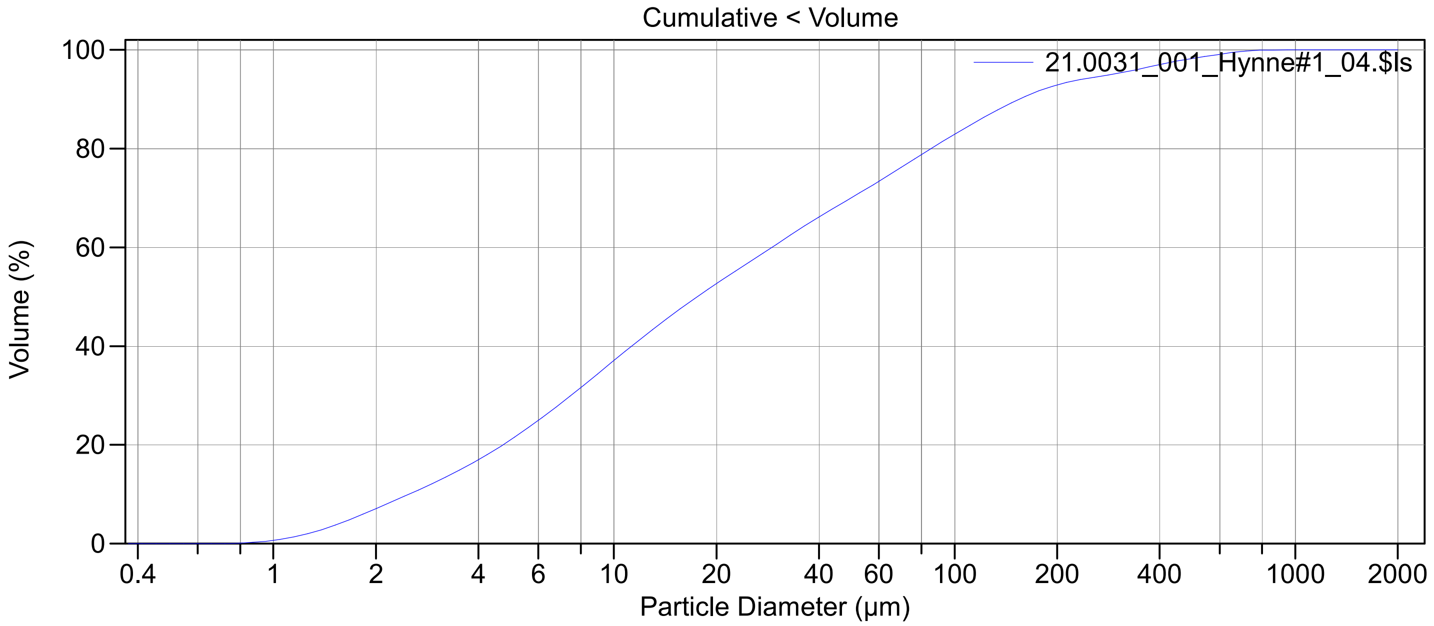
Delrapport som består av forside med informasjon om metode ("Forside_Coulter"), sider med analysedata ("Data") og tilleggsinformasjon ("Prove_info").
Fullstendig analyserapport finnes kun i papirformat. Gjengivelse av analysedata skal skje på en slik måte at meningsinnholdet i rapporten ikke endres.

For informasjon om metode for databeregning (Optical Mode) og statistiske parametre henvises til arket Prove_info.

Forbehandlet av:	Marit Sigrid Halle
Rapportert av:	Marit Sigrid Halle

Forbehandling fullført (dato):	07.04.2021
Analysert fullført (dato):	12.04.2021

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_001_Hynne#1_04.$ls
	21.0031_001_Hynne#1_04.$ls
File ID:	21.0031_001_Hynne#1
Sample ID:	21.0031_Hynne_40107
Operator:	MSH
Run number:	4
	Control Sample
Comment 1:	0,154 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.24%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-19 12:00 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_001_Hynne#1_04.$ls

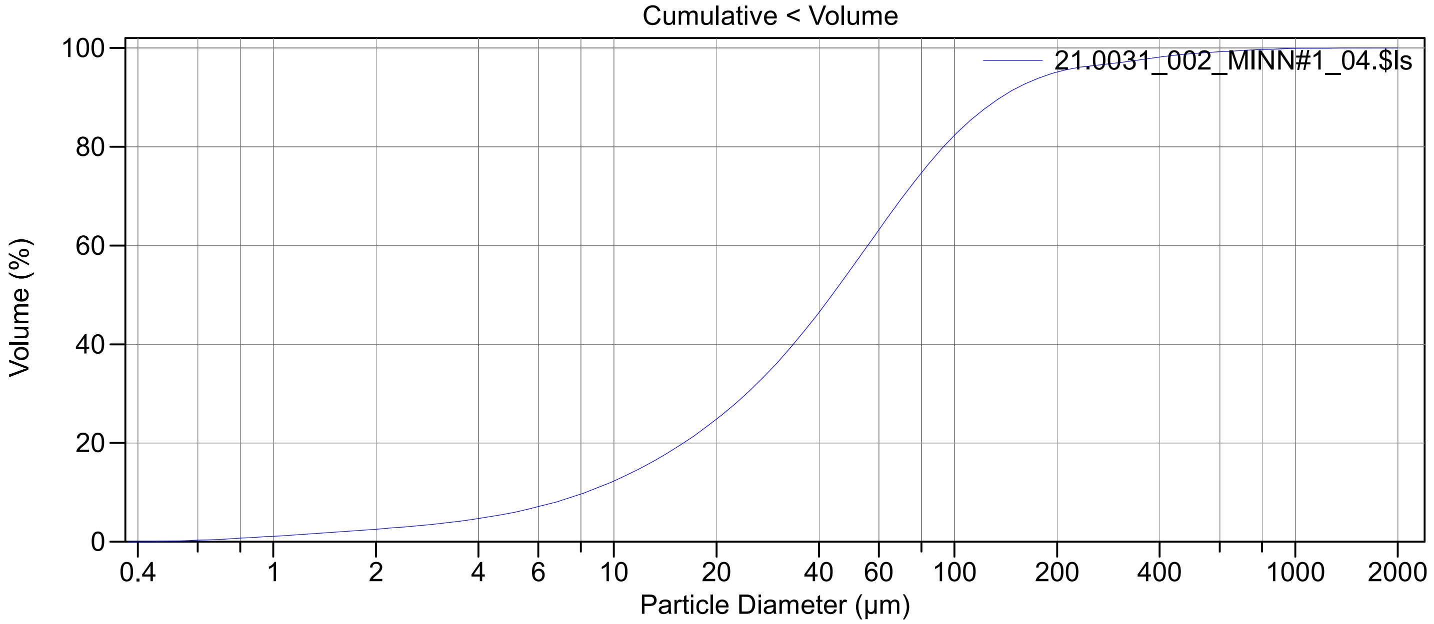
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	60.71 µm	S.D.:	109.1 µm
Median:	17.54 µm	Variance:	11893 μm^2
D(3,2):	7.245 µm	C.V.:	180%
Mean/Median ratio:	3.462	Skewness:	3.389 Right skewed
Mode:	9.370 µm	Kurtosis:	13.17 Leptokurtic
Specific Surf. Area:	8281 cm^2/mL		

d_{10}: 2.504 µm d_{50}: 17.54 µm d_{90}: 155.0 µm

<10%	<25%	<50%	<75%	<90%
2.504 µm	6.013 µm	17.54 µm	65.43 µm	155.0 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_002_MINN#1_04.$ls 21.0031_002_MINN#1_04.$ls
File ID:	21.0031_002_MINN#1
Sample ID:	21.0031_MINN_Split 1
Operator:	MSH
Run number:	4
	Control Sample
Comment 1:	0,334 g + disp.middel, Springvann
Comment 2:	ultralyd, probe 2 (naken), 5 ampl-5 min,Fraunhofer
Optical model:	Fraunhofer.rf780d
Residual:	0.16%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-19 12:13 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_002_MINN#1_04.$ls

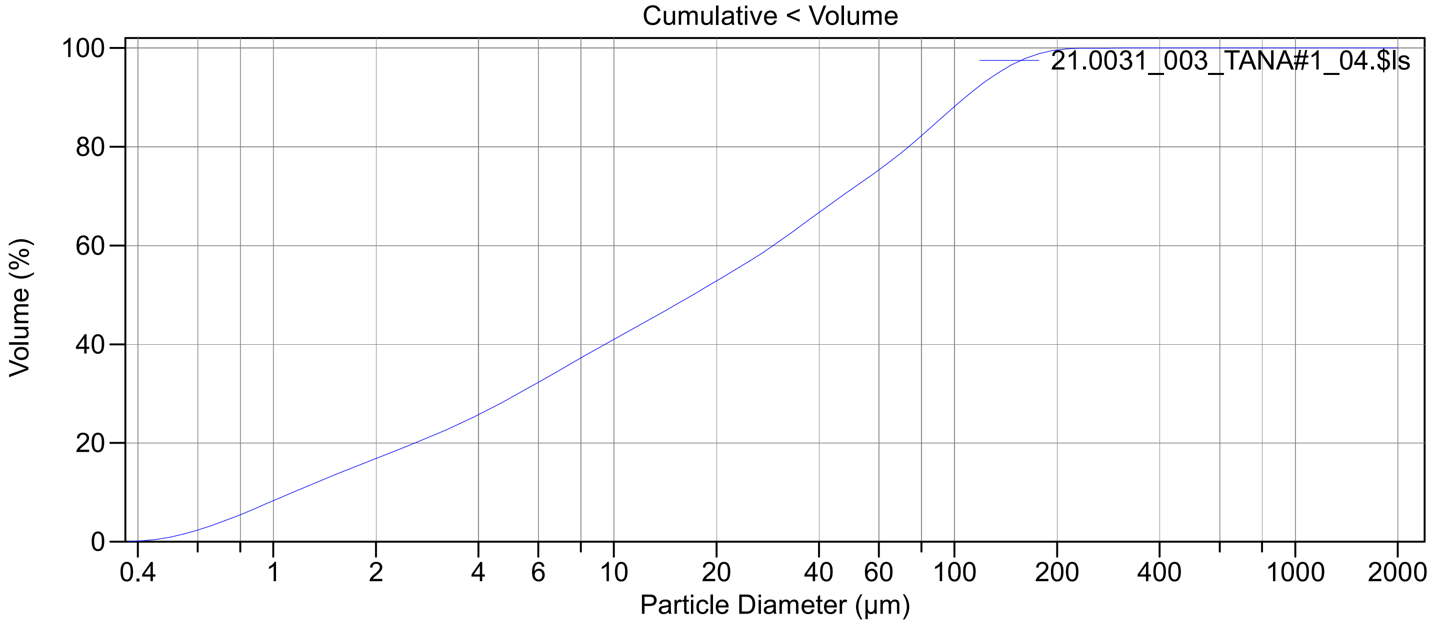
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	68.65 µm	S.D.:	95.86 µm
Median:	43.68 µm	Variance:	9189 µm^2
D(3,2):	14.53 µm	C.V.:	140%
Mean/Median ratio:	1.572	Skewness:	4.735 Right skewed
Mode:	55.14 µm	Kurtosis:	31.19 Leptokurtic
Specific Surf. Area:	4130 cm^2/mL		

d_{10}: 8.243 µm d_{50}: 43.68 µm d_{90}: 136.7 µm

<10%	<25%	<50%	<75%	<90%
8.243 µm	20.15 µm	43.68 µm	80.61 µm	136.7 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_003_TANA#1_04.$ls		
	21.0031_003_TANA#1_04.$ls		
File ID:	21.0031_003_TANA#1		
Sample ID:	21.0031_TANA (2)		
Operator:	MSH		
Run number:	4		
	Control Sample		
Comment 1:	0,140 g + disp.middel, Springvann		
Comment 2:	ultralyd, Probe 2 (naken), 5 ampl-5 min		
Optical model:	Fraunhofer.rf780d		
Residual:	0.26%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-19 10:37	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_003_TANA#1_04.$ls

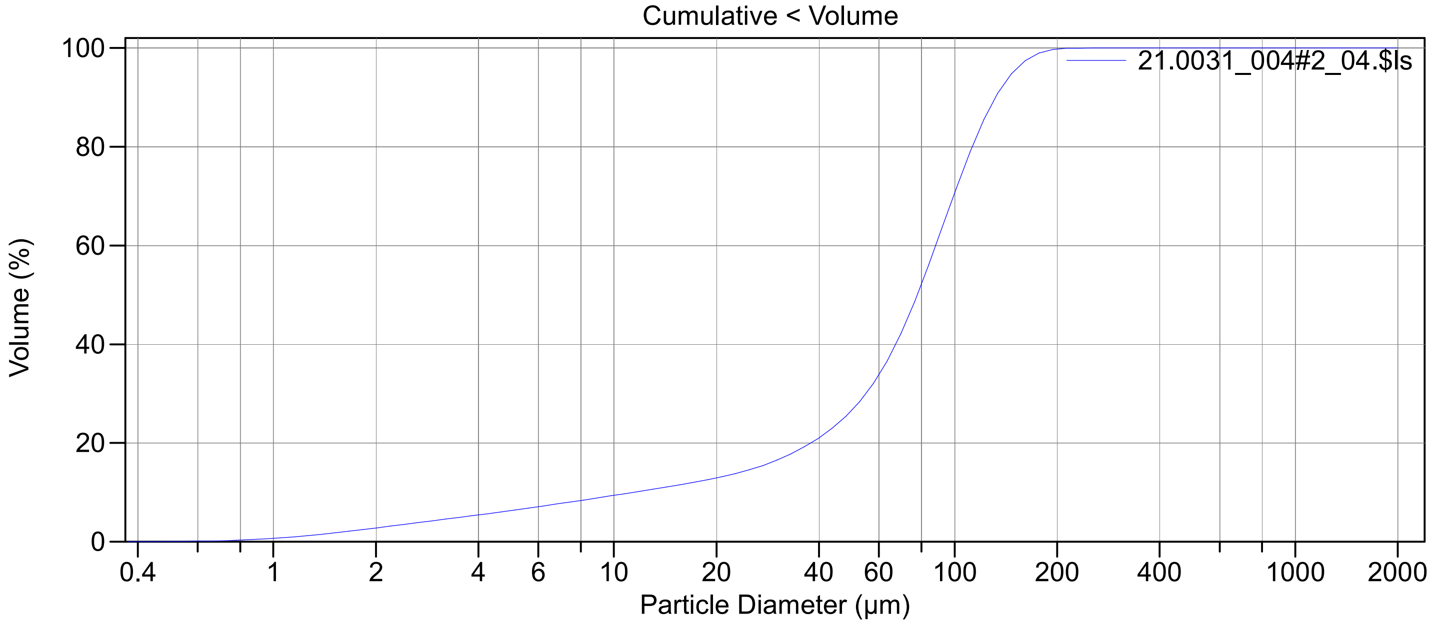
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	37.60 µm	S.D.:	45.03 µm
Median:	17.04 µm	Variance:	2028 µm^2
D(3,2):	3.847 µm	C.V.:	120%
Mean/Median ratio:	2.207	Skewness:	1.461 Right skewed
Mode:	87.90 µm	Kurtosis:	1.537 Leptokurtic
Specific Surf. Area:	15595 cm^2/mL		

d_{10}: 1.140 µm d_{50}: 17.04 µm d_{90}: 107.5 µm

<10%	<25%	<50%	<75%	<90%
1.140 µm	3.803 µm	17.04 µm	59.13 µm	107.5 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_004#2_04.$ls 21.0031_004#2_04.$ls		
File ID:	21.0031_004#2		
Sample ID:	21.0031_188003_R2132MC006A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,451 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.32%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-19 12:41	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_004#2_04.$ls

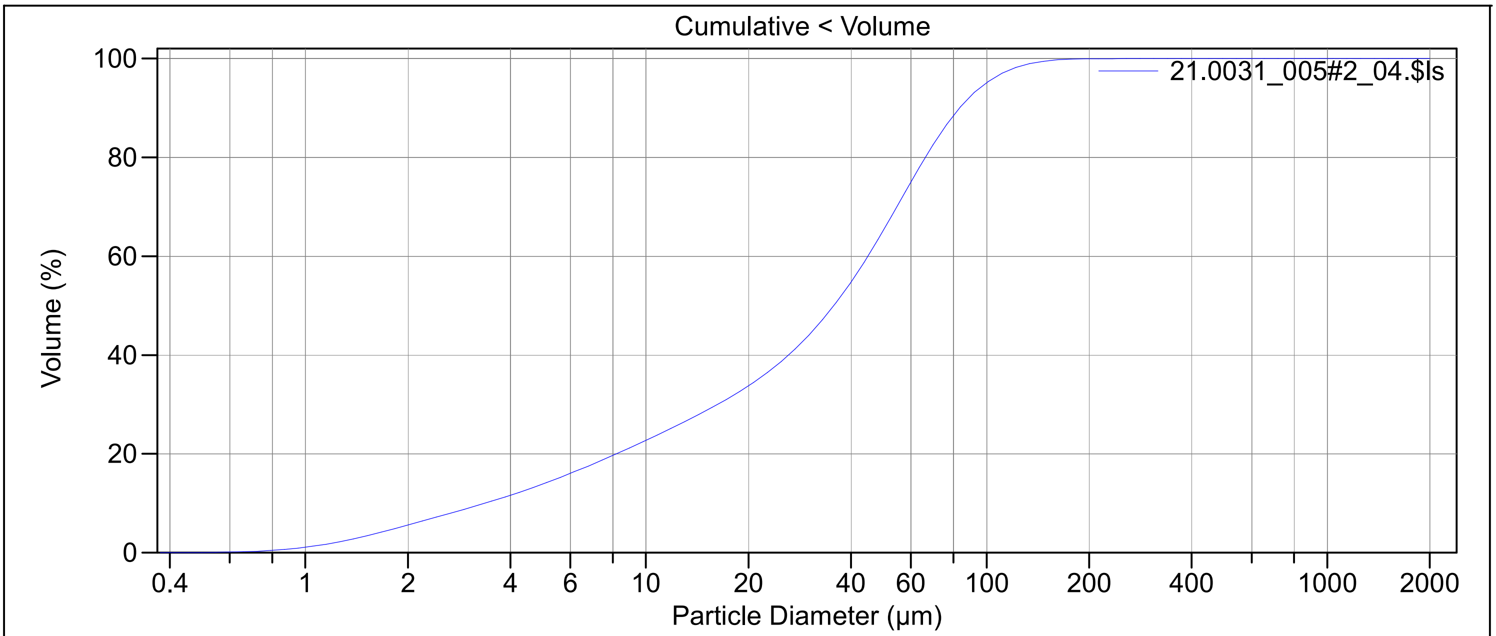
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	76.64 μm	S.D.:	42.84 μm
Median:	77.81 μm	Variance:	1835 $μm^2$
D(3,2):	18.36 μm	C.V.:	55.9%
Mean/Median ratio:	0.985	Skewness:	0.102 Right skewed
Mode:	96.49 μm	Kurtosis:	-0.407 Platykurtic
Specific Surf. Area:	3268 cm^2/mL		

d_{10}: 11.43 μm d_{50}: 77.81 μm d_{90}: 131.9 μm

<10%	<25%	<50%	<75%	<90%
11.43 μm	47.21 μm	77.81 μm	105.6 μm	131.9 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_005#2_04.$ls 21.0031_005#2_04.$ls
File ID:	21.0031_005#2
Sample ID:	21.0031_188042_R2139MC008A 0-1 cm
Operator:	MSH
Run number:	4
Comment 1:	0,182 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.19%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-19 13:12 Run length: 60 seconds
Pump speed:	45
Obscuration:	9%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic)   21.0031_005#2_04.$ls

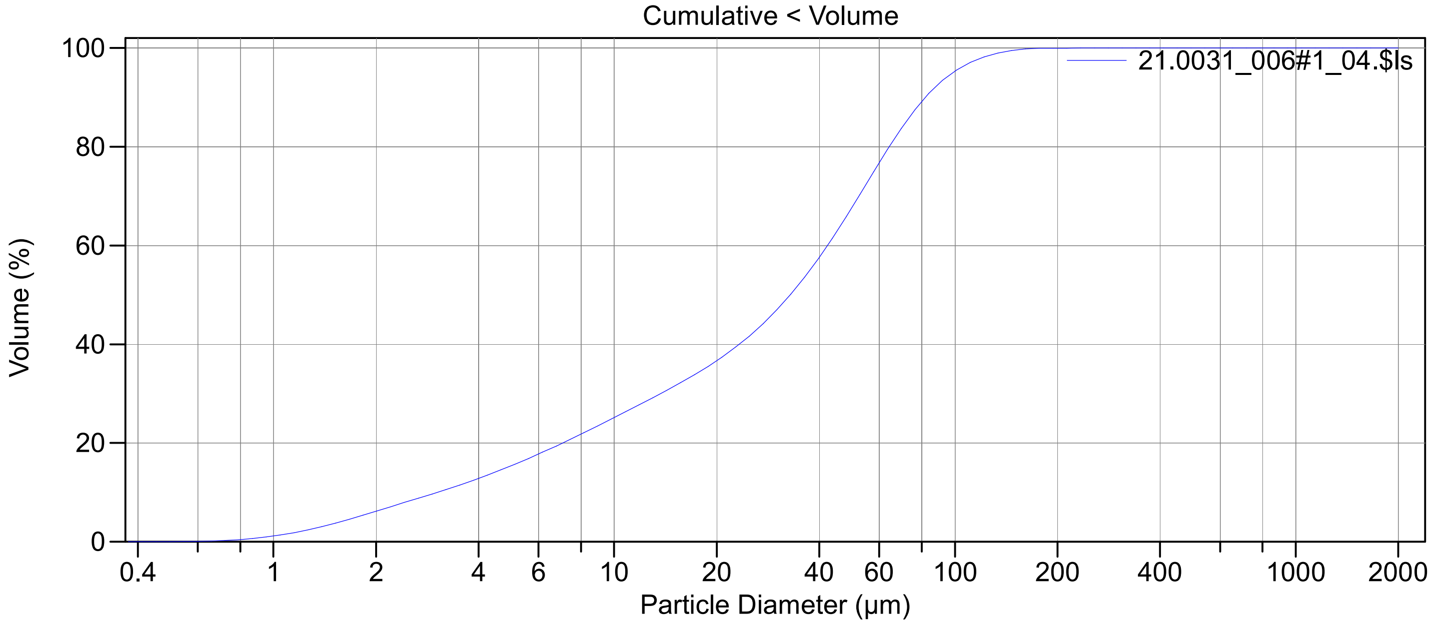
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	40.09 µm	S.D.:	32.08 µm
Median:	35.64 µm	Variance:	1029 μm^2
D(3,2):	9.362 µm	C.V.:	80.0%
Mean/Median ratio:	1.125	Skewness:	0.903 Right skewed
Mode:	55.13 µm	Kurtosis:	0.718 Leptokurtic
Specific Surf. Area:	6409 cm^2/mL		

d_{10}: 3.366 µm d_{50}: 35.64 µm d_{90}: 83.39 µm

<10%	<25%	<50%	<75%	<90%
3.366 µm	11.73 µm	35.64 µm	60.02 µm	83.39 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_006#1_04.$ls 21.0031_006#1_04.$ls
File ID:	21.0031_006#1
Sample ID:	21.0031_188044_R2139MC008A 2-3 cm
Operator:	MSH
Run number:	4
Comment 1:	0,185 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.19%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-19 13:28 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_006#1_04.$ls

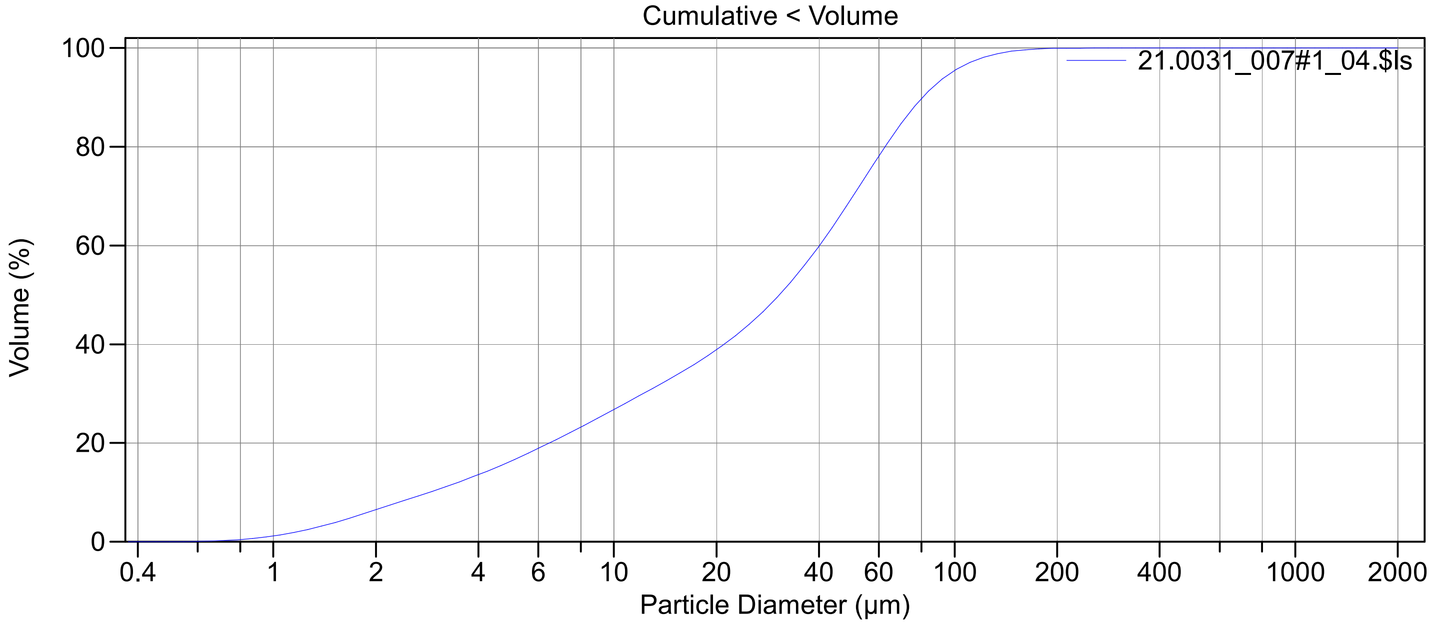
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	38.25 µm	S.D.:	31.97 µm
Median:	32.87 µm	Variance:	1022 μm^2
D(3,2):	8.708 µm	C.V.:	83.6%
Mean/Median ratio:	1.164	Skewness:	0.969 Right skewed
Mode:	55.13 µm	Kurtosis:	0.778 Leptokurtic
Specific Surf. Area:	6890 cm^2/mL		

d_{10}: 3.022 µm d_{50}: 32.87 µm d_{90}: 82.03 µm

<10%	<25%	<50%	<75%	<90%
3.022 µm	9.913 µm	32.87 µm	57.82 µm	82.03 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_007#1_04.$ls 21.0031_007#1_04.$ls		
File ID:	21.0031_007#1		
Sample ID:	21.0031_188046_R2139CMC008A 4-5 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,185 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.20%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-19 13:42	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_007#1_04.$ls

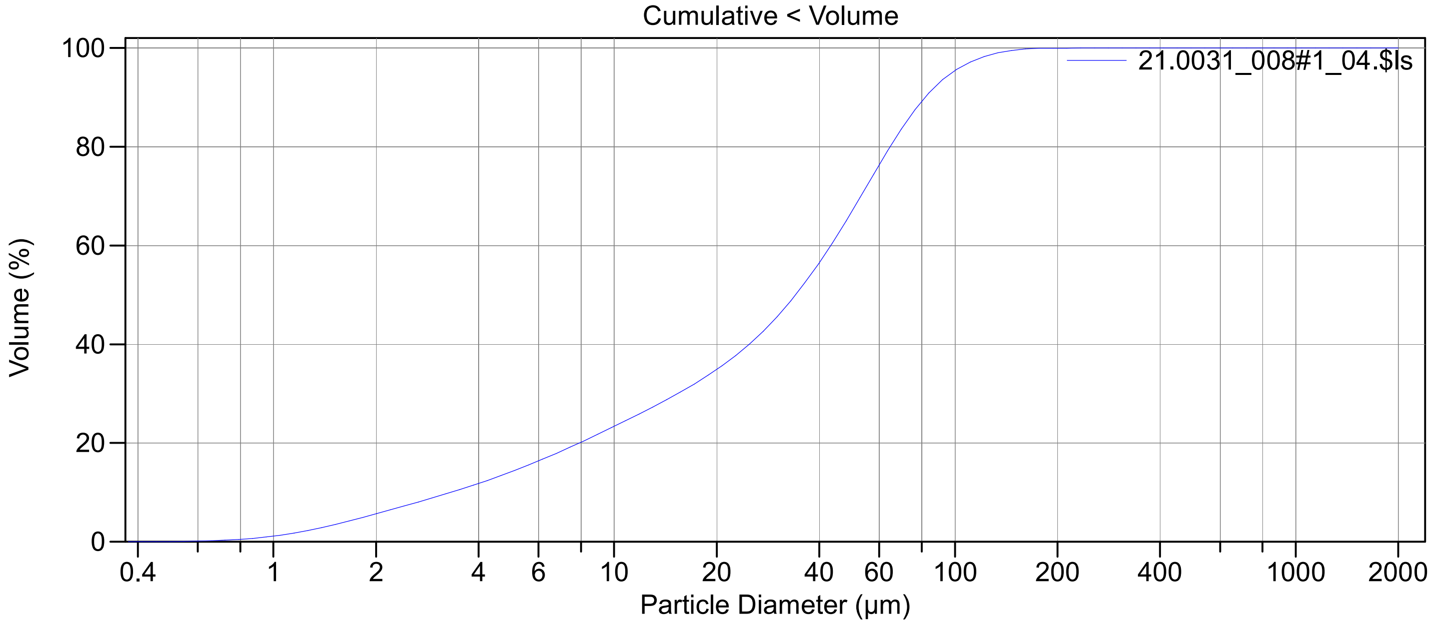
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	36.94 µm	S.D.:	32.18 µm
Median:	30.61 µm	Variance:	1036 μm^2
D(3,2):	8.344 µm	C.V.:	87.1%
Mean/Median ratio:	1.207	Skewness:	1.122 Right skewed
Mode:	55.13 µm	Kurtosis:	1.393 Leptokurtic
Specific Surf. Area:	7190 cm^2/mL		

d_{10}: 2.864 µm d_{50}: 30.61 µm d_{90}: 80.79 µm

<10%	<25%	<50%	<75%	<90%
2.864 µm	8.931 µm	30.61 µm	56.04 µm	80.79 µm

File name:	N:\Lab\Korn\Coulter\Data\2021\Rådata\20210031\21.0031_008#1_04.$ls 21.0031_008#1_04.$ls		
File ID:	21.0031_008#1		
Sample ID:	21.0031_188051_R2139CMC008A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,186 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.19%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-19 13:53	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_008#1_04.$ls

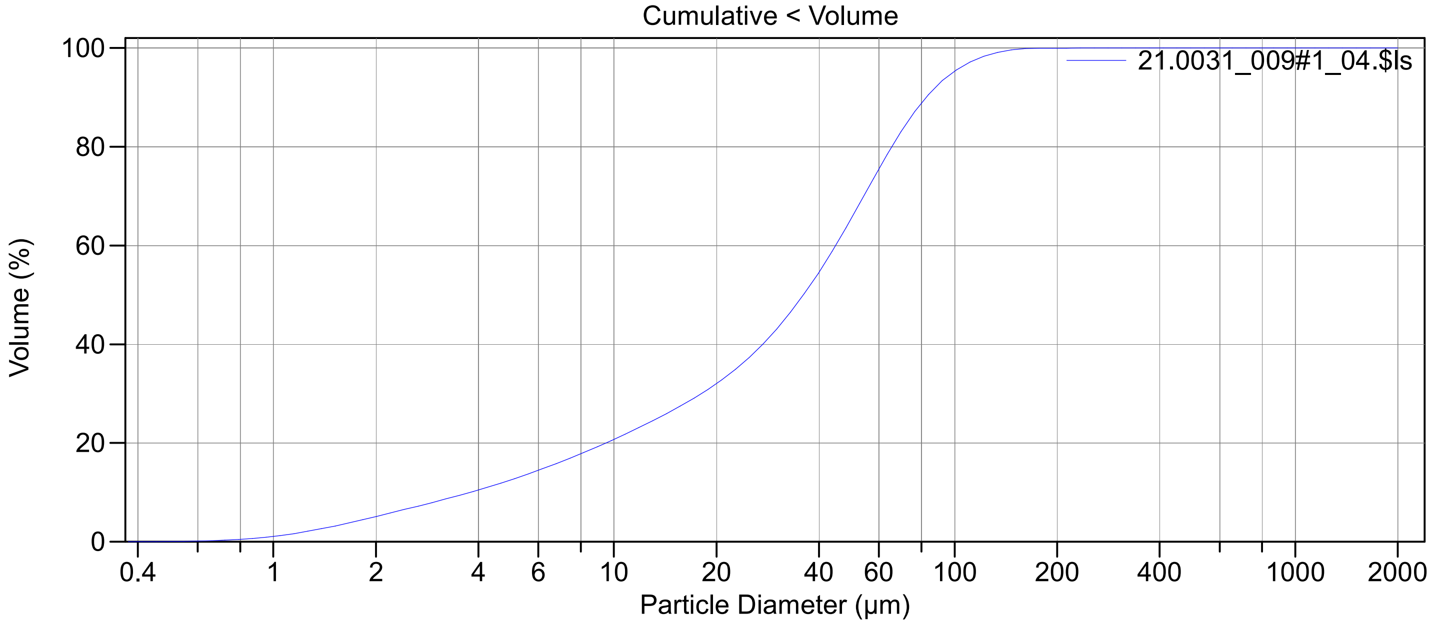
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	38.97 µm	S.D.:	31.60 µm
Median:	34.09 µm	Variance:	998.7 µm^2
D(3,2):	9.186 µm	C.V.:	81.1%
Mean/Median ratio:	1.143	Skewness:	0.936 Right skewed
Mode:	55.13 µm	Kurtosis:	0.756 Leptokurtic
Specific Surf. Area:	6532 cm^2/mL		

d_{10}: 3.318 µm d_{50}: 34.09 µm d_{90}: 81.97 µm

<10%	<25%	<50%	<75%	<90%
3.318 µm	11.18 µm	34.09 µm	58.41 µm	81.97 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_009#1_04.$ls 21.0031_009#1_04.$ls		
File ID:	21.0031_009#1		
Sample ID:	21.0031_188056_R2139CMC008A 14-15 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,187 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.17%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-19 14:08	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_009#1_04.$ls

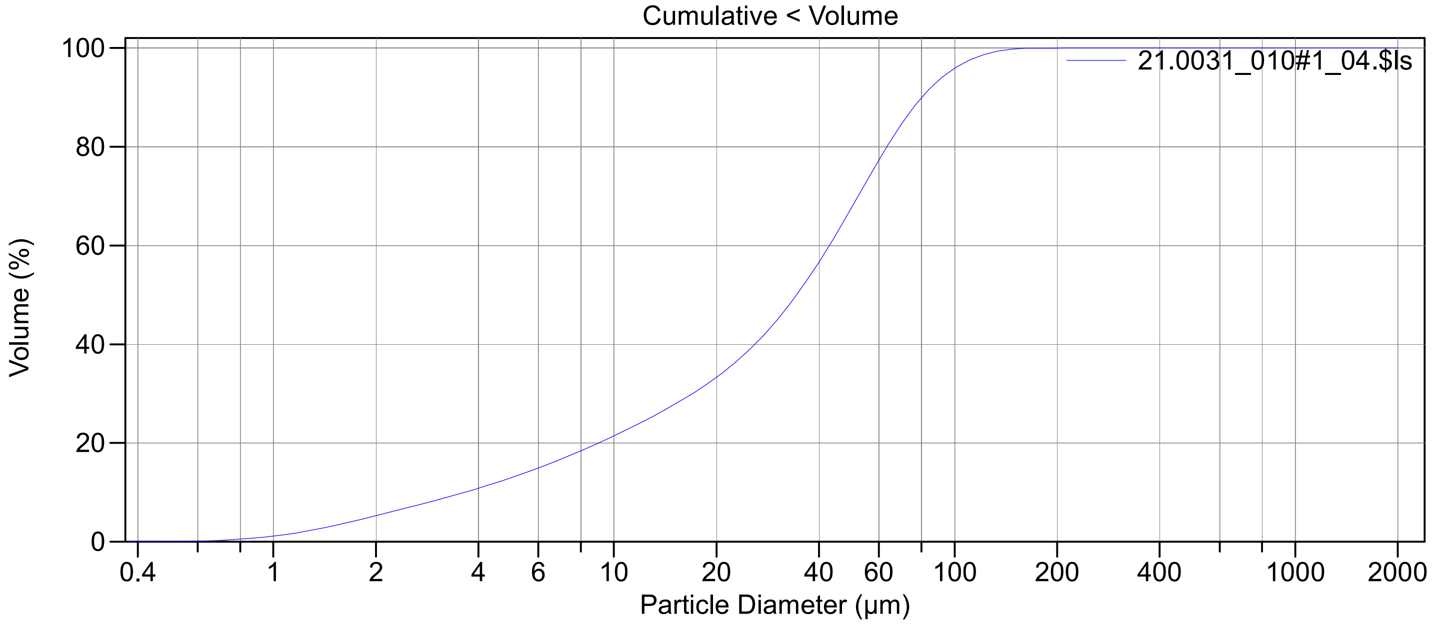
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	40.26 µm	S.D.:	31.18 µm
Median:	36.02 µm	Variance:	972.3 $µm^2$
D(3,2):	9.928 µm	C.V.:	77.4%
Mean/Median ratio:	1.118	Skewness:	0.865 Right skewed
Mode:	55.13 µm	Kurtosis:	0.572 Leptokurtic
Specific Surf. Area:	6044 cm^2/mL		

d_{10}: 3.781 µm d_{50}: 36.02 µm d_{90}: 82.61 µm

<10%	<25%	<50%	<75%	<90%
3.781 µm	13.44 µm	36.02 µm	59.42 µm	82.61 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_010#1_04.$ls 21.0031_010#1_04.$ls
File ID:	21.0031_010#1
Sample ID:	21.0031_188066_R2139CMC008A 24-25 cm
Operator:	MSH
Run number:	4
Comment 1:	0,189 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.18%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-19 14:22 Run length: 60 seconds
Pump speed:	45
Obscuration:	9%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_010#1_04.$ls

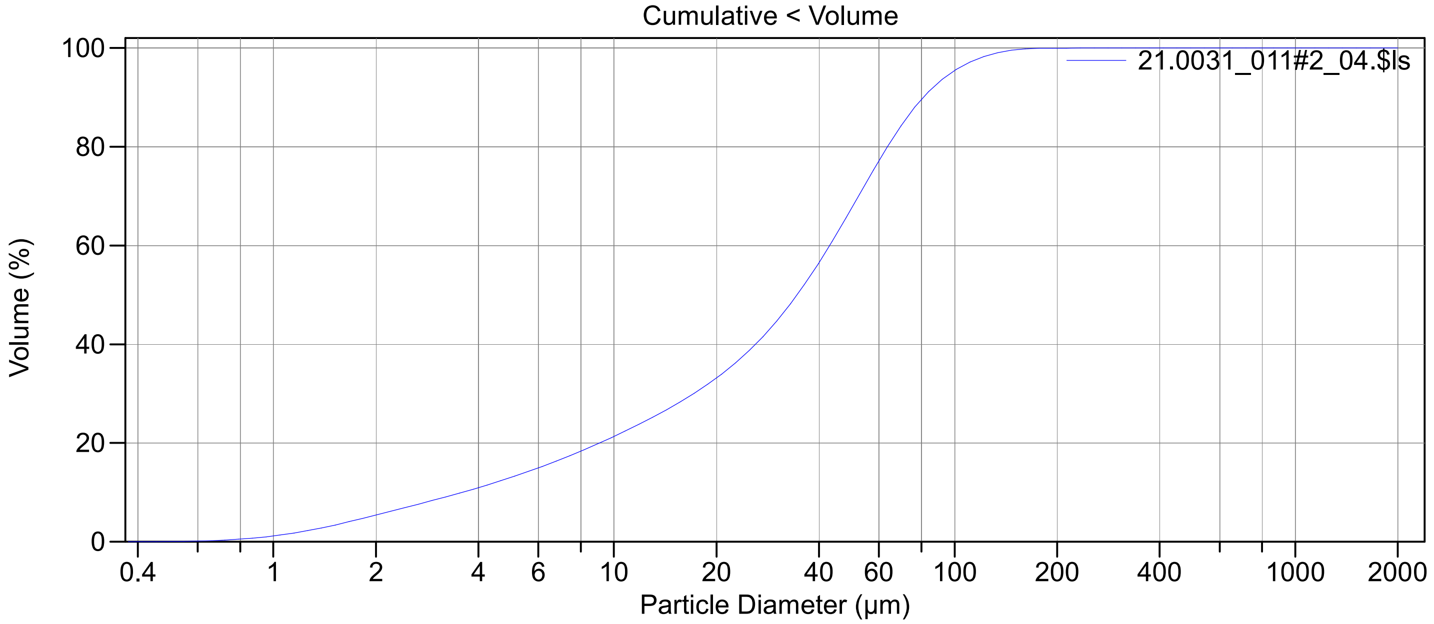
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	38.76 µm	S.D.:	30.23 µm
Median:	34.41 µm	Variance:	913.7 μm^2
D(3,2):	9.632 µm	C.V.:	78.0%
Mean/Median ratio:	1.126	Skewness:	0.864 Right skewed
Mode:	50.22 µm	Kurtosis:	0.502 Leptokurtic
Specific Surf. Area:	6229 cm^2/mL		

d_{10}: 3.640 µm d_{50}: 34.41 µm d_{90}: 80.35 µm

<10%	<25%	<50%	<75%	<90%
3.640 µm	12.70 µm	34.41 µm	57.31 µm	80.35 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_011#2_04.$ls 21.0031_011#2_04.$ls
File ID:	21.0031_011#2
Sample ID:	21.0031_188070_R2139CMC008A 28-29 cm
Operator:	MSH
Run number:	4
Comment 1:	0,191 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.19%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-22 9:58 Run length: 60 seconds
Pump speed:	45
Obscuration:	9%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_011#2_04.$ls

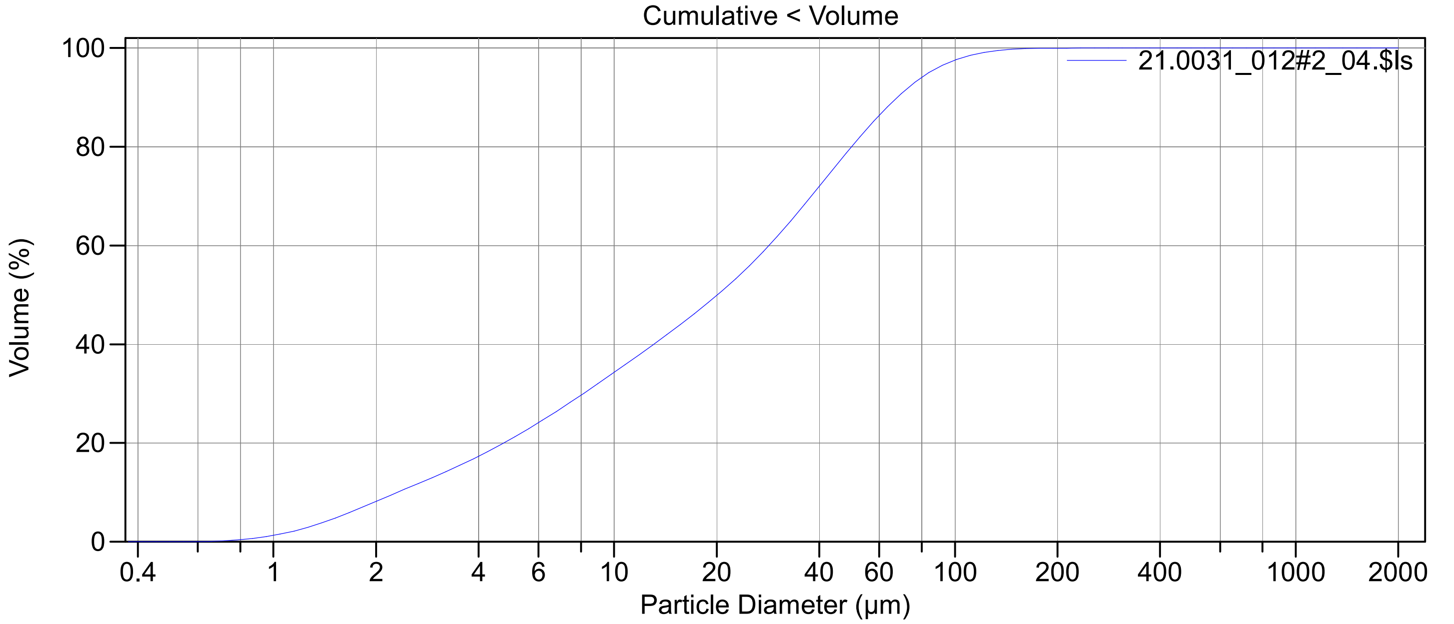
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	39.15 µm	S.D.:	30.98 µm
Median:	34.48 µm	Variance:	959.7 µm^2
D(3,2):	9.578 µm	C.V.:	79.1%
Mean/Median ratio:	1.135	Skewness:	0.952 Right skewed
Mode:	50.22 µm	Kurtosis:	0.822 Leptokurtic
Specific Surf. Area:	6264 cm^2/mL		

d_{10}: 3.587 µm d_{50}: 34.48 µm d_{90}: 81.10 µm

<10%	<25%	<50%	<75%	<90%
3.587 µm	12.83 µm	34.48 µm	57.48 µm	81.10 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_012#2_04.$ls 21.0031_012#2_04.$ls		
File ID:	21.0031_012#2		
Sample ID:	21.0031_188076_R2183MC009A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,150 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 10:23	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_012#2_04.$ls

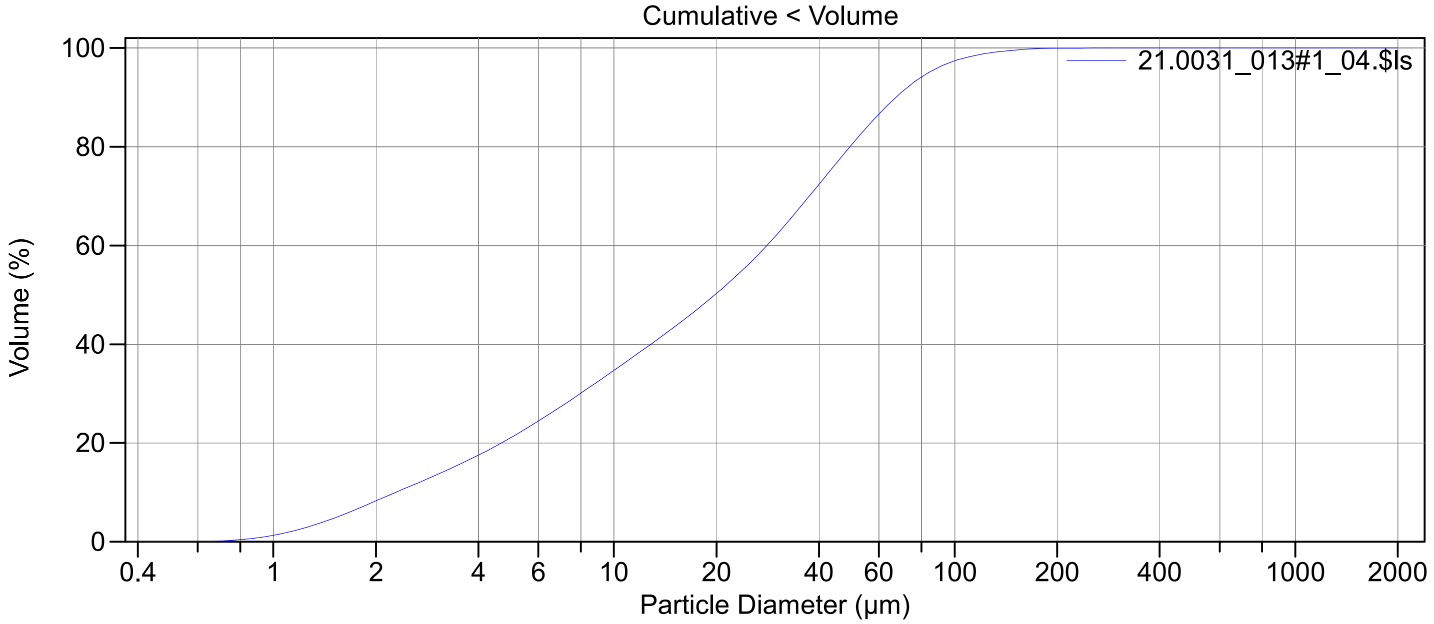
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	28.69 µm	S.D.:	27.82 µm
Median:	20.08 µm	Variance:	773.9 μm^2
D(3,2):	6.838 µm	C.V.:	97.0%
Mean/Median ratio:	1.429	Skewness:	1.401 Right skewed
Mode:	41.68 µm	Kurtosis:	2.159 Leptokurtic
Specific Surf. Area:	8774 cm^2/mL		

d_{10}: 2.313 µm d_{50}: 20.08 µm d_{90}: 67.80 µm

<10%	<25%	<50%	<75%	<90%
2.313 µm	6.293 µm	20.08 µm	43.35 µm	67.80 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_013#1_04.$ls 21.0031_013#1_04.$ls		
File ID:	21.0031_013#1		
Sample ID:	21.0031_188078_R2183MC009A 2-3 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,151 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 10:40	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_013#1_04.$ls

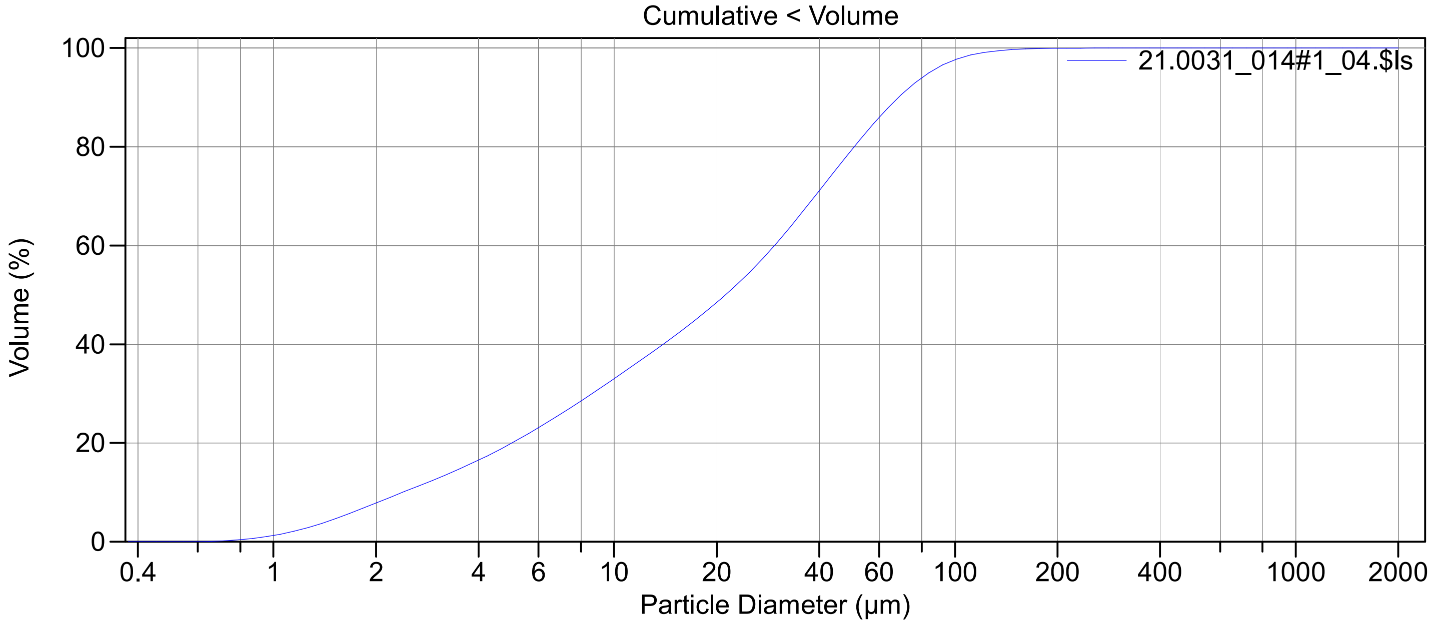
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	28.62 μm	S.D.:	28.44 μm
Median:	19.77 μm	Variance:	808.7 μm^2
D(3,2):	6.774 μm	C.V.:	99.4%
Mean/Median ratio:	1.448	Skewness:	1.589 Right skewed
Mode:	41.68 μm	Kurtosis:	3.314 Leptokurtic
Specific Surf. Area:	8857 cm^2/mL		

d_{10}: 2.290 μm d_{50}: 19.77 μm d_{90}: 67.31 μm

<10%	<25%	<50%	<75%	<90%
2.290 μm	6.179 μm	19.77 μm	42.92 μm	67.31 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_014#1_04.$ls 21.0031_014#1_04.$ls		
File ID:	21.0031_014#1		
Sample ID:	21.0031_188080_R2183MC009A 4-5 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,151 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.21%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 10:54	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_014#1_04.$ls

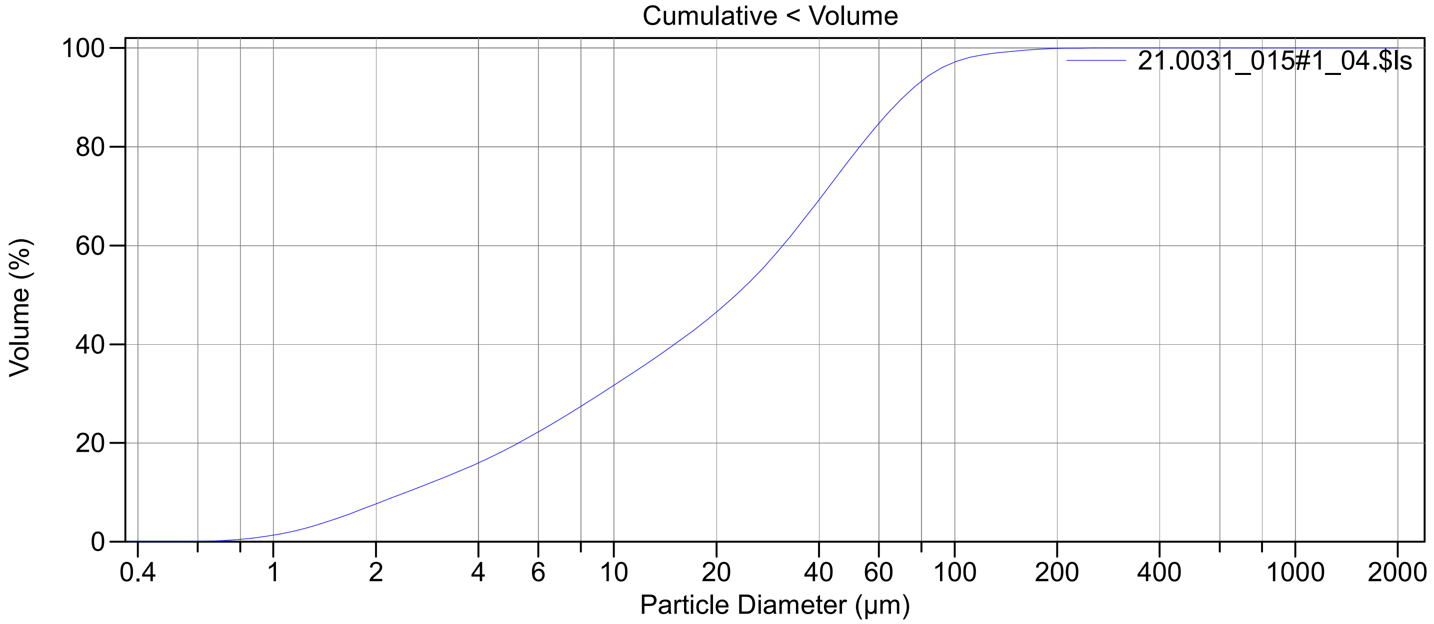
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	29.34 µm	S.D.:	27.98 µm
Median:	21.20 µm	Variance:	782.8 $µm^2$
D(3,2):	7.056 µm	C.V.:	95.4%
Mean/Median ratio:	1.384	Skewness:	1.417 Right skewed
Mode:	41.68 µm	Kurtosis:	2.515 Leptokurtic
Specific Surf. Area:	8503 cm^2/mL		

d_{10}: 2.396 µm d_{50}: 21.20 µm d_{90}: 68.40 µm

<10%	<25%	<50%	<75%	<90%
2.396 µm	6.651 µm	21.20 µm	44.26 µm	68.40 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_015#1_04.$ls 21.0031_015#1_04.$ls
File ID:	21.0031_015#1
Sample ID:	21.0031_188085_R2183MC009A 9-10 cm
Operator:	MSH
Run number:	4
Comment 1:	0,151 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.21%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-22 11:48 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_015#1_04.$ls

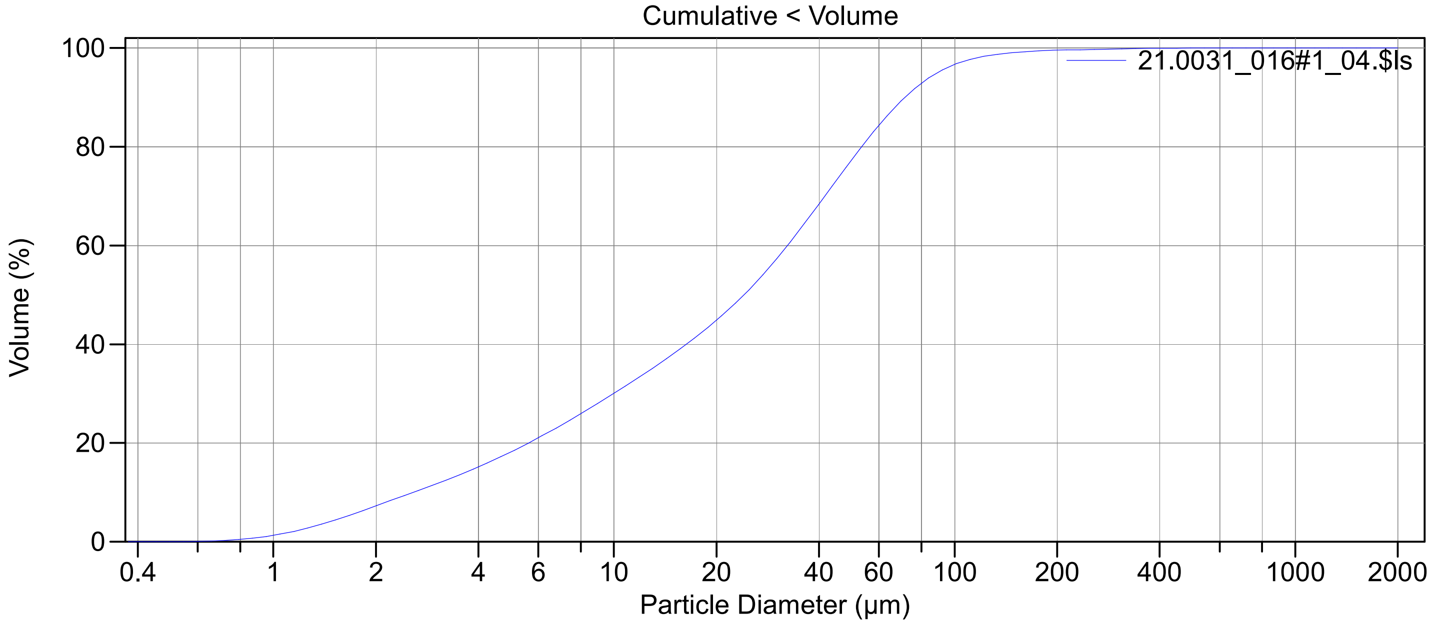
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	30.89 µm	S.D.:	29.67 µm
Median:	22.83 µm	Variance:	880.5 µm^2
D(3,2):	7.230 µm	C.V.:	96.1%
Mean/Median ratio:	1.353	Skewness:	1.576 Right skewed
Mode:	41.68 µm	Kurtosis:	3.587 Leptokurtic
Specific Surf. Area:	8299 cm^2/mL		

d_{10}: 2.453 µm d_{50}: 22.83 µm d_{90}: 70.61 µm

<10%	<25%	<50%	<75%	<90%
2.453 µm	7.015 µm	22.83 µm	46.28 µm	70.61 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_016#1_04.$ls 21.0031_016#1_04.$ls
File ID:	21.0031_016#1
Sample ID:	21.0031_188090_R2183MC009A 14-15 cm
Operator:	MSH
Run number:	4
Comment 1:	0,151 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.21%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-22 12:01 Run length: 60 seconds
Pump speed:	45
Obscuration:	9%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic)   21.0031_016#1_04.$ls

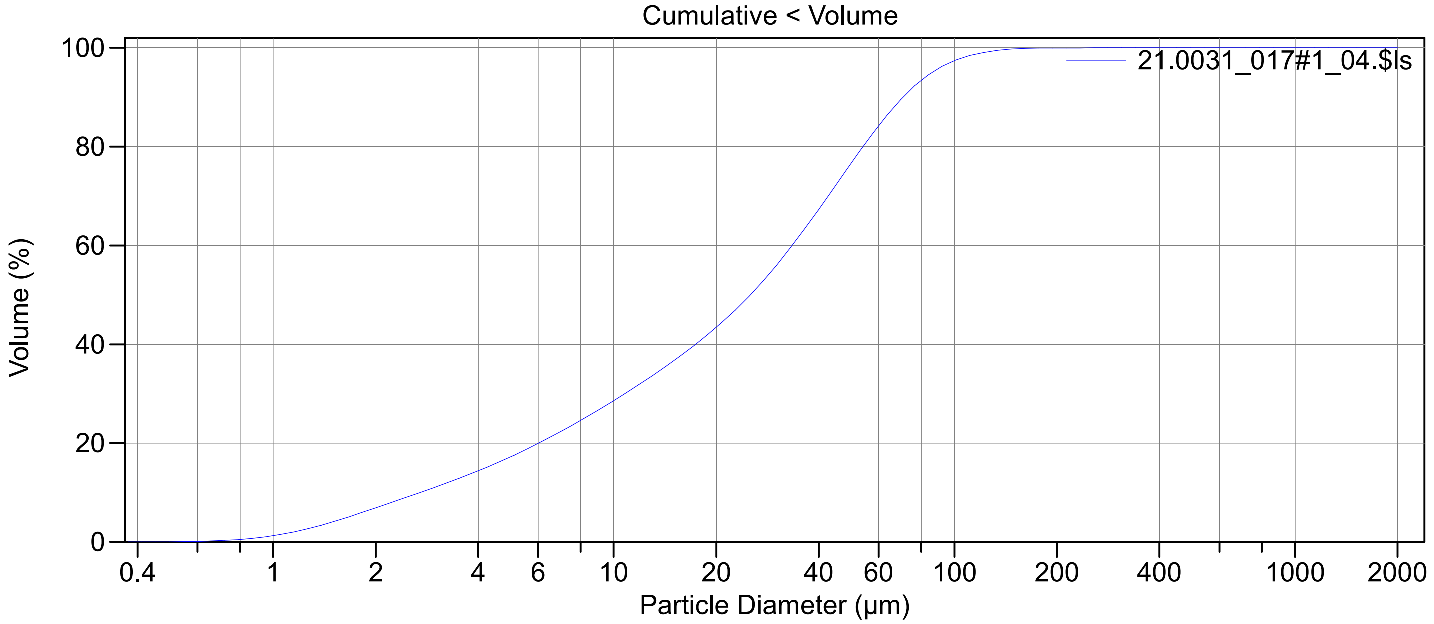
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	32.41 µm	S.D.:	33.88 µm
Median:	24.09 µm	Variance:	1148 μm^2
D(3,2):	7.506 µm	C.V.:	105%
Mean/Median ratio:	1.346	Skewness:	3.049 Right skewed
Mode:	41.68 µm	Kurtosis:	19.28 Leptokurtic
Specific Surf. Area:	7993 cm^2/mL		

d_{10}: 2.574 µm d_{50}: 24.09 µm d_{90}: 71.59 µm

<10%	<25%	<50%	<75%	<90%
2.574 µm	7.581 µm	24.09 µm	47.03 µm	71.59 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_017#1_04.$ls 21.0031_017#1_04.$ls		
File ID:	21.0031_017#1		
Sample ID:	21.0031_188100_R2183MC009A 24-25 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,151 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.20%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 12:12	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_017#1_04.$ls

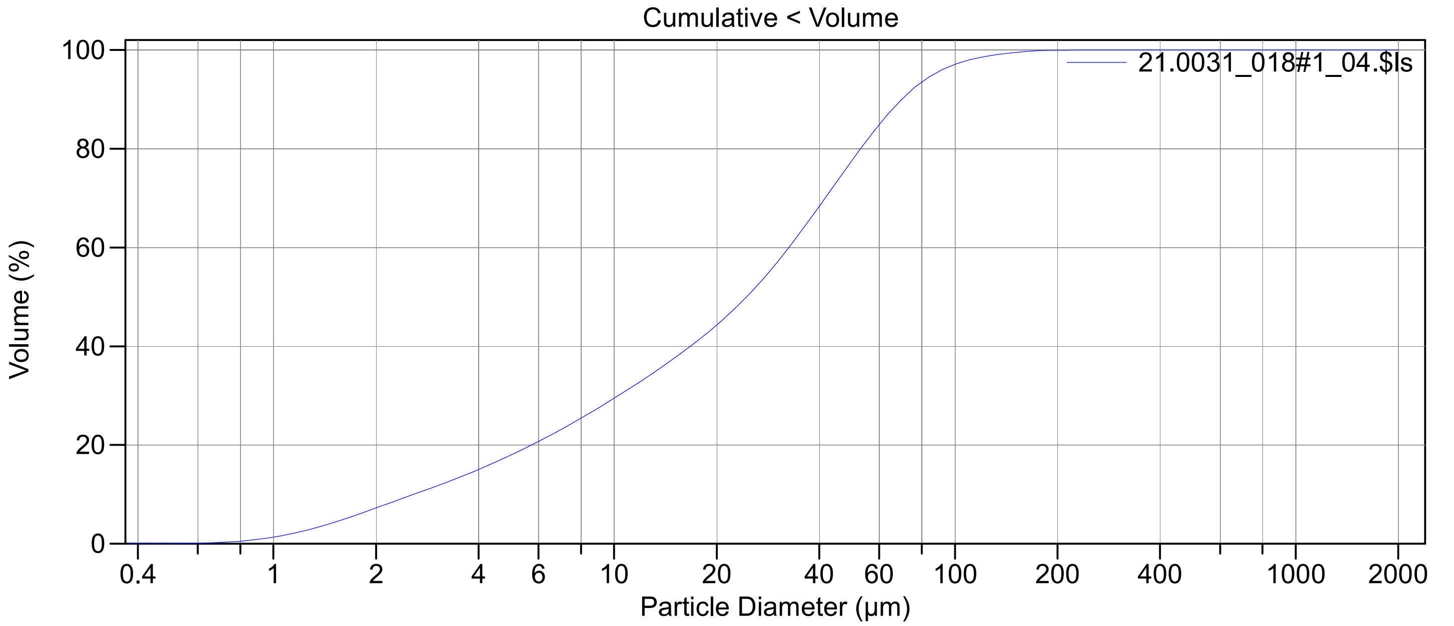
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	31.81 µm	S.D.:	28.21 µm
Median:	25.18 µm	Variance:	795.8 $µm^2$
D(3,2):	7.772 µm	C.V.:	88.7%
Mean/Median ratio:	1.263	Skewness:	1.222 Right skewed
Mode:	45.75 µm	Kurtosis:	1.708 Leptokurtic
Specific Surf. Area:	7720 cm^2/mL		

d_{10}: 2.698 µm d_{50}: 25.18 µm d_{90}: 70.69 µm

<10%	<25%	<50%	<75%	<90%
2.698 µm	8.185 µm	25.18 µm	47.86 µm	70.69 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_018#1_04.$ls 21.0031_018#1_04.$ls		
File ID:	21.0031_018#1		
Sample ID:	21.0031_188110_R2183MC009A 34-35 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,151 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.20%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 12:28	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_018#1_04.$ls

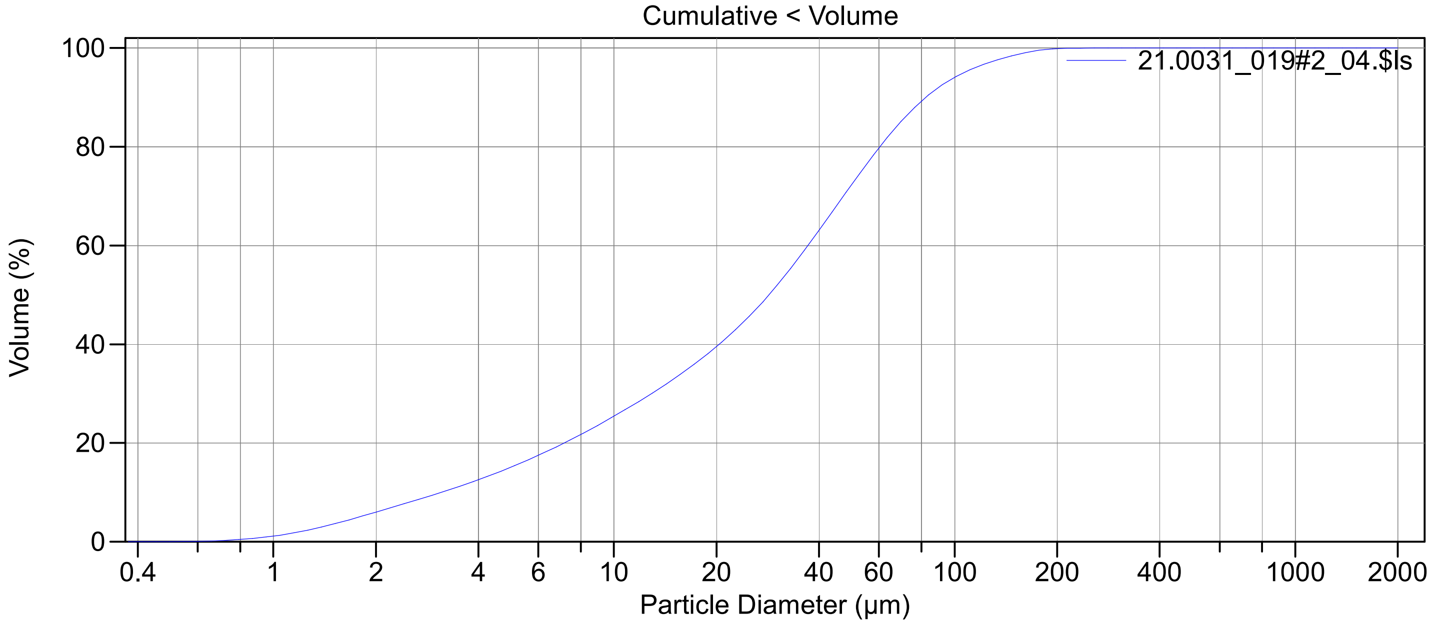
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	31.47 µm	S.D.:	28.97 µm
Median:	24.47 µm	Variance:	839.2 µm^2
D(3,2):	7.539 µm	C.V.:	92.1%
Mean/Median ratio:	1.286	Skewness:	1.439 Right skewed
Mode:	41.68 µm	Kurtosis:	2.769 Leptokurtic
Specific Surf. Area:	7958 cm^2/mL		

d_{10}: 2.580 µm d_{50}: 24.47 µm d_{90}: 69.75 µm

<10%	<25%	<50%	<75%	<90%
2.580 µm	7.797 µm	24.47 µm	46.83 µm	69.75 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_019#2_04.$ls 21.0031_019#2_04.$ls		
File ID:	21.0031_019#2		
Sample ID:	21.0031_188123_R2229MC009A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,188 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 12:52	Run length:	61 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_019#2_04.$ls

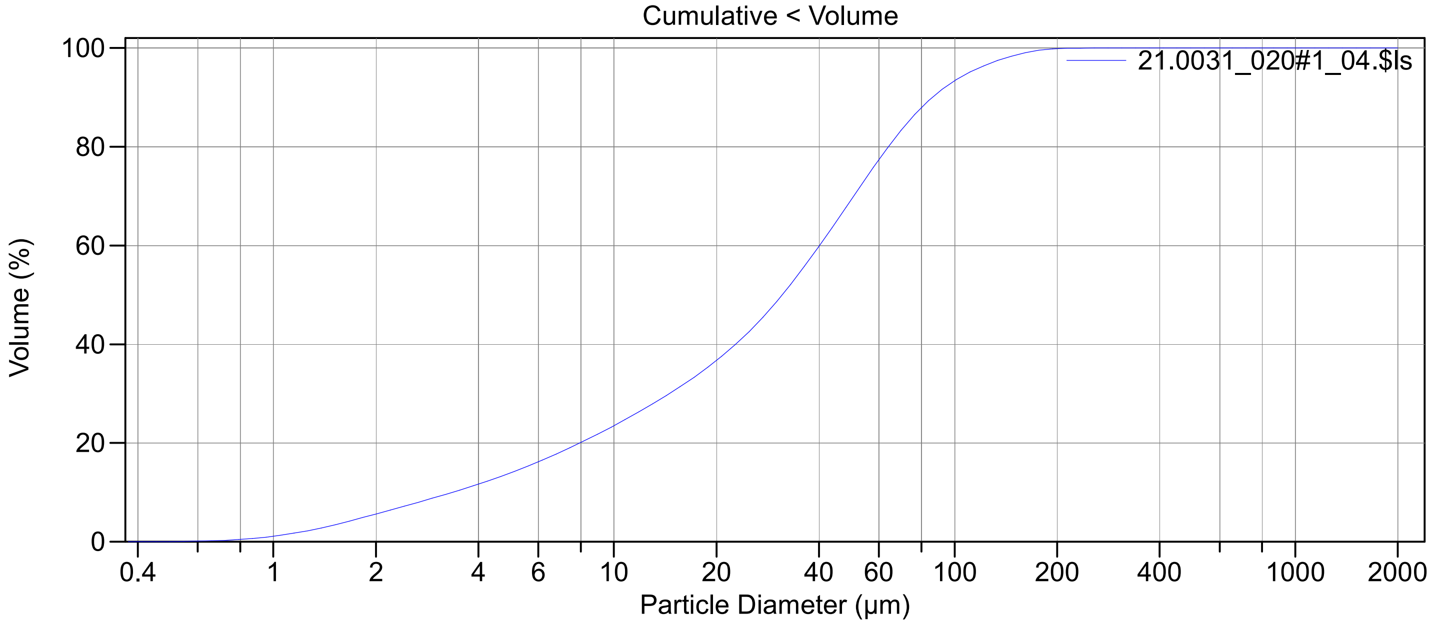
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	37.09 µm	S.D.:	34.70 µm
Median:	28.53 µm	Variance:	1204 $µm^2$
D(3,2):	8.638 µm	C.V.:	93.5%
Mean/Median ratio:	1.300	Skewness:	1.537 Right skewed
Mode:	45.75 µm	Kurtosis:	2.866 Leptokurtic
Specific Surf. Area:	6946 cm^2/mL		

d_{10}: 3.108 µm d_{50}: 28.53 µm d_{90}: 82.42 µm

<10%	<25%	<50%	<75%	<90%
3.108 µm	9.755 µm	28.53 µm	53.18 µm	82.42 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_020#1_04.$ls 21.0031_020#1_04.$ls		
File ID:	21.0031_020#1		
Sample ID:	21.0031_188125_R2229MC009A 2-3 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,188 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 13:05	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_020#1_04.$ls

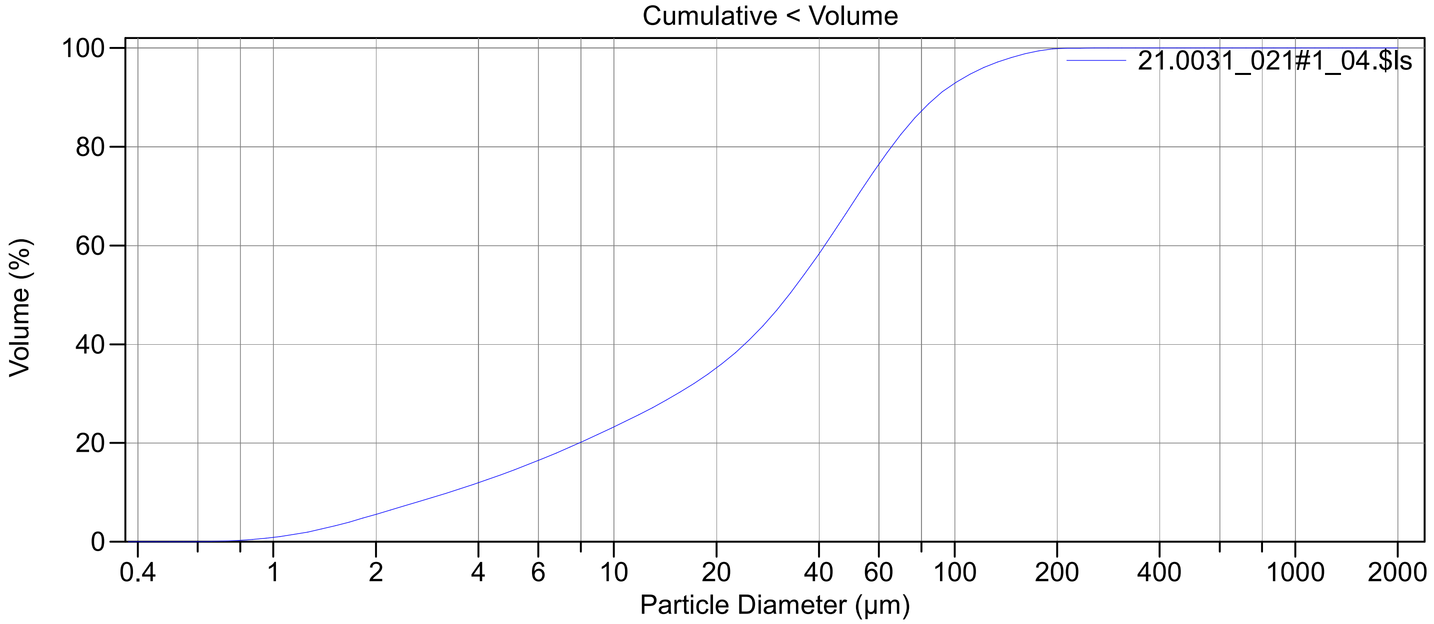
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	39.32 µm	S.D.:	35.38 µm
Median:	31.21 µm	Variance:	1252 µm^2
D(3,2):	9.141 µm	C.V.:	90.0%
Mean/Median ratio:	1.260	Skewness:	1.402 Right skewed
Mode:	50.22 µm	Kurtosis:	2.297 Leptokurtic
Specific Surf. Area:	6564 cm^2/mL		

d_{10}: 3.354 µm d_{50}: 31.21 µm d_{90}: 86.18 µm

<10%	<25%	<50%	<75%	<90%
3.354 µm	10.97 µm	31.21 µm	56.69 µm	86.18 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_021#1_04.$ls		
	21.0031_021#1_04.$ls		
File ID:	21.0031_021#1		
Sample ID:	21.0031_188127_R2229MC009A 4-5 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,190 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 13:25	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_021#1_04.$ls

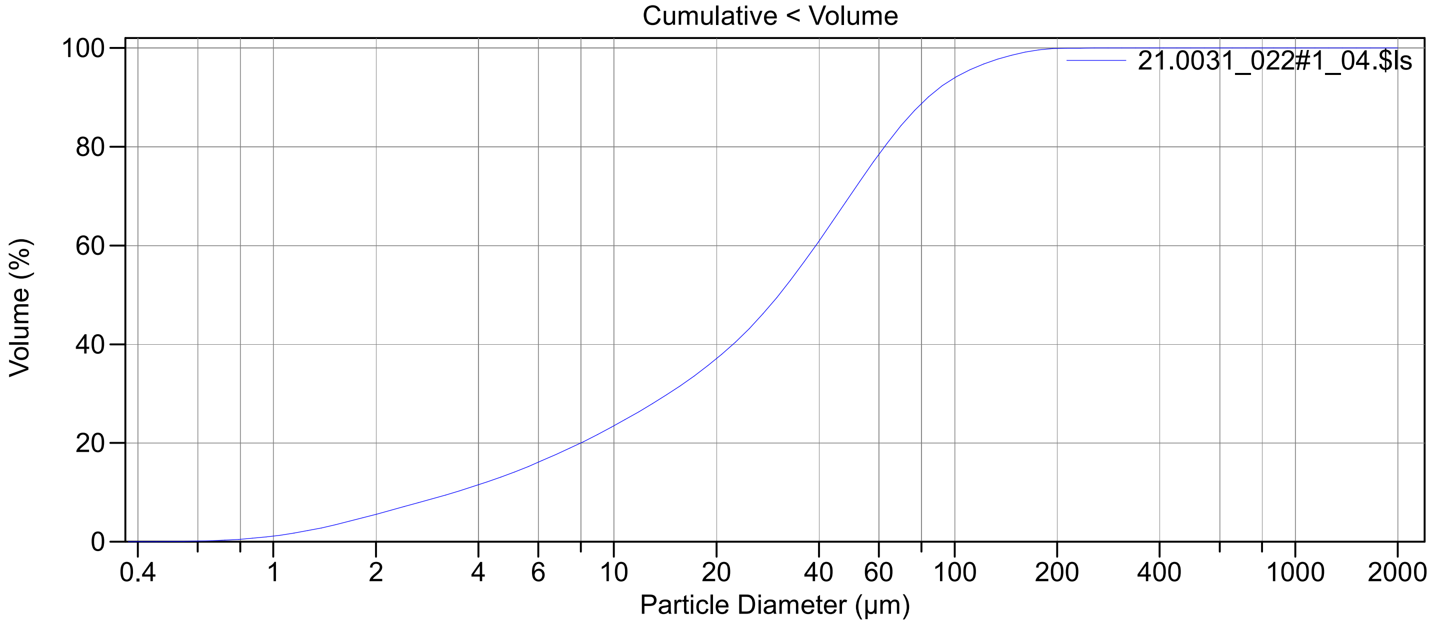
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	40.50 µm	S.D.:	36.22 µm
Median:	32.69 µm	Variance:	1312 µm^2
D(3,2):	9.390 µm	C.V.:	89.4%
Mean/Median ratio:	1.239	Skewness:	1.391 Right skewed
Mode:	50.22 µm	Kurtosis:	2.268 Leptokurtic
Specific Surf. Area:	6390 cm^2/mL		

d_{10}: 3.278 µm d_{50}: 32.69 µm d_{90}: 88.26 µm

<10%	<25%	<50%	<75%	<90%
3.278 µm	11.27 µm	32.69 µm	57.94 µm	88.26 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_022#1_04.$ls 21.0031_022#1_04.$ls		
File ID:	21.0031_022#1		
Sample ID:	21.0031_188132_R2229MC009A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,190 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 13:37	Run length:	61 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_022#1_04.$ls

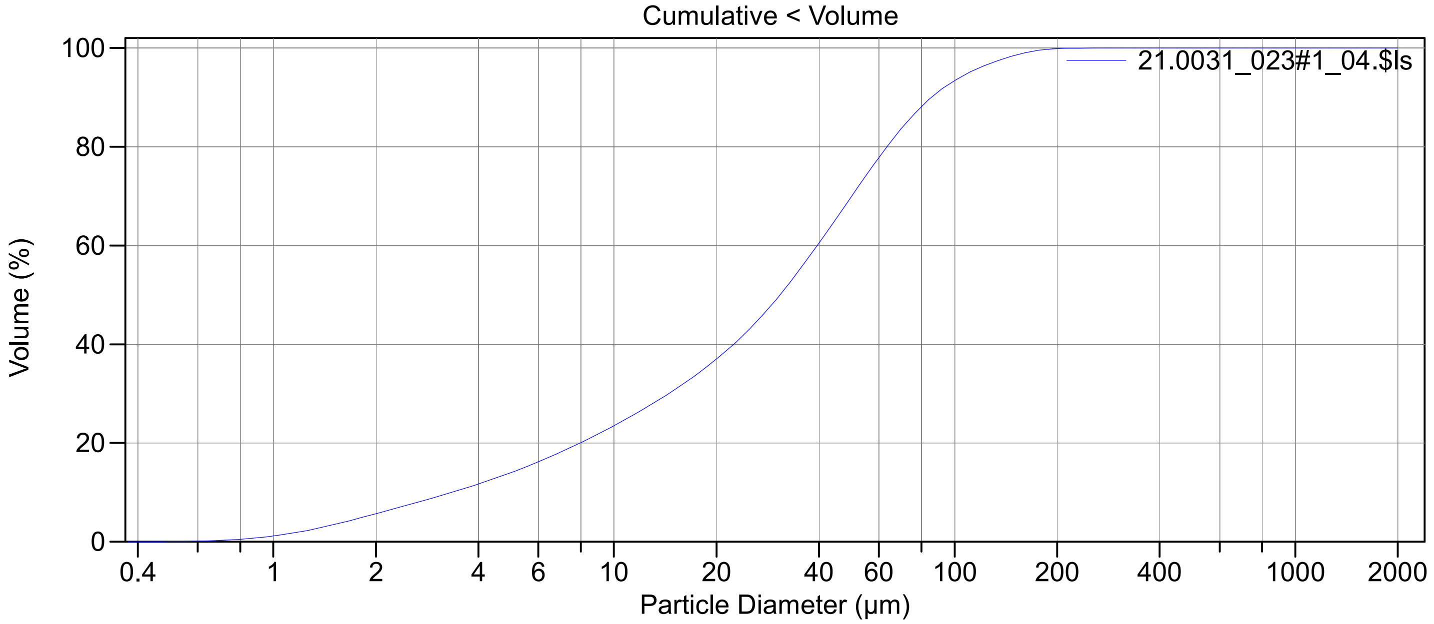
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	38.40 µm	S.D.:	34.45 µm
Median:	30.52 µm	Variance:	1187 µm^2
D(3,2):	9.129 µm	C.V.:	89.7%
Mean/Median ratio:	1.258	Skewness:	1.431 Right skewed
Mode:	45.75 µm	Kurtosis:	2.491 Leptokurtic
Specific Surf. Area:	6573 cm^2/mL		

d_{10}: 3.404 µm d_{50}: 30.52 µm d_{90}: 83.57 µm

<10%	<25%	<50%	<75%	<90%
3.404 µm	10.96 µm	30.52 µm	55.25 µm	83.57 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_023#1_04.$ls 21.0031_023#1_04.$ls		
File ID:	21.0031_023#1		
Sample ID:	21.0031_188137_R2229MC009A 14-15 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,191 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 13:51	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_023#1_04.$ls

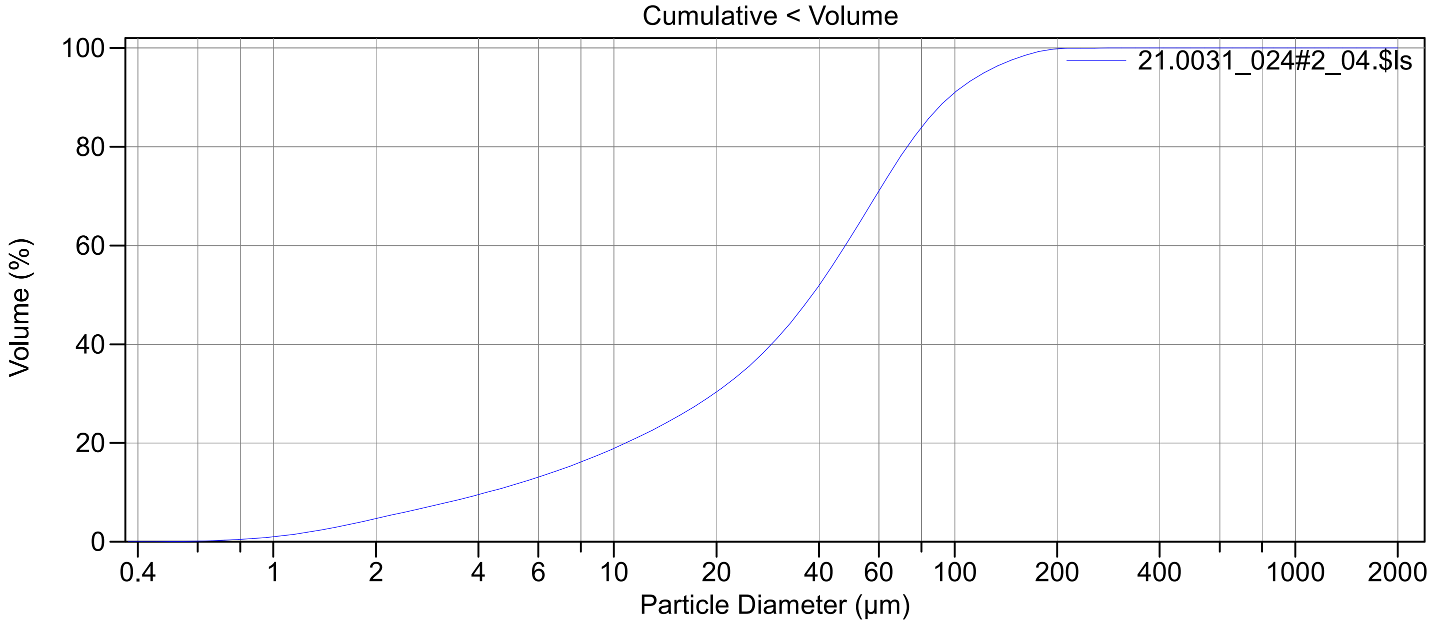
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	39.03 µm	S.D.:	35.36 µm
Median:	30.74 µm	Variance:	1250 μm^2
D(3,2):	9.057 µm	C.V.:	90.6%
Mean/Median ratio:	1.270	Skewness:	1.436 Right skewed
Mode:	45.75 µm	Kurtosis:	2.424 Leptokurtic
Specific Surf. Area:	6625 cm^2/mL		

d_{10}: 3.338 µm d_{50}: 30.74 µm d_{90}: 85.67 µm

<10%	<25%	<50%	<75%	<90%
3.338 µm	10.96 µm	30.74 µm	56.08 µm	85.67 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_024#2_04.$ls 21.0031_024#2_04.$ls		
File ID:	21.0031_024#2		
Sample ID:	21.0031_188147_R2229MC009A 24-25 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,241 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 14:14	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_024#2_04.$ls

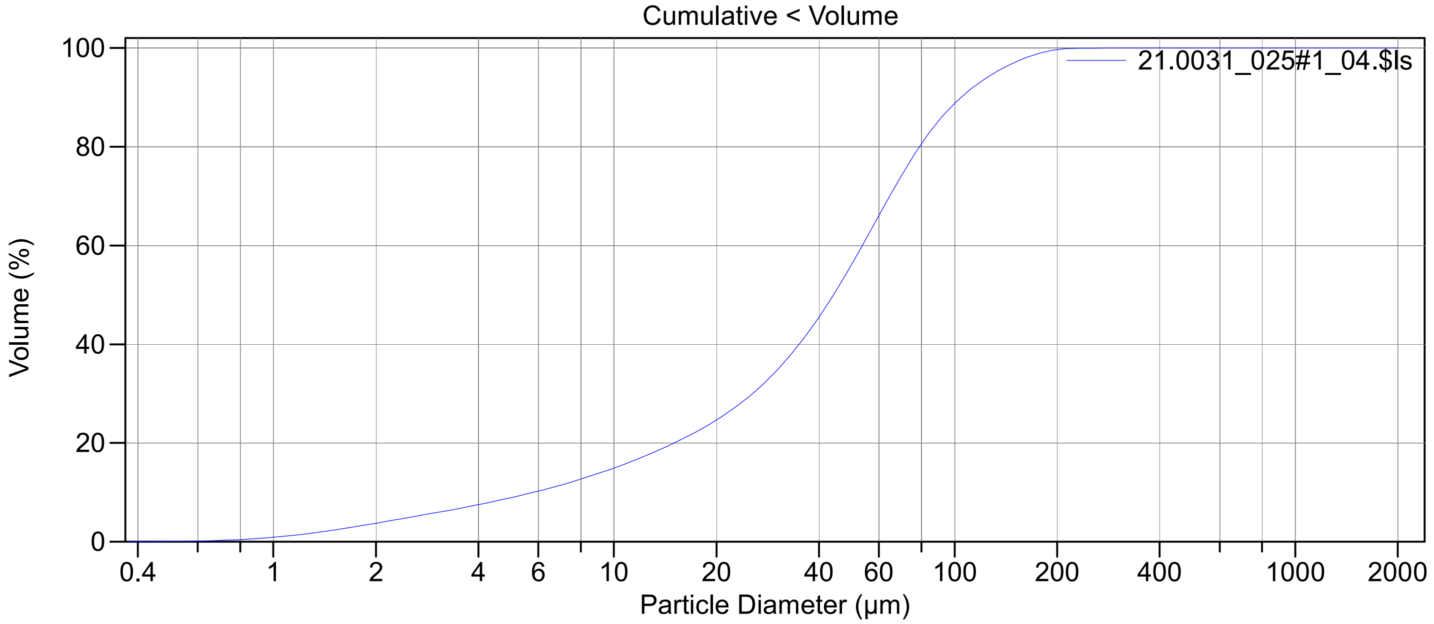
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	45.59 µm	S.D.:	38.15 µm
Median:	38.19 µm	Variance:	1455 µm^2
D(3,2):	10.67 µm	C.V.:	83.7%
Mean/Median ratio:	1.194	Skewness:	1.226 Right skewed
Mode:	55.13 µm	Kurtosis:	1.652 Leptokurtic
Specific Surf. Area:	5622 cm^2/mL		

d_{10}: 4.234 µm d_{50}: 38.19 µm d_{90}: 96.57 µm

<10%	<25%	<50%	<75%	<90%
4.234 µm	15.06 µm	38.19 µm	65.10 µm	96.57 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_025#1_04.$ls 21.0031_025#1_04.$ls		
File ID:	21.0031_025#1		
Sample ID:	21.0031_188153_R2229MC009A 30-31 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,240 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 14:30	Run length:	60 seconds
Pump speed:	45		
Obscuration:	8%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_025#1_04.$ls

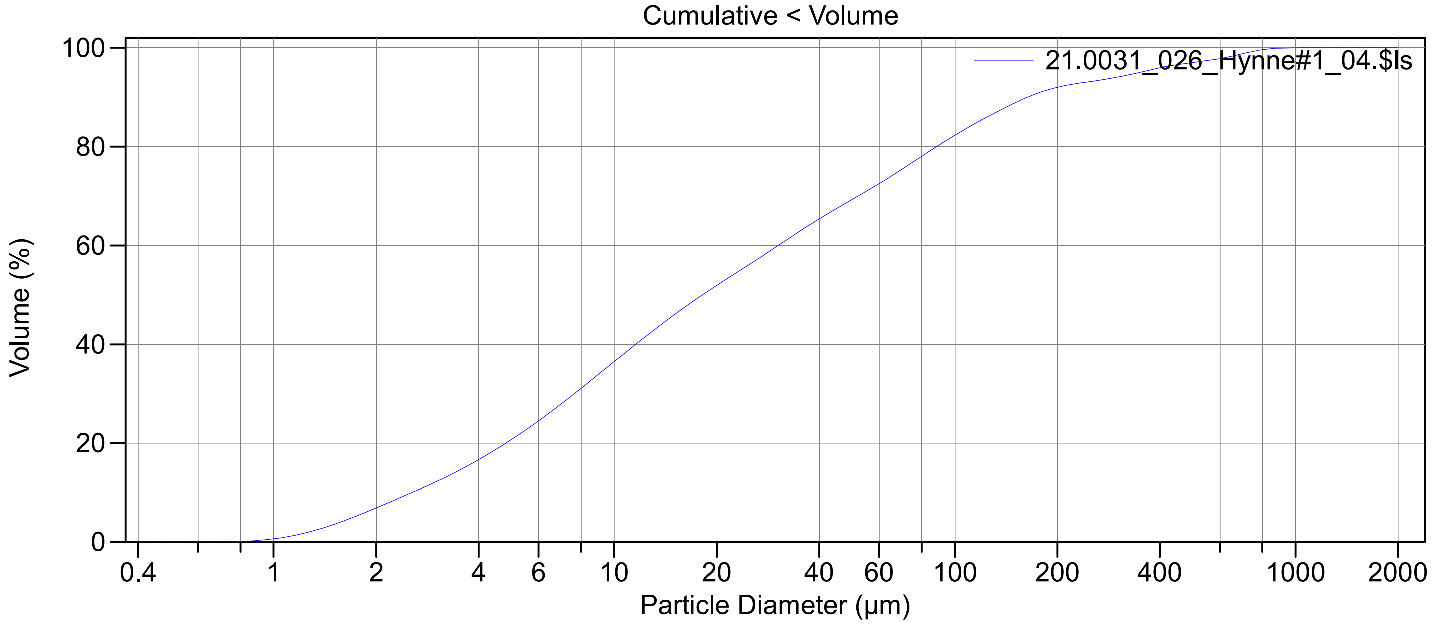
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	50.99 µm	S.D.:	39.91 µm
Median:	44.09 µm	Variance:	1593 µm^2
D(3,2):	12.67 µm	C.V.:	78.3%
Mean/Median ratio:	1.157	Skewness:	1.147 Right skewed
Mode:	60.52 µm	Kurtosis:	1.454 Leptokurtic
Specific Surf. Area:	4737 cm^2/mL		

d_{10}: 5.801 µm d_{50}: 44.09 µm d_{90}: 104.6 µm

<10%	<25%	<50%	<75%	<90%
5.801 µm	20.36 µm	44.09 µm	71.09 µm	104.6 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_026_Hynne#1_04.$ls 21.0031_026_Hynne#1_04.$ls		
File ID:	21.0031_026_Hynne#1		
Sample ID:	21.0031_Hynne_40107		
Operator:	MSH		
Run number:	4		
Comment 1:	0,154 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-22 14:45	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_026_Hynne#1_04.$ls

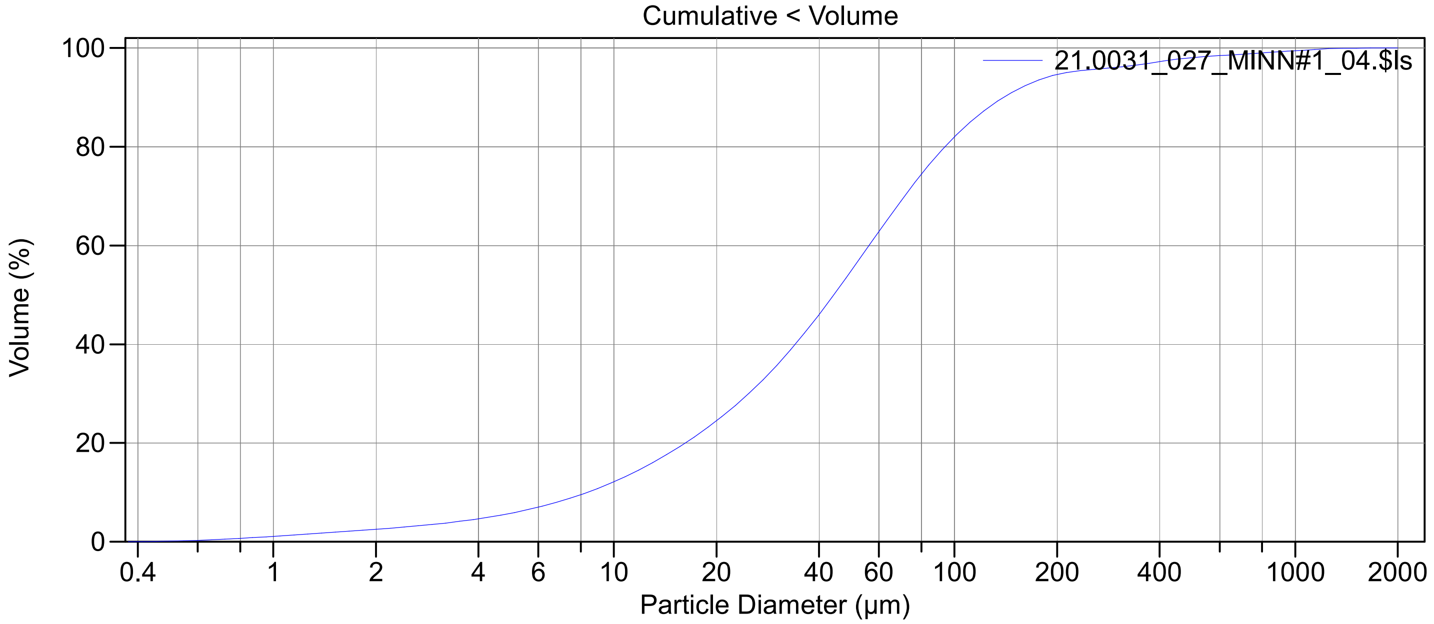
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	68.66 µm	S.D.:	132.4 µm
Median:	18.15 µm	Variance:	17530 $µm^2$
D(3,2):	7.380 µm	C.V.:	193%
Mean/Median ratio:	3.783	Skewness:	3.500 Right skewed
Mode:	9.370 µm	Kurtosis:	13.31 Leptokurtic
Specific Surf. Area:	8130 cm^2/mL		

d_{10}: 2.552 µm d_{50}: 18.15 µm d_{90}: 163.5 µm

<10%	<25%	<50%	<75%	<90%
2.552 µm	6.130 µm	18.15 µm	68.49 µm	163.5 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_027_MINN#1_04.$ls 21.0031_027_MINN#1_04.$ls		
File ID:	21.0031_027_MINN#1		
Sample ID:	21.0031_MINN_Split 1		
Operator:	MSH		
Run number:	4 Control Sample		
Comment 1:	0,335 g + disp.middel, Springvann		
Comment 2:	ultralyd, probe 2 (naken), 5 ampl-5 min,Fraunhofer		
Optical model:	Fraunhofer.rf780d		
Residual:	0.18%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 9:10	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_027_MINN#1_04.$ls

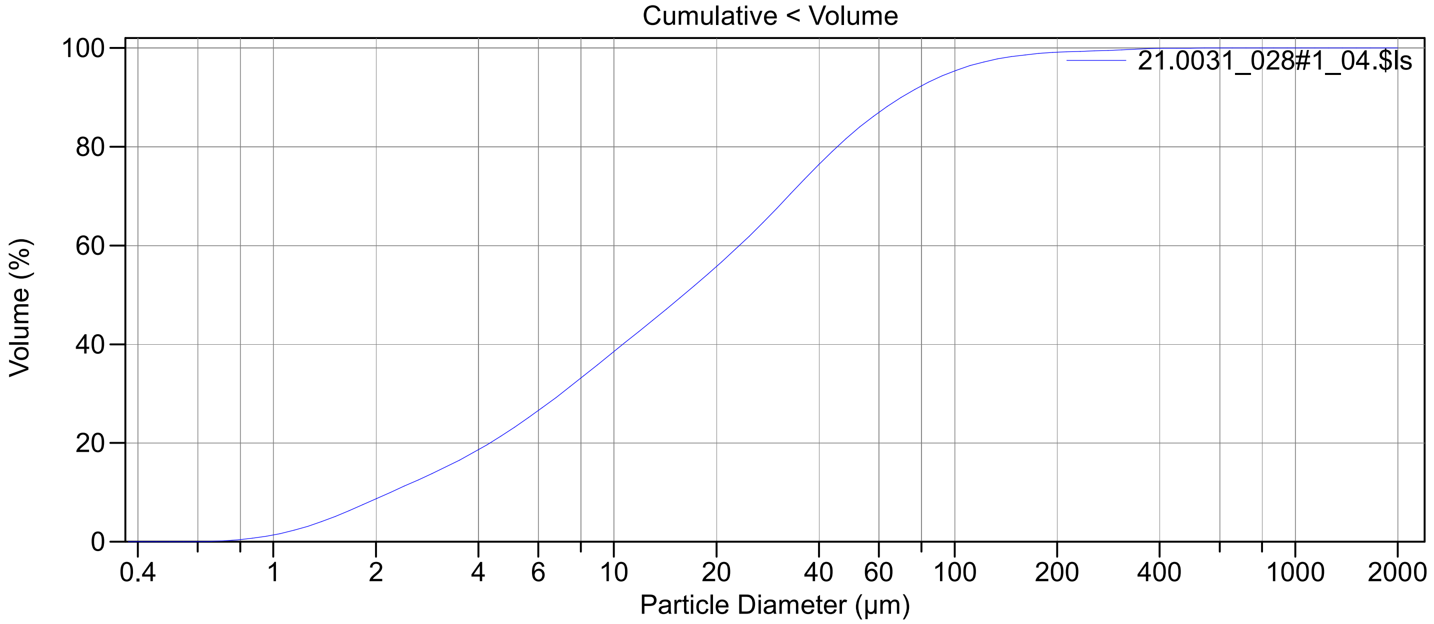
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	76.20 µm	S.D.:	130.4 µm
Median:	44.17 µm	Variance:	17013 µm^2
D(3,2):	14.68 µm	C.V.:	171%
Mean/Median ratio:	1.725	Skewness:	5.449 Right skewed
Mode:	55.14 µm	Kurtosis:	36.72 Leptokurtic
Specific Surf. Area:	4087 cm^2/mL		

d_{10}: 8.341 µm d_{50}: 44.17 µm d_{90}: 139.5 µm

<10%	<25%	<50%	<75%	<90%
8.341 µm	20.44 µm	44.17 µm	81.28 µm	139.5 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_028#1_04.$ls 21.0031_028#1_04.$ls		
File ID:	21.0031_028#1		
Sample ID:	21.0031_188164_R2242MC012A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,157 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 9:28	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_028#1_04.$ls

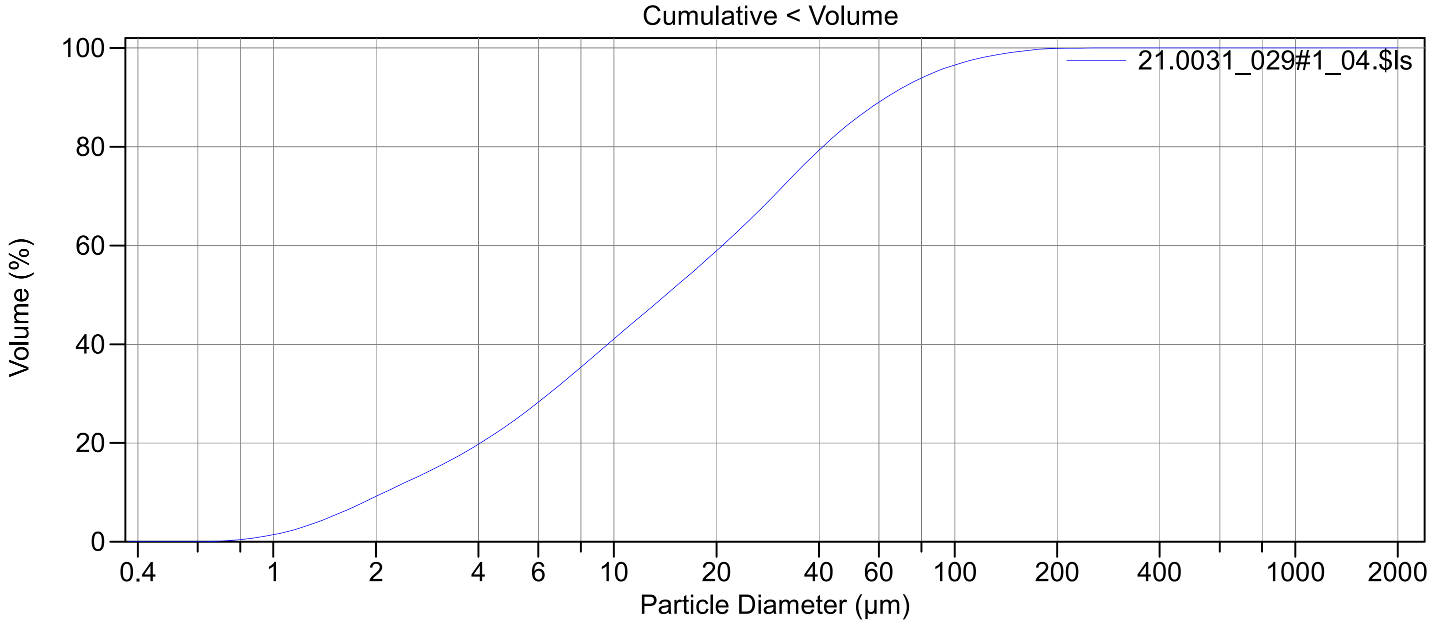
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	29.17 µm	S.D.:	39.27 µm
Median:	16.02 µm	Variance:	1542 $µm^2$
D(3,2):	6.352 µm	C.V.:	135%
Mean/Median ratio:	1.821	Skewness:	3.778 Right skewed
Mode:	34.58 µm	Kurtosis:	22.28 Leptokurtic
Specific Surf. Area:	9446 cm^2/mL		

d_{10}: 2.208 µm d_{50}: 16.02 µm d_{90}: 69.73 µm

<10%	<25%	<50%	<75%	<90%
2.208 µm	5.583 µm	16.02 µm	38.16 µm	69.73 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_029#1_04.$ls 21.0031_029#1_04.$ls		
File ID:	21.0031_029#1		
Sample ID:	21.0031_188166_R2242MC012A 2-3 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,156 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 9:45	Run length:	60 seconds
Pump speed:	45		
Obscuration:	12%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic)   21.0031_029#1_04.$ls

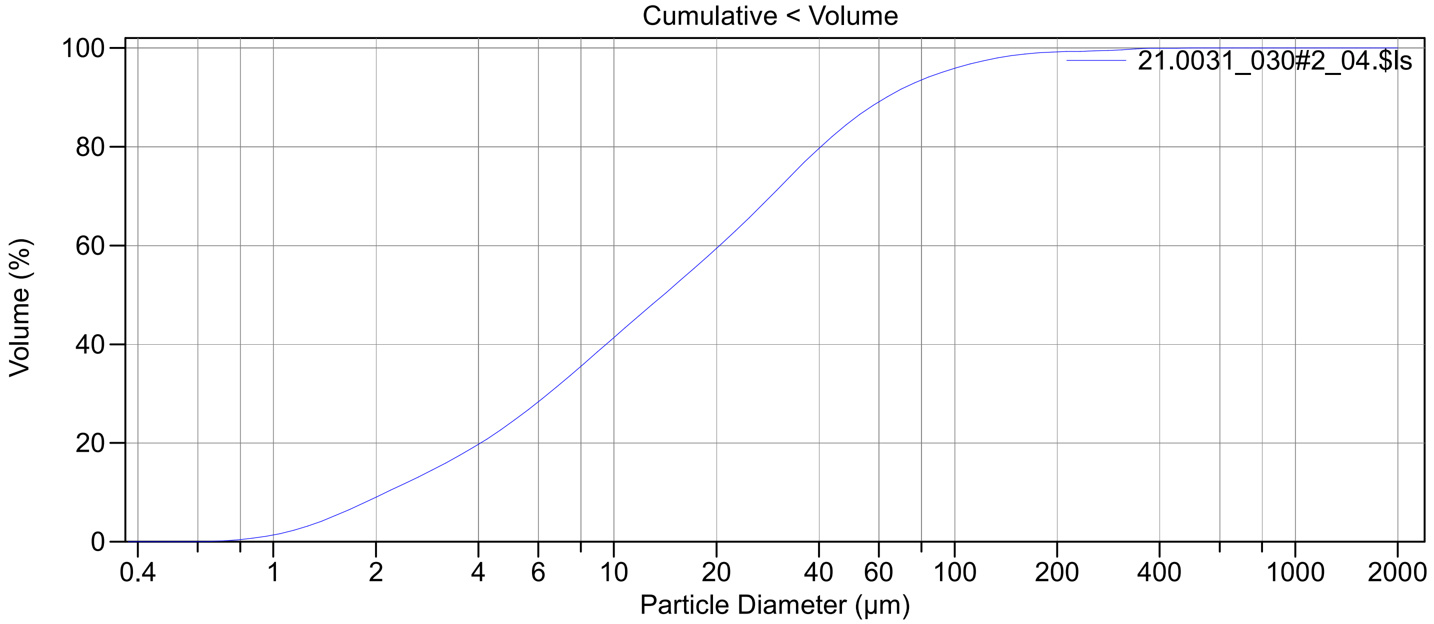
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	25.33 µm	S.D.:	29.70 µm
Median:	14.22 µm	Variance:	882.3 μm^2
D(3,2):	6.038 µm	C.V.:	117%
Mean/Median ratio:	1.781	Skewness:	2.218 Right skewed
Mode:	31.50 µm	Kurtosis:	6.105 Leptokurtic
Specific Surf. Area:	9937 cm^2/mL		

d_{10}: 2.124 µm d_{50}: 14.22 µm d_{90}: 62.98 µm

<10%	<25%	<50%	<75%	<90%
2.124 µm	5.200 µm	14.22 µm	34.61 µm	62.98 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_030#2_04.$ls 21.0031_030#2_04.$ls
File ID:	21.0031_030#2
Sample ID:	21.0031_188168_R2242MC012A 4-5 cm
Operator:	MSH
Run number:	4
Comment 1:	0,130 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-23 10:08 Run length: 60 seconds
Pump speed:	45
Obscuration:	11%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_030#2_04.$ls

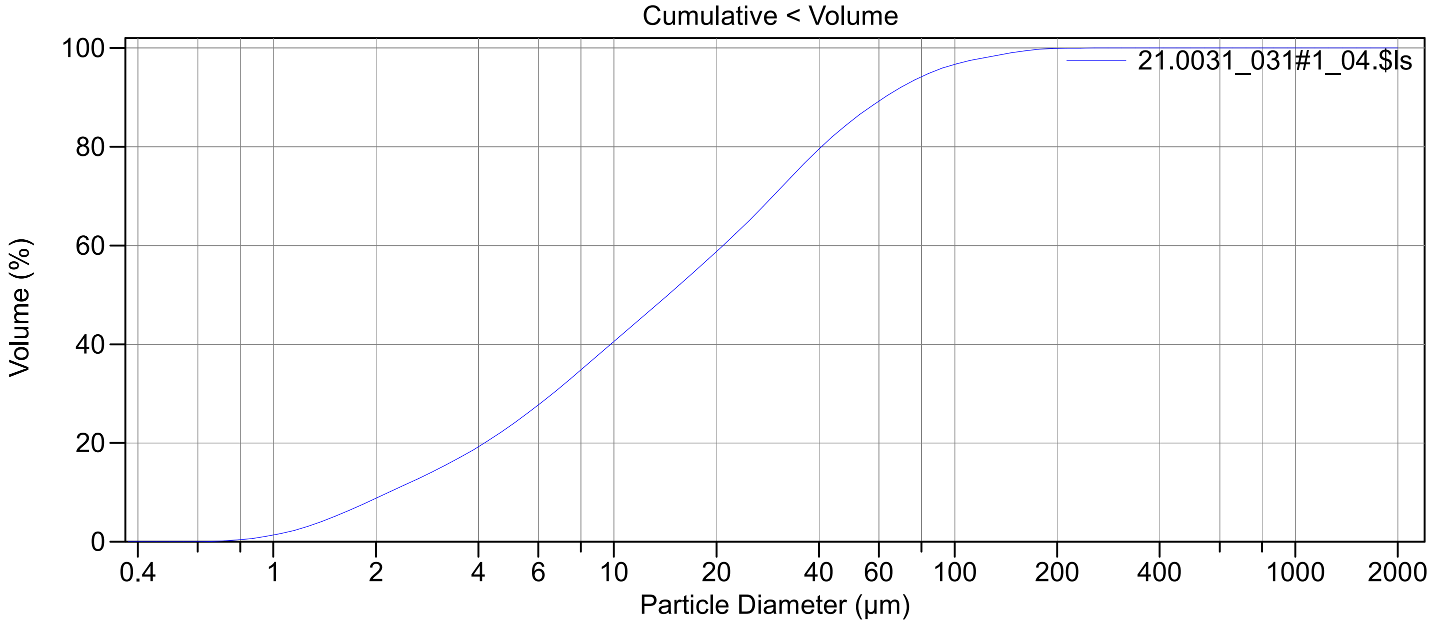
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	26.70 µm	S.D.:	37.72 µm
Median:	13.99 µm	Variance:	1422 µm^2
D(3,2):	6.059 µm	C.V.:	141%
Mean/Median ratio:	1.908	Skewness:	4.106 Right skewed
Mode:	31.50 µm	Kurtosis:	25.57 Leptokurtic
Specific Surf. Area:	9903 cm^2/mL		

d_{10}: 2.146 µm d_{50}: 13.99 µm d_{90}: 62.93 µm

<10%	<25%	<50%	<75%	<90%
2.146 µm	5.190 µm	13.99 µm	34.07 µm	62.93 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_031#1_04.$ls 21.0031_031#1_04.$ls		
File ID:	21.0031_031#1		
Sample ID:	21.0031_188173_R2242MC012A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,129 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 10:24	Run length:	61 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_031#1_04.$ls

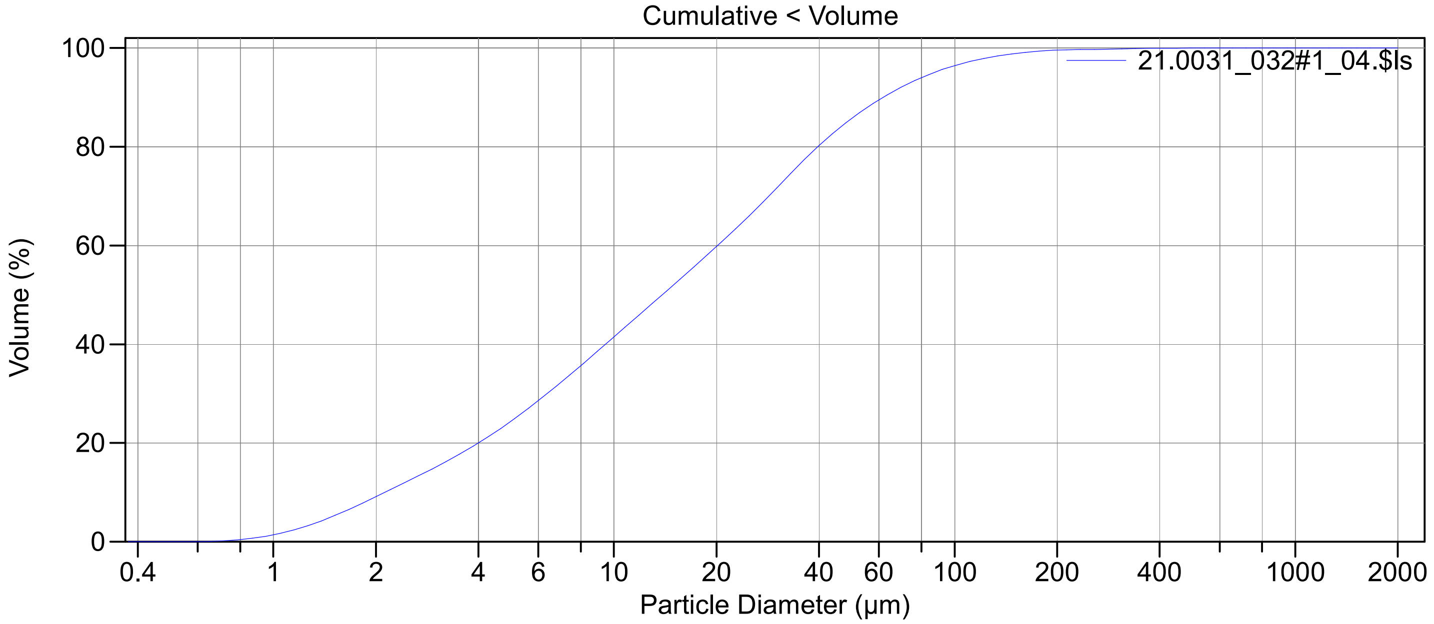
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	25.28 µm	S.D.:	29.55 µm
Median:	14.42 µm	Variance:	873.5 μm^2
D(3,2):	6.161 µm	C.V.:	117%
Mean/Median ratio:	1.754	Skewness:	2.263 Right skewed
Mode:	31.50 µm	Kurtosis:	6.410 Leptokurtic
Specific Surf. Area:	9739 cm^2/mL		

d_{10}: 2.185 µm d_{50}: 14.42 µm d_{90}: 62.29 µm

<10%	<25%	<50%	<75%	<90%
2.185 µm	5.332 µm	14.42 µm	34.42 µm	62.29 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_032#1_04.$ls 21.0031_032#1_04.$ls		
File ID:	21.0031_032#1		
Sample ID:	21.0031_188178_R2242MC012A 14-15 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,128 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 10:38	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_032#1_04.$ls

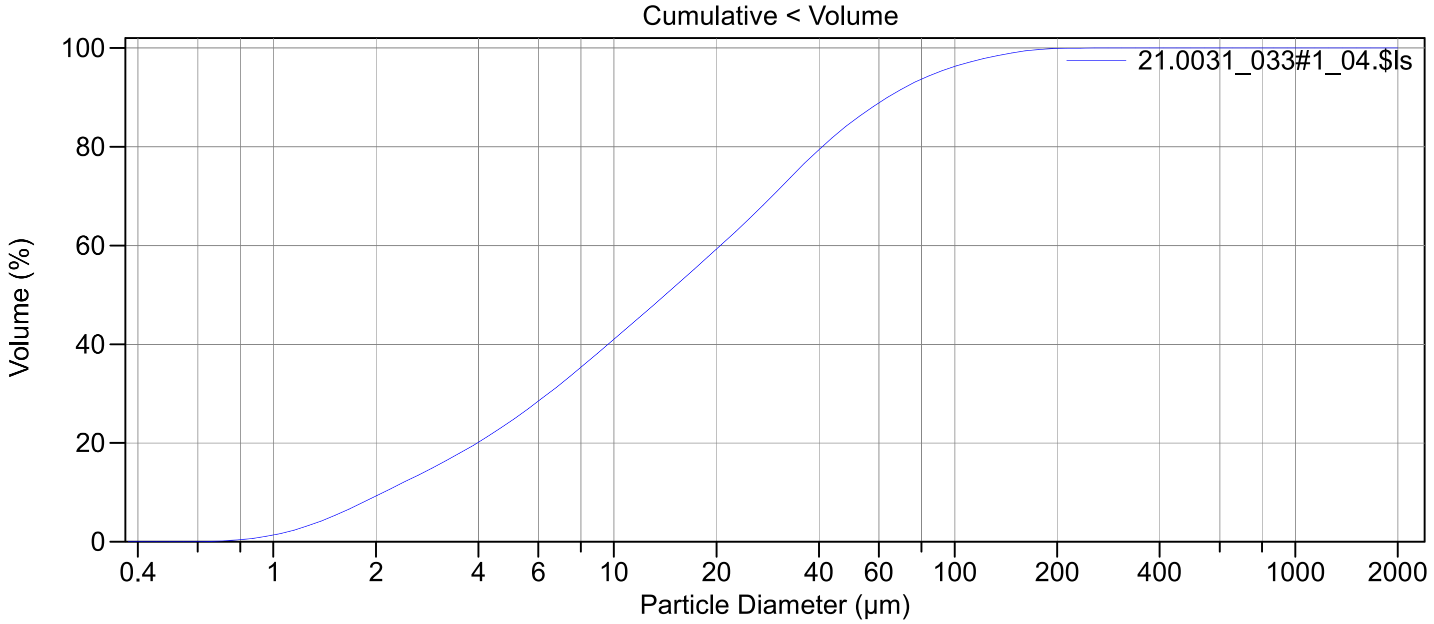
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	25.53 µm	S.D.:	33.62 µm
Median:	13.87 µm	Variance:	1130 $µm^2$
D(3,2):	6.003 µm	C.V.:	132%
Mean/Median ratio:	1.841	Skewness:	3.716 Right skewed
Mode:	31.50 µm	Kurtosis:	23.56 Leptokurtic
Specific Surf. Area:	9994 cm^2/mL		

d_{10}: 2.126 µm d_{50}: 13.87 µm d_{90}: 61.70 µm

<10%	<25%	<50%	<75%	<90%
2.126 µm	5.126 µm	13.87 µm	33.50 µm	61.70 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_033#1_04.$ls		
	21.0031_033#1_04.$ls		
File ID:	21.0031_033#1		
Sample ID:	21.0031_188188_R2242MC012A 24-25 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,129 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 10:50	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_033#1_04.$ls

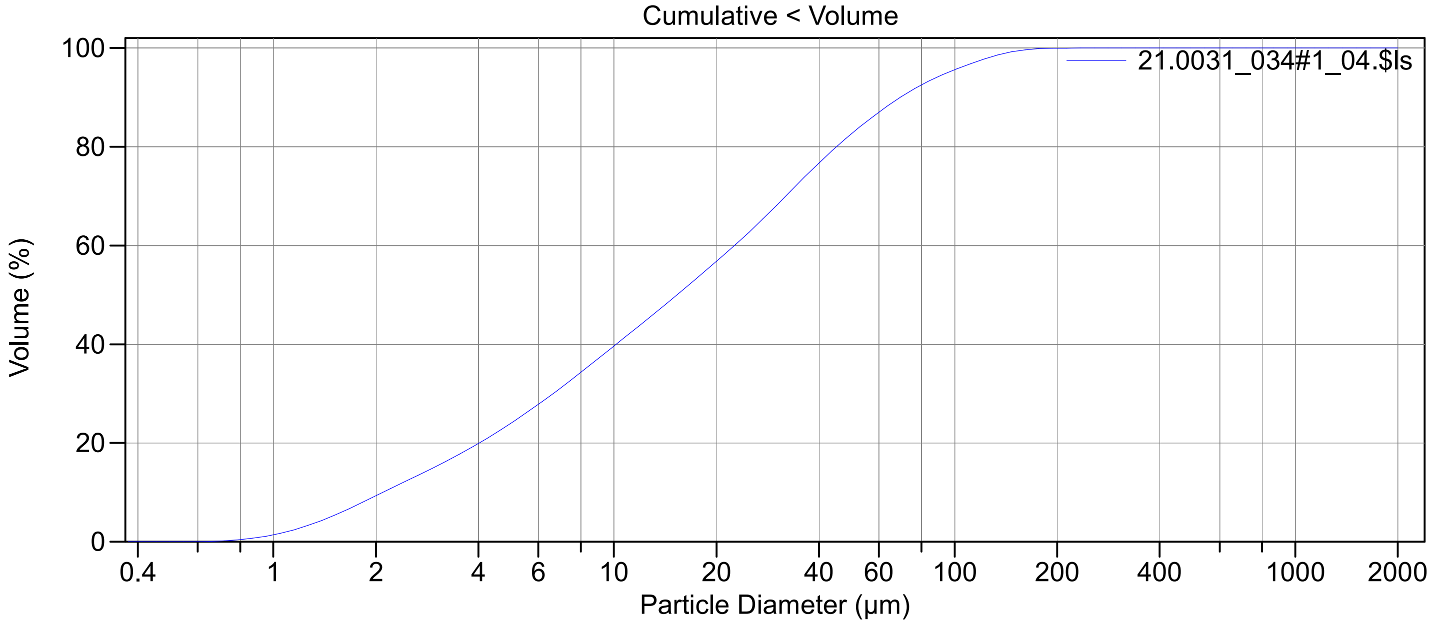
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	25.47 µm	S.D.:	30.33 µm
Median:	14.15 µm	Variance:	919.9 μm^2
D(3,2):	6.016 µm	C.V.:	119%
Mean/Median ratio:	1.800	Skewness:	2.251 Right skewed
Mode:	31.50 µm	Kurtosis:	6.148 Leptokurtic
Specific Surf. Area:	9974 cm^2/mL		

d_{10}: 2.109 µm d_{50}: 14.15 µm d_{90}: 63.48 µm

<10%	<25%	<50%	<75%	<90%
2.109 µm	5.124 µm	14.15 µm	34.36 µm	63.48 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_034#1_04.$ls 21.0031_034#1_04.$ls		
File ID:	21.0031_034#1		
Sample ID:	21.0031_188202_R2242MC012A 38-39 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,128 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.24%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 12:40	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_034#1_04.$ls

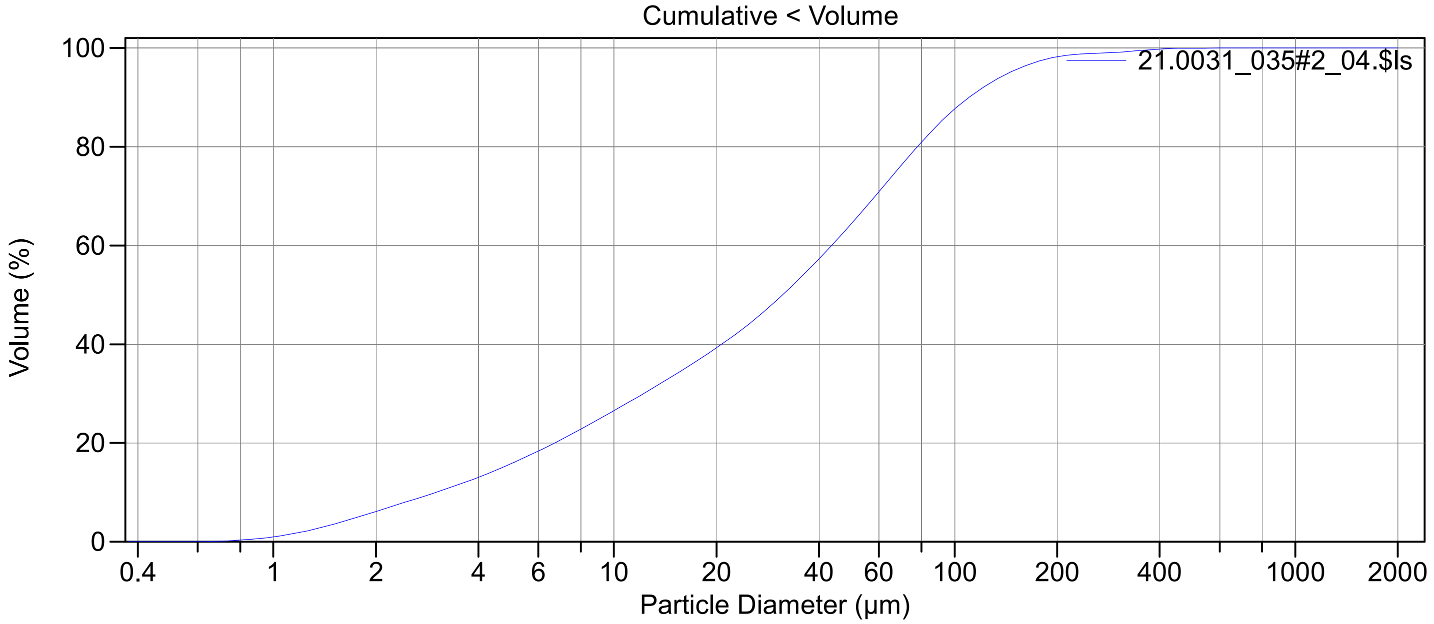
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	27.20 μm	S.D.:	31.15 μm
Median:	15.33 μm	Variance:	970.1 $μm^2$
D(3,2):	6.110 μm	C.V.:	115%
Mean/Median ratio:	1.775	Skewness:	1.910 Right skewed
Mode:	31.50 μm	Kurtosis:	3.932 Leptokurtic
Specific Surf. Area:	9819 cm^2/mL		

d_{10}: 2.101 μm d_{50}: 15.33 μm d_{90}: 69.31 μm

<10%	<25%	<50%	<75%	<90%
2.101 μm	5.244 μm	15.33 μm	37.71 μm	69.31 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_035#2_04.$ls 21.0031_035#2_04.$ls		
File ID:	21.0031_035#2		
Sample ID:	21.0031_188208_R2270MC013A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,184 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.24%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 13:09	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_035#2_04.$ls

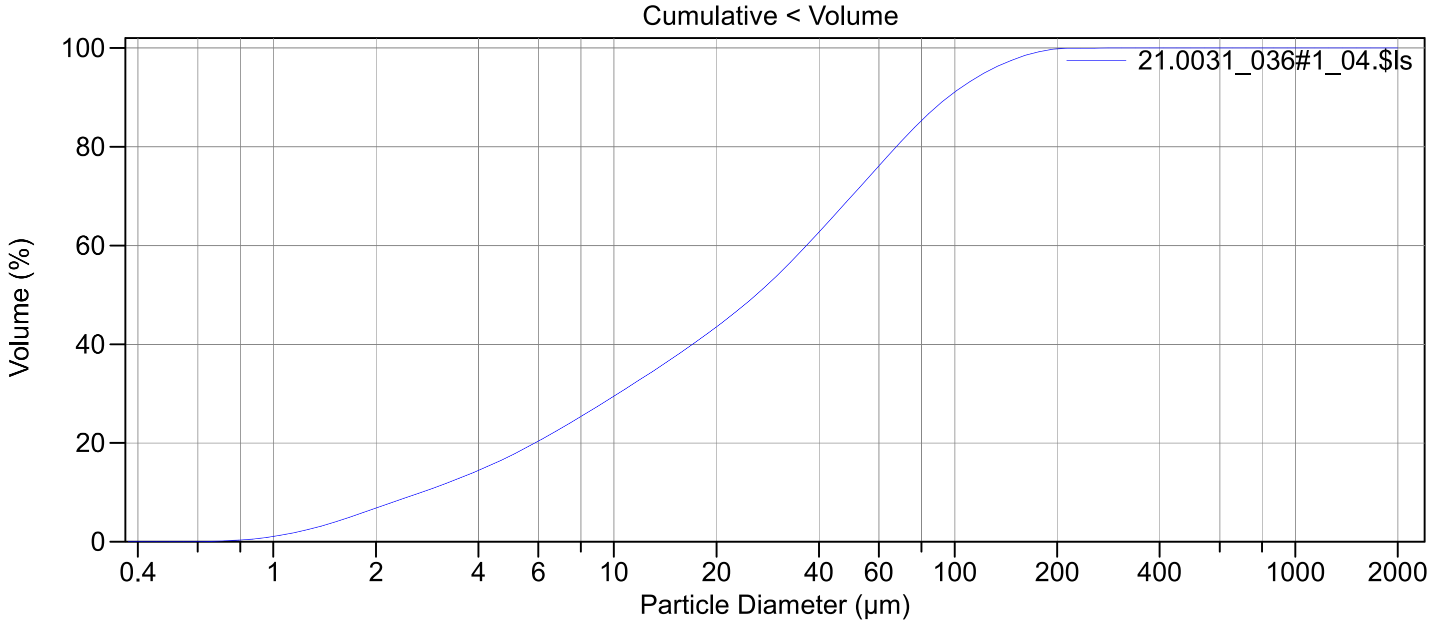
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	47.44 µm	S.D.:	54.15 µm
Median:	31.31 µm	Variance:	2933 $µm^2$
D(3,2):	8.704 µm	C.V.:	114%
Mean/Median ratio:	1.515	Skewness:	2.678 Right skewed
Mode:	66.44 µm	Kurtosis:	11.48 Leptokurtic
Specific Surf. Area:	6894 cm^2/mL		

d_{10}: 2.999 µm d_{50}: 31.31 µm d_{90}: 110.1 µm

<10%	<25%	<50%	<75%	<90%
2.999 µm	9.127 µm	31.31 µm	67.44 µm	110.1 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_036#1_04.$ls		
	21.0031_036#1_04.$ls		
File ID:	21.0031_036#1		
Sample ID:	21.0031_188210_R2270MC013A 2-3 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,184 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 13:26	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_036#1_04.$ls

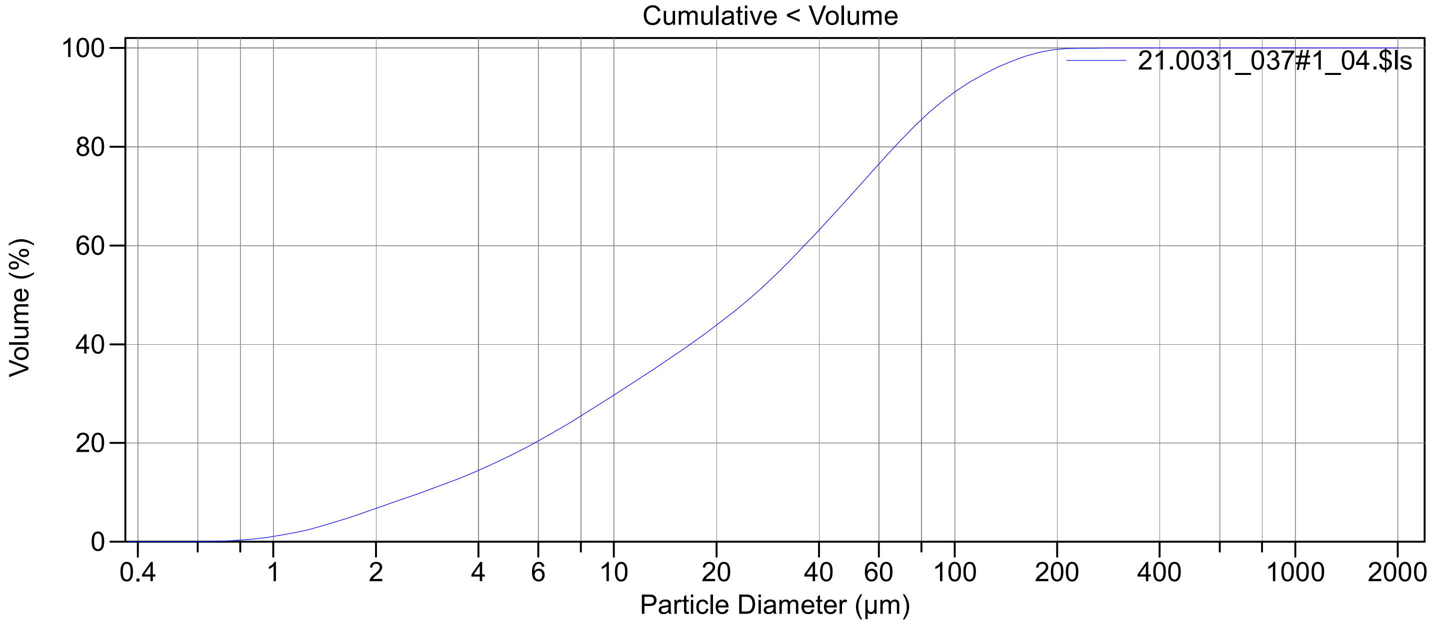
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	39.06 µm	S.D.:	39.67 µm
Median:	26.17 µm	Variance:	1574 µm^2
D(3,2):	7.948 µm	C.V.:	102%
Mean/Median ratio:	1.492	Skewness:	1.450 Right skewed
Mode:	55.13 µm	Kurtosis:	1.942 Leptokurtic
Specific Surf. Area:	7549 cm^2/mL		

d_{10}: 2.716 µm d_{50}: 26.17 µm d_{90}: 95.57 µm

<10%	<25%	<50%	<75%	<90%
2.716 µm	7.844 µm	26.17 µm	57.94 µm	95.57 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_037#1_04.$ls
	21.0031_037#1_04.$ls
File ID:	21.0031_037#1
Sample ID:	21.0031_188212_R2270MC013A 4-5 cm
Operator:	MSH
Run number:	4
Comment 1:	0,184 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-23 13:39	Run length:	60 seconds
Pump speed:	45
Obscuration:	11%
Fluid:	Water
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_037#1_04.$ls

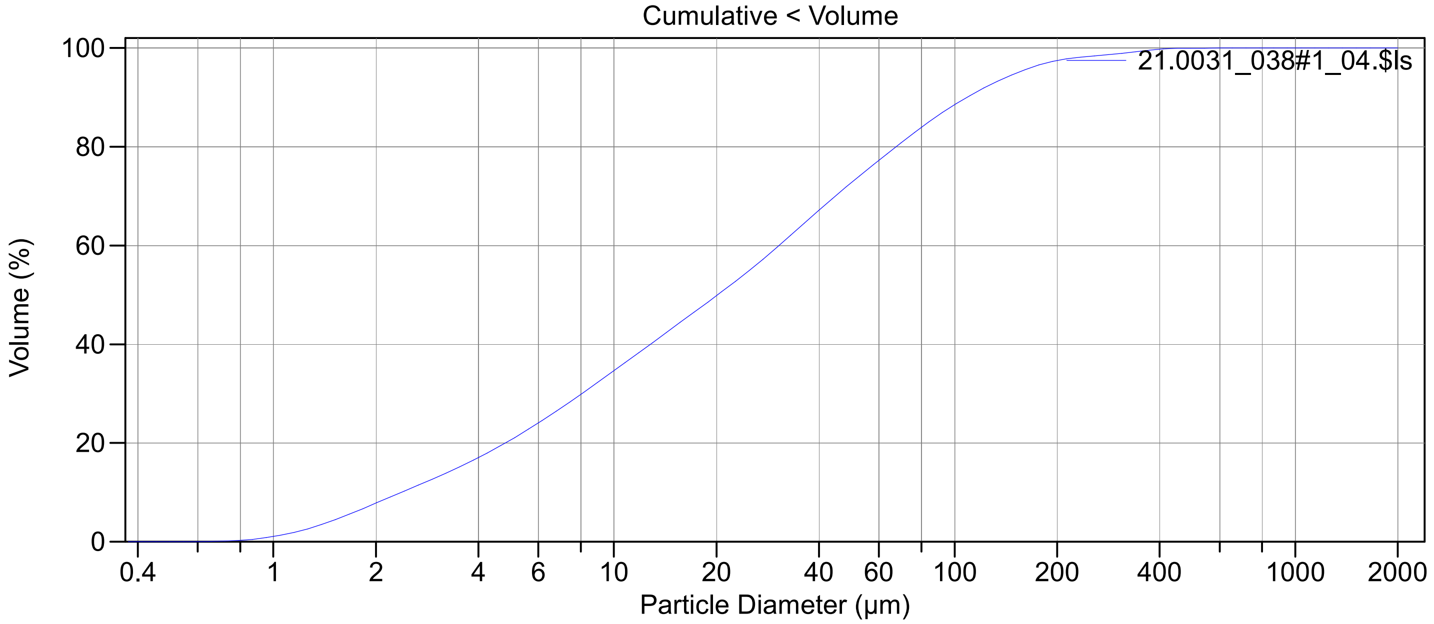
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	38.93 µm	S.D.:	40.07 µm
Median:	25.75 µm	Variance:	1605 $µm^2$
D(3,2):	7.944 µm	C.V.:	103%
Mean/Median ratio:	1.512	Skewness:	1.513 Right skewed
Mode:	55.13 µm	Kurtosis:	2.212 Leptokurtic
Specific Surf. Area:	7553 cm^2/mL		

d_{10}: 2.727 µm d_{50}: 25.75 µm d_{90}: 95.39 µm

<10%	<25%	<50%	<75%	<90%
2.727 µm	7.793 µm	25.75 µm	57.29 µm	95.39 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_038#1_04.$ls 21.0031_038#1_04.$ls		
File ID:	21.0031_038#1		
Sample ID:	21.0031_188217_R2270MC013A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,184 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 14:06	Run length:	60 seconds
Pump speed:	45		
Obscuration:	12%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_038#1_04.$ls

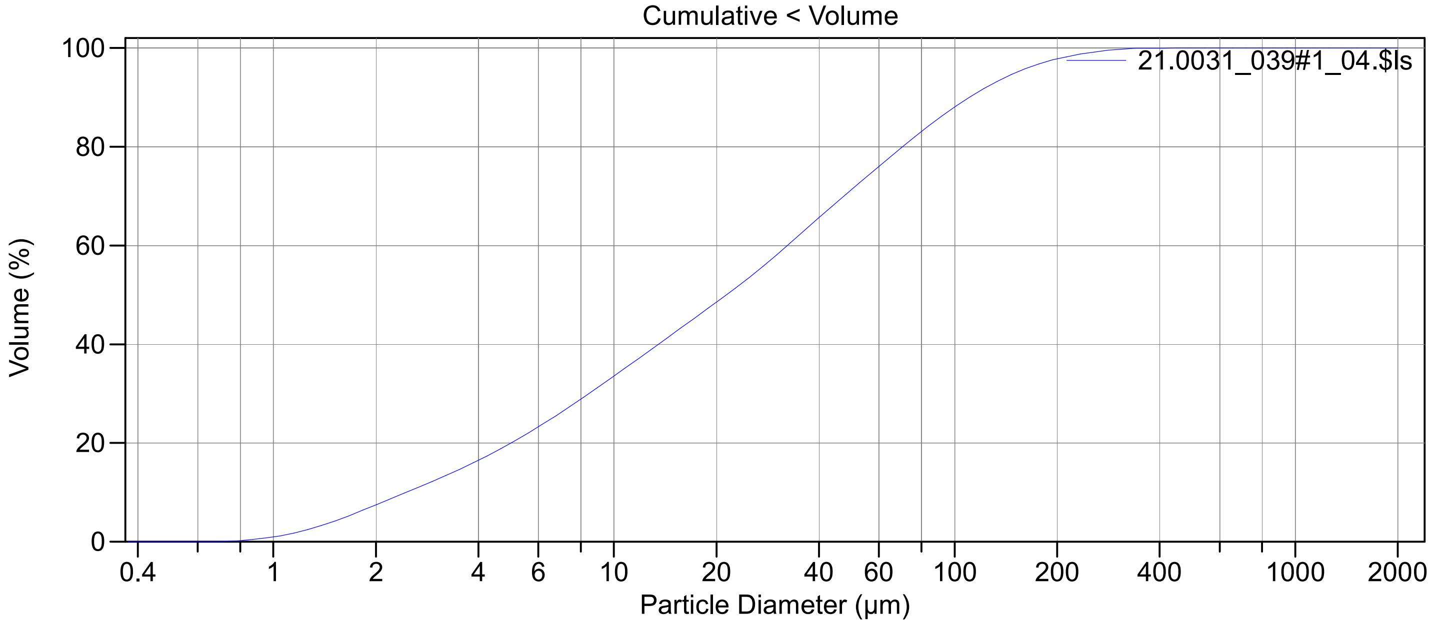
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	42.17 µm	S.D.:	58.44 µm
Median:	20.14 µm	Variance:	3415 μm^2
D(3,2):	7.081 µm	C.V.:	139%
Mean/Median ratio:	2.094	Skewness:	2.944 Right skewed
Mode:	34.58 µm	Kurtosis:	11.53 Leptokurtic
Specific Surf. Area:	8473 cm^2/mL		

d_{10}: 2.377 µm d_{50}: 20.14 µm d_{90}: 108.6 µm

<10%	<25%	<50%	<75%	<90%
2.377 µm	6.300 µm	20.14 µm	54.62 µm	108.6 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_039#1_04.$ls 21.0031_039#1_04.$ls		
File ID:	21.0031_039#1		
Sample ID:	21.0031_188222_R2270MC013A 14-15 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,158 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.26%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 14:21	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_039#1_04.$ls

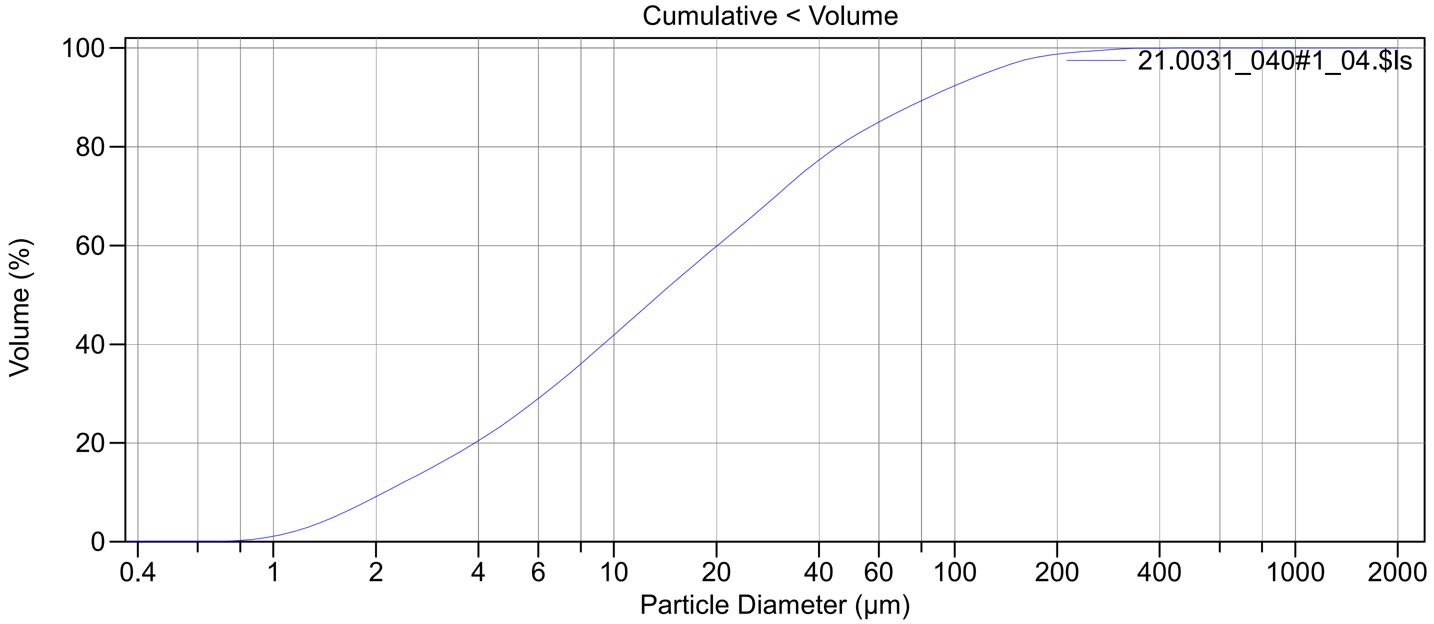
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	41.88 µm	S.D.:	52.09 µm
Median:	21.36 µm	Variance:	2714 $µm^2$
D(3,2):	7.316 µm	C.V.:	124%
Mean/Median ratio:	1.961	Skewness:	2.177 Right skewed
Mode:	34.58 µm	Kurtosis:	5.704 Leptokurtic
Specific Surf. Area:	8201 cm^2/mL		

d_{10}: 2.454 µm d_{50}: 21.36 µm d_{90}: 110.5 µm

<10%	<25%	<50%	<75%	<90%
2.454 µm	6.580 µm	21.36 µm	57.61 µm	110.5 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_040#1_04.$ls		
	21.0031_040#1_04.$ls		
File ID:	21.0031_040#1		
Sample ID:	21.0031_188232_R2270MC013A 24-25 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,159 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-23 14:34	Run length:	60 seconds
Pump speed:	45		
Obscuration:	12%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_040#1_04.$ls

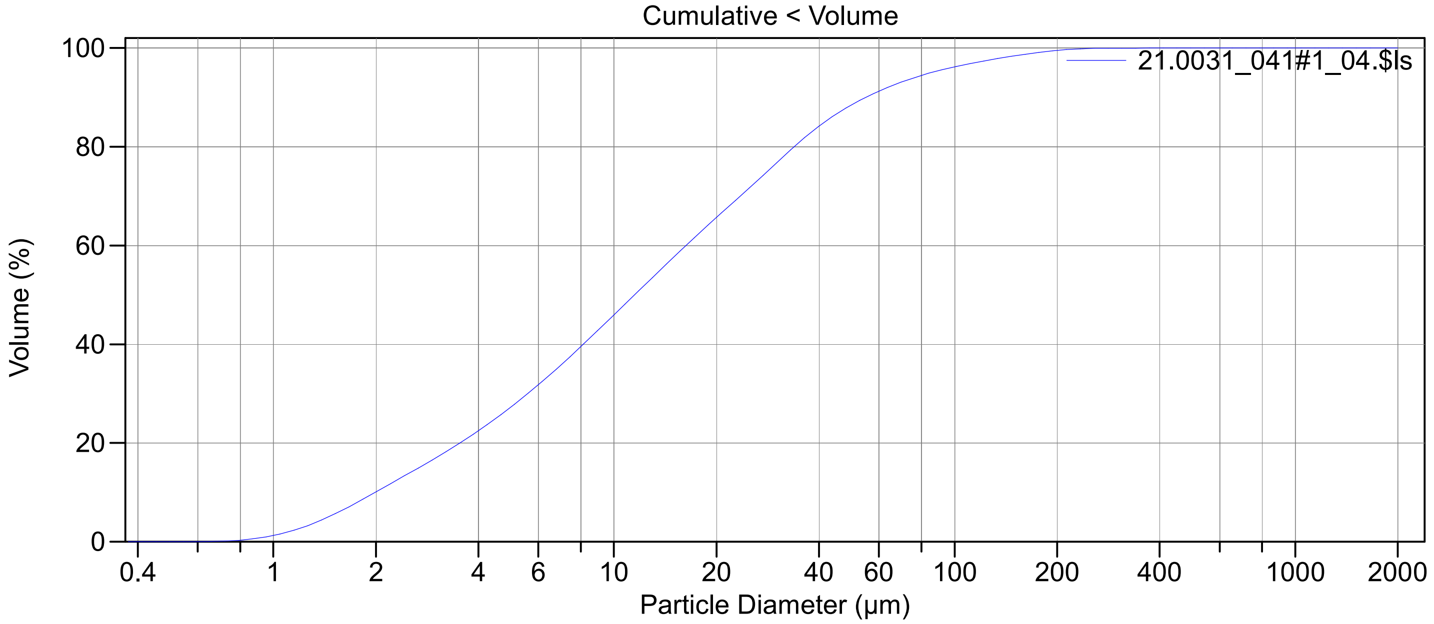
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	30.79 µm	S.D.:	44.07 µm
Median:	13.62 µm	Variance:	1943 μm^2
D(3,2):	6.070 µm	C.V.:	143%
Mean/Median ratio:	2.261	Skewness:	2.898 Right skewed
Mode:	10.29 µm	Kurtosis:	10.86 Leptokurtic
Specific Surf. Area:	9884 cm^2/mL		

d_{10}: 2.119 µm d_{50}: 13.62 µm d_{90}: 83.96 µm

<10%	<25%	<50%	<75%	<90%
2.119 µm	5.022 µm	13.62 µm	36.24 µm	83.96 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_041#1_04.$ls 21.0031_041#1_04.$ls		
File ID:	21.0031_041#1		
Sample ID:	21.0031_188241_R2270MC013A 32-33 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,125 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 8:44	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_041#1_04.$ls

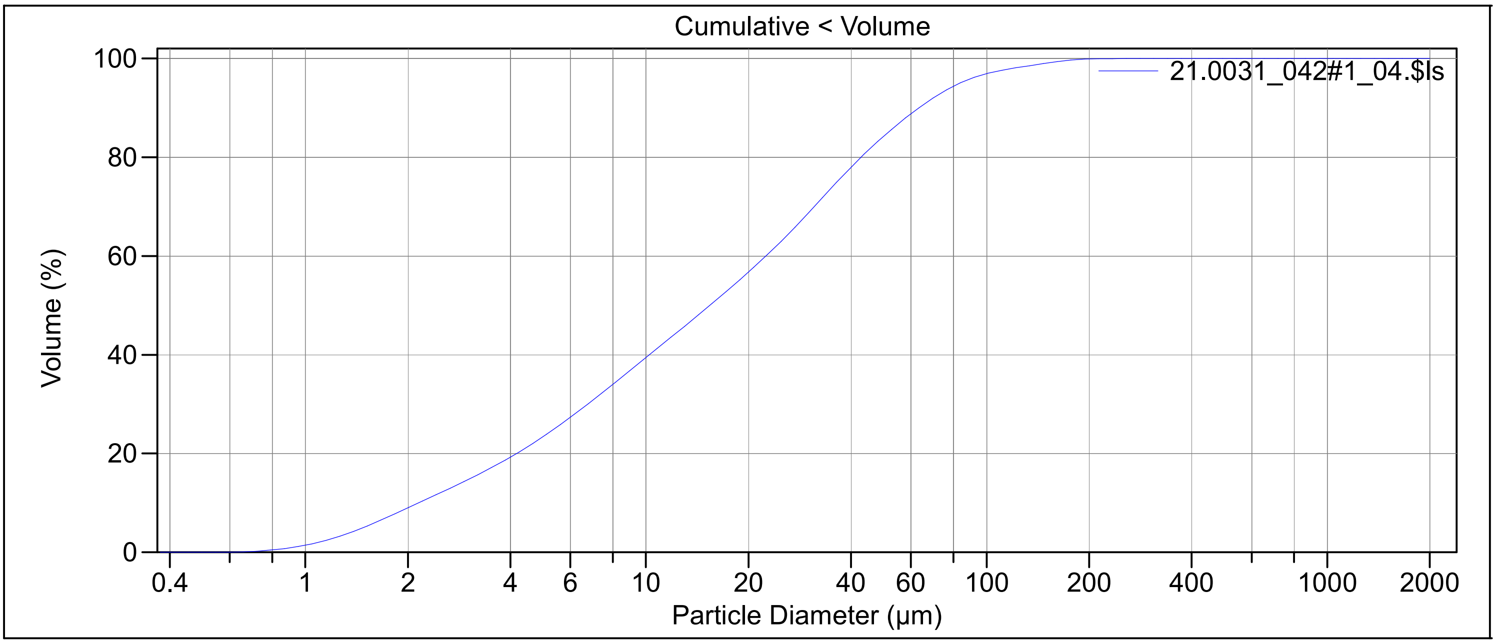
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	23.07 µm	S.D.:	32.33 µm
Median:	11.50 µm	Variance:	1045 $µm^2$
D(3,2):	5.550 µm	C.V.:	140%
Mean/Median ratio:	2.005	Skewness:	3.180 Right skewed
Mode:	10.29 µm	Kurtosis:	12.86 Leptokurtic
Specific Surf. Area:	10811 cm^2/mL		

d_{10}: 1.993 µm d_{50}: 11.50 µm d_{90}: 54.82 µm

<10%	<25%	<50%	<75%	<90%
1.993 µm	4.510 µm	11.50 µm	28.23 µm	54.82 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_042#1_04.$ls 21.0031_042#1_04.$ls		
File ID:	21.0031_042#1		
Sample ID:	21.0031_188246_R2276MC014A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,155 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 9:01	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_042#1_04.$ls

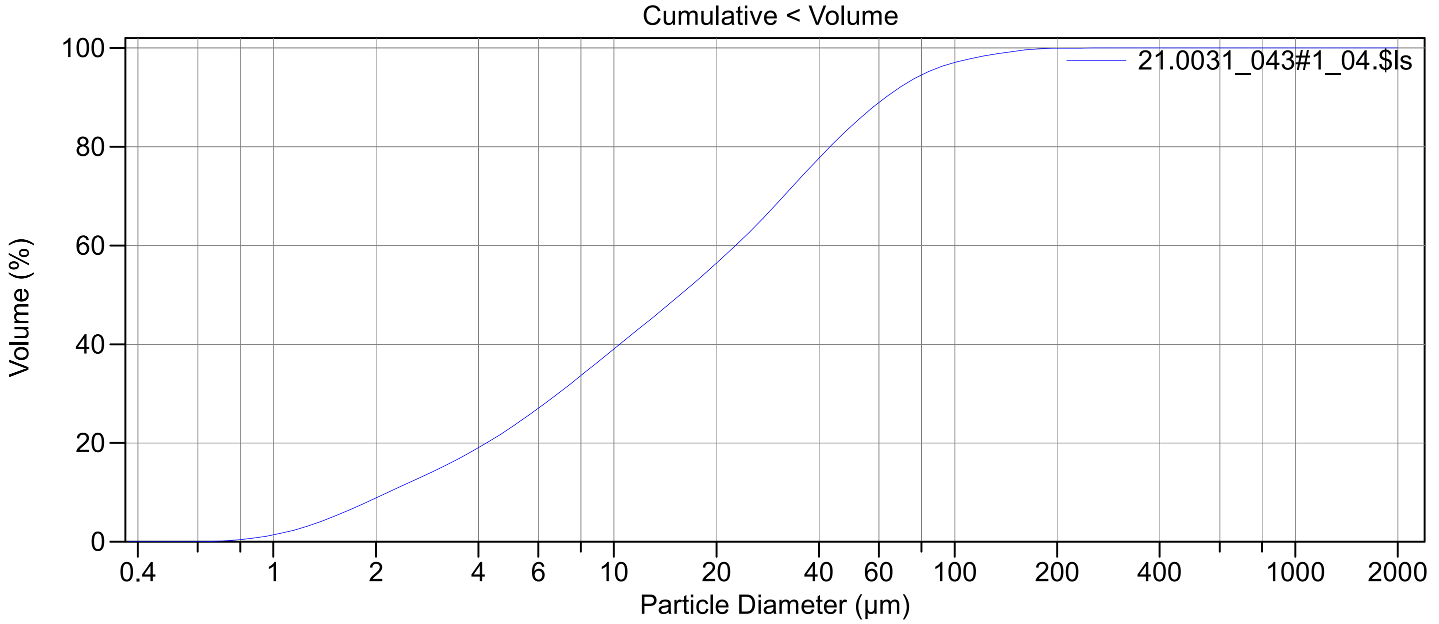
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	26.02 µm	S.D.:	29.62 µm
Median:	15.42 µm	Variance:	877.2 μm^2
D(3,2):	6.184 µm	C.V.:	114%
Mean/Median ratio:	1.687	Skewness:	2.208 Right skewed
Mode:	31.50 µm	Kurtosis:	6.406 Leptokurtic
Specific Surf. Area:	9703 cm^2/mL		

d_{10}: 2.152 µm d_{50}: 15.42 µm d_{90}: 63.24 µm

<10%	<25%	<50%	<75%	<90%
2.152 µm	5.389 µm	15.42 µm	36.38 µm	63.24 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_043#1_04.$ls 21.0031_043#1_04.$ls		
File ID:	21.0031_043#1		
Sample ID:	21.0031_188248_R2276MC014A 2-3 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,153 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 9:14	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_043#1_04.$ls

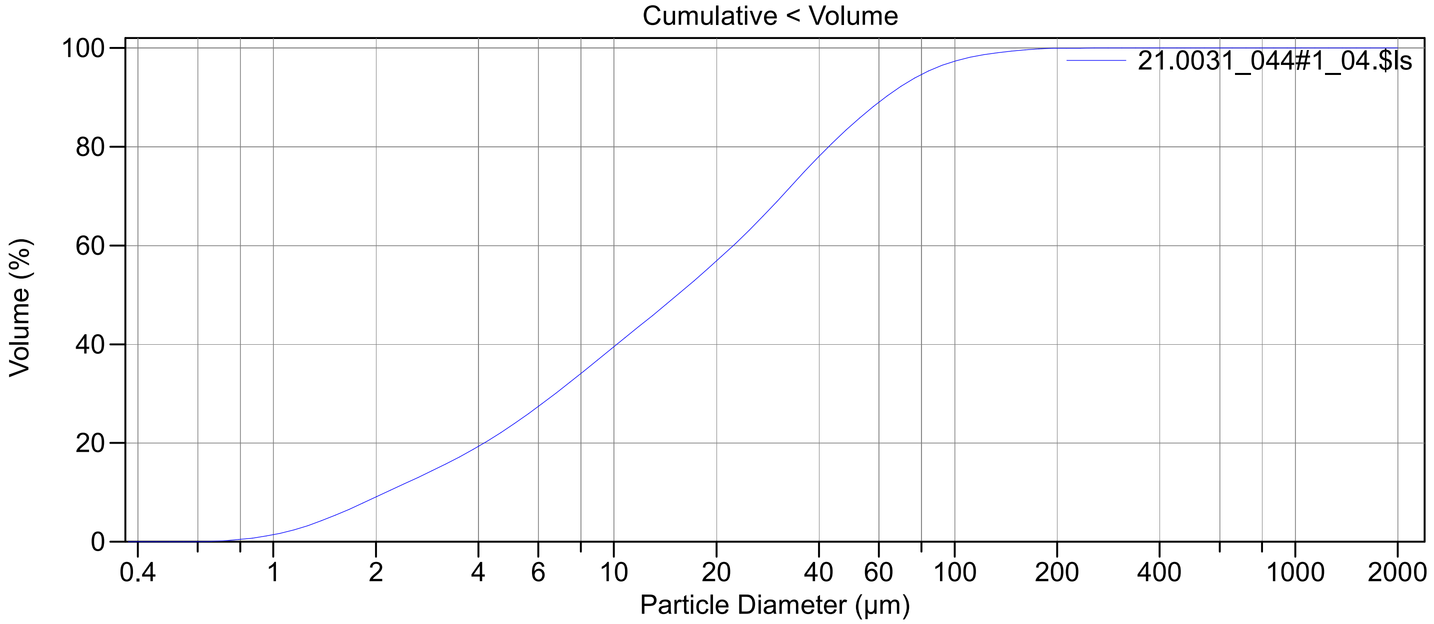
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	25.87 µm	S.D.:	28.60 µm
Median:	15.65 µm	Variance:	818.1 $µm^2$
D(3,2):	6.244 µm	C.V.:	111%
Mean/Median ratio:	1.653	Skewness:	2.039 Right skewed
Mode:	34.58 µm	Kurtosis:	5.333 Leptokurtic
Specific Surf. Area:	9610 cm^2/mL		

d_{10}: 2.174 µm d_{50}: 15.65 µm d_{90}: 62.69 µm

<10%	<25%	<50%	<75%	<90%
2.174 µm	5.461 µm	15.65 µm	36.73 µm	62.69 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_044#1_04.$ls		
	21.0031_044#1_04.$ls		
File ID:	21.0031_044#1		
Sample ID:	21.0031_188250_R2276MC014A 4-5 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,150 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 9:38	Run length:	60 seconds
Pump speed:	45		
Obscuration:	12%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_044#1_04.$ls

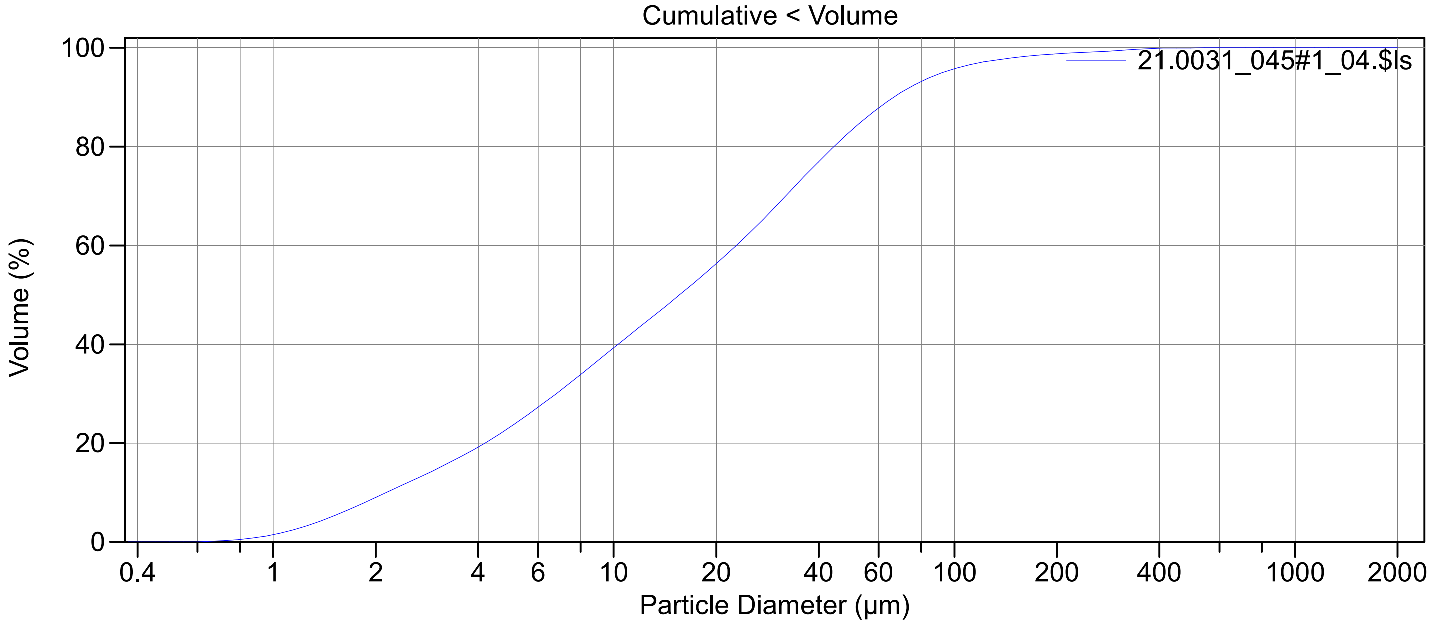
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	25.53 µm	S.D.:	28.18 µm
Median:	15.38 µm	Variance:	794.3 μm^2
D(3,2):	6.168 µm	C.V.:	110%
Mean/Median ratio:	1.660	Skewness:	2.029 Right skewed
Mode:	34.58 µm	Kurtosis:	5.416 Leptokurtic
Specific Surf. Area:	9727 cm^2/mL		

d_{10}: 2.144 µm d_{50}: 15.38 µm d_{90}: 62.61 µm

<10%	<25%	<50%	<75%	<90%
2.144 µm	5.377 µm	15.38 µm	36.30 µm	62.61 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_045#1_04.$ls		
	21.0031_045#1_04.$ls		
File ID:	21.0031_045#1		
Sample ID:	21.0031_188255_R2276MC014A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,147 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 9:57	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_045#1_04.$ls

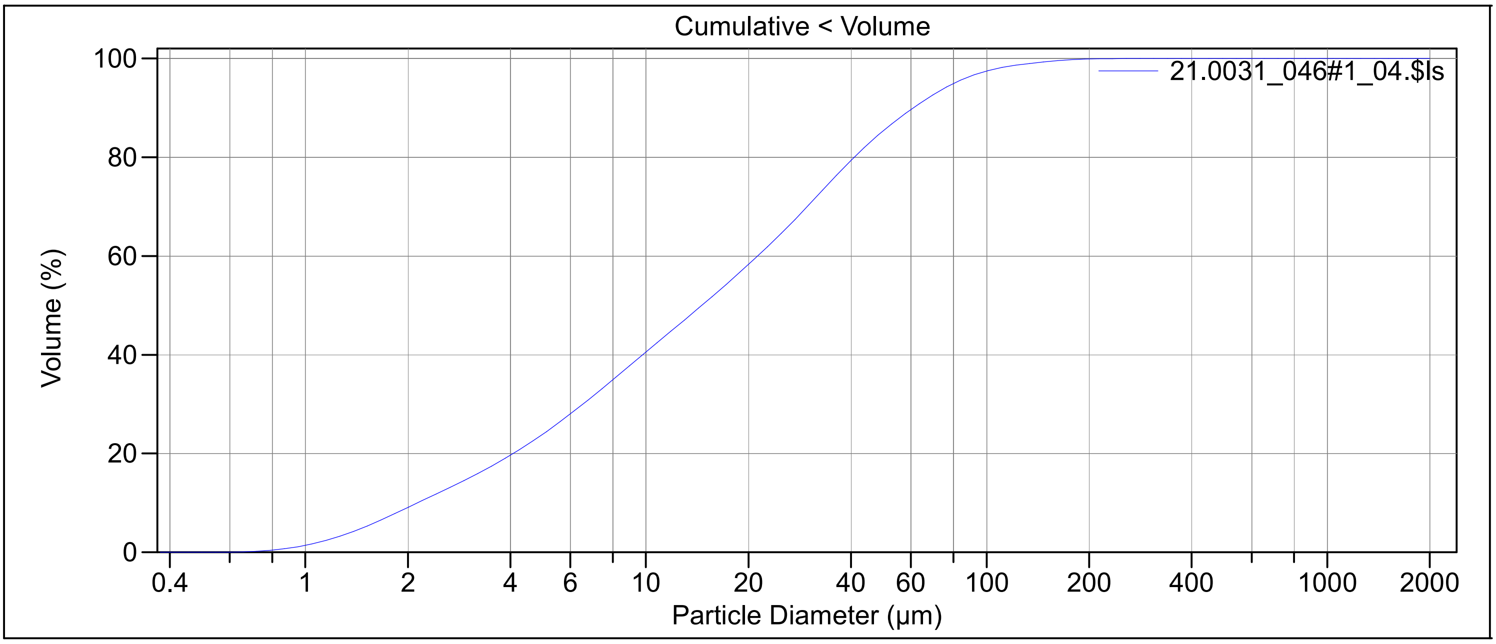
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	29.03 µm	S.D.:	41.66 µm
Median:	15.61 µm	Variance:	1735 µm^2
D(3,2):	6.202 µm	C.V.:	143%
Mean/Median ratio:	1.860	Skewness:	4.189 Right skewed
Mode:	34.58 µm	Kurtosis:	25.19 Leptokurtic
Specific Surf. Area:	9675 cm^2/mL		

d_{10}: 2.152 µm d_{50}: 15.61 µm d_{90}: 66.49 µm

<10%	<25%	<50%	<75%	<90%
2.152 µm	5.410 µm	15.61 µm	37.49 µm	66.49 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_046#1_04.$ls		
	21.0031_046#1_04.$ls		
File ID:	21.0031_046#1		
Sample ID:	21.0031_188260_R2276MC014A 14-15 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,144 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 10:12	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_046#1_04.$ls

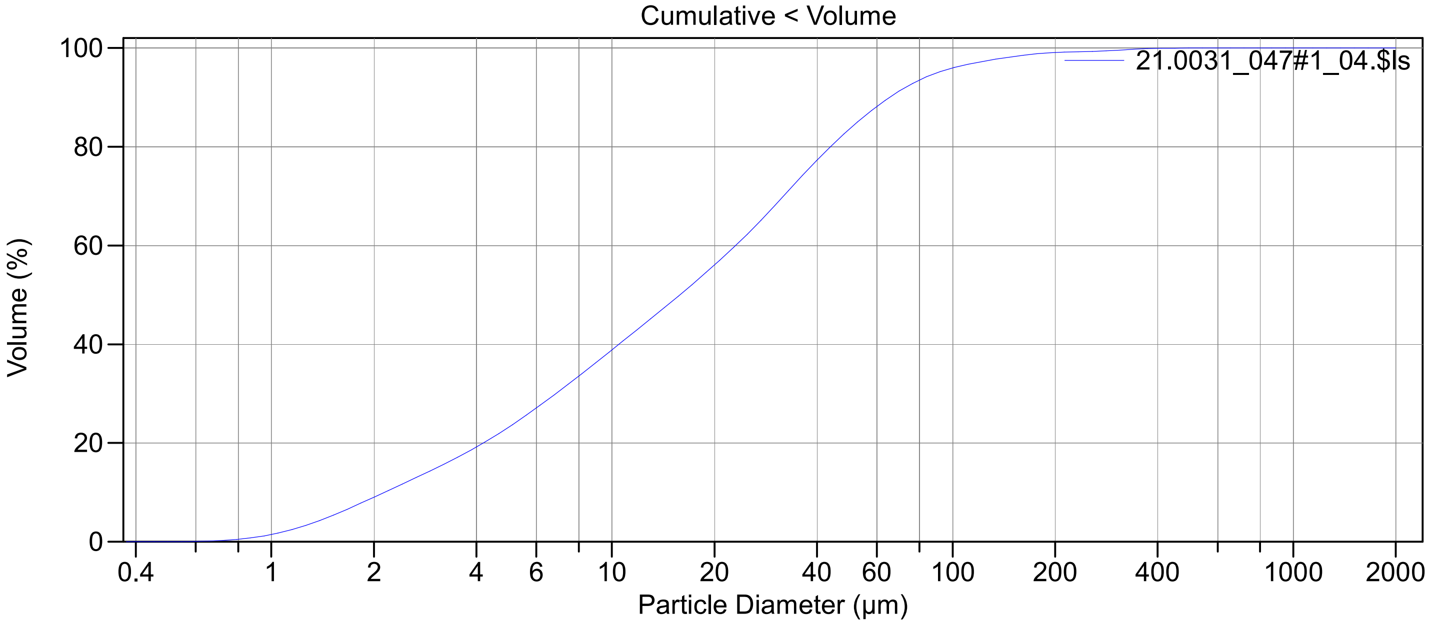
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	24.77 µm	S.D.:	27.97 µm
Median:	14.60 µm	Variance:	782.5 µm^2
D(3,2):	6.086 µm	C.V.:	113%
Mean/Median ratio:	1.696	Skewness:	2.187 Right skewed
Mode:	31.50 µm	Kurtosis:	6.491 Leptokurtic
Specific Surf. Area:	9859 cm^2/mL		

d_{10}: 2.136 µm d_{50}: 14.60 µm d_{90}: 60.93 µm

<10%	<25%	<50%	<75%	<90%
2.136 µm	5.245 µm	14.60 µm	34.78 µm	60.93 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_047#1_04.$ls 21.0031_047#1_04.$ls		
File ID:	21.0031_047#1		
Sample ID:	21.0031_188270_R2276MC014A 24-25 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,140 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.25%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 10:51	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_047#1_04.$ls

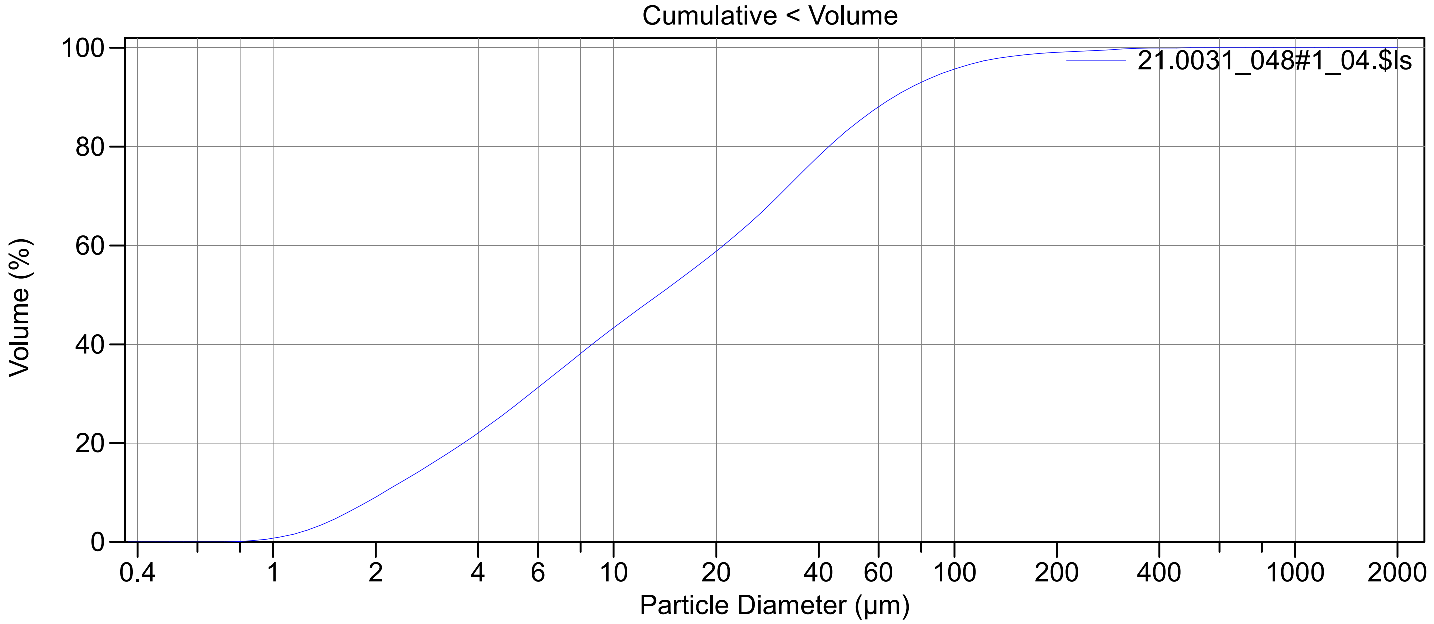
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	28.44 µm	S.D.:	39.29 µm
Median:	15.83 µm	Variance:	1543 $µm^2$
D(3,2):	6.211 µm	C.V.:	138%
Mean/Median ratio:	1.797	Skewness:	4.063 Right skewed
Mode:	31.50 µm	Kurtosis:	24.65 Leptokurtic
Specific Surf. Area:	9661 cm^2/mL		

d_{10}: 2.148 µm d_{50}: 15.83 µm d_{90}: 65.35 µm

<10%	<25%	<50%	<75%	<90%
2.148 µm	5.439 µm	15.83 µm	37.20 µm	65.35 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_048#1_04.$ls 21.0031_048#1_04.$ls
File ID:	21.0031_048#1
Sample ID:	21.0031_188289_R2276MC014A 43-44 cm
Operator:	MSH
Run number:	4
Comment 1:	0,136 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.25%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-24 12:04 Run length: 60 seconds
Pump speed:	45
Obscuration:	12%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_048#1_04.$ls

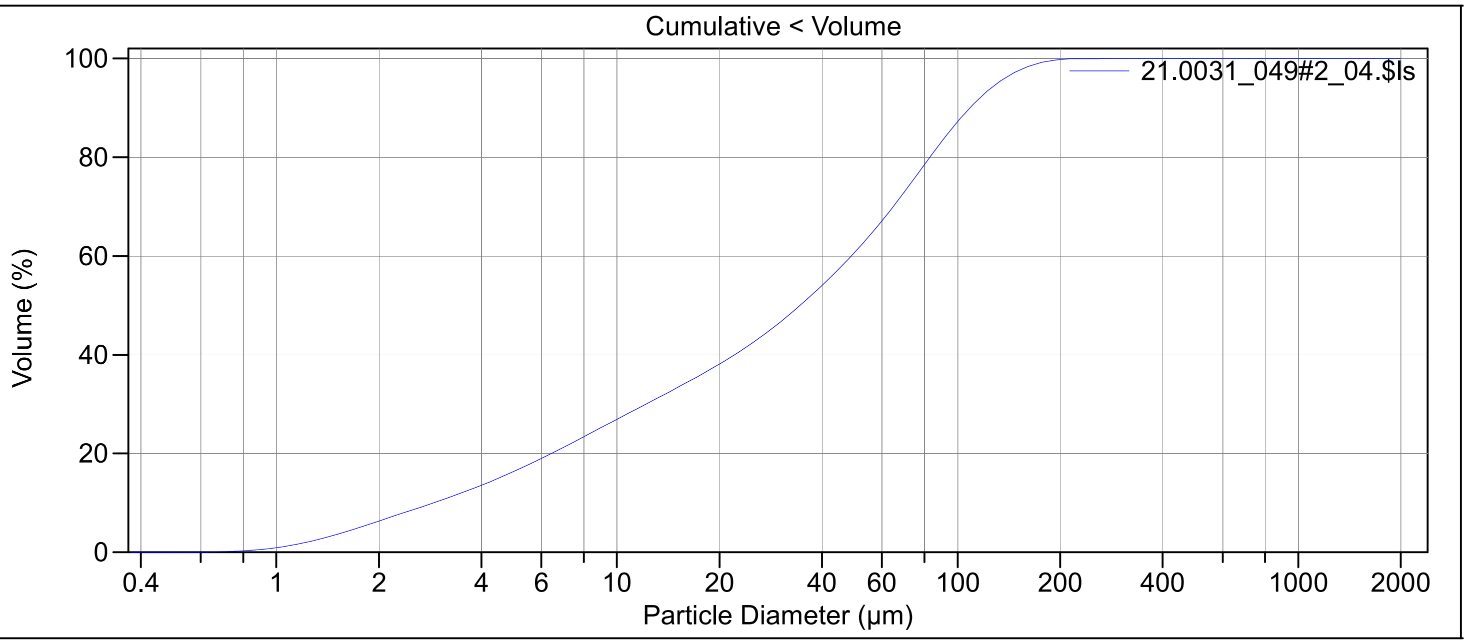
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	27.33 µm	S.D.:	38.30 µm
Median:	13.55 µm	Variance:	1467 µm^2
D(3,2):	5.993 µm	C.V.:	140%
Mean/Median ratio:	2.017	Skewness:	3.731 Right skewed
Mode:	34.58 µm	Kurtosis:	21.09 Leptokurtic
Specific Surf. Area:	10012 cm^2/mL		

d_{10}: 2.111 µm d_{50}: 13.55 µm d_{90}: 66.41 µm

<10%	<25%	<50%	<75%	<90%
2.111 µm	4.584 µm	13.55 µm	35.96 µm	66.41 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_049#2_04.$ls 21.0031_049#2_04.$ls		
File ID:	21.0031_049#2		
Sample ID:	21.0031_188293_R2279BC060 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,183 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.25%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 12:28	Run length:	61 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_049#2_04.$ls

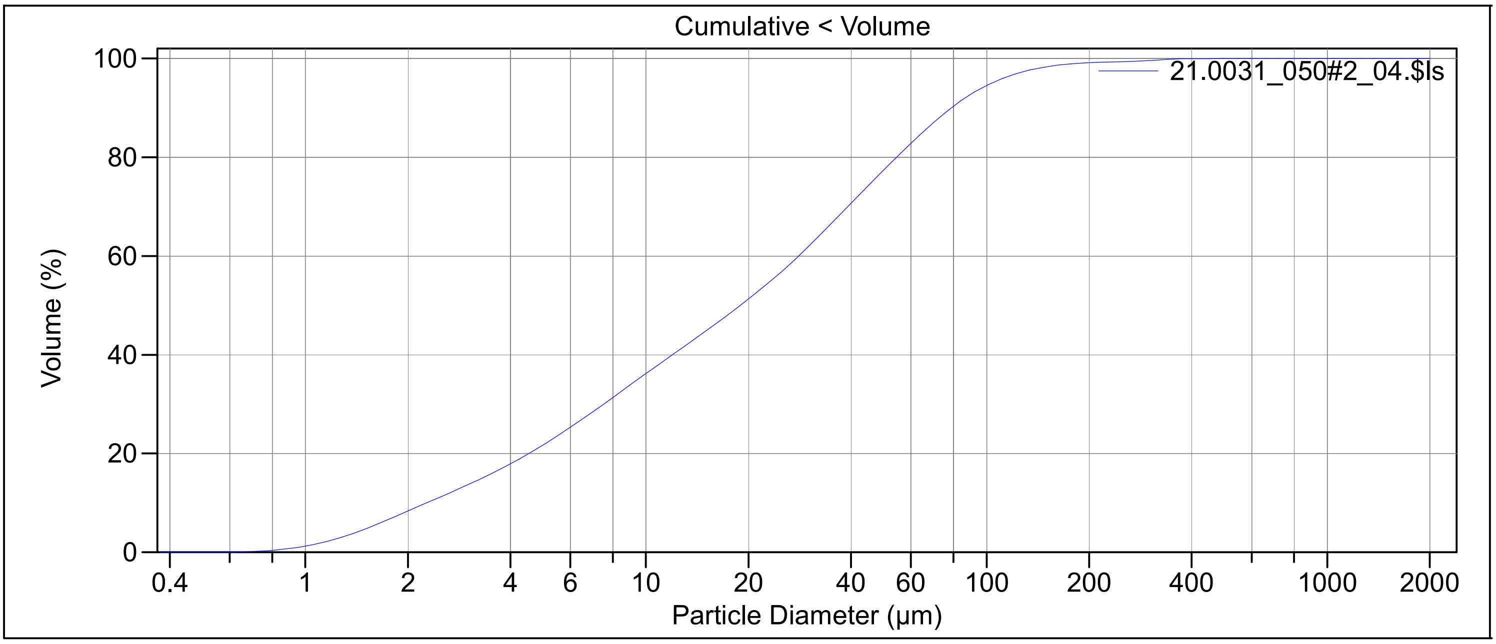
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	46.35 µm	S.D.:	42.96 µm
Median:	34.49 µm	Variance:	1846 µm^2
D(3,2):	8.669 µm	C.V.:	92.7%
Mean/Median ratio:	1.344	Skewness:	1.021 Right skewed
Mode:	80.07 µm	Kurtosis:	0.484 Leptokurtic
Specific Surf. Area:	6921 cm^2/mL		

d_{10}: 2.890 µm d_{50}: 34.49 µm d_{90}: 108.7 µm

<10%	<25%	<50%	<75%	<90%
2.890 µm	8.844 µm	34.49 µm	73.42 µm	108.7 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_050#2_04.$ls 21.0031_050#2_04.$ls
File ID:	21.0031_050#2
Sample ID:	21.0031_188294_R2289MC015A 0-1 cm
Operator:	MSH
Run number:	4
Comment 1:	0,153 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.24%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-24 12:53 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_050#2_04.$ls

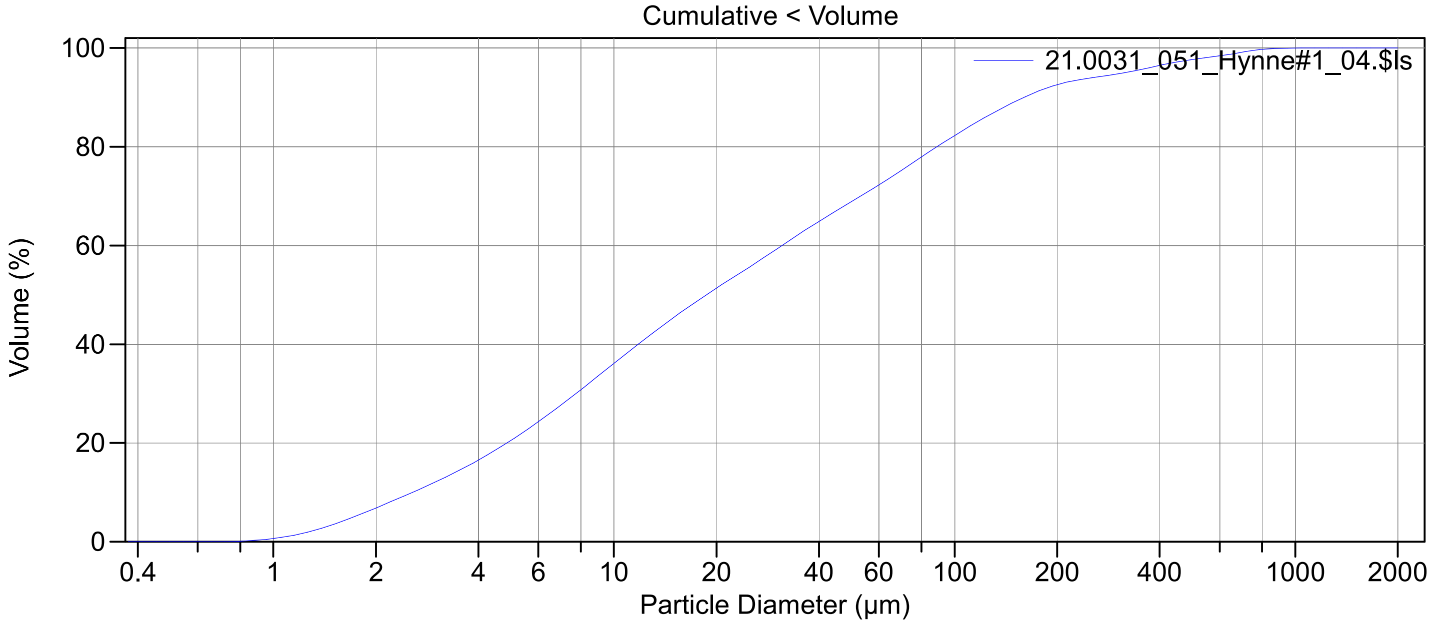
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	32.75 µm	S.D.:	40.79 µm
Median:	18.91 µm	Variance:	1664 $µm^2$
D(3,2):	6.694 µm	C.V.:	125%
Mean/Median ratio:	1.732	Skewness:	3.243 Right skewed
Mode:	37.97 µm	Kurtosis:	17.30 Leptokurtic
Specific Surf. Area:	8963 cm^2/mL		

d_{10}: 2.273 µm d_{50}: 18.91 µm d_{90}: 78.94 µm

<10%	<25%	<50%	<75%	<90%
2.273 µm	5.908 µm	18.91 µm	46.04 µm	78.94 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_051_Hynne#1_04.$ls 21.0031_051_Hynne#1_04.$ls		
File ID:	21.0031_051_Hynne#1		
Sample ID:	21.0031_Hynne_40107		
Operator:	MSH		
Run number:	4		
Comment 1:	0,154 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.25%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 13:07	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic)   21.0031_051_Hynne#1_04.$ls

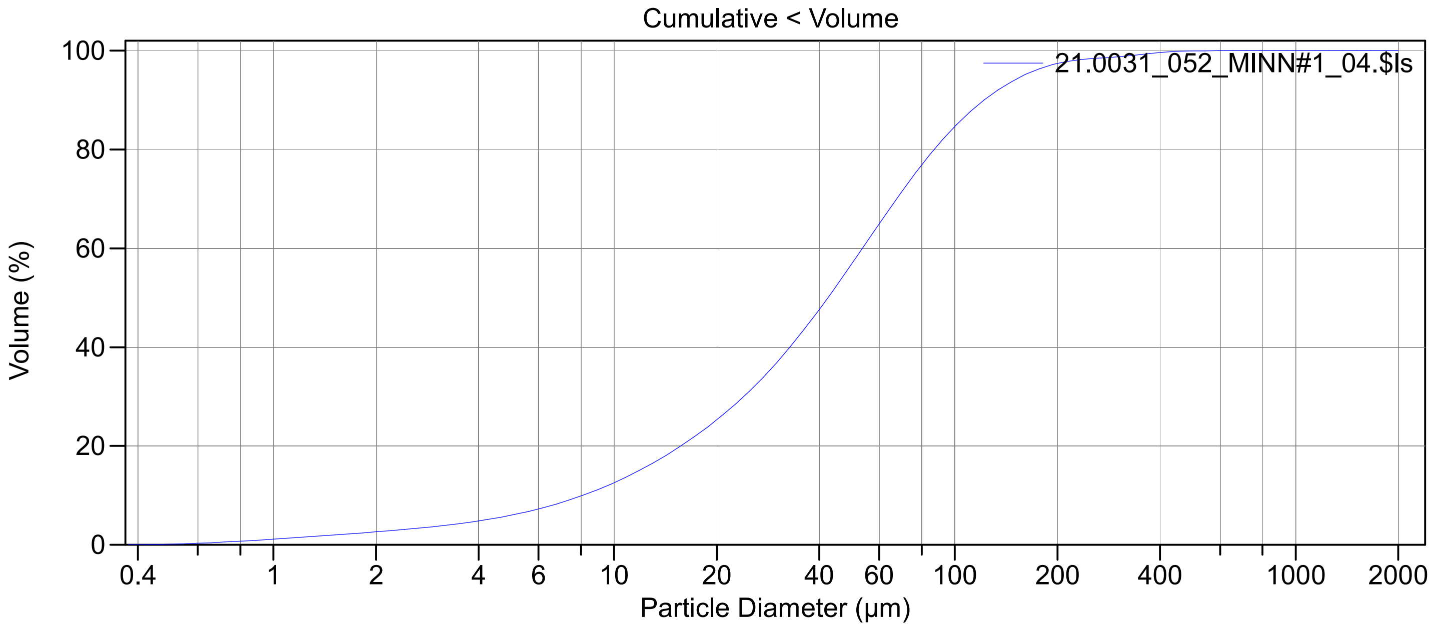
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	65.48 µm	S.D.:	122.1 µm
Median:	18.65 µm	Variance:	14915 μm^2
D(3,2):	7.418 µm	C.V.:	187%
Mean/Median ratio:	3.512	Skewness:	3.575 Right skewed
Mode:	9.370 µm	Kurtosis:	14.54 Leptokurtic
Specific Surf. Area:	8088 cm^2/mL		

d_{10}: 2.560 µm d_{50}: 18.65 µm d_{90}: 159.6 µm

<10%	<25%	<50%	<75%	<90%
2.560 µm	6.194 µm	18.65 µm	69.00 µm	159.6 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_052_MINN#1_04.$ls 21.0031_052_MINN#1_04.$ls		
File ID:	21.0031_052_MINN#1		
Sample ID:	21.0031_MINN_Split 1		
Operator:	MSH		
Run number:	4		
Comment 1:	0,334 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Fraunhofer.rf780d		
Residual:	0.17%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 13:22	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_052_MINN#1_04.$ls

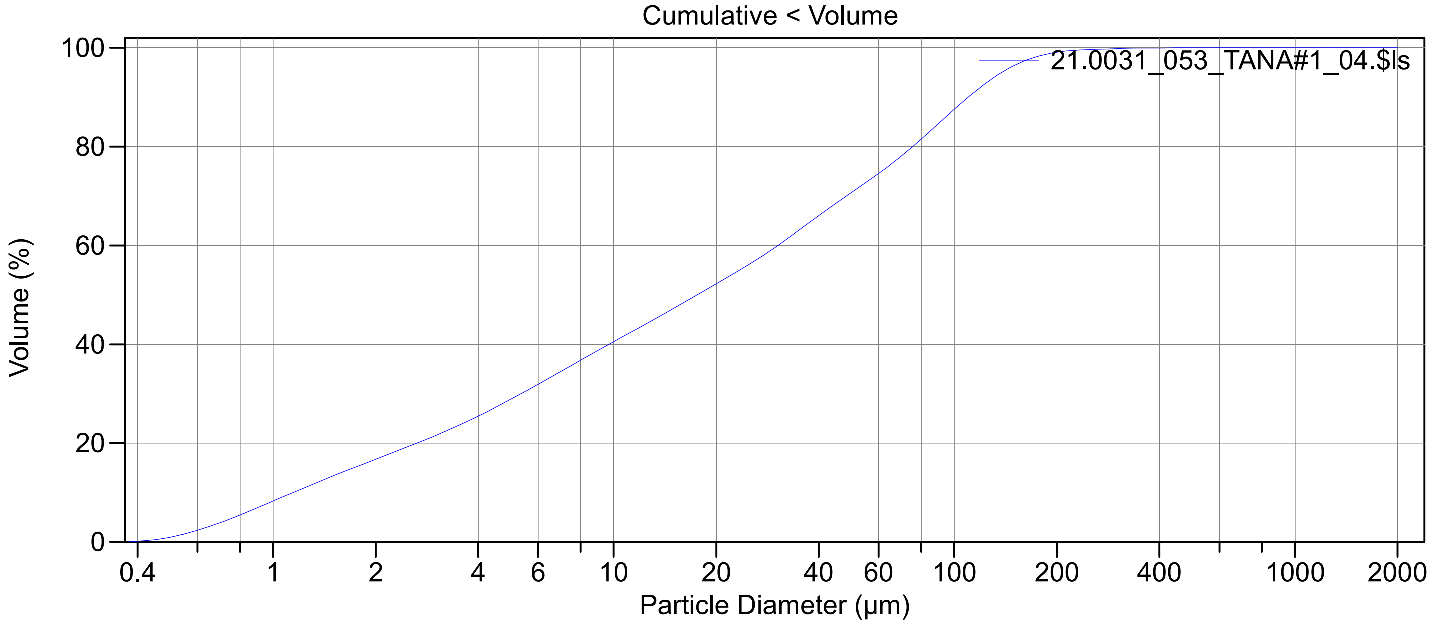
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	57.75 µm	S.D.:	58.34 µm
Median:	42.40 µm	Variance:	3403 µm^2
D(3,2):	14.18 µm	C.V.:	101%
Mean/Median ratio:	1.362	Skewness:	2.763 Right skewed
Mode:	55.14 µm	Kurtosis:	11.60 Leptokurtic
Specific Surf. Area:	4232 cm^2/mL		

d_{10}: 8.089 µm d_{50}: 42.40 µm d_{90}: 121.6 µm

<10%	<25%	<50%	<75%	<90%
8.089 µm	19.75 µm	42.40 µm	76.15 µm	121.6 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_053_TANA#1_04.$ls 21.0031_053_TANA#1_04.$ls
File ID:	21.0031_053_TANA#1
Sample ID:	21.0031_TANA (4)
Operator:	MSH
Run number:	4
	Control Sample
Comment 1:	0,140 g + disp.middel, Springvann
Comment 2:	ultralyd, Probe 2 (naken), 5 ampl-5 min
Optical model:	Fraunhofer.rf780d
Residual:	0.36%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-24 8:27 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_053_TANA#1_04.$ls

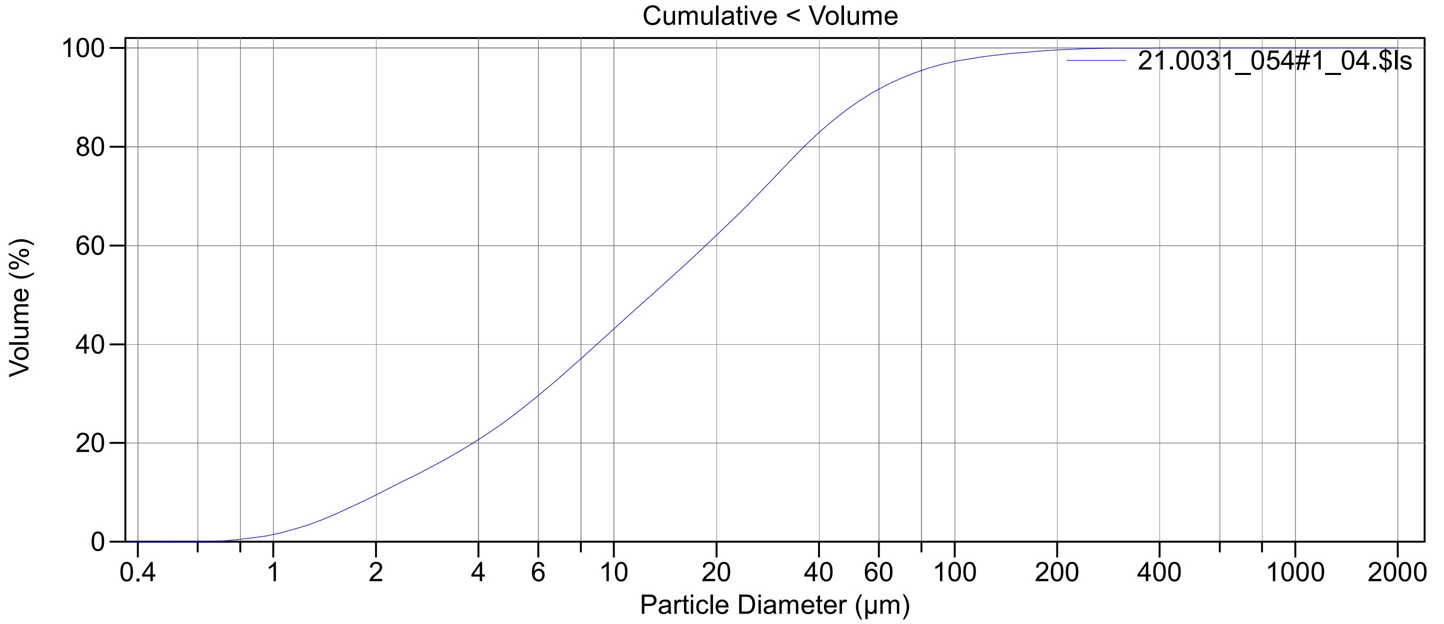
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	39.10 µm	S.D.:	48.18 µm
Median:	17.60 µm	Variance:	2321 µm^2
D(3,2):	3.880 µm	C.V.:	123%
Mean/Median ratio:	2.222	Skewness:	1.786 Right skewed
Mode:	87.90 µm	Kurtosis:	4.018 Leptokurtic
Specific Surf. Area:	15463 cm^2/mL		

d_{10}: 1.145 µm d_{50}: 17.60 µm d_{90}: 109.7 µm

<10%	<25%	<50%	<75%	<90%
1.145 µm	3.875 µm	17.60 µm	61.15 µm	109.7 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_054#1_04.$ls		
	21.0031_054#1_04.$ls		
File ID:	21.0031_054#1		
Sample ID:	21.0031_188339_R2326GR104 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,141 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 13:36	Run length:	61 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_054#1_04.$ls

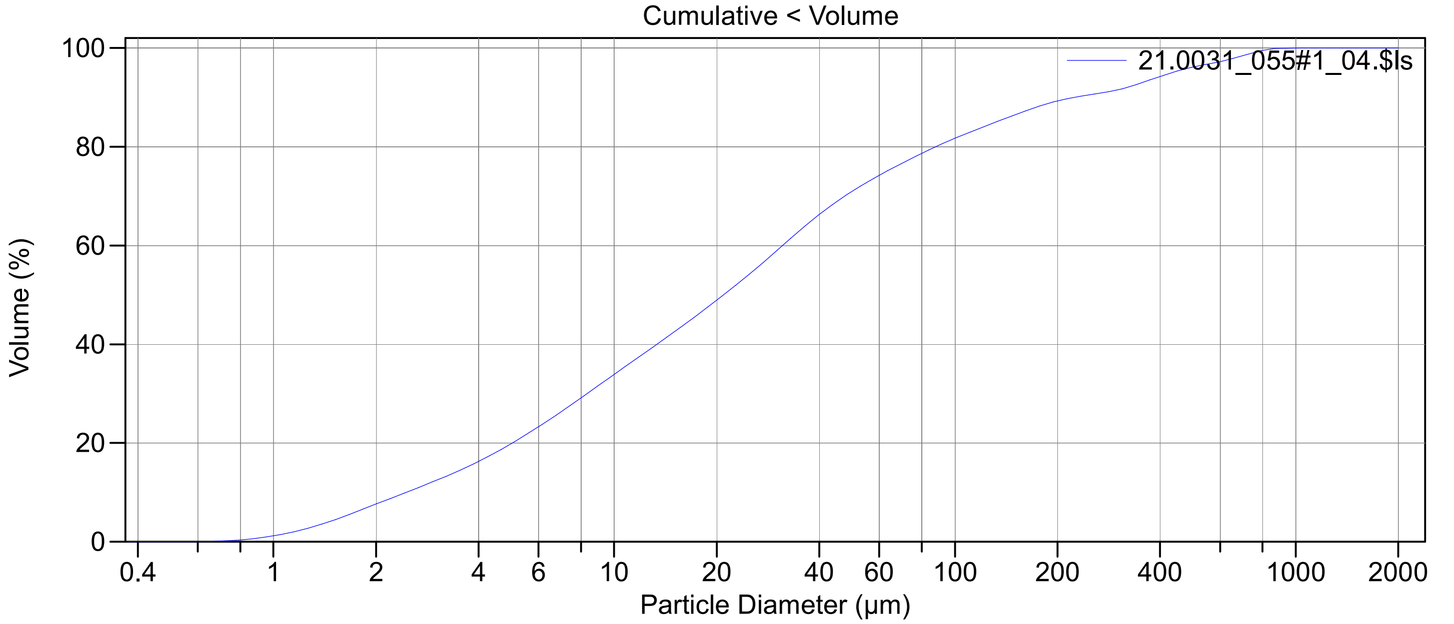
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	23.23 µm	S.D.:	29.73 µm
Median:	12.92 µm	Variance:	883.8 $µm^2$
D(3,2):	5.803 µm	C.V.:	128%
Mean/Median ratio:	1.799	Skewness:	3.249 Right skewed
Mode:	31.50 µm	Kurtosis:	15.70 Leptokurtic
Specific Surf. Area:	10340 cm^2/mL		

d_{10}: 2.075 µm d_{50}: 12.92 µm d_{90}: 54.53 µm

<10%	<25%	<50%	<75%	<90%
2.075 µm	4.933 µm	12.92 µm	30.76 µm	54.53 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_055#1_04.$ls 21.0031_055#1_04.$ls		
File ID:	21.0031_055#1		
Sample ID:	21.0031_188340_R2331MC016A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,136 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 14:03	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_055#1_04.$ls

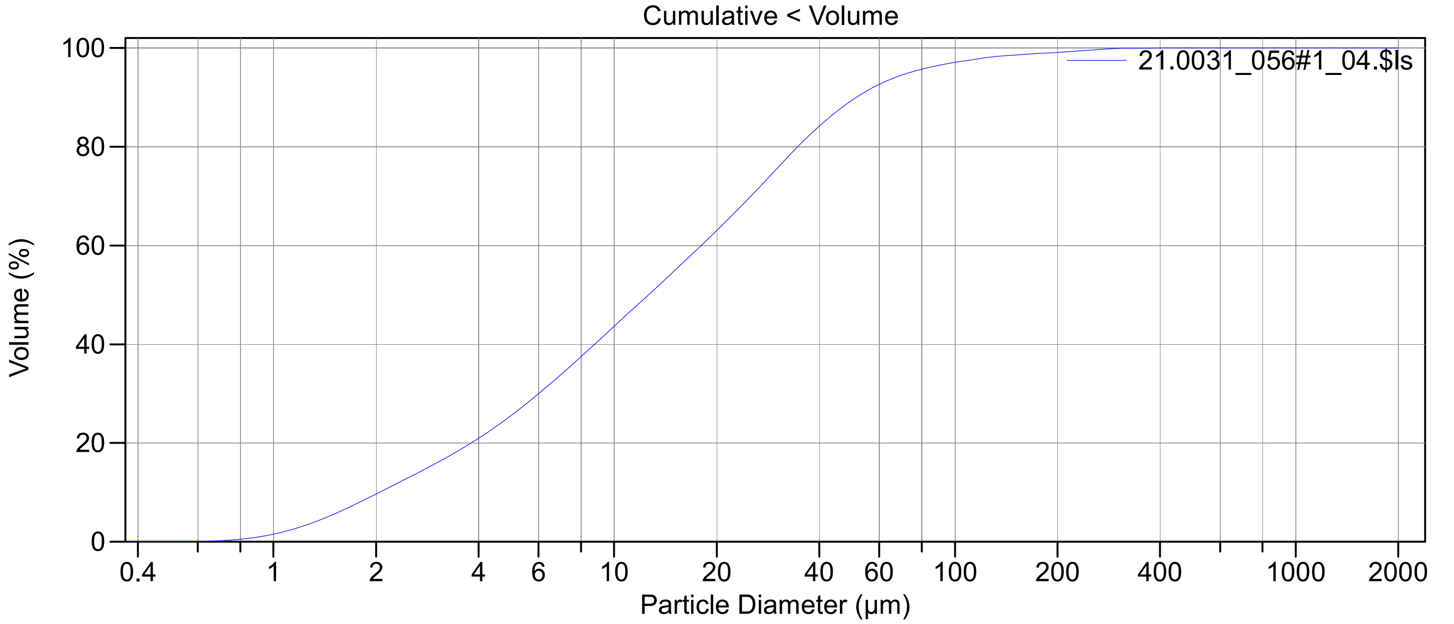
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	78.47 µm	S.D.:	150.3 µm
Median:	20.94 µm	Variance:	22593 μm^2
D(3,2):	7.250 µm	C.V.:	192%
Mean/Median ratio:	3.748	Skewness:	3.030 Right skewed
Mode:	31.50 µm	Kurtosis:	9.293 Leptokurtic
Specific Surf. Area:	8275 cm^2/mL		

d_{10}: 2.451 µm d_{50}: 20.94 µm d_{90}: 224.4 µm

<10%	<25%	<50%	<75%	<90%
2.451 µm	6.544 µm	20.94 µm	62.92 µm	224.4 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_056#1_04.$ls 21.0031_056#1_04.$ls		
File ID:	21.0031_056#1		
Sample ID:	21.0031_188381_R2338MC017A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,137 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 14:17	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_056#1_04.$ls

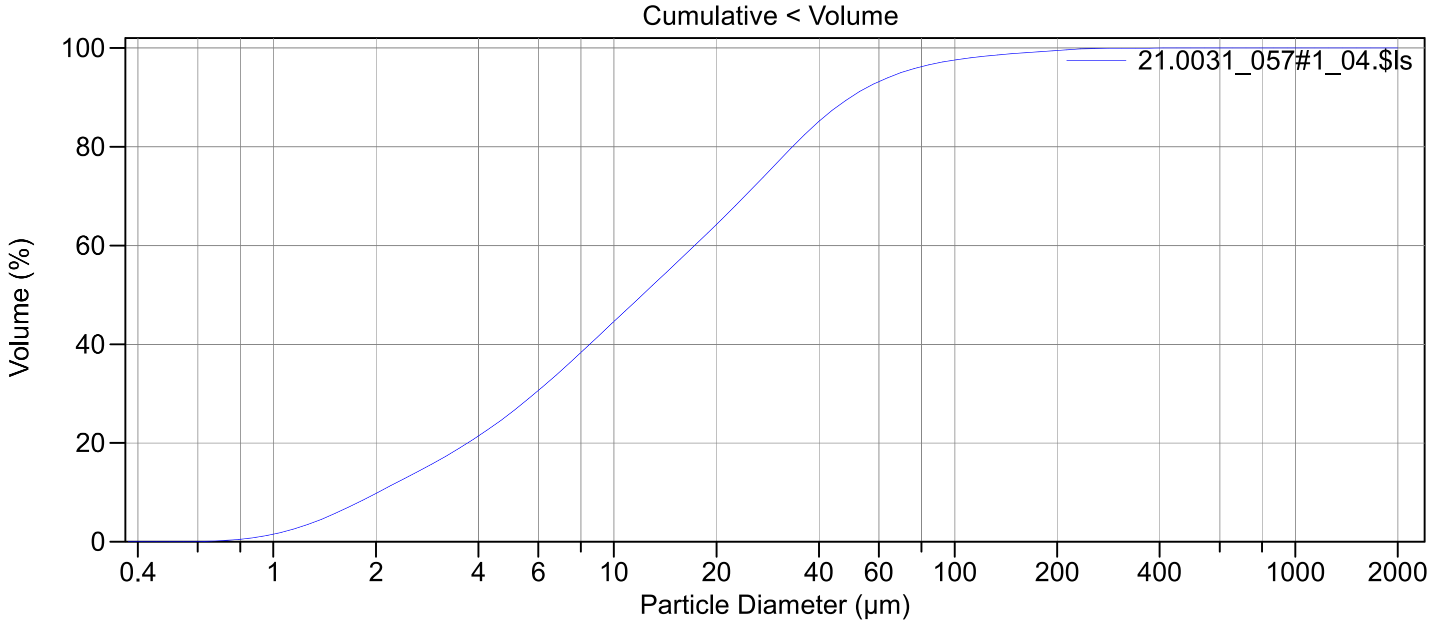
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	23.18 µm	S.D.:	33.01 µm
Median:	12.62 µm	Variance:	1089 µm^2
D(3,2):	5.719 µm	C.V.:	142%
Mean/Median ratio:	1.838	Skewness:	4.138 Right skewed
Mode:	28.70 µm	Kurtosis:	23.81 Leptokurtic
Specific Surf. Area:	10492 cm^2/mL		

d_{10}: 2.047 µm d_{50}: 12.62 µm d_{90}: 51.31 µm

<10%	<25%	<50%	<75%	<90%
2.047 µm	4.864 µm	12.62 µm	29.51 µm	51.31 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_057#1_04.$ls 21.0031_057#1_04.$ls		
File ID:	21.0031_057#1		
Sample ID:	21.0031_188383_R2338MC017A 2-3 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,133 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-24 14:28	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_057#1_04.$ls

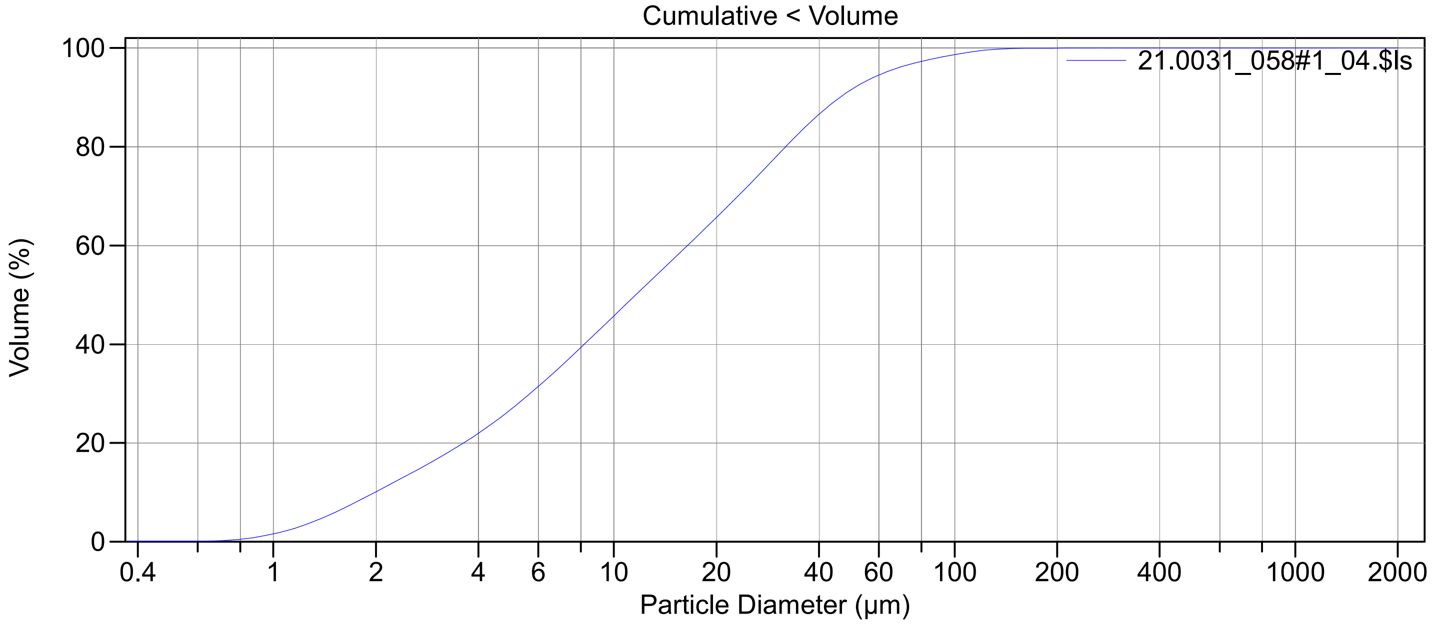
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	21.80 µm	S.D.:	29.00 µm
Median:	12.13 µm	Variance:	840.9 μm^2
D(3,2):	5.630 µm	C.V.:	133%
Mean/Median ratio:	1.797	Skewness:	3.673 Right skewed
Mode:	28.70 µm	Kurtosis:	19.59 Leptokurtic
Specific Surf. Area:	10656 cm^2/mL		

d_{10}: 2.029 µm d_{50}: 12.13 µm d_{90}: 49.43 µm

<10%	<25%	<50%	<75%	<90%
2.029 µm	4.746 µm	12.13 µm	28.49 µm	49.43 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_058#1_04.$ls 21.0031_058#1_04.$ls		
File ID:	21.0031_058#1		
Sample ID:	21.0031_188385_R2338MC017A 4-5 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,129 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 11:09	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_058#1_04.$ls

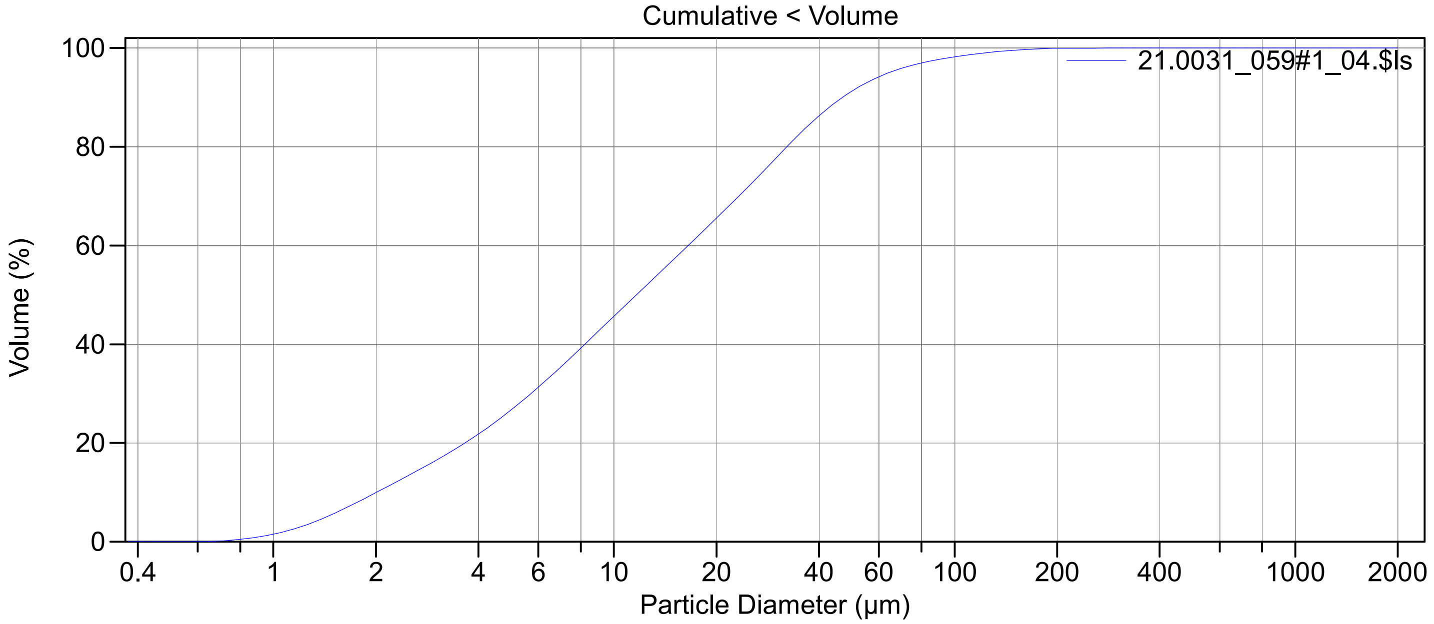
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.48 µm	S.D.:	21.71 µm
Median:	11.60 µm	Variance:	471.3 µm^2
D(3,2):	5.490 µm	C.V.:	111%
Mean/Median ratio:	1.679	Skewness:	2.214 Right skewed
Mode:	28.70 µm	Kurtosis:	6.340 Leptokurtic
Specific Surf. Area:	10929 cm^2/mL		

d_{10}: 1.986 µm d_{50}: 11.60 µm d_{90}: 46.09 µm

<10%	<25%	<50%	<75%	<90%
1.986 µm	4.609 µm	11.60 µm	27.21 µm	46.09 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_059#1_04.$ls 21.0031_059#1_04.$ls		
File ID:	21.0031_059#1		
Sample ID:	21.0031_188390_R2338MC017A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,124 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 11:53	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_059#1_04.$ls

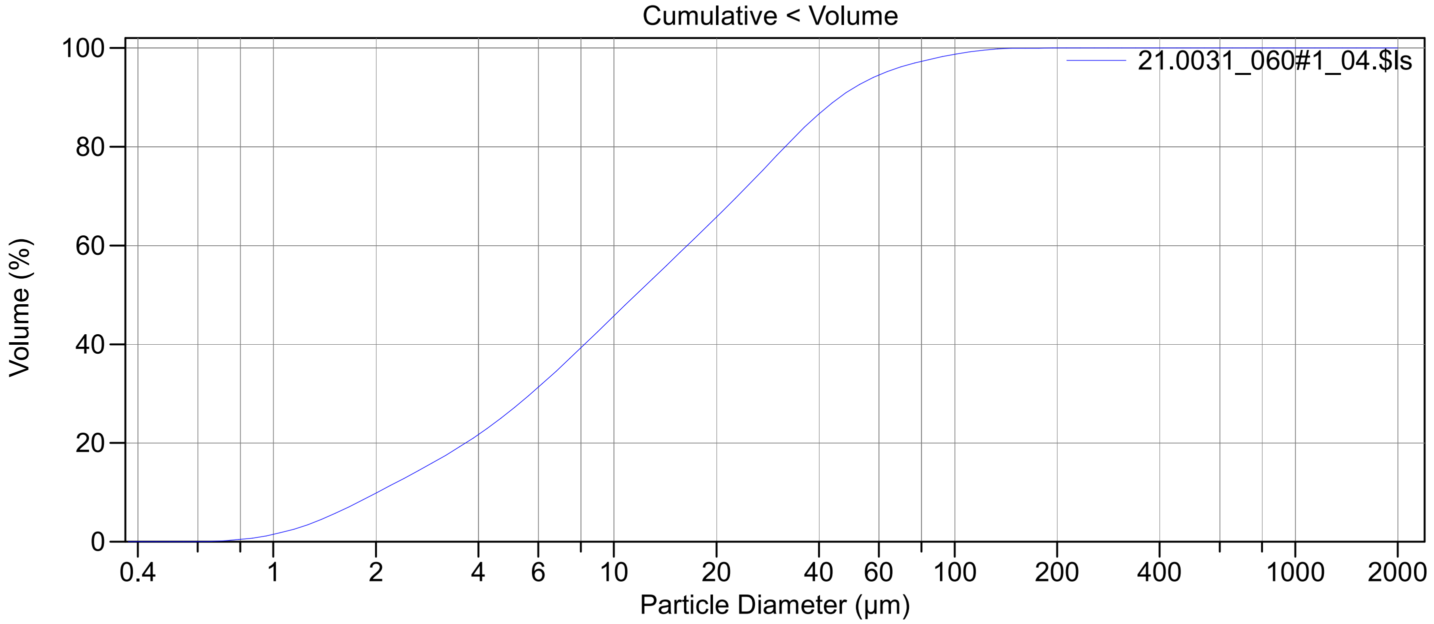
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	20.08 µm	S.D.:	23.84 µm
Median:	11.64 µm	Variance:	568.4 μm^2
D(3,2):	5.538 µm	C.V.:	119%
Mean/Median ratio:	1.726	Skewness:	2.753 Right skewed
Mode:	28.70 µm	Kurtosis:	10.86 Leptokurtic
Specific Surf. Area:	10834 cm^2/mL		

d_{10}: 2.008 µm d_{50}: 11.64 µm d_{90}: 46.84 µm

<10%	<25%	<50%	<75%	<90%
2.008 µm	4.643 µm	11.64 µm	27.40 µm	46.84 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_060#1_04.$ls 21.0031_060#1_04.$ls		
File ID:	21.0031_060#1		
Sample ID:	21.0031_188395_R2338MC017A 14-15 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,119 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 12:06	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_060#1_04.$ls

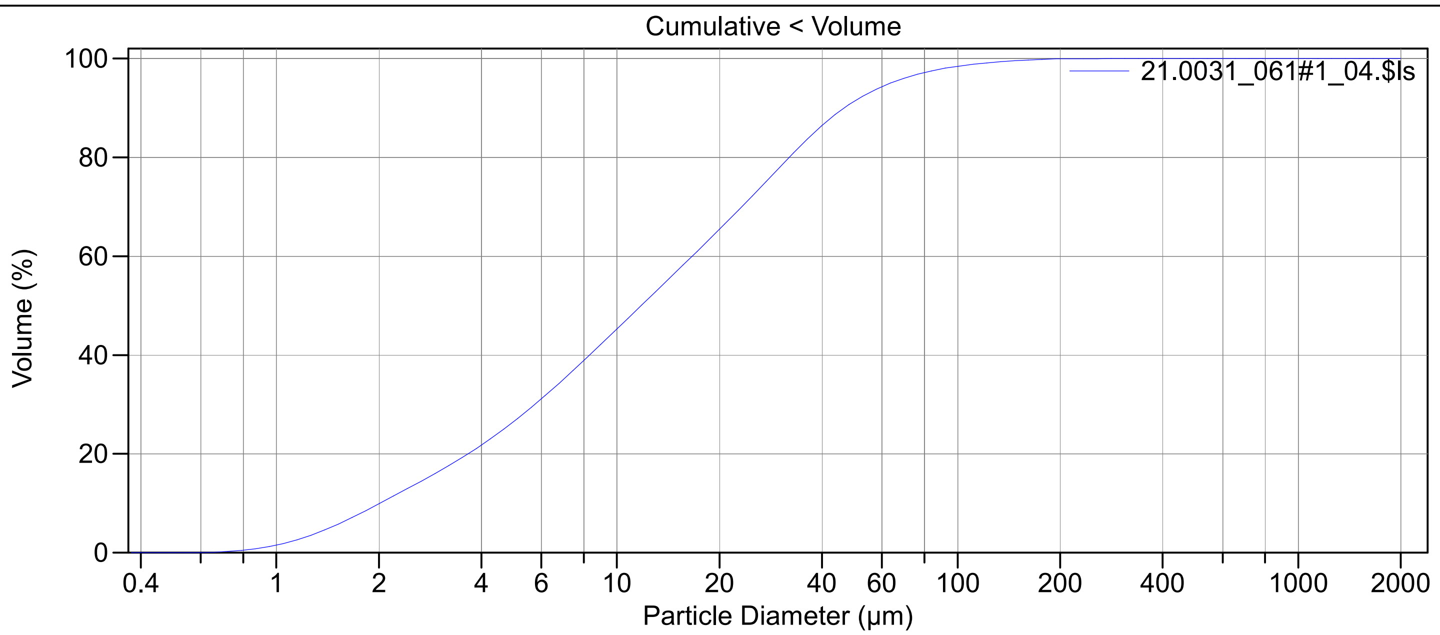
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.43 µm	S.D.:	21.52 µm
Median:	11.60 µm	Variance:	463.0 $µm^2$
D(3,2):	5.553 µm	C.V.:	111%
Mean/Median ratio:	1.675	Skewness:	2.173 Right skewed
Mode:	28.70 µm	Kurtosis:	6.008 Leptokurtic
Specific Surf. Area:	10805 cm^2/mL		

d_{10}: 2.023 µm d_{50}: 11.60 µm d_{90}: 45.97 µm

<10%	<25%	<50%	<75%	<90%
2.023 µm	4.651 µm	11.60 µm	27.12 µm	45.97 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_061#1_04.$ls 21.0031_061#1_04.$ls		
File ID:	21.0031_061#1		
Sample ID:	21.0031_188405_R2338MC017A 24-25 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,119 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 12:20	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_061#1_04.$ls

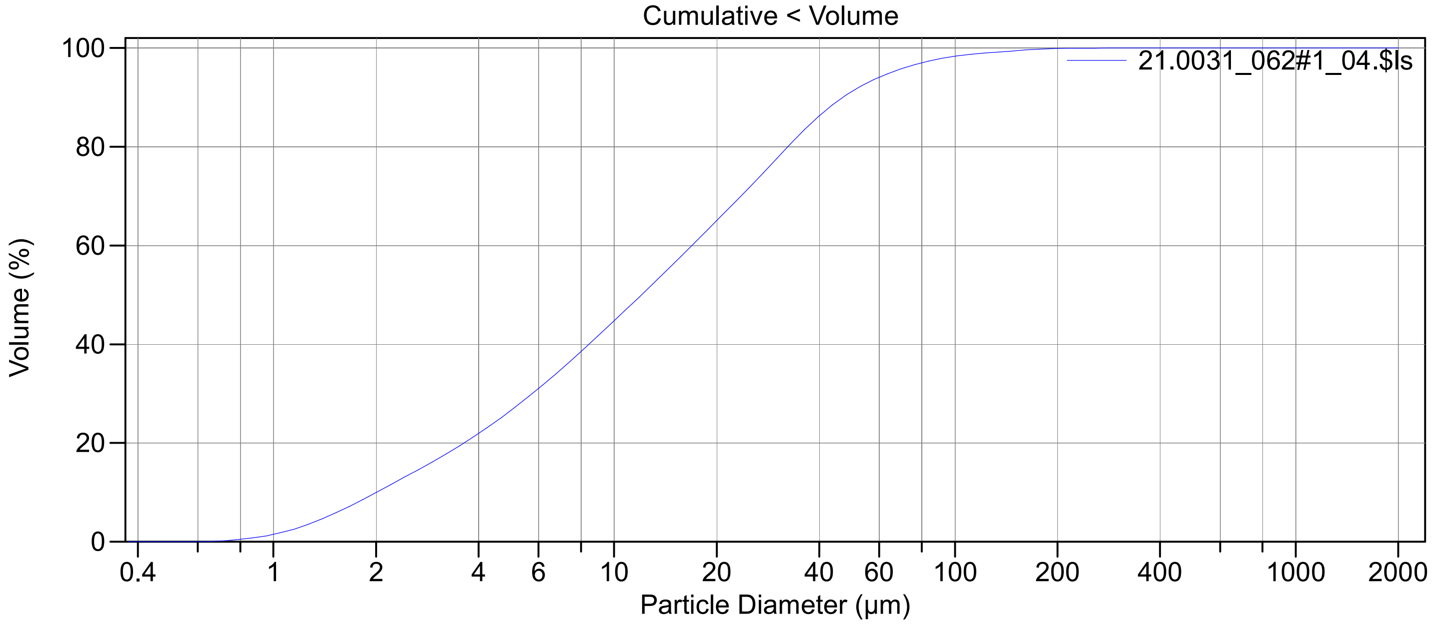
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.96 µm	S.D.:	23.42 µm
Median:	11.78 µm	Variance:	548.5 µm^2
D(3,2):	5.556 µm	C.V.:	117%
Mean/Median ratio:	1.694	Skewness:	2.778 Right skewed
Mode:	28.70 µm	Kurtosis:	11.51 Leptokurtic
Specific Surf. Area:	10800 cm^2/mL		

d_{10}: 2.015 µm d_{50}: 11.78 µm d_{90}: 46.48 µm

<10%	<25%	<50%	<75%	<90%
2.015 µm	4.653 µm	11.78 µm	27.34 µm	46.48 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_062#1_04.$ls 21.0031_062#1_04.$ls		
File ID:	21.0031_062#1		
Sample ID:	21.0031_188428_R2338MC017A 47-48 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,120 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.21%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 12:37	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_062#1_04.$ls

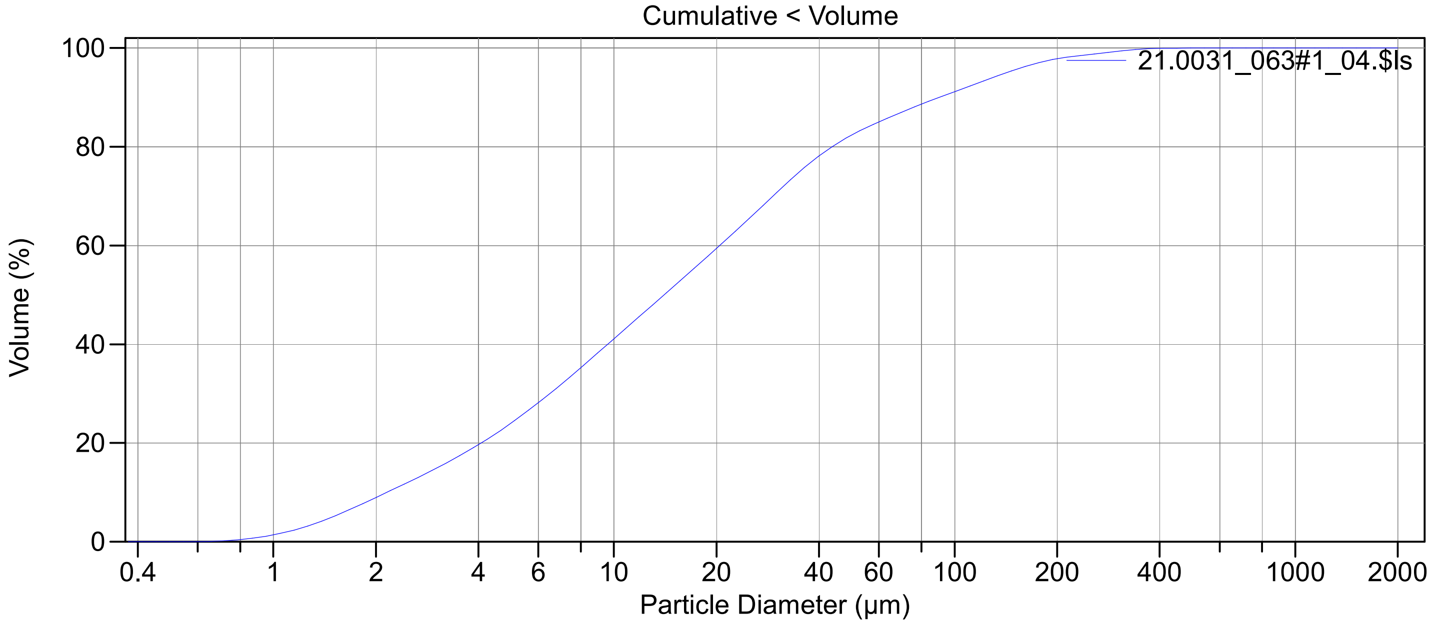
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	20.30 µm	S.D.:	24.17 µm
Median:	12.04 µm	Variance:	584.2 µm^2
D(3,2):	5.564 µm	C.V.:	119%
Mean/Median ratio:	1.686	Skewness:	2.869 Right skewed
Mode:	28.70 µm	Kurtosis:	12.06 Leptokurtic
Specific Surf. Area:	10783 cm^2/mL		

d_{10}: 2.005 µm d_{50}: 12.04 µm d_{90}: 46.85 µm

<10%	<25%	<50%	<75%	<90%
2.005 µm	4.637 µm	12.04 µm	27.64 µm	46.85 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_063#1_04.$ls 21.0031_063#1_04.$ls
File ID:	21.0031_063#1
Sample ID:	21.0031_188486_R2354GR125 0-1 cm
Operator:	MSH
Run number:	4
Comment 1:	0,123 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.25%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-25 12:55 — Run length: 60 seconds
Pump speed:	45
Obscuration:	9%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_063#1_04.$ls

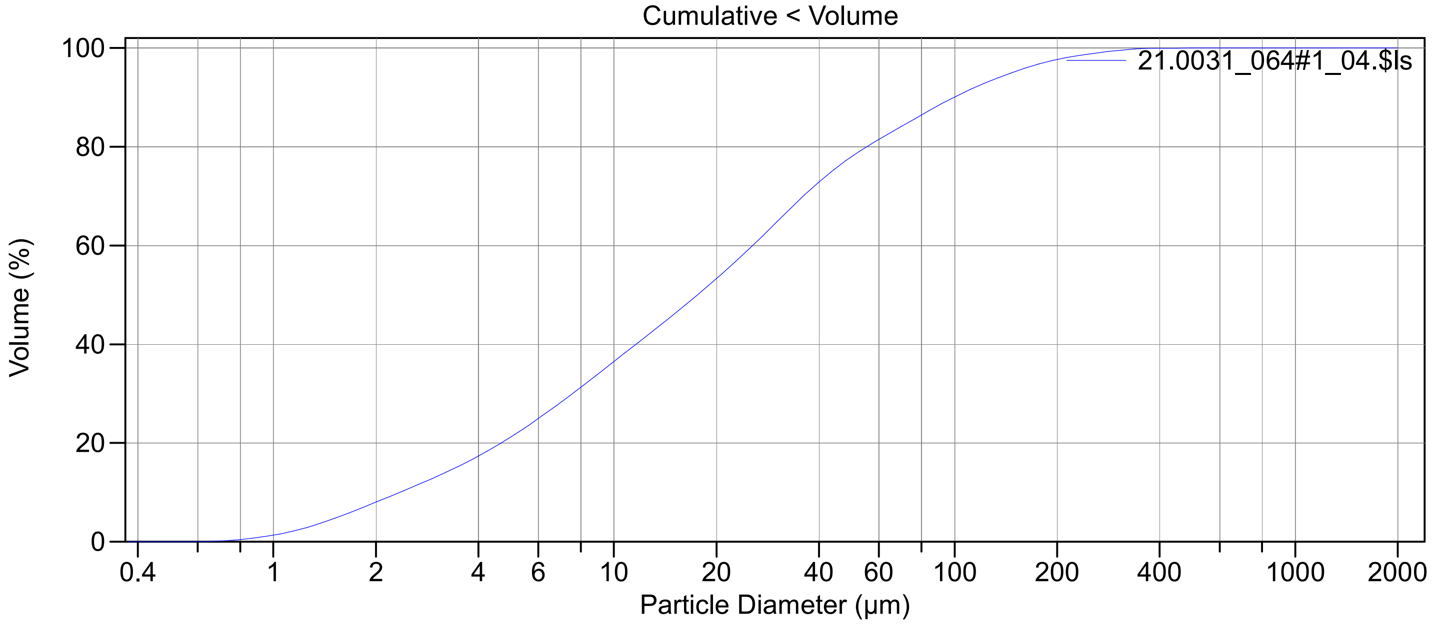
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	33.18 µm	S.D.:	51.69 µm
Median:	14.04 µm	Variance:	2672 µm^2
D(3,2):	6.107 µm	C.V.:	156%
Mean/Median ratio:	2.362	Skewness:	3.168 Right skewed
Mode:	28.70 µm	Kurtosis:	12.17 Leptokurtic
Specific Surf. Area:	9825 cm^2/mL		

d_{10}: 2.156 µm d_{50}: 14.04 µm d_{90}: 90.07 µm

<10%	<25%	<50%	<75%	<90%
2.156 µm	5.222 µm	14.04 µm	35.17 µm	90.07 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_064#1_04.$ls		
	21.0031_064#1_04.$ls		
File ID:	21.0031_064#1		
Sample ID:	21.0031_188487_R2359GR129 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,126 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.25%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 13:13	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_064#1_04.$ls

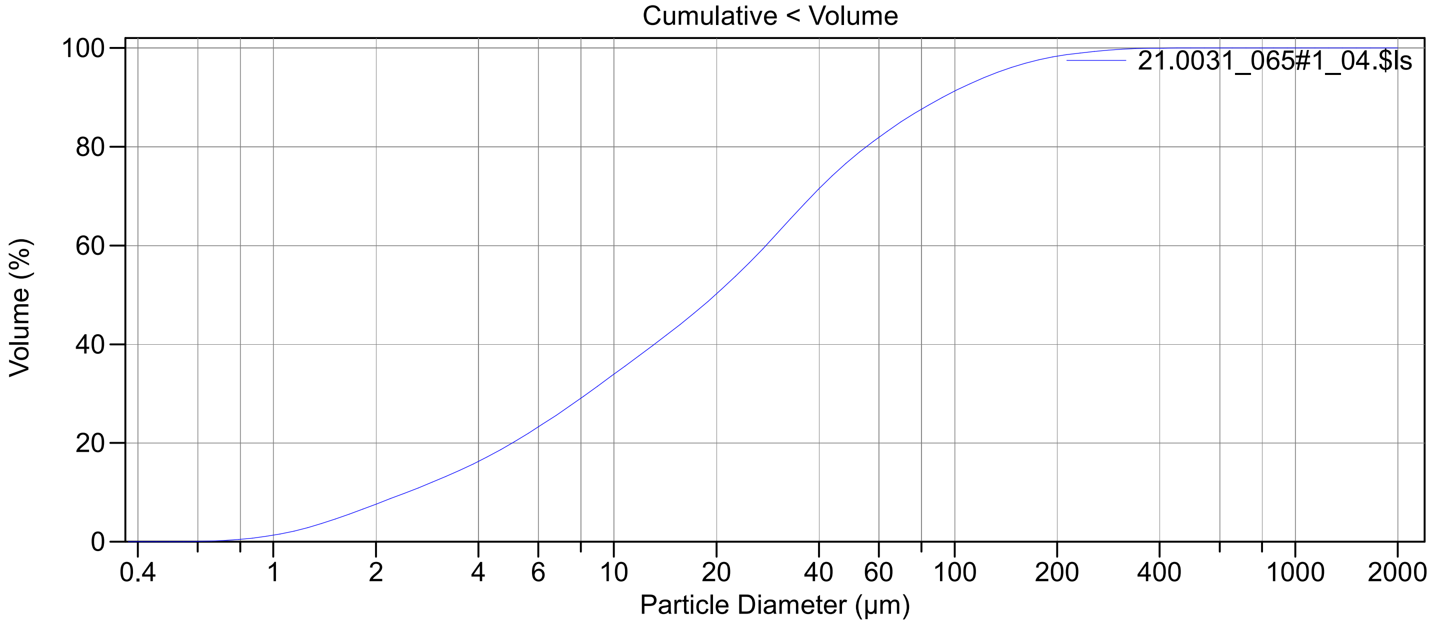
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	37.17 µm	S.D.:	52.01 µm
Median:	17.59 µm	Variance:	2705 $µm^2$
D(3,2):	6.734 µm	C.V.:	140%
Mean/Median ratio:	2.114	Skewness:	2.736 Right skewed
Mode:	31.50 µm	Kurtosis:	9.150 Leptokurtic
Specific Surf. Area:	8910 cm^2/mL		

d_{10}: 2.350 µm d_{50}: 17.59 µm d_{90}: 99.55 µm

<10%	<25%	<50%	<75%	<90%
2.350 µm	6.019 µm	17.59 µm	43.50 µm	99.55 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_065#1_04.$ls 21.0031_065#1_04.$ls		
File ID:	21.0031_065#1		
Sample ID:	21.0031_188488_R2363MC019A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,130 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 13:32	Run length:	60 seconds
Pump speed:	45		
Obscuration:	8%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_065#1_04.$ls

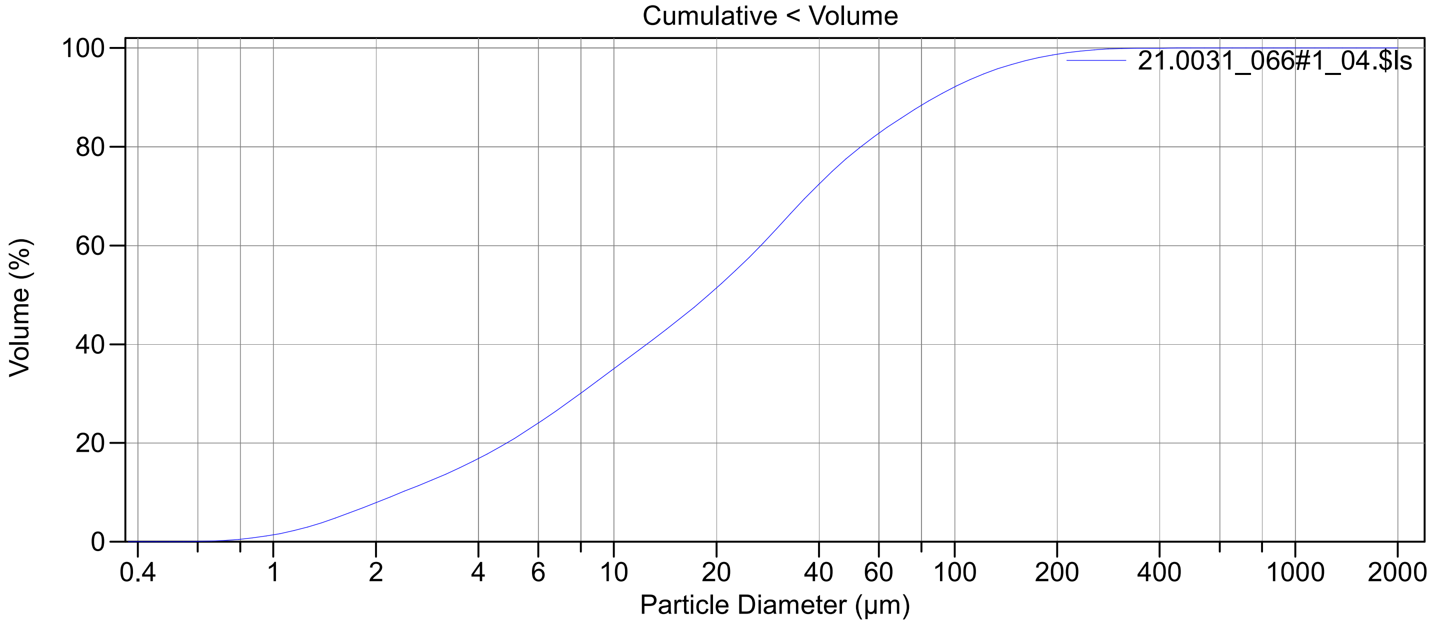
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	36.20 µm	S.D.:	46.82 µm
Median:	19.85 µm	Variance:	2193 µm^2
D(3,2):	7.047 µm	C.V.:	129%
Mean/Median ratio:	1.824	Skewness:	2.660 Right skewed
Mode:	31.50 µm	Kurtosis:	9.096 Leptokurtic
Specific Surf. Area:	8514 cm^2/mL		

d_{10}: 2.464 µm d_{50}: 19.85 µm d_{90}: 92.00 µm

<10%	<25%	<50%	<75%	<90%
2.464 µm	6.562 µm	19.85 µm	45.17 µm	92.00 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_066#1_04.$ls 21.0031_066#1_04.$ls
File ID:	21.0031_066#1
Sample ID:	21.0031_188490_R2363MC019A 2-3 cm
Operator:	MSH
Run number:	4
Comment 1:	0,141 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.23%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-25 13:55 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_066#1_04.$ls

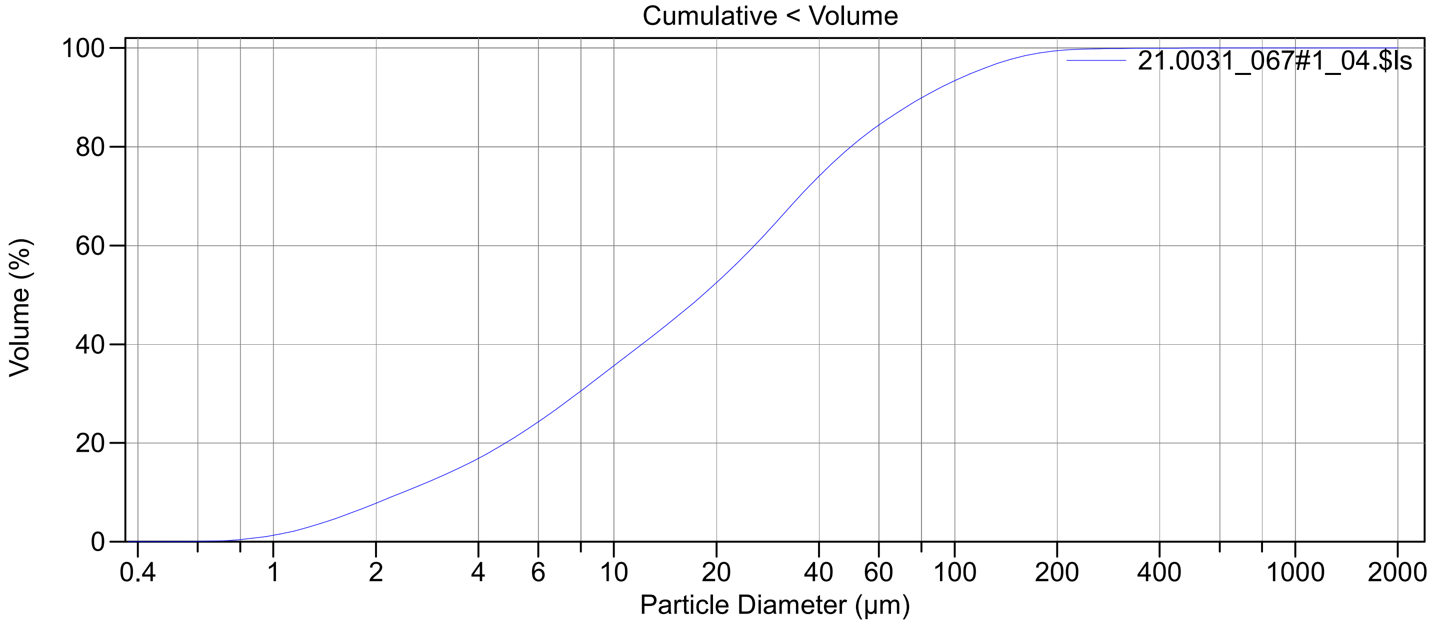
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	34.35 µm	S.D.:	43.43 µm
Median:	18.95 µm	Variance:	1886 $µm^2$
D(3,2):	6.844 µm	C.V.:	126%
Mean/Median ratio:	1.813	Skewness:	2.533 Right skewed
Mode:	31.50 µm	Kurtosis:	8.273 Leptokurtic
Specific Surf. Area:	8767 cm^2/mL		

d_{10}: 2.382 µm d_{50}: 18.95 µm d_{90}: 87.69 µm

<10%	<25%	<50%	<75%	<90%
2.382 µm	6.291 µm	18.95 µm	43.63 µm	87.69 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_067#1_04.$ls 21.0031_067#1_04.$ls		
File ID:	21.0031_067#1		
Sample ID:	21.0031_188492_R2363MC019A 4-5 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,143 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 14:11	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_067#1_04.$ls

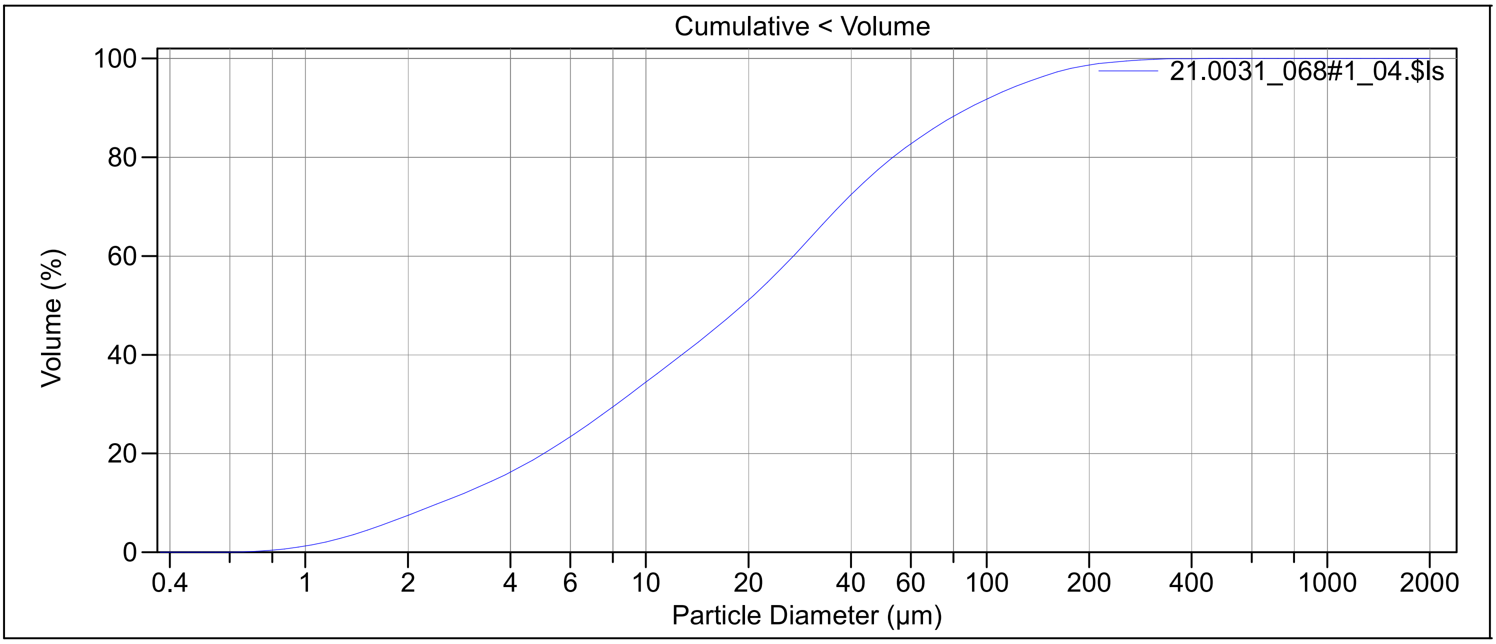
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	31.73 µm	S.D.:	38.47 µm
Median:	18.24 µm	Variance:	1480 μm^2
D(3,2):	6.831 µm	C.V.:	121%
Mean/Median ratio:	1.739	Skewness:	2.477 Right skewed
Mode:	31.50 µm	Kurtosis:	8.826 Leptokurtic
Specific Surf. Area:	8783 cm^2/mL		

d_{10}: 2.402 µm d_{50}: 18.24 µm d_{90}: 80.56 µm

<10%	<25%	<50%	<75%	<90%
2.402 µm	6.205 µm	18.24 µm	41.30 µm	80.56 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_068#1_04.$ls 21.0031_068#1_04.$ls		
File ID:	21.0031_068#1		
Sample ID:	21.0031_188497_R2363MC019A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,143 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 14:27	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_068#1_04.$ls

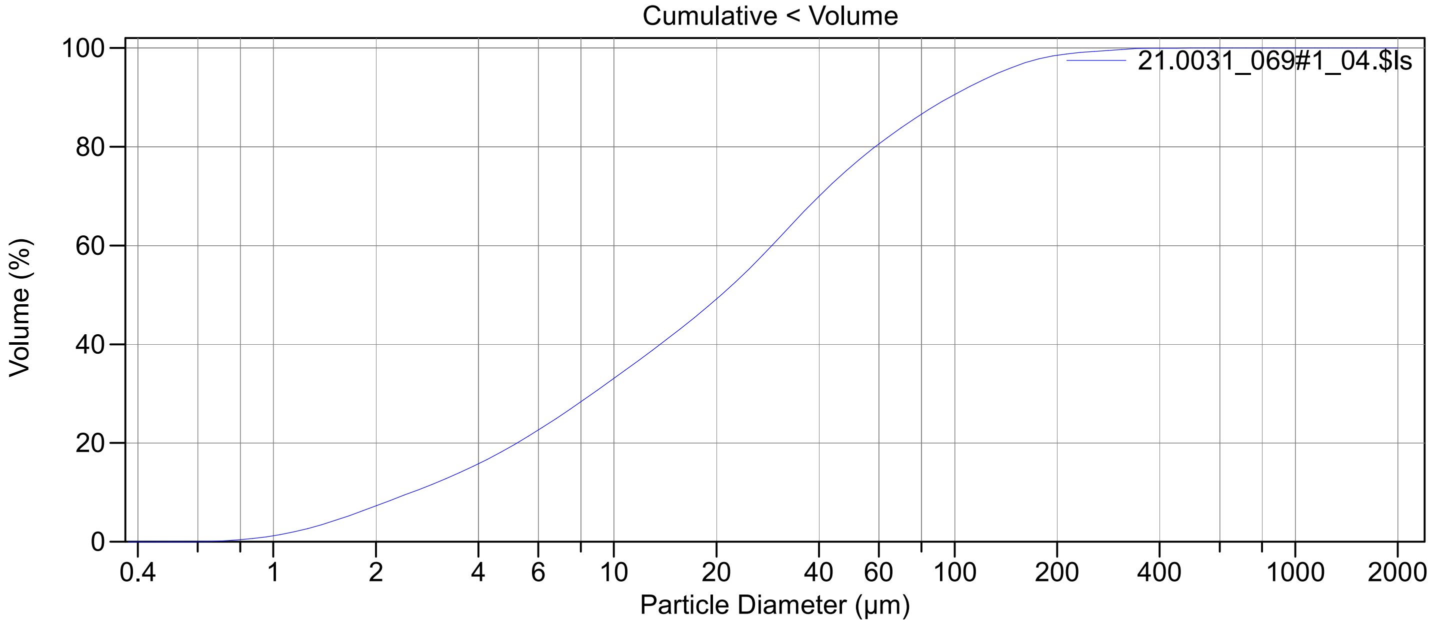
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	34.90 µm	S.D.:	44.64 µm
Median:	19.20 µm	Variance:	1993 µm^2
D(3,2):	7.061 µm	C.V.:	128%
Mean/Median ratio:	1.818	Skewness:	2.622 Right skewed
Mode:	31.50 µm	Kurtosis:	8.958 Leptokurtic
Specific Surf. Area:	8497 cm^2/mL		

d_{10}: 2.486 µm d_{50}: 19.20 µm d_{90}: 88.88 µm

<10%	<25%	<50%	<75%	<90%
2.486 µm	6.495 µm	19.20 µm	43.70 µm	88.88 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_069#1_04.$ls		
	21.0031_069#1_04.$ls		
File ID:	21.0031_069#1		
Sample ID:	21.0031_188502_R2363MC019A 14-15 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,144 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-25 14:38	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_069#1_04.$ls

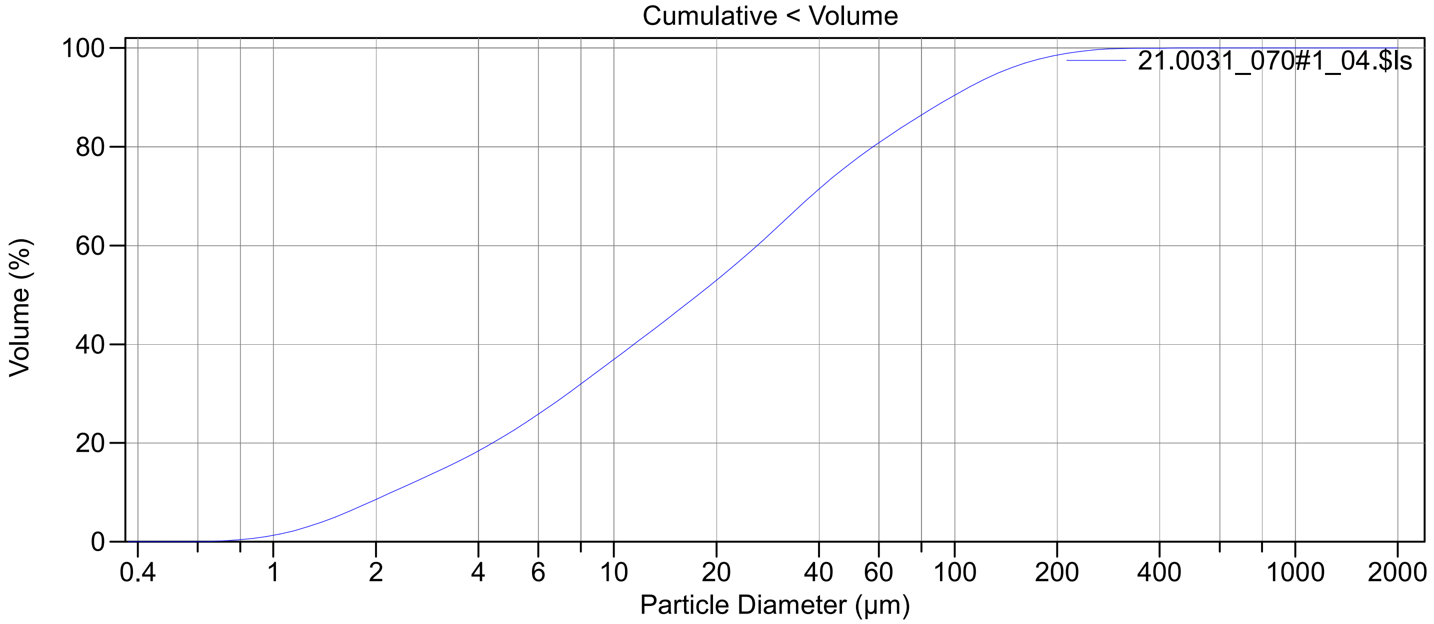
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	37.43 μm	S.D.:	47.42 μm
Median:	20.64 μm	Variance:	2249 $μm^2$
D(3,2):	7.293 μm	C.V.:	127%
Mean/Median ratio:	1.813	Skewness:	2.608 Right skewed
Mode:	31.50 μm	Kurtosis:	9.213 Leptokurtic
Specific Surf. Area:	8227 cm^2/mL		

d_{10}: 2.548 μm d_{50}: 20.64 μm d_{90}: 96.58 μm

<10%	<25%	<50%	<75%	<90%
2.548 μm	6.784 μm	20.64 μm	47.75 μm	96.58 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_070#1_04.$ls 21.0031_070#1_04.$ls
File ID:	21.0031_070#1
Sample ID:	21.0031_188512_R2363MC019A 24-25 cm
Operator:	MSH
Run number:	4
Comment 1:	0,146 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.25%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-26 10:21 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_070#1_04.$ls

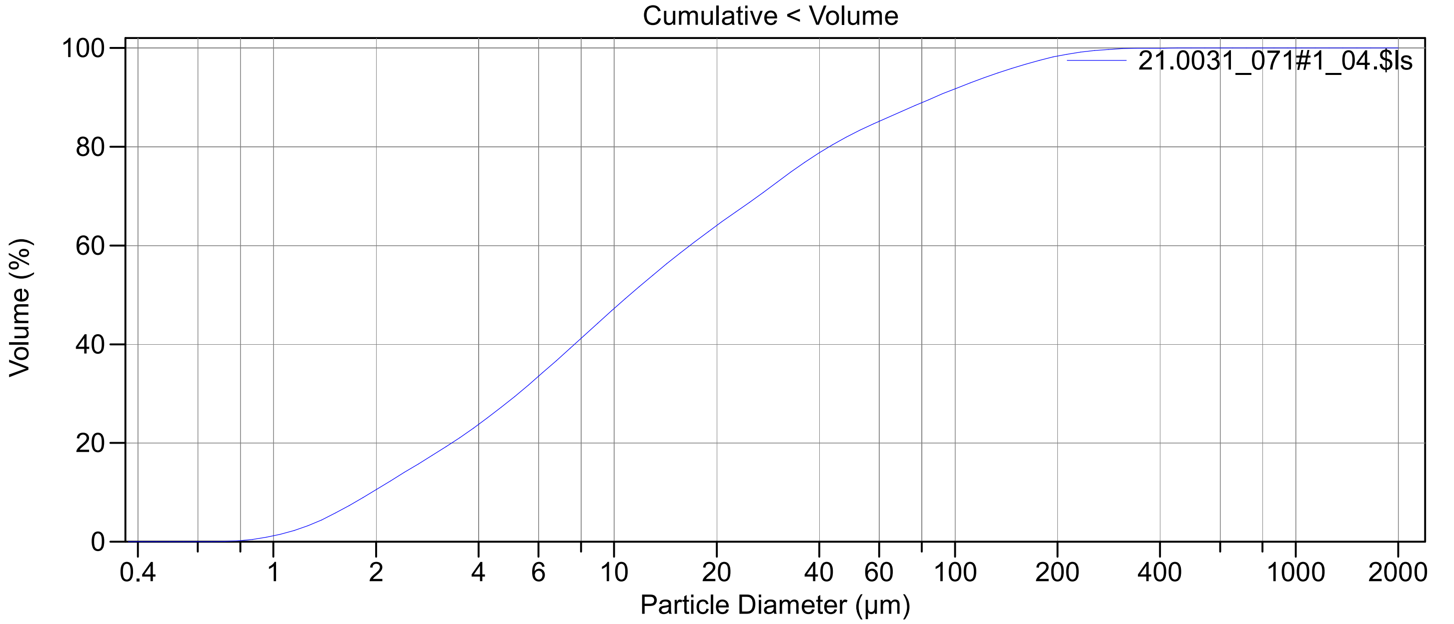
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	35.87 µm	S.D.:	46.32 µm
Median:	17.66 µm	Variance:	2146 $µm^2$
D(3,2):	6.567 µm	C.V.:	129%
Mean/Median ratio:	2.031	Skewness:	2.316 Right skewed
Mode:	31.50 µm	Kurtosis:	6.431 Leptokurtic
Specific Surf. Area:	9137 cm^2/mL		

d_{10}: 2.225 µm d_{50}: 17.66 µm d_{90}: 97.65 µm

<10%	<25%	<50%	<75%	<90%
2.225 µm	5.753 µm	17.66 µm	46.15 µm	97.65 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_071#1_04.$ls 21.0031_071#1_04.$ls		
File ID:	21.0031_071#1		
Sample ID:	21.0031_188525_R2363MC019A 37-38 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,147 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.26%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 10:34	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_071#1_04.$ls

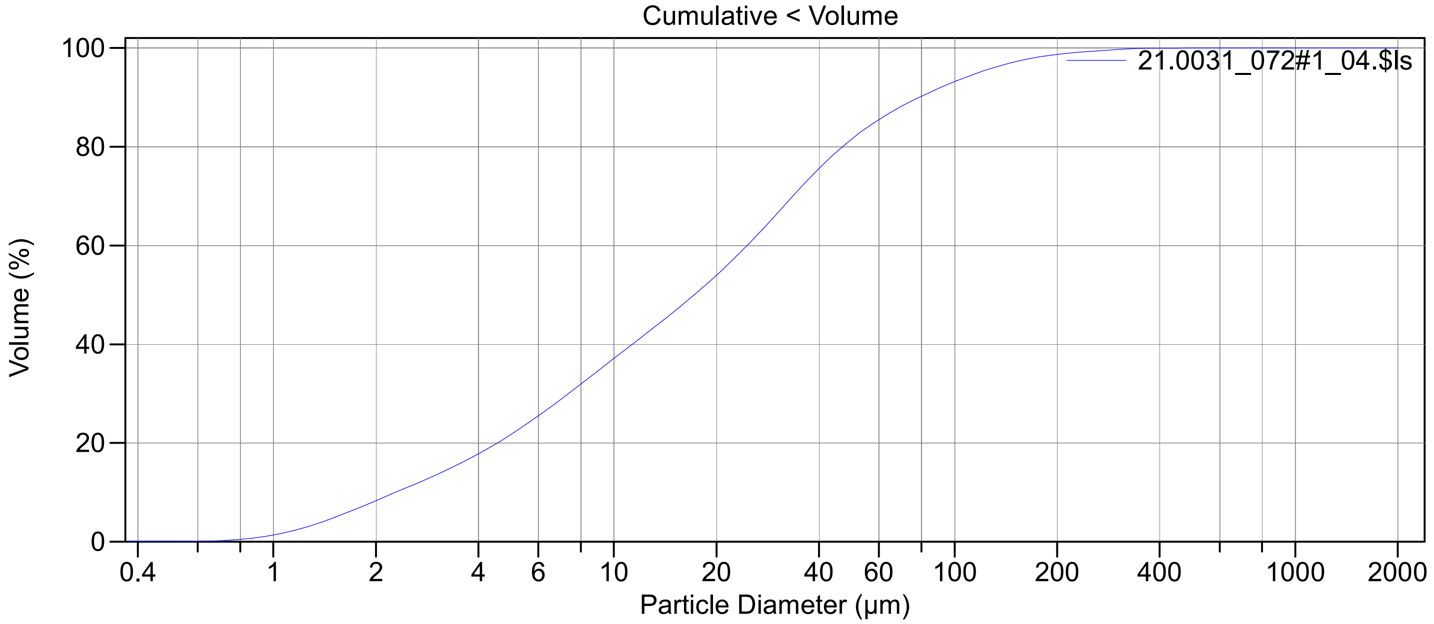
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	30.17 µm	S.D.:	46.48 µm
Median:	11.10 µm	Variance:	2161 µm^2
D(3,2):	5.469 µm	C.V.:	154%
Mean/Median ratio:	2.718	Skewness:	2.789 Right skewed
Mode:	8.536 µm	Kurtosis:	8.999 Leptokurtic
Specific Surf. Area:	10971 cm^2/mL		

d_{10}: 1.944 µm d_{50}: 11.10 µm d_{90}: 86.90 µm

<10%	<25%	<50%	<75%	<90%
1.944 µm	4.232 µm	11.10 µm	33.23 µm	86.90 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_072#1_04.$ls 21.0031_072#1_04.$ls		
File ID:	21.0031_072#1		
Sample ID:	21.0031_188531_R2365GR141 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,147 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 10:57	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_072#1_04.$ls

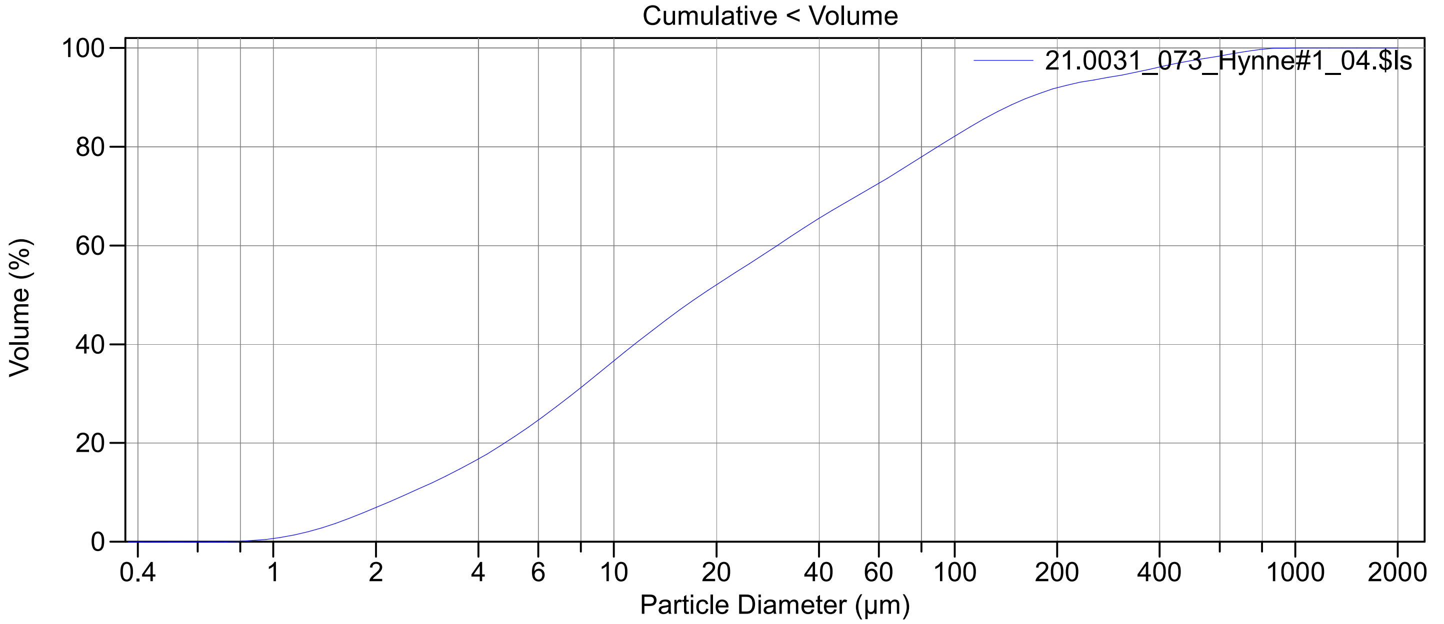
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	31.96 μm	S.D.:	43.42 μm
Median:	17.19 μm	Variance:	1885 μm^2
D(3,2):	6.557 μm	C.V.:	136%
Mean/Median ratio:	1.859	Skewness:	3.145 Right skewed
Mode:	31.50 μm	Kurtosis:	13.57 Leptokurtic
Specific Surf. Area:	9151 cm^2/mL		

d_{10}: 2.286 μm d_{50}: 17.19 μm d_{90}: 78.66 μm

<10%	<25%	<50%	<75%	<90%
2.286 μm	5.861 μm	17.19 μm	39.20 μm	78.66 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_073_Hynne#1_04.$ls
	21.0031_073_Hynne#1_04.$ls
File ID:	21.0031_073_Hynne#1
Sample ID:	21.0031_Hynne_40107
Operator:	MSH
Run number:	4
Comment 1:	0,154 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.24%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-26 11:40 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_073_Hynne#1_04.$ls

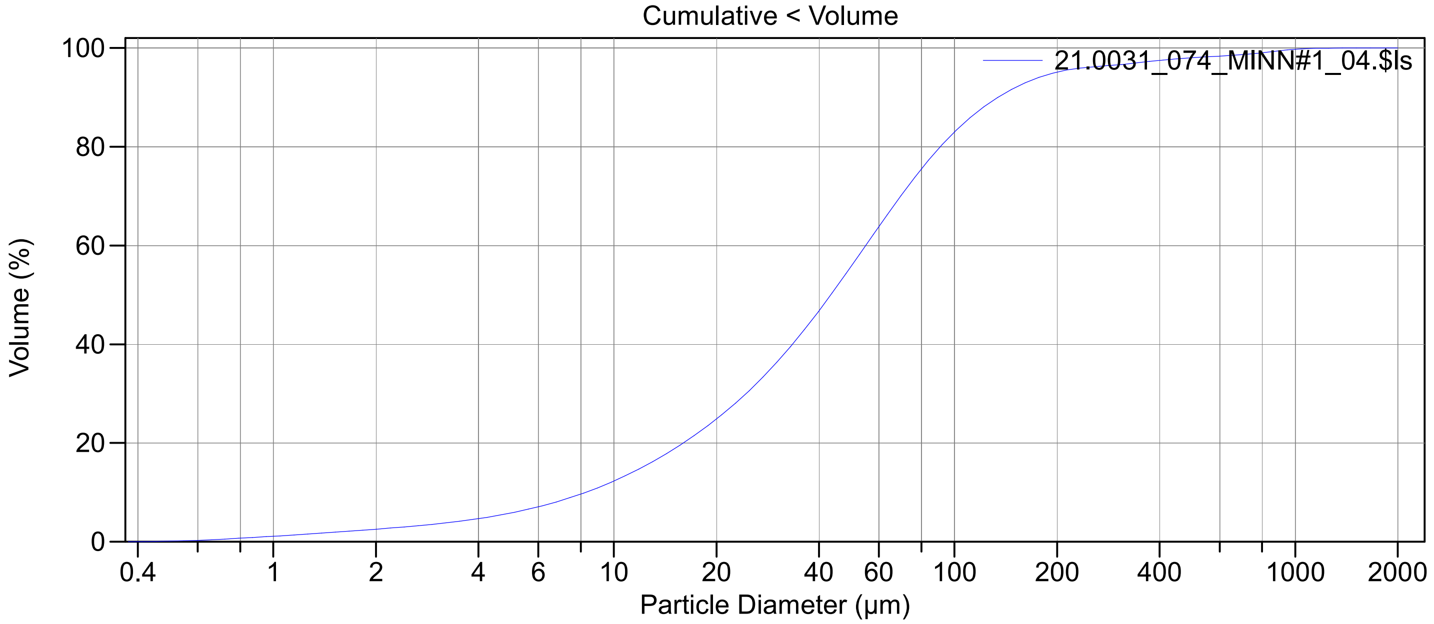
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	66.73 μm	S.D.:	125.0 μm
Median:	18.04 μm	Variance:	15634 μm^2
D(3,2):	7.333 μm	C.V.:	187%
Mean/Median ratio:	3.698	Skewness:	3.431 Right skewed
Mode:	9.370 μm	Kurtosis:	13.09 Leptokurtic
Specific Surf. Area:	8182 cm^2/mL		

d_{10}: 2.534 μm d_{50}: 18.04 μm d_{90}: 165.4 μm

<10%	<25%	<50%	<75%	<90%
2.534 μm	6.096 μm	18.04 μm	68.43 μm	165.4 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_074_MINN#1_04.$ls 21.0031_074_MINN#1_04.$ls
File ID:	21.0031_074_MINN#1
Sample ID:	21.0031_MINN_Split 1
Operator:	MSH
Run number:	4
	Control Sample
Comment 1:	0,334 g + disp.middel, Springvann
Comment 2:	ultralyd, probe 2 (naken), 5 ampl-5 min,Fraunhofer
Optical model:	Fraunhofer.rf780d
Residual:	0.17%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-26 11:53 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_074_MINN#1_04.$ls

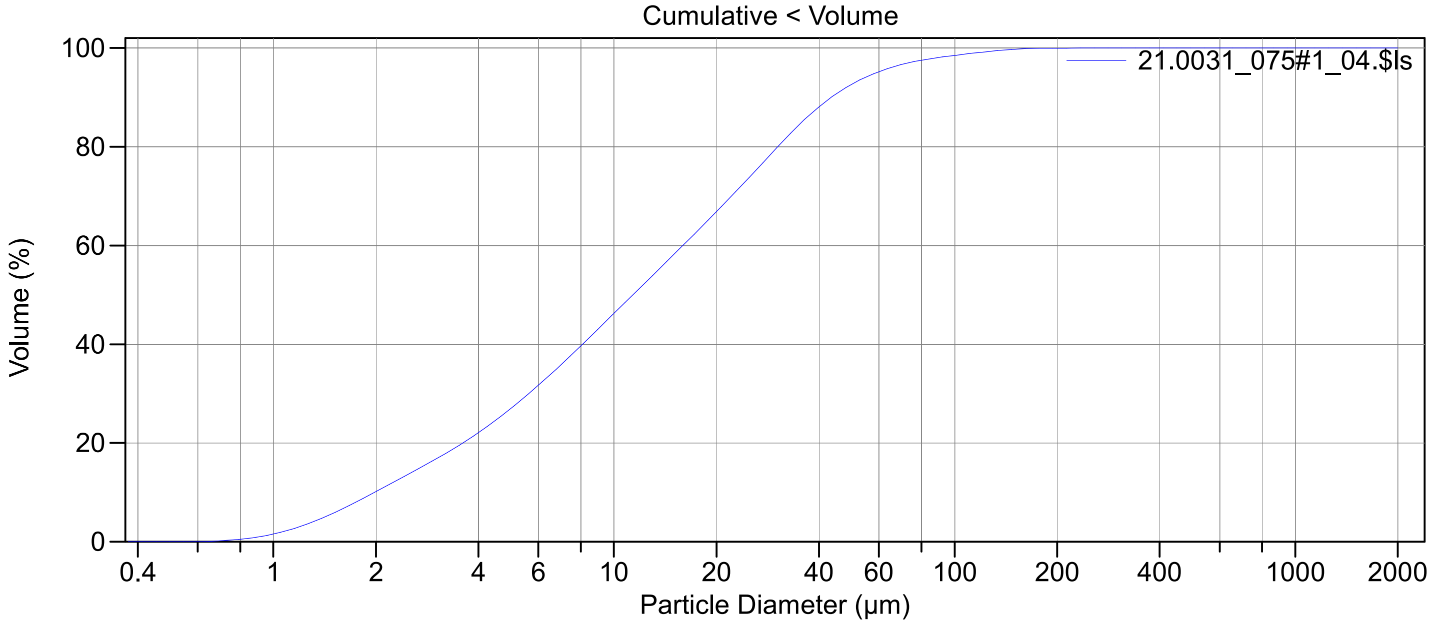
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	72.89 µm	S.D.:	120.6 µm
Median:	43.28 µm	Variance:	14554 µm^2
D(3,2):	14.52 µm	C.V.:	166%
Mean/Median ratio:	1.684	Skewness:	5.129 Right skewed
Mode:	55.14 µm	Kurtosis:	31.33 Leptokurtic
Specific Surf. Area:	4133 cm^2/mL		

d_{10}: 8.251 µm d_{50}: 43.28 µm d_{90}: 133.6 µm

<10%	<25%	<50%	<75%	<90%
8.251 µm	20.11 µm	43.28 µm	79.03 µm	133.6 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_075#1_04.$ls 21.0031_075#1_04.$ls		
File ID:	21.0031_075#1		
Sample ID:	21.0031_188433_R2339MC018A 0-1 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,145 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 12:12	Run length:	60 seconds
Pump speed:	45		
Obscuration:	12%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_075#1_04.$ls

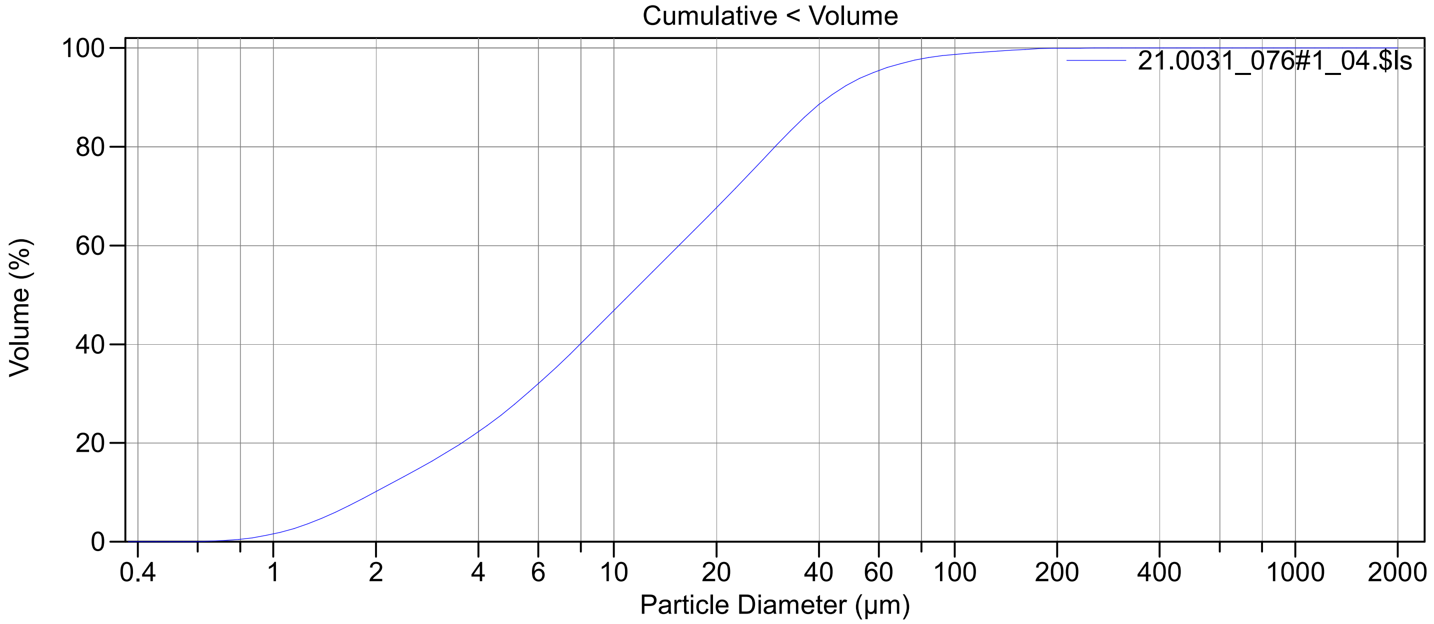
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.92 µm	S.D.:	21.91 µm
Median:	11.37 µm	Variance:	480.2 μm^2
D(3,2):	5.448 µm	C.V.:	116%
Mean/Median ratio:	1.664	Skewness:	2.699 Right skewed
Mode:	28.70 µm	Kurtosis:	10.34 Leptokurtic
Specific Surf. Area:	11014 cm^2/mL		

d_{10}: 1.980 µm d_{50}: 11.37 µm d_{90}: 43.34 µm

<10%	<25%	<50%	<75%	<90%
1.980 µm	4.578 µm	11.37 µm	25.92 µm	43.34 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_076#1_04.$ls
	21.0031_076#1_04.$ls
File ID:	21.0031_076#1
Sample ID:	21.0031_188434_R2339MC018A 1-2 cm
Operator:	MSH
Run number:	4
Comment 1:	0,122 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-26 12:26 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_076#1_04.$ls

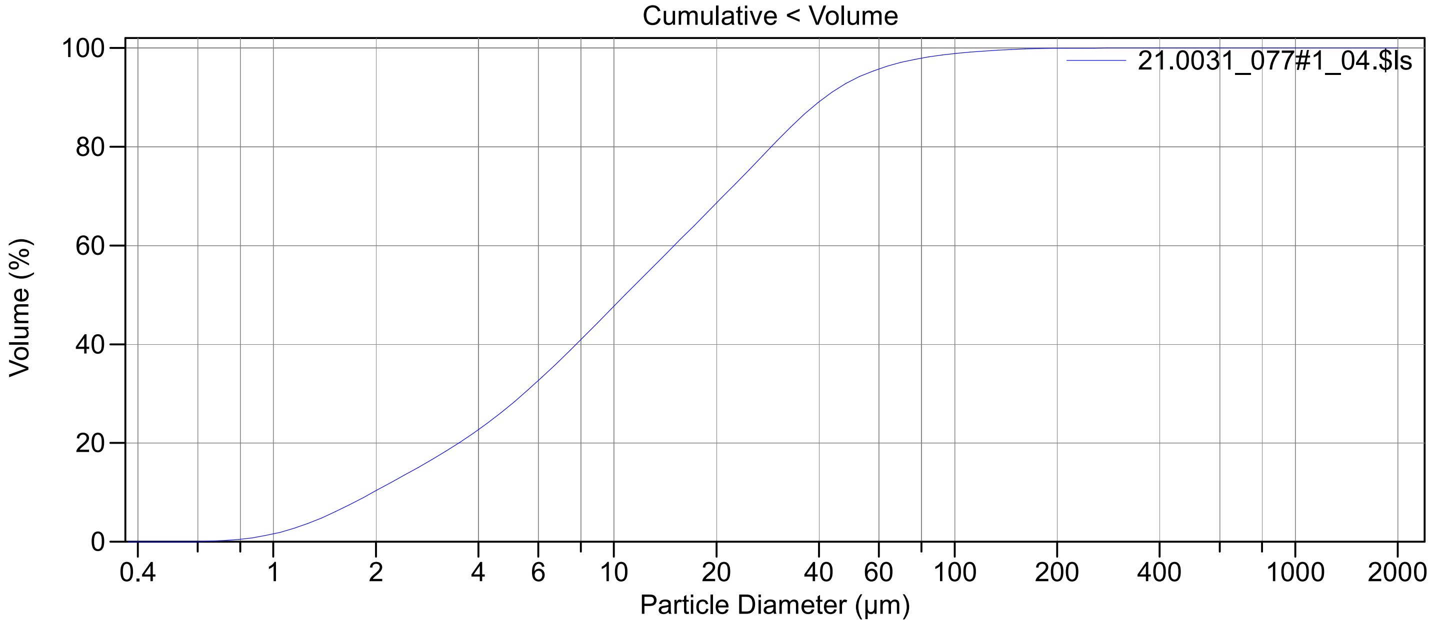
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	18.61 μm	S.D.:	22.01 μm
Median:	11.12 μm	Variance:	484.4 μm^2
D(3,2):	5.415 μm	C.V.:	118%
Mean/Median ratio:	1.674	Skewness:	3.027 Right skewed
Mode:	28.70 μm	Kurtosis:	13.86 Leptokurtic
Specific Surf. Area:	11080 cm^2/mL		

d_{10}: 1.986 μm d_{50}: 11.12 μm d_{90}: 42.57 μm

<10%	<25%	<50%	<75%	<90%
1.986 μm	4.533 μm	11.12 μm	25.39 μm	42.57 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_077#1_04.$ls 21.0031_077#1_04.$ls		
File ID:	21.0031_077#1		
Sample ID:	21.0031_188435_R2339MC018A 2-3 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,122 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 12:39	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_077#1_04.$ls

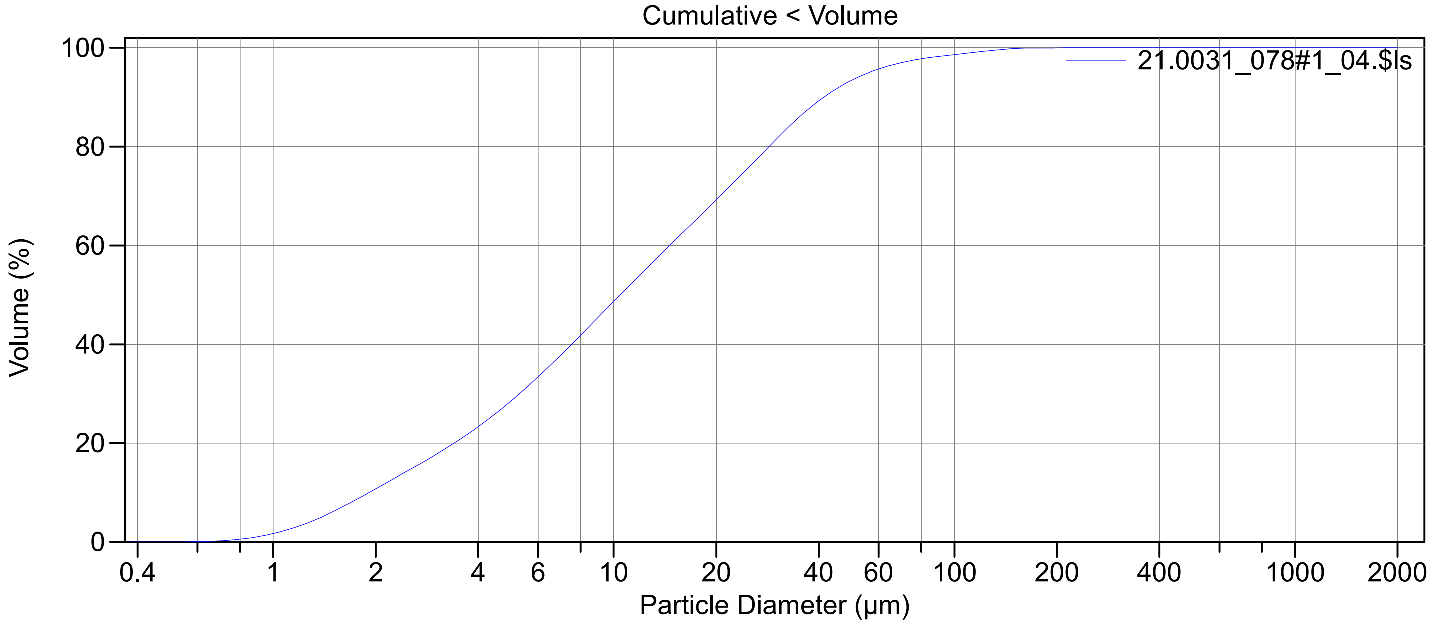
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.03 µm	S.D.:	21.03 µm
Median:	10.78 µm	Variance:	442.3 μm^2
D(3,2):	5.333 µm	C.V.:	117%
Mean/Median ratio:	1.673	Skewness:	2.946 Right skewed
Mode:	28.70 µm	Kurtosis:	13.56 Leptokurtic
Specific Surf. Area:	11251 cm^2/mL		

d_{10}: 1.962 µm d_{50}: 10.78 µm d_{90}: 41.59 µm

<10%	<25%	<50%	<75%	<90%
1.962 µm	4.440 µm	10.78 µm	24.66 µm	41.59 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_078#1_04.$ls 21.0031_078#1_04.$ls		
File ID:	21.0031_078#1		
Sample ID:	21.0031_188436_R2339MC018A 3-4 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,120 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 12:57	Run length:	60 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_078#1_04.$ls

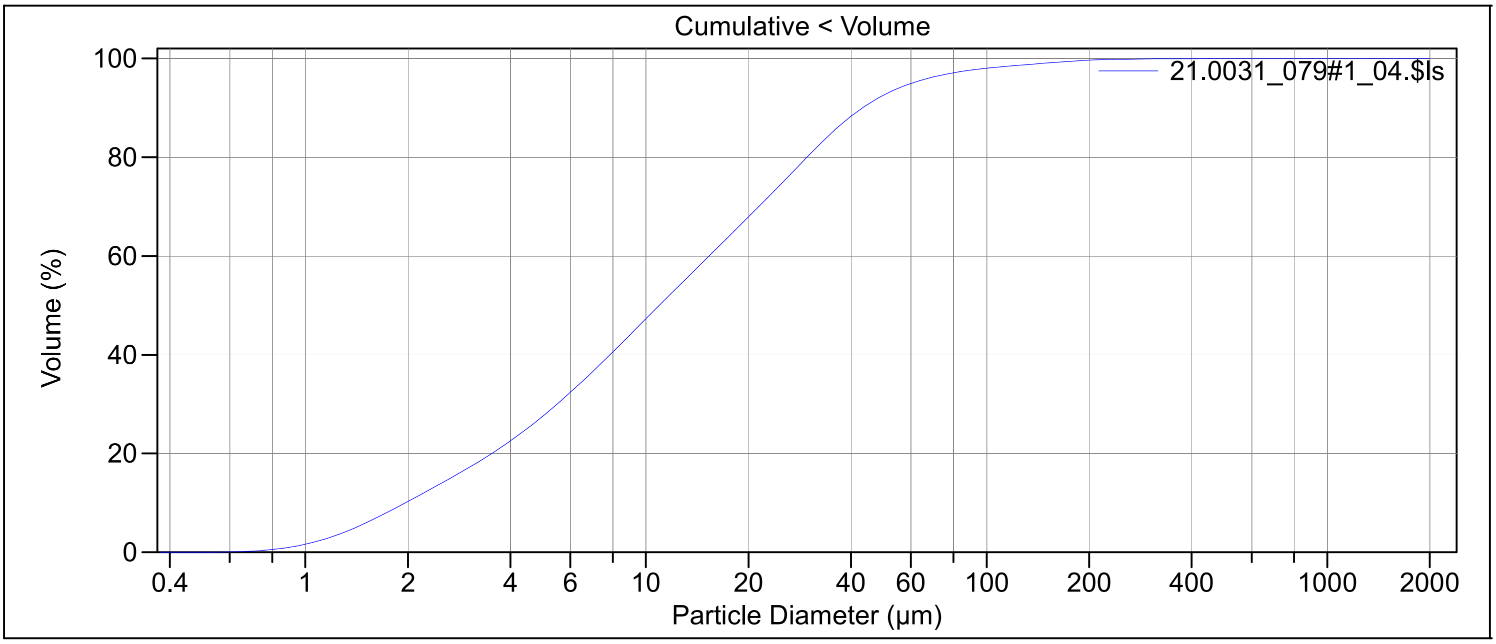
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	17.84 µm	S.D.:	20.99 µm
Median:	10.46 µm	Variance:	440.5 µm^2
D(3,2):	5.215 µm	C.V.:	118%
Mean/Median ratio:	1.706	Skewness:	2.751 Right skewed
Mode:	8.536 µm	Kurtosis:	10.62 Leptokurtic
Specific Surf. Area:	11506 cm^2/mL		

d_{10}: 1.915 µm d_{50}: 10.46 µm d_{90}: 41.35 µm

<10%	<25%	<50%	<75%	<90%
1.915 µm	4.316 µm	10.46 µm	24.24 µm	41.35 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_079#1_04.$ls 21.0031_079#1_04.$ls		
File ID:	21.0031_079#1		
Sample ID:	21.0031_188437_R2339MC018A 4-5 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,110 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 13:12	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_079#1_04.$ls

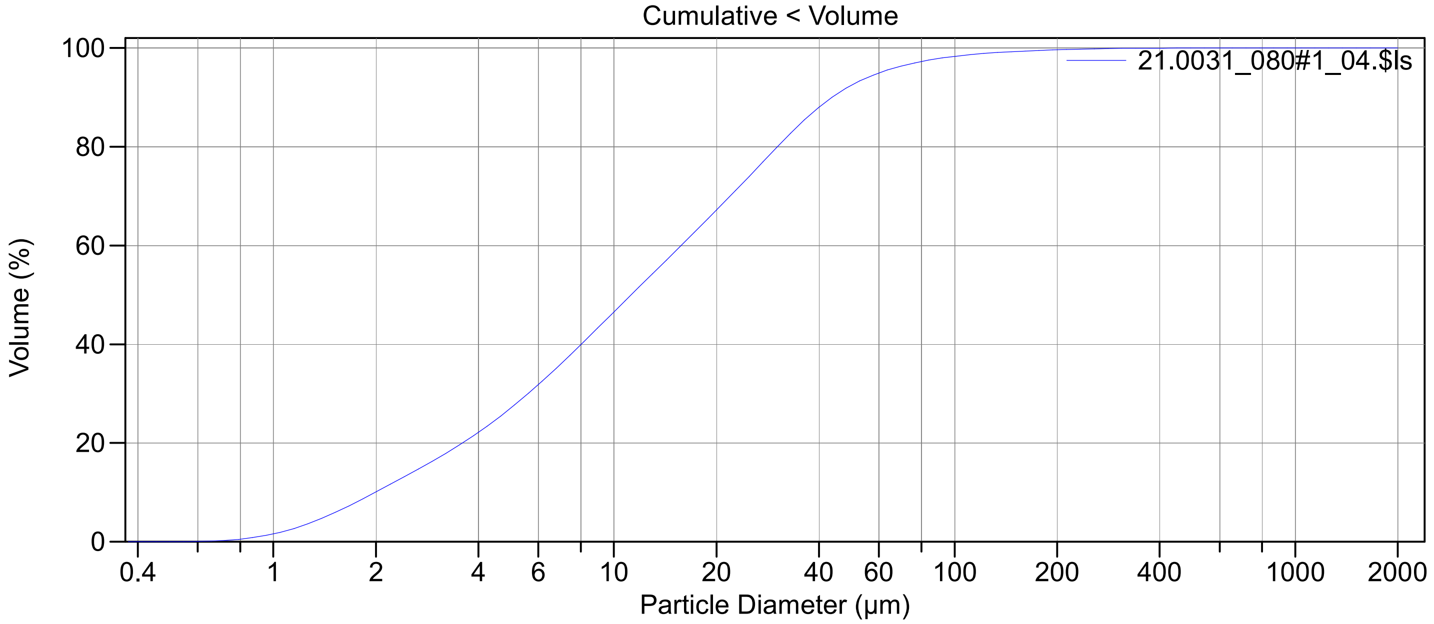
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.54 µm	S.D.:	26.93 µm
Median:	10.95 µm	Variance:	725.5 µm^2
D(3,2):	5.360 µm	C.V.:	138%
Mean/Median ratio:	1.785	Skewness:	4.432 Right skewed
Mode:	28.70 µm	Kurtosis:	30.66 Leptokurtic
Specific Surf. Area:	11194 cm^2/mL		

d_{10}: 1.966 µm d_{50}: 10.95 µm d_{90}: 43.14 µm

<10%	<25%	<50%	<75%	<90%
1.966 µm	4.473 µm	10.95 µm	25.25 µm	43.14 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_080#1_04.$ls
	21.0031_080#1_04.$ls
File ID:	21.0031_080#1
Sample ID:	21.0031_188438_R2339MC018A 5-6 cm
Operator:	MSH
Run number:	4
Comment 1:	0,114 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-26 13:29 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_080#1_04.$ls

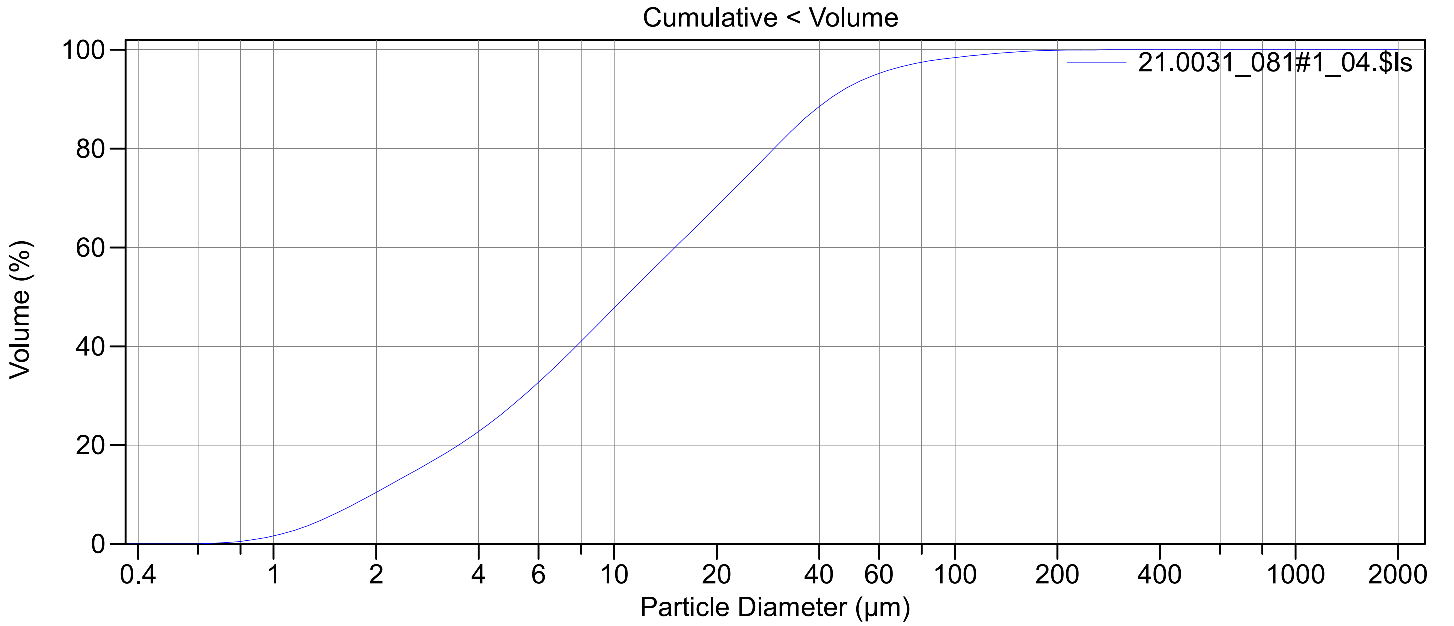
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.60 µm	S.D.:	26.44 µm
Median:	11.24 µm	Variance:	699.0 μm^2
D(3,2):	5.439 µm	C.V.:	135%
Mean/Median ratio:	1.744	Skewness:	4.633 Right skewed
Mode:	28.70 µm	Kurtosis:	35.14 Leptokurtic
Specific Surf. Area:	11032 cm^2/mL		

d_{10}: 1.991 µm d_{50}: 11.24 µm d_{90}: 43.55 µm

<10%	<25%	<50%	<75%	<90%
1.991 µm	4.560 µm	11.24 µm	25.77 µm	43.55 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_081#1_04.$ls 21.0031_081#1_04.$ls
File ID:	21.0031_081#1
Sample ID:	21.0031_188439_R2339MC018A 6-7 cm
Operator:	MSH
Run number:	4
Comment 1:	0,114 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-03-26 13:48 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic)   21.0031_081#1_04.$ls

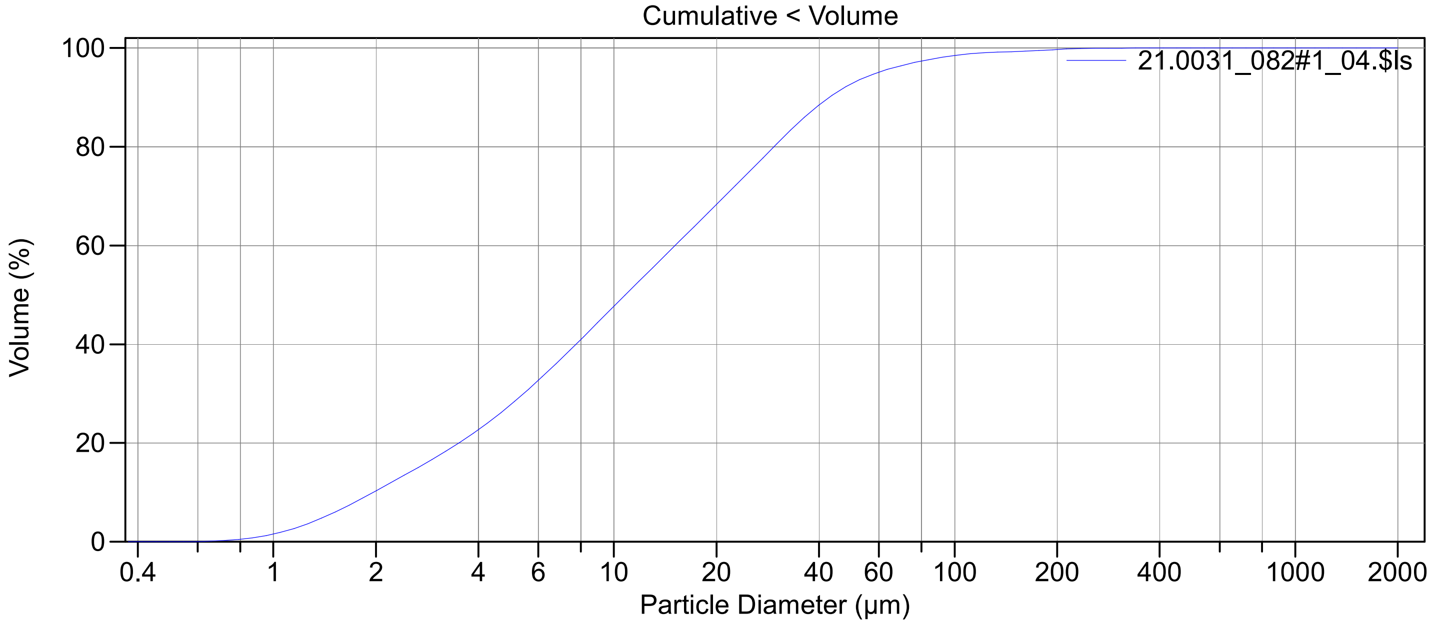
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.62 µm	S.D.:	22.77 µm
Median:	10.77 µm	Variance:	518.5 $µm^2$
D(3,2):	5.320 µm	C.V.:	122%
Mean/Median ratio:	1.729	Skewness:	3.125 Right skewed
Mode:	28.70 µm	Kurtosis:	14.38 Leptokurtic
Specific Surf. Area:	11278 cm^2/mL		

d_{10}: 1.952 µm d_{50}: 10.77 µm d_{90}: 42.71 µm

<10%	<25%	<50%	<75%	<90%
1.952 µm	4.423 µm	10.77 µm	24.96 µm	42.71 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_082#1_04.$ls		
	21.0031_082#1_04.$ls		
File ID:	21.0031_082#1		
Sample ID:	21.0031_188440_R2339MC018A 7-8 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 14:09	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_082#1_04.$ls

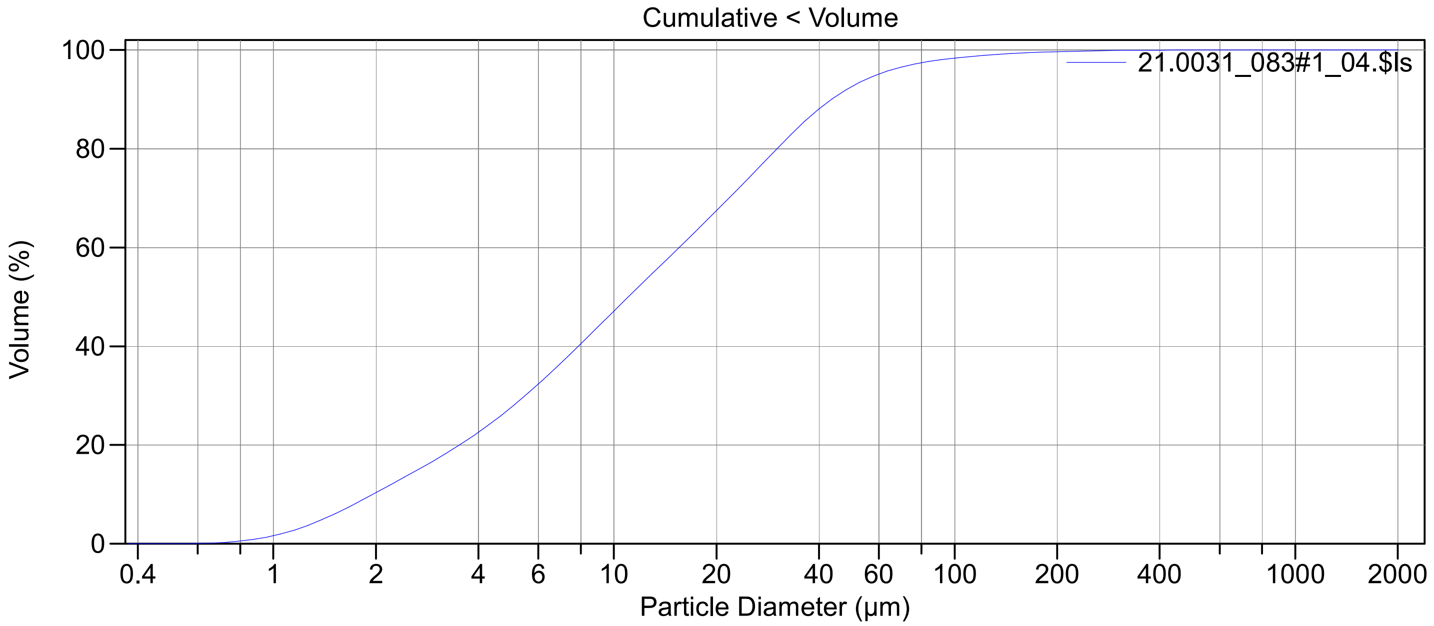
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.94 µm	S.D.:	24.58 µm
Median:	10.79 µm	Variance:	604.0 µm^2
D(3,2):	5.346 µm	C.V.:	130%
Mean/Median ratio:	1.756	Skewness:	3.845 Right skewed
Mode:	28.70 µm	Kurtosis:	22.62 Leptokurtic
Specific Surf. Area:	11224 cm^2/mL		

d_{10}: 1.965 µm d_{50}: 10.79 µm d_{90}: 42.82 µm

<10%	<25%	<50%	<75%	<90%
1.965 µm	4.436 µm	10.79 µm	25.00 µm	42.82 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_083#1_04.$ls 21.0031_083#1_04.$ls		
File ID:	21.0031_083#1		
Sample ID:	21.0031_188441_R2339MC018A 8-9 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 14:25	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_083#1_04.$ls

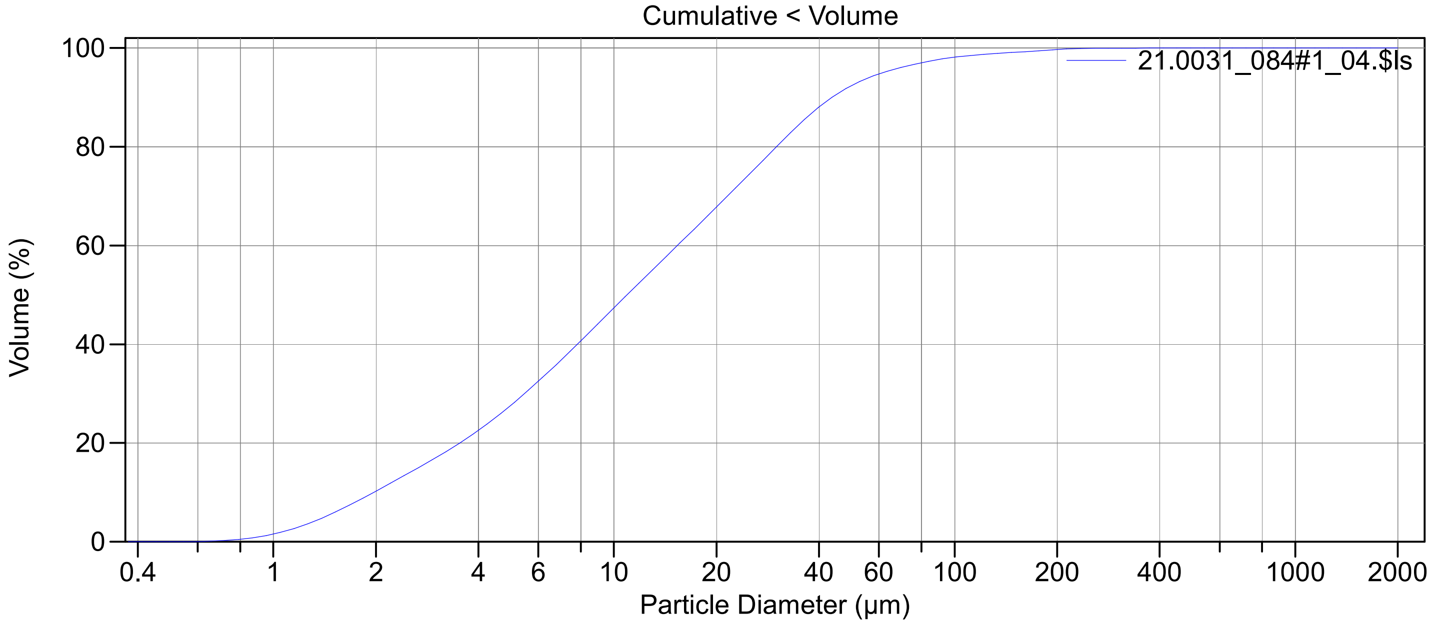
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.33 µm	S.D.:	25.69 µm
Median:	11.03 µm	Variance:	659.8 μm^2
D(3,2):	5.362 µm	C.V.:	133%
Mean/Median ratio:	1.753	Skewness:	4.408 Right skewed
Mode:	28.70 µm	Kurtosis:	31.88 Leptokurtic
Specific Surf. Area:	11189 cm^2/mL		

d_{10}: 1.960 µm d_{50}: 11.03 µm d_{90}: 43.43 µm

<10%	<25%	<50%	<75%	<90%
1.960 µm	4.473 µm	11.03 µm	25.63 µm	43.43 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_084#1_04.$ls 21.0031_084#1_04.$ls		
File ID:	21.0031_084#1		
Sample ID:	21.0031_188442_R2339MC018A 9-10 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-03-26 14:37	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_084#1_04.$ls

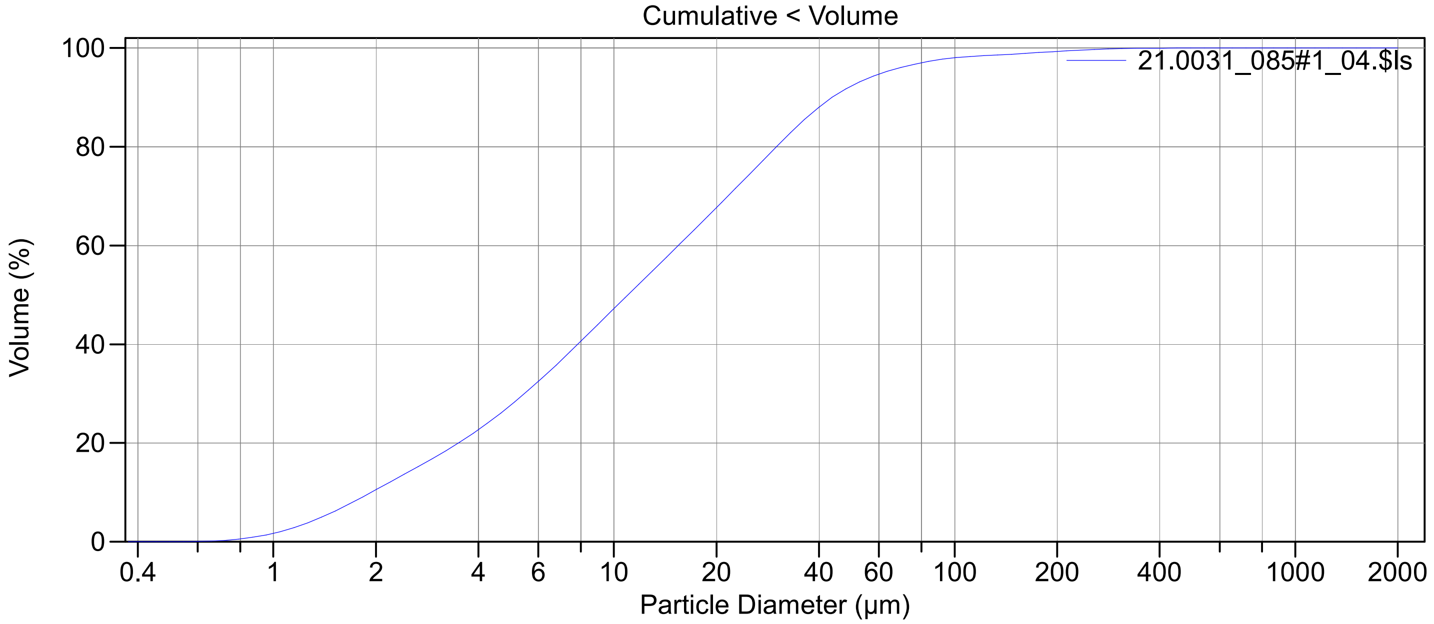
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.49 µm	S.D.:	25.86 µm
Median:	10.92 µm	Variance:	668.5 $µm^2$
D(3,2):	5.375 µm	C.V.:	133%
Mean/Median ratio:	1.785	Skewness:	3.803 Right skewed
Mode:	28.70 µm	Kurtosis:	21.15 Leptokurtic
Specific Surf. Area:	11162 cm^2/mL		

d_{10}: 1.972 µm d_{50}: 10.92 µm d_{90}: 43.52 µm

<10%	<25%	<50%	<75%	<90%
1.972 µm	4.462 µm	10.92 µm	25.45 µm	43.52 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_085#1_04.$ls 21.0031_085#1_04.$ls		
File ID:	21.0031_085#1		
Sample ID:	21.0031_188443_R2339MC018A 10-11 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-06 11:51	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_085#1_04.$ls

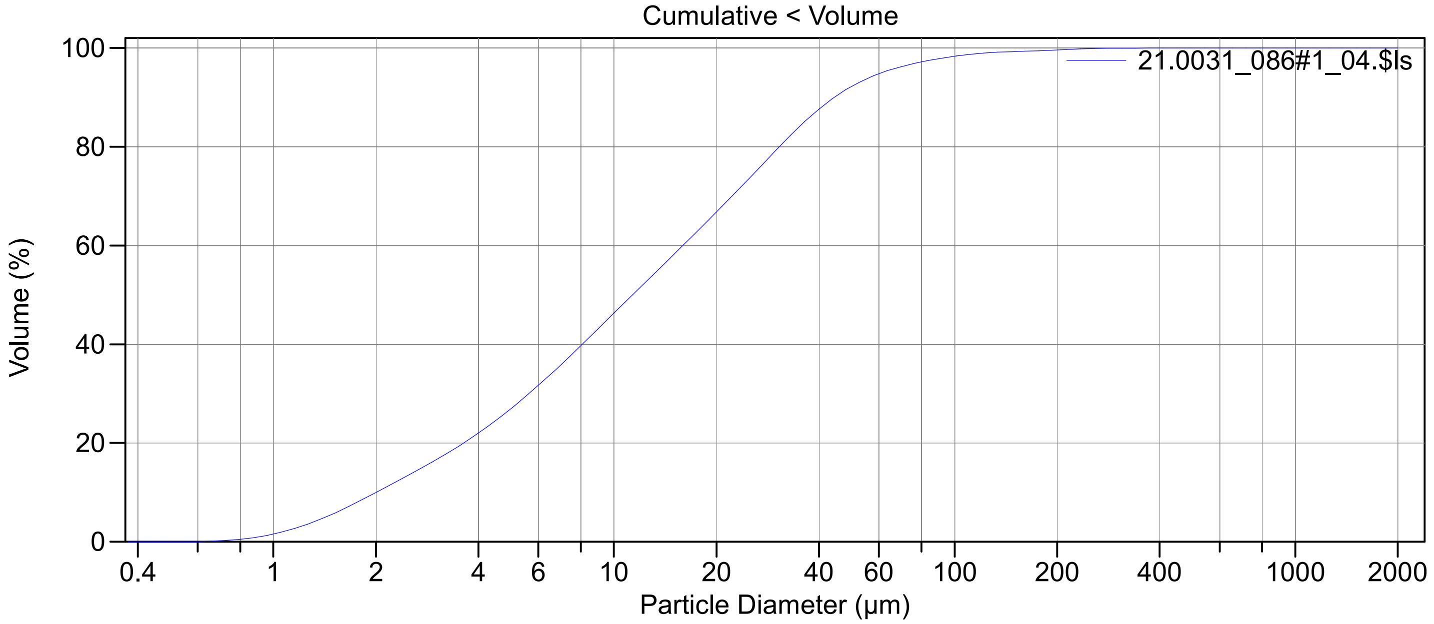
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	20.16 µm	S.D.:	29.94 µm
Median:	10.99 µm	Variance:	896.4 µm^2
D(3,2):	5.321 µm	C.V.:	149%
Mean/Median ratio:	1.835	Skewness:	4.906 Right skewed
Mode:	28.70 µm	Kurtosis:	34.20 Leptokurtic
Specific Surf. Area:	11276 cm^2/mL		

d_{10}: 1.939 µm d_{50}: 10.99 µm d_{90}: 43.62 µm

<10%	<25%	<50%	<75%	<90%
1.939 µm	4.446 µm	10.99 µm	25.48 µm	43.62 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_086#1_04.$ls 21.0031_086#1_04.$ls
File ID:	21.0031_086#1
Sample ID:	21.0031_188444_R2339MC018A 11-12 cm
Operator:	MSH
Run number:	4
Comment 1:	0,114 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-06 12:05 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_086#1_04.$ls

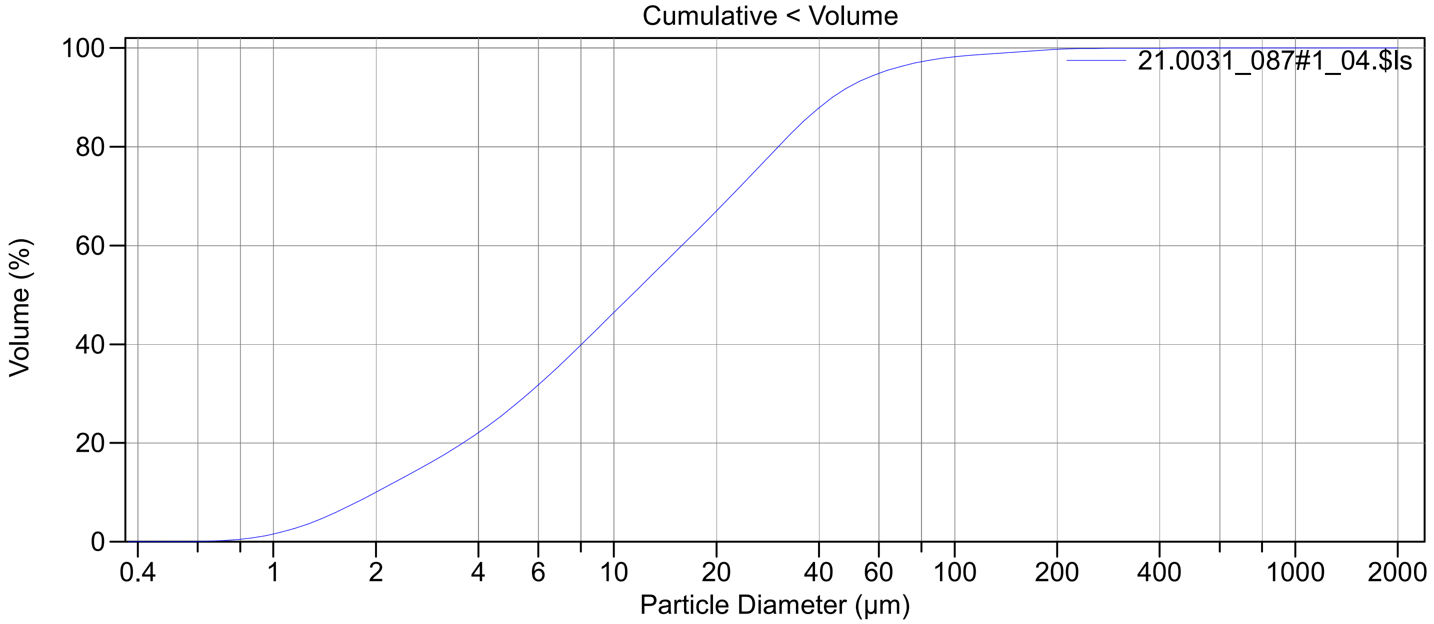
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.71 µm	S.D.:	25.72 µm
Median:	11.34 µm	Variance:	661.3 μm^2
D(3,2):	5.478 µm	C.V.:	130%
Mean/Median ratio:	1.737	Skewness:	4.029 Right skewed
Mode:	28.70 µm	Kurtosis:	25.37 Leptokurtic
Specific Surf. Area:	10954 cm^2/mL		

d_{10}: 2.004 µm d_{50}: 11.34 µm d_{90}: 44.29 µm

<10%	<25%	<50%	<75%	<90%
2.004 µm	4.589 µm	11.34 µm	26.10 µm	44.29 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_087#1_04.$ls		
	21.0031_087#1_04.$ls		
File ID:	21.0031_087#1		
Sample ID:	21.0031_188445_R2339MC018A 12-13 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-06 12:19	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_087#1_04.$ls

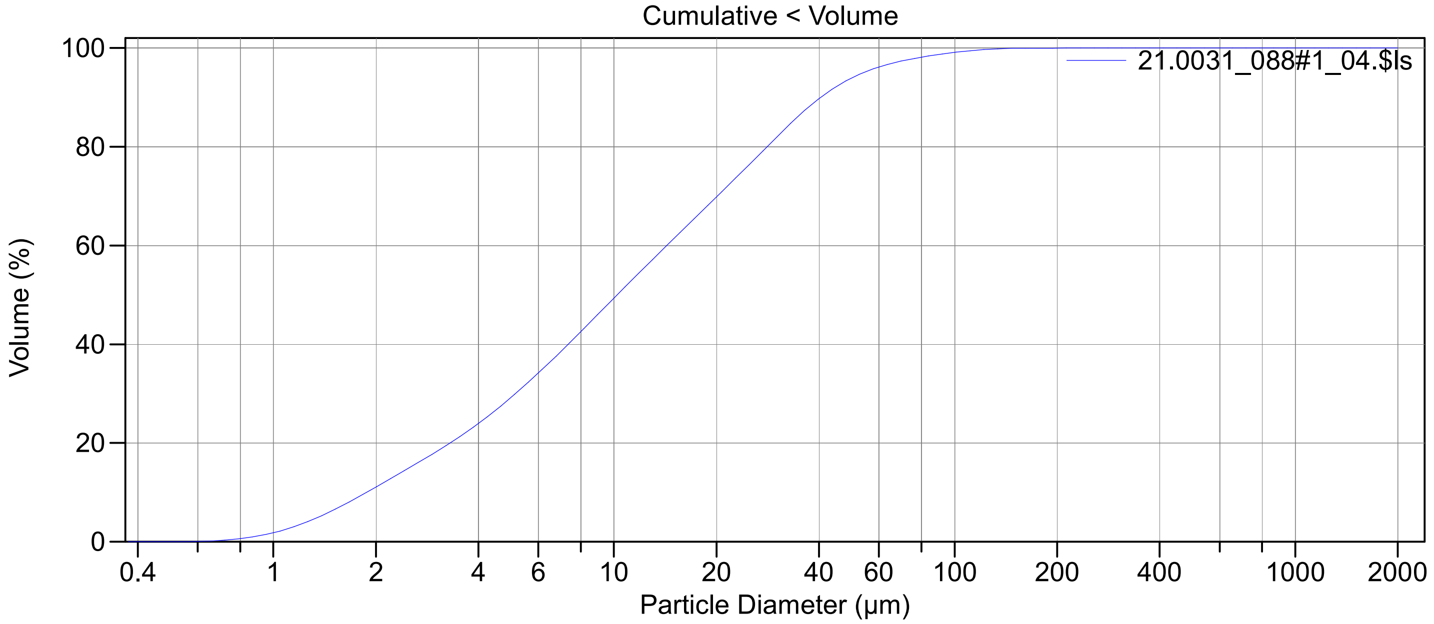
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.65 µm	S.D.:	25.77 µm
Median:	11.29 µm	Variance:	664.3 μm^2
D(3,2):	5.459 µm	C.V.:	131%
Mean/Median ratio:	1.740	Skewness:	3.998 Right skewed
Mode:	28.70 µm	Kurtosis:	25.00 Leptokurtic
Specific Surf. Area:	10990 cm^2/mL		

d_{10}: 1.998 µm d_{50}: 11.29 µm d_{90}: 43.74 µm

<10%	<25%	<50%	<75%	<90%
1.998 µm	4.572 µm	11.29 µm	25.92 µm	43.74 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_088#1_04.$ls 21.0031_088#1_04.$ls		
File ID:	21.0031_088#1		
Sample ID:	21.0031_188446_R2339MC018A 13-14 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-06 13:03	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_088#1_04.$ls

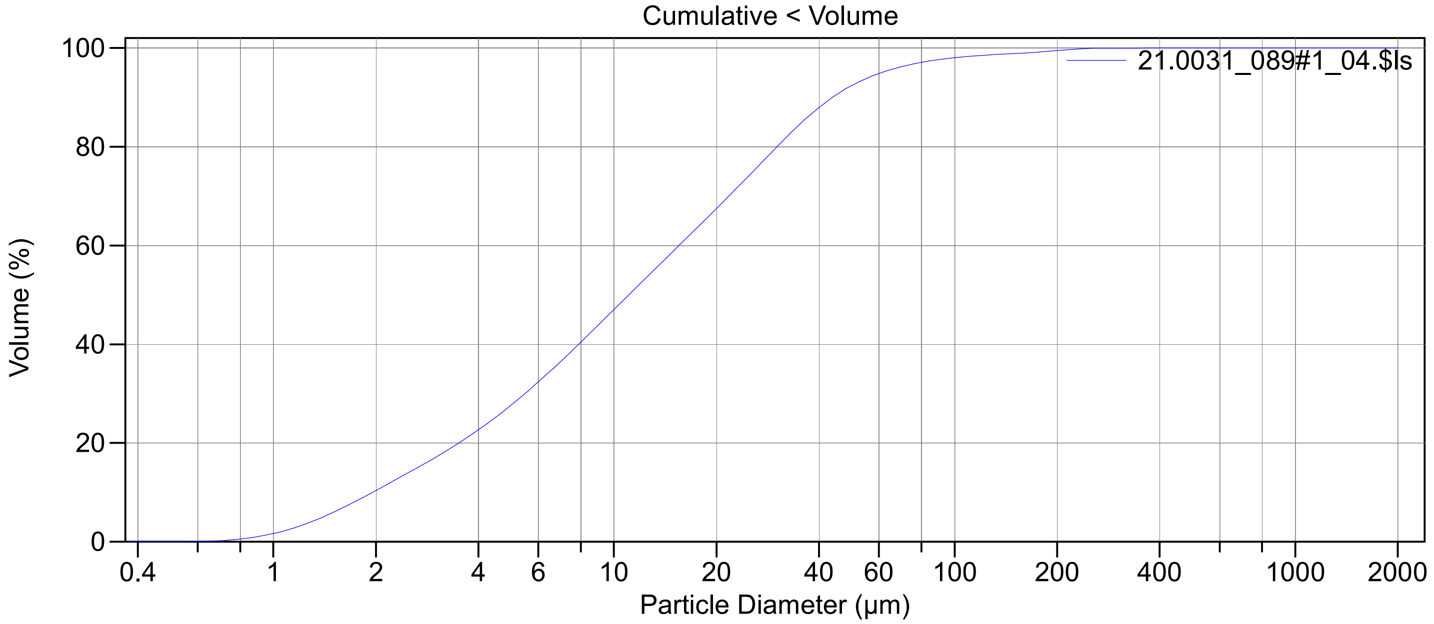
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	17.20 µm	S.D.:	19.39 µm
Median:	10.22 µm	Variance:	376.1 μm^2
D(3,2):	5.097 µm	C.V.:	113%
Mean/Median ratio:	1.682	Skewness:	2.431 Right skewed
Mode:	8.536 µm	Kurtosis:	8.261 Leptokurtic
Specific Surf. Area:	11771 cm^2/mL		

d_{10}: 1.878 µm d_{50}: 10.22 µm d_{90}: 40.41 µm

<10%	<25%	<50%	<75%	<90%
1.878 µm	4.189 µm	10.22 µm	23.83 µm	40.41 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_089#1_04.$ls 21.0031_089#1_04.$ls
File ID:	21.0031_089#1
Sample ID:	21.0031_188447_R2339MC018A 14-15 cm
Operator:	MSH
Run number:	4
Comment 1:	0,114 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.24%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-06 13:19 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_089#1_04.$ls

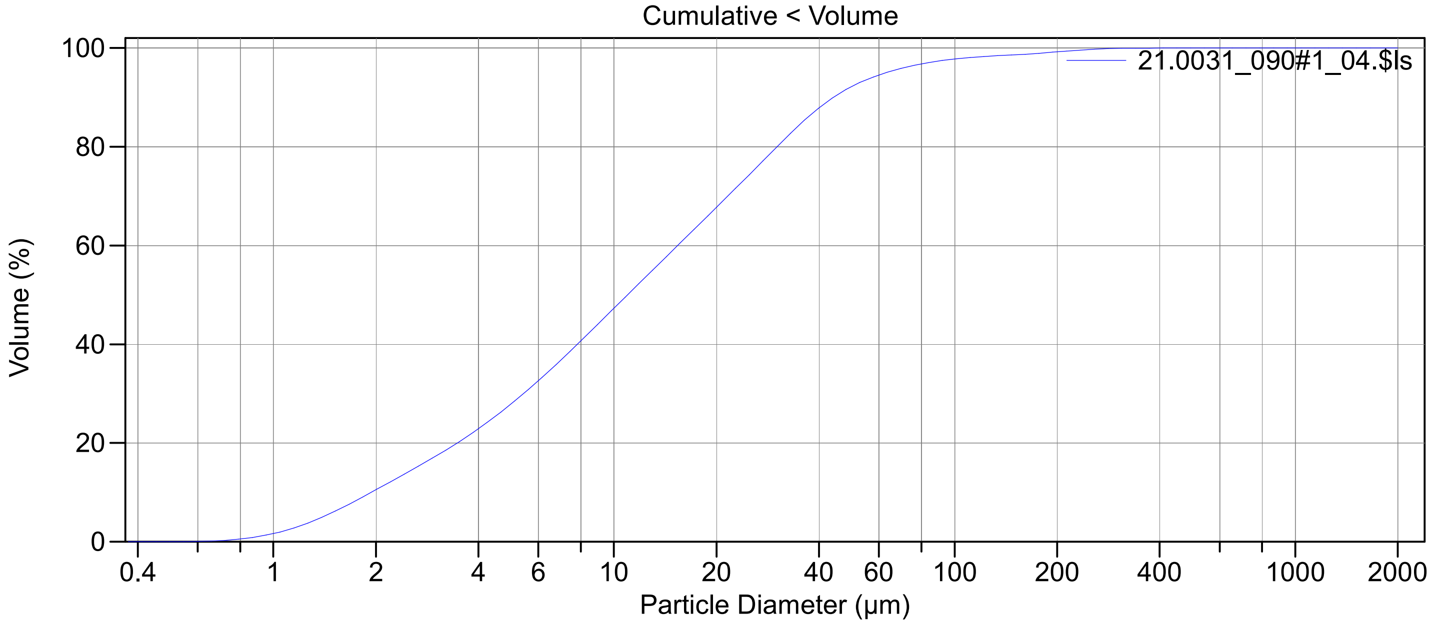
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.84 µm	S.D.:	27.42 µm
Median:	11.06 µm	Variance:	751.7 μm^2
D(3,2):	5.354 µm	C.V.:	138%
Mean/Median ratio:	1.794	Skewness:	4.116 Right skewed
Mode:	28.70 µm	Kurtosis:	23.73 Leptokurtic
Specific Surf. Area:	11206 cm^2/mL		

d_{10}: 1.956 µm d_{50}: 11.06 µm d_{90}: 43.69 µm

<10%	<25%	<50%	<75%	<90%
1.956 µm	4.458 µm	11.06 µm	25.63 µm	43.69 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_090#1_04.$ls 21.0031_090#1_04.$ls
File ID:	21.0031_090#1
Sample ID:	21.0031_188448_R2339MC018A 15-16 cm
Operator:	MSH
Run number:	4
Comment 1:	0,114 g + disp.middel, springvann
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.23%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-06 13:37 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_090#1_04.$ls

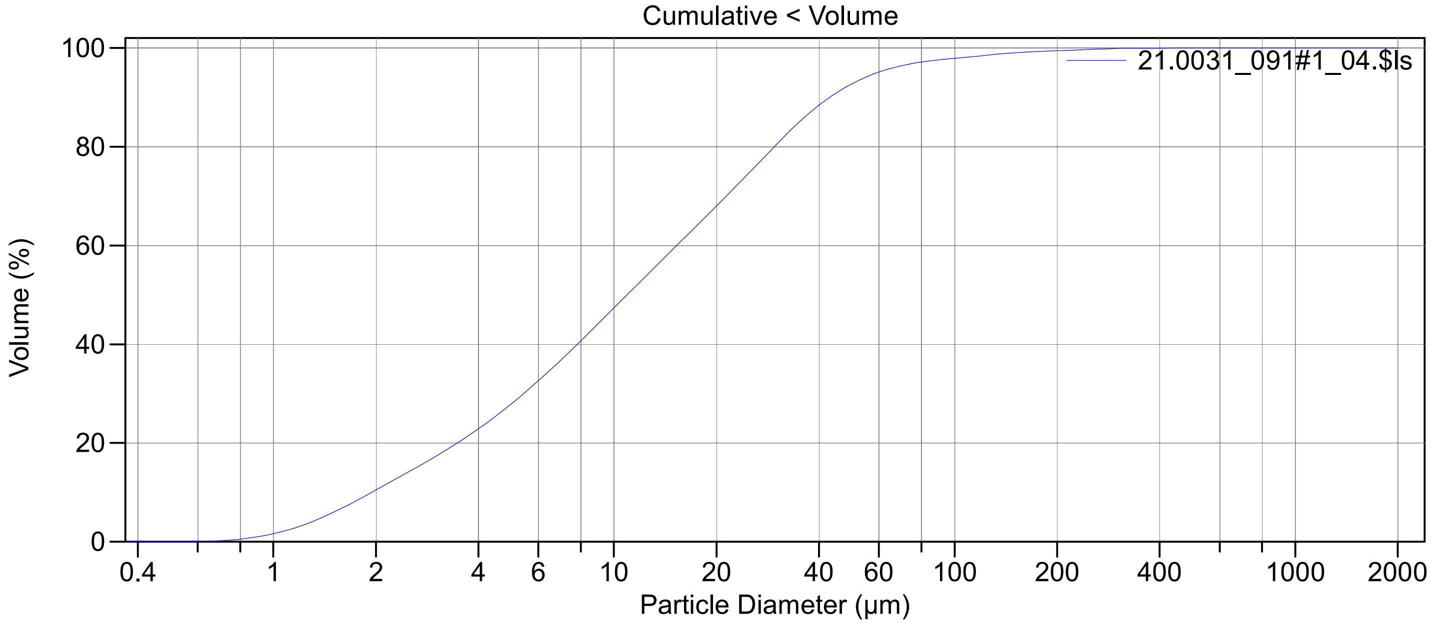
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	20.40 µm	S.D.:	30.42 µm
Median:	10.96 µm	Variance:	925.1 μm^2
D(3,2):	5.321 µm	C.V.:	149%
Mean/Median ratio:	1.861	Skewness:	4.575 Right skewed
Mode:	28.70 µm	Kurtosis:	28.43 Leptokurtic
Specific Surf. Area:	11276 cm^2/mL		

d_{10}: 1.941 µm d_{50}: 10.96 µm d_{90}: 43.98 µm

<10%	<25%	<50%	<75%	<90%
1.941 µm	4.410 µm	10.96 µm	25.53 µm	43.98 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_091#1_04.$ls 21.0031_091#1_04.$ls		
File ID:	21.0031_091#1		
Sample ID:	21.0031_188449_R2339MC018A 16-17 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-06 13:59	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_091#1_04.$ls

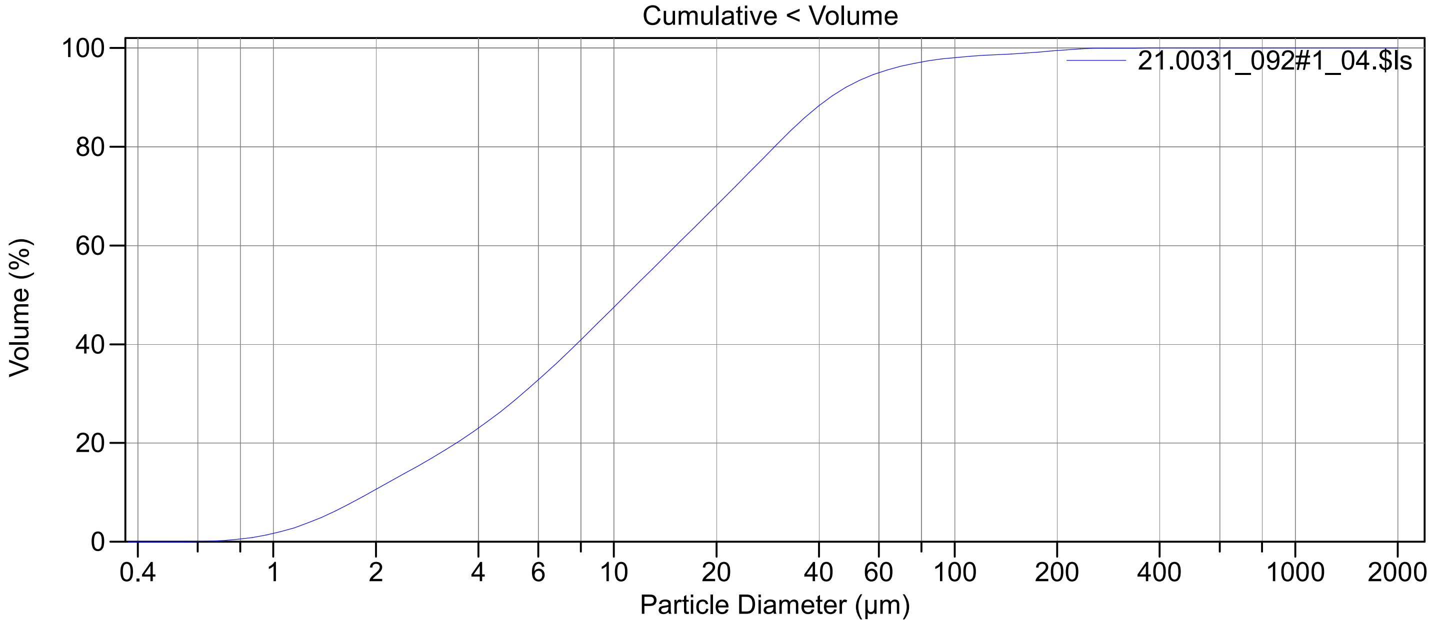
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.68 µm	S.D.:	28.41 µm
Median:	10.93 µm	Variance:	807.0 μm^2
D(3,2):	5.326 µm	C.V.:	144%
Mean/Median ratio:	1.801	Skewness:	4.824 Right skewed
Mode:	26.14 µm	Kurtosis:	34.34 Leptokurtic
Specific Surf. Area:	11266 cm^2/mL		

d_{10}: 1.946 µm d_{50}: 10.93 µm d_{90}: 42.91 µm

<10%	<25%	<50%	<75%	<90%
1.946 µm	4.416 µm	10.93 µm	25.16 µm	42.91 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_092#1_04.$ls 21.0031_092#1_04.$ls		
File ID:	21.0031_092#1		
Sample ID:	21.0031_188450_R2339MC018A 17-18 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-06 14:15	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_092#1_04.$ls

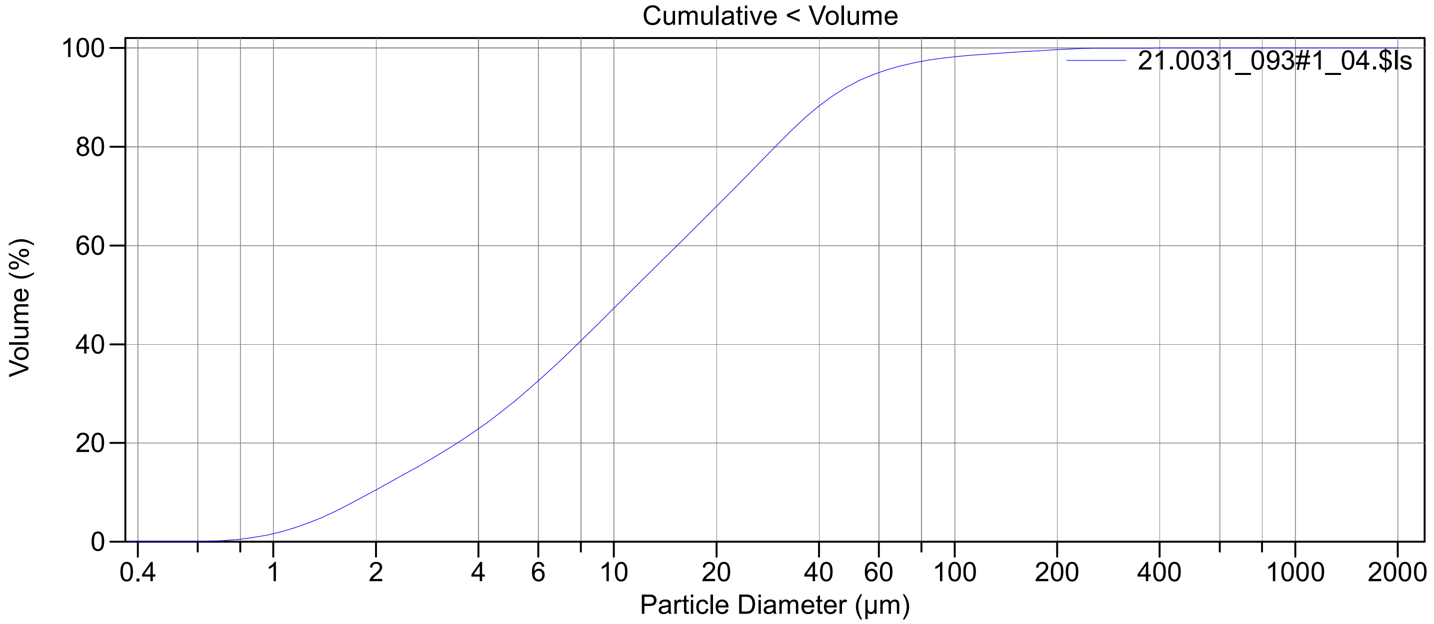
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.58 µm	S.D.:	27.42 µm
Median:	10.86 µm	Variance:	751.9 $µm^2$
D(3,2):	5.291 µm	C.V.:	140%
Mean/Median ratio:	1.802	Skewness:	4.223 Right skewed
Mode:	28.70 µm	Kurtosis:	24.83 Leptokurtic
Specific Surf. Area:	11339 cm^2/mL		

d_{10}: 1.934 µm d_{50}: 10.86 µm d_{90}: 43.04 µm

<10%	<25%	<50%	<75%	<90%
1.934 µm	4.381 µm	10.86 µm	25.12 µm	43.04 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_093#1_04.$ls 21.0031_093#1_04.$ls		
File ID:	21.0031_093#1		
Sample ID:	21.0031_188451_R2339MC018A 18-19 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-06 14:31	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_093#1_04.$ls

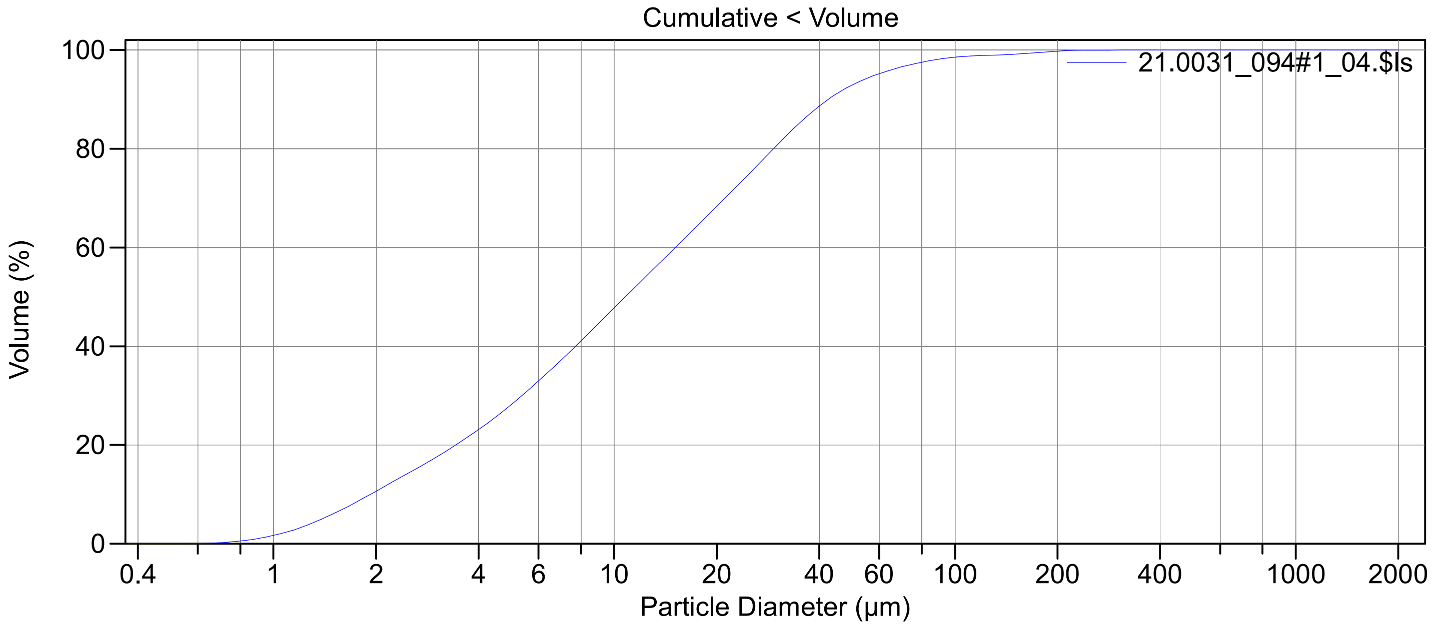
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.30 µm	S.D.:	25.68 µm
Median:	10.94 µm	Variance:	659.3 $µm^2$
D(3,2):	5.323 µm	C.V.:	133%
Mean/Median ratio:	1.763	Skewness:	3.992 Right skewed
Mode:	28.70 µm	Kurtosis:	23.89 Leptokurtic
Specific Surf. Area:	11271 cm^2/mL		

d_{10}: 1.944 µm d_{50}: 10.94 µm d_{90}: 43.19 µm

<10%	<25%	<50%	<75%	<90%
1.944 µm	4.414 µm	10.94 µm	25.28 µm	43.19 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_094#1_04.$ls 21.0031_094#1_04.$ls		
File ID:	21.0031_094#1		
Sample ID:	21.0031_188452_R2339MC018A 19-20 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, springvann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 8:51	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_094#1_04.$ls

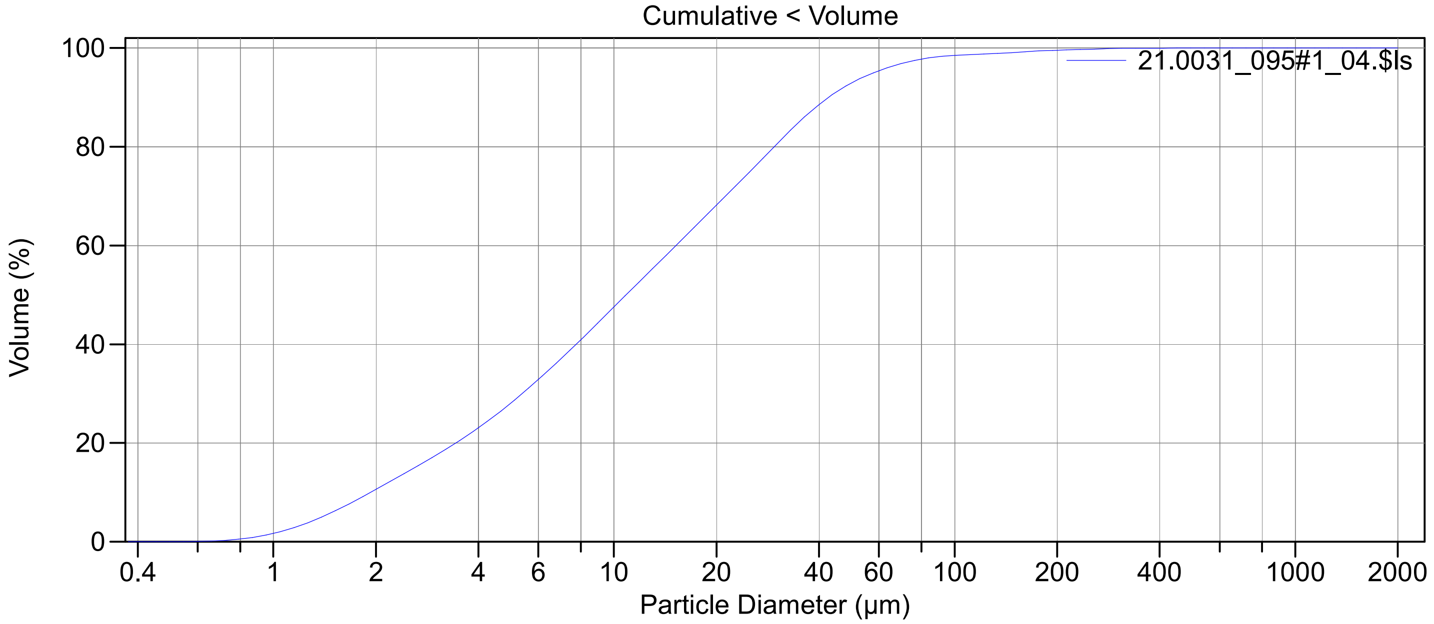
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.86 µm	S.D.:	24.53 µm
Median:	10.78 µm	Variance:	601.8 $µm^2$
D(3,2):	5.272 µm	C.V.:	130%
Mean/Median ratio:	1.749	Skewness:	3.795 Right skewed
Mode:	28.70 µm	Kurtosis:	21.29 Leptokurtic
Specific Surf. Area:	11380 cm^2/mL		

d_{10}: 1.928 µm d_{50}: 10.78 µm d_{90}: 42.49 µm

<10%	<25%	<50%	<75%	<90%
1.928 µm	4.360 µm	10.78 µm	24.93 µm	42.49 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_095#1_04.$ls 21.0031_095#1_04.$ls		
File ID:	21.0031_095#1		
Sample ID:	21.0031_188453_R2339MC018A 20-21 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 9:05	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_095#1_04.$ls

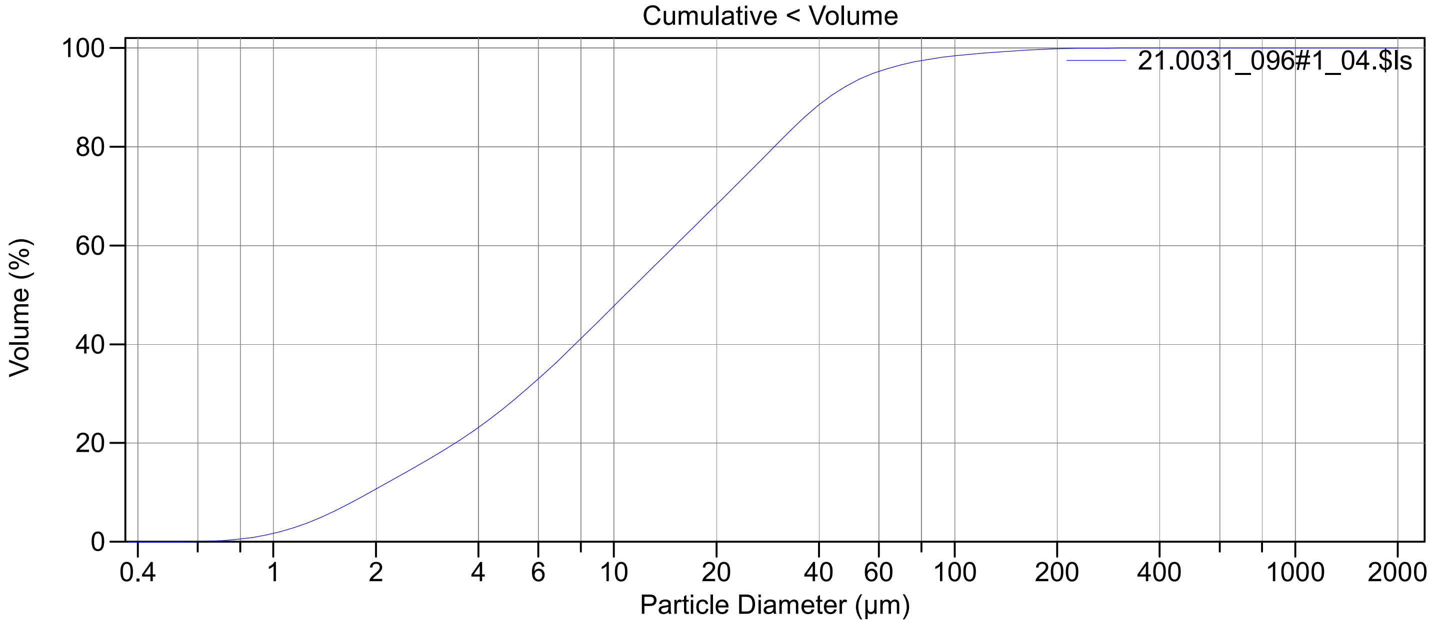
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.13 µm	S.D.:	26.64 µm
Median:	10.86 µm	Variance:	709.9 µm^2
D(3,2):	5.280 µm	C.V.:	139%
Mean/Median ratio:	1.762	Skewness:	4.885 Right skewed
Mode:	28.70 µm	Kurtosis:	36.89 Leptokurtic
Specific Surf. Area:	11363 cm^2/mL		

d_{10}: 1.931 µm d_{50}: 10.86 µm d_{90}: 42.63 µm

<10%	<25%	<50%	<75%	<90%
1.931 µm	4.370 µm	10.86 µm	25.07 µm	42.63 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_096#1_04.$ls 21.0031_096#1_04.$ls		
File ID:	21.0031_096#1		
Sample ID:	21.0031_188454_R2339MC018A 21-22 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 9:22	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_096#1_04.$ls

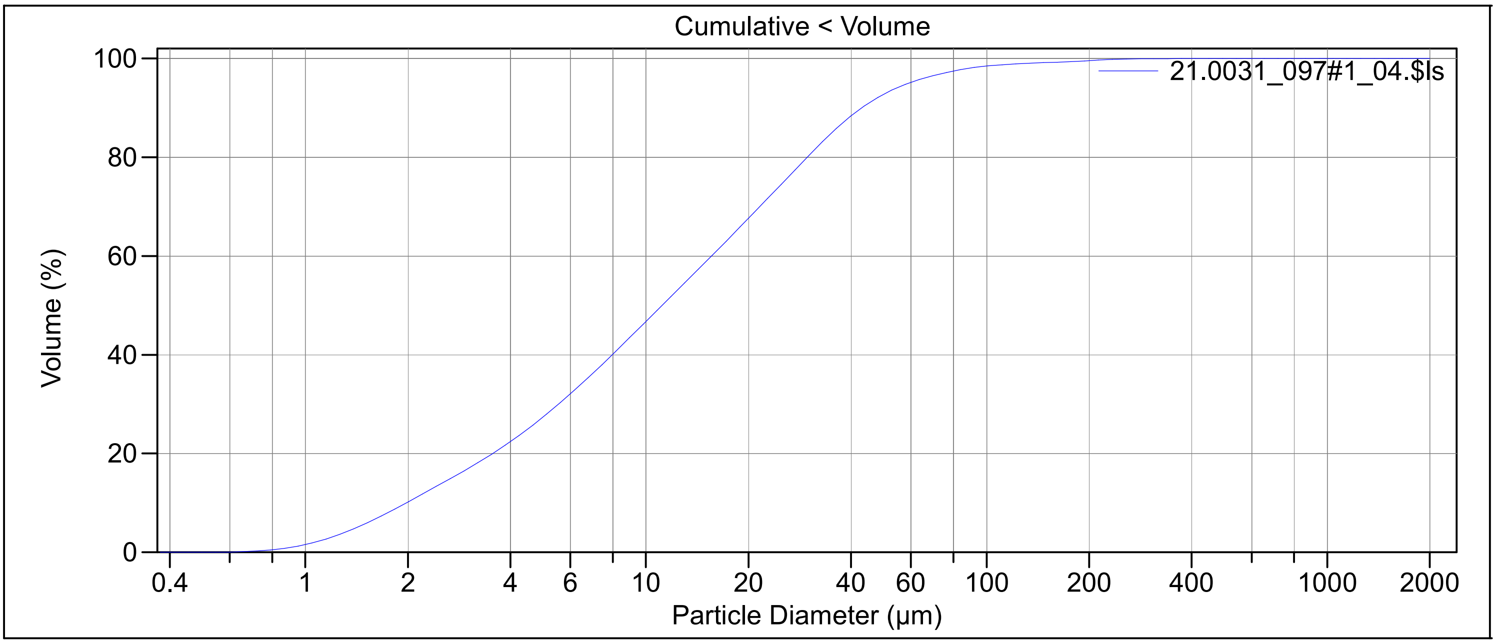
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	18.74 μm	S.D.:	23.52 μm
Median:	10.77 μm	Variance:	553.1 μm^2
D(3,2):	5.265 μm	C.V.:	126%
Mean/Median ratio:	1.739	Skewness:	3.418 Right skewed
Mode:	28.70 μm	Kurtosis:	17.63 Leptokurtic
Specific Surf. Area:	11395 cm^2/mL		

d_{10}: 1.924 μm d_{50}: 10.77 μm d_{90}: 42.71 μm

<10%	<25%	<50%	<75%	<90%
1.924 μm	4.351 μm	10.77 μm	25.06 μm	42.71 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_097#1_04.$ls 21.0031_097#1_04.$ls		
File ID:	21.0031_097#1		
Sample ID:	21.0031_188455_R2339MC018A 22-23 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 9:36	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_097#1_04.$ls

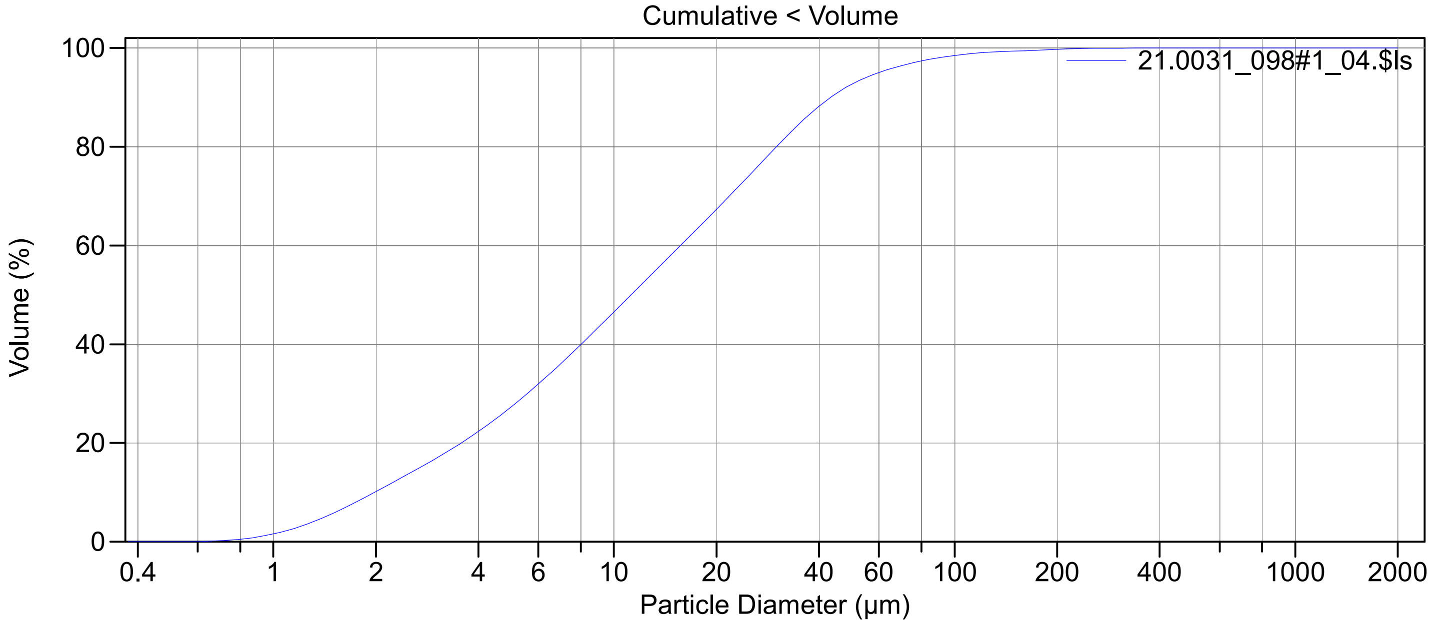
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.29 µm	S.D.:	25.68 µm
Median:	11.16 µm	Variance:	659.3 µm^2
D(3,2):	5.407 µm	C.V.:	133%
Mean/Median ratio:	1.728	Skewness:	4.248 Right skewed
Mode:	26.14 µm	Kurtosis:	27.38 Leptokurtic
Specific Surf. Area:	11097 cm^2/mL		

d_{10}: 1.979 µm d_{50}: 11.16 µm d_{90}: 42.94 µm

<10%	<25%	<50%	<75%	<90%
1.979 µm	4.507 µm	11.16 µm	25.35 µm	42.94 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_098#1_04.$ls 21.0031_098#1_04.$ls		
File ID:	21.0031_098#1		
Sample ID:	21.0031_188456_R2339MC018A 23-24 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 9:50	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_098#1_04.$ls

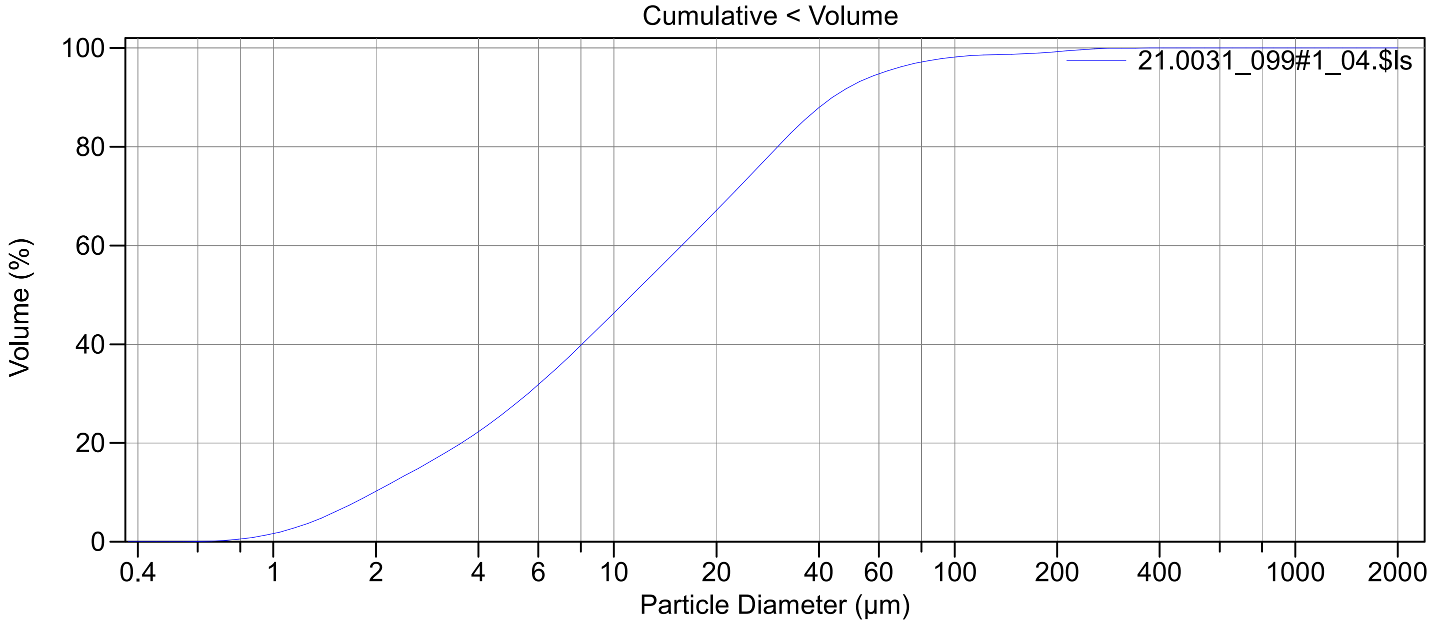
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.19 µm	S.D.:	24.23 µm
Median:	11.23 µm	Variance:	586.9 µm^2
D(3,2):	5.424 µm	C.V.:	126%
Mean/Median ratio:	1.708	Skewness:	3.706 Right skewed
Mode:	28.70 µm	Kurtosis:	21.54 Leptokurtic
Specific Surf. Area:	11063 cm^2/mL		

d_{10}: 1.984 µm d_{50}: 11.23 µm d_{90}: 43.22 µm

<10%	<25%	<50%	<75%	<90%
1.984 µm	4.528 µm	11.23 µm	25.61 µm	43.22 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_099#1_04.$ls 21.0031_099#1_04.$ls		
File ID:	21.0031_099#1		
Sample ID:	21.0031_188457_R2339MC018A 24-25 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.25%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 12:12	Run length:	60 seconds
Pump speed:	45		
Obscuration:	9%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_099#1_04.$ls

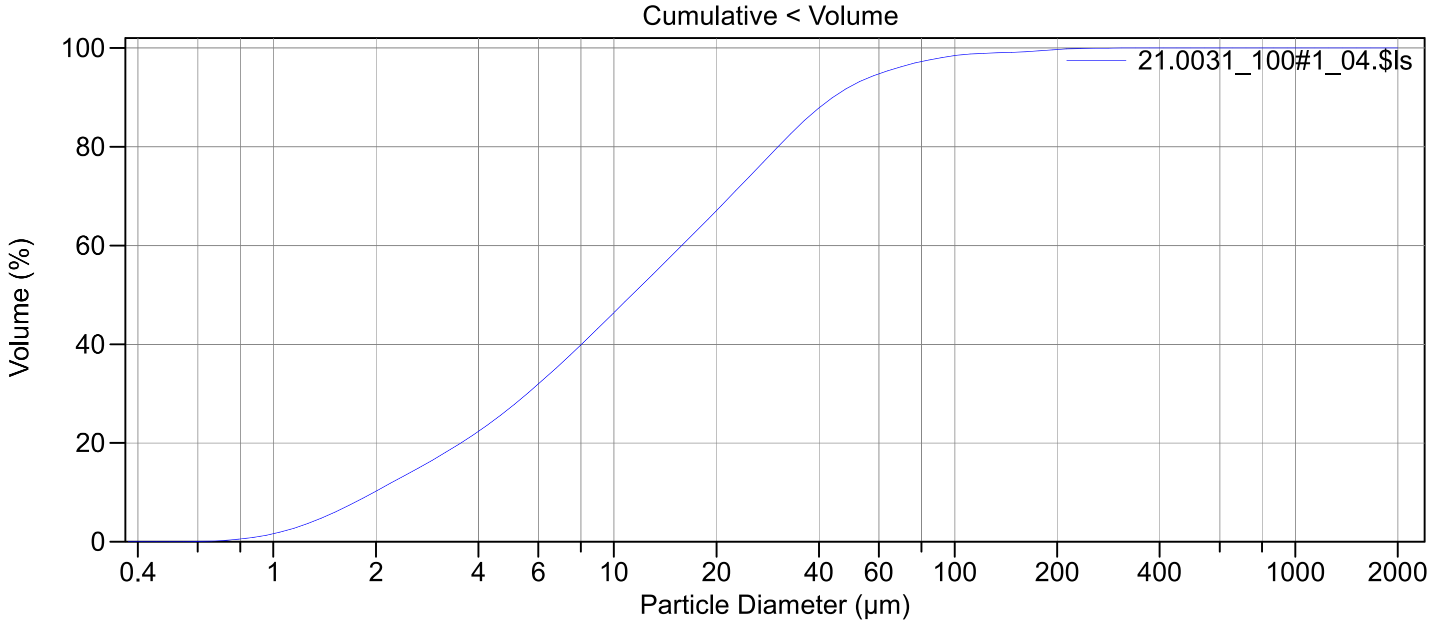
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	20.16 µm	S.D.:	28.90 µm
Median:	11.31 µm	Variance:	835.4 $µm^2$
D(3,2):	5.408 µm	C.V.:	143%
Mean/Median ratio:	1.782	Skewness:	4.569 Right skewed
Mode:	28.70 µm	Kurtosis:	28.84 Leptokurtic
Specific Surf. Area:	11094 cm^2/mL		

d_{10}: 1.972 µm d_{50}: 11.31 µm d_{90}: 43.69 µm

<10%	<25%	<50%	<75%	<90%
1.972 µm	4.538 µm	11.31 µm	25.80 µm	43.69 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_100#1_04.$ls 21.0031_100#1_04.$ls		
File ID:	21.0031_100#1		
Sample ID:	21.0031_188458_R2339MC018A 25-26 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, vann type III		
Comment 2:	Ultralyd Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.24%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 12:54	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_100#1_04.$ls

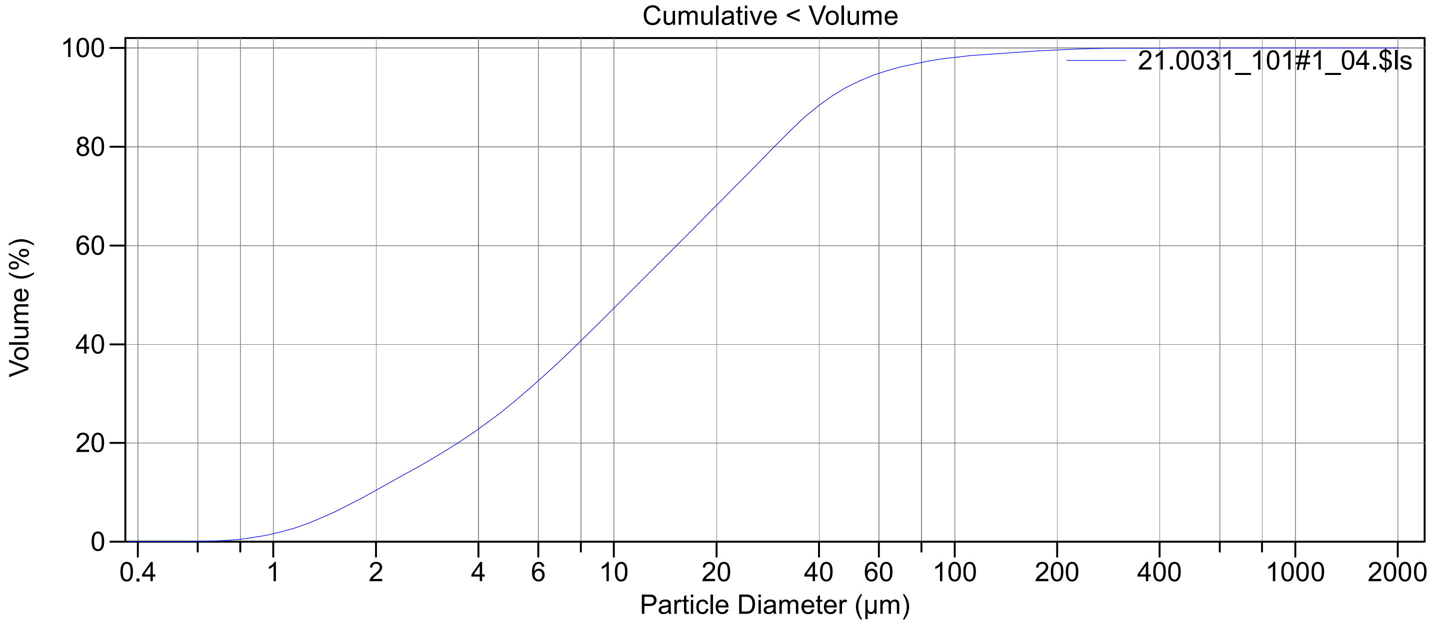
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.54 µm	S.D.:	25.28 µm
Median:	11.31 µm	Variance:	639.2 µm^2
D(3,2):	5.407 µm	C.V.:	129%
Mean/Median ratio:	1.728	Skewness:	3.795 Right skewed
Mode:	28.70 µm	Kurtosis:	21.55 Leptokurtic
Specific Surf. Area:	11096 cm^2/mL		

d_{10}: 1.972 µm d_{50}: 11.31 µm d_{90}: 43.84 µm

<10%	<25%	<50%	<75%	<90%
1.972 µm	4.520 µm	11.31 µm	25.86 µm	43.84 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_101#1_04.$ls 21.0031_101#1_04.$ls		
File ID:	21.0031_101#1		
Sample ID:	21.0031_188459_R2339MC018A 26-27 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 13:09	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_101#1_04.$ls

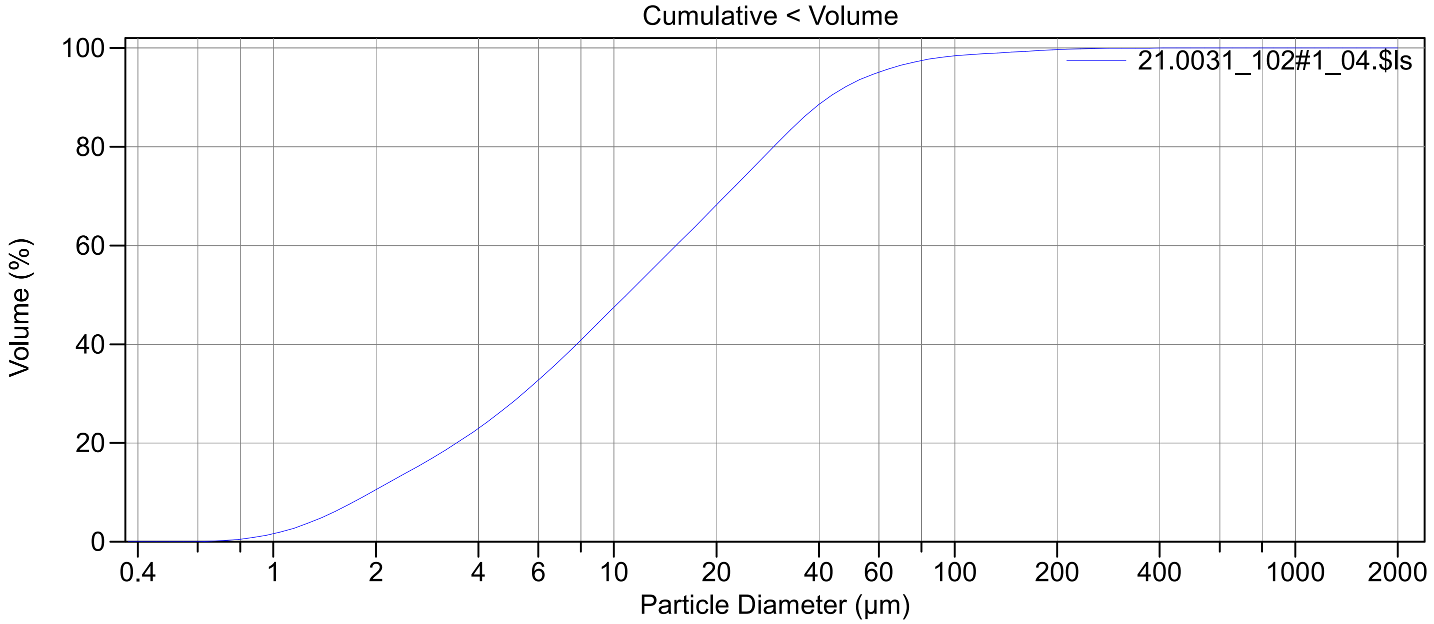
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	19.45 μm	S.D.:	26.63 μm
Median:	10.93 μm	Variance:	709.0 μm^2
D(3,2):	5.334 μm	C.V.:	137%
Mean/Median ratio:	1.779	Skewness:	4.267 Right skewed
Mode:	26.14 μm	Kurtosis:	27.78 Leptokurtic
Specific Surf. Area:	11249 cm^2/mL		

d_{10}: 1.954 μm d_{50}: 10.93 μm d_{90}: 43.03 μm

<10%	<25%	<50%	<75%	<90%
1.954 μm	4.420 μm	10.93 μm	25.07 μm	43.03 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_102#1_04.$ls 21.0031_102#1_04.$ls		
File ID:	21.0031_102#1		
Sample ID:	21.0031_188460_R2339MC018A 27-28 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,114 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 13:28	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_102#1_04.$ls

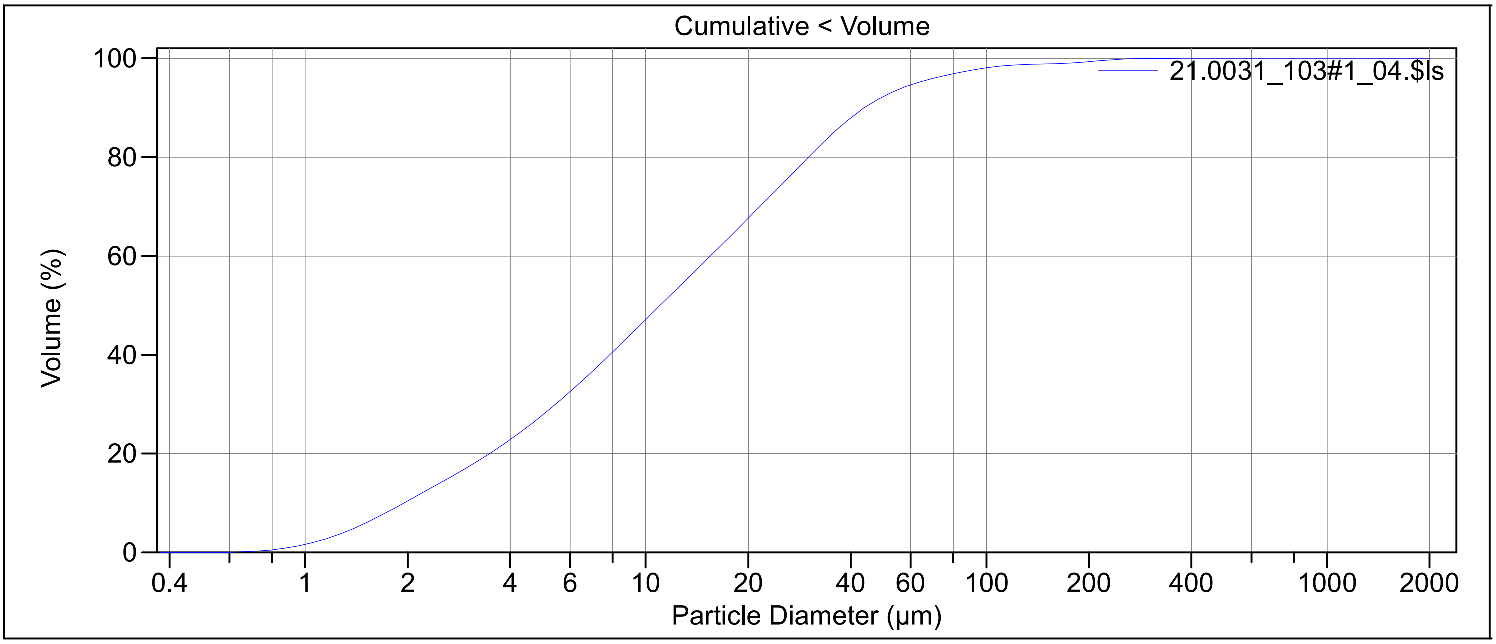
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.06 µm	S.D.:	25.34 µm
Median:	10.88 µm	Variance:	642.4 μm^2
D(3,2):	5.308 µm	C.V.:	133%
Mean/Median ratio:	1.751	Skewness:	4.151 Right skewed
Mode:	28.70 µm	Kurtosis:	26.75 Leptokurtic
Specific Surf. Area:	11304 cm^2/mL		

d_{10}: 1.942 µm d_{50}: 10.88 µm d_{90}: 42.67 µm

<10%	<25%	<50%	<75%	<90%
1.942 µm	4.390 µm	10.88 µm	25.00 µm	42.67 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_103#1_04.$ls
	21.0031_103#1_04.$ls
File ID:	21.0031_103#1
Sample ID:	21.0031_188461_R2339MC018A 28-29 cm
Operator:	MSH
Run number:	4
Comment 1:	0,114 g + disp.middel, spr.vann
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.23%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-09 13:44 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_103#1_04.$ls

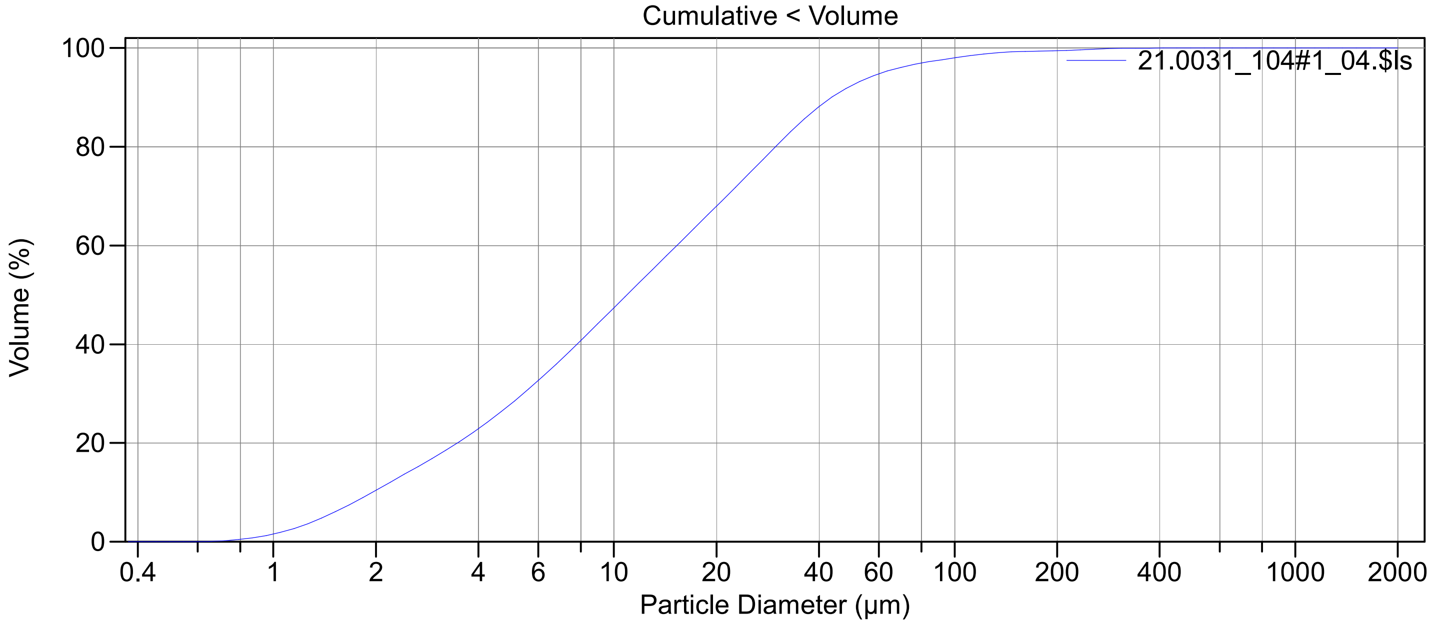
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.98 µm	S.D.:	28.36 µm
Median:	11.03 µm	Variance:	804.5 µm^2
D(3,2):	5.349 µm	C.V.:	142%
Mean/Median ratio:	1.812	Skewness:	4.371 Right skewed
Mode:	28.70 µm	Kurtosis:	26.83 Leptokurtic
Specific Surf. Area:	11218 cm^2/mL		

d_{10}: 1.954 µm d_{50}: 11.03 µm d_{90}: 43.75 µm

<10%	<25%	<50%	<75%	<90%
1.954 µm	4.422 µm	11.03 µm	25.53 µm	43.75 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_104#1_04.$ls 21.0031_104#1_04.$ls		
File ID:	21.0031_104#1		
Sample ID:	21.0031_188462_R2339MC018A 29-30 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,115 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 14:04	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_104#1_04.$ls

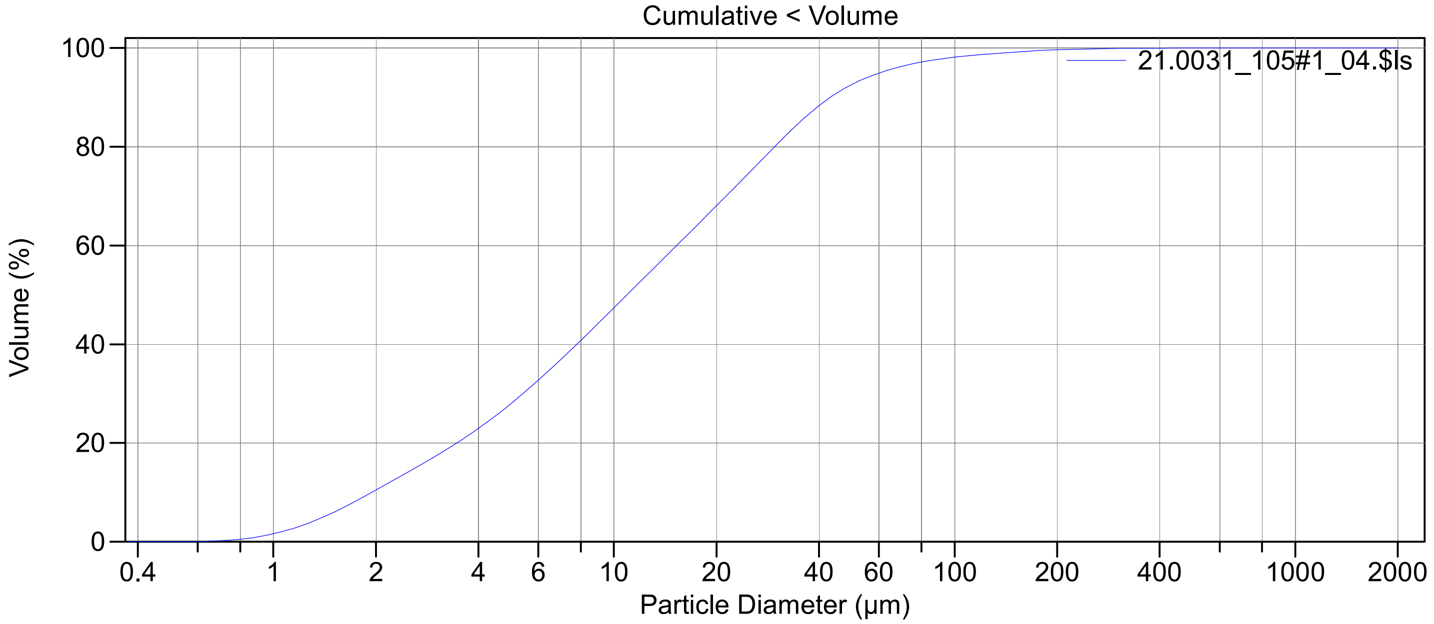
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.68 µm	S.D.:	27.78 µm
Median:	10.92 µm	Variance:	771.7 μm^2
D(3,2):	5.340 µm	C.V.:	141%
Mean/Median ratio:	1.802	Skewness:	4.670 Right skewed
Mode:	28.70 µm	Kurtosis:	33.01 Leptokurtic
Specific Surf. Area:	11235 cm^2/mL		

d_{10}: 1.952 µm d_{50}: 10.92 µm d_{90}: 43.49 µm

<10%	<25%	<50%	<75%	<90%
1.952 µm	4.406 µm	10.92 µm	25.28 µm	43.49 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_105#1_04.$ls 21.0031_105#1_04.$ls		
File ID:	21.0031_105#1		
Sample ID:	21.0031_188463_R2339MC018A 30-31 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,115 g + disp.middel, spr.vann		
Comment 2:	UL- Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-09 14:19	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_105#1_04.$ls

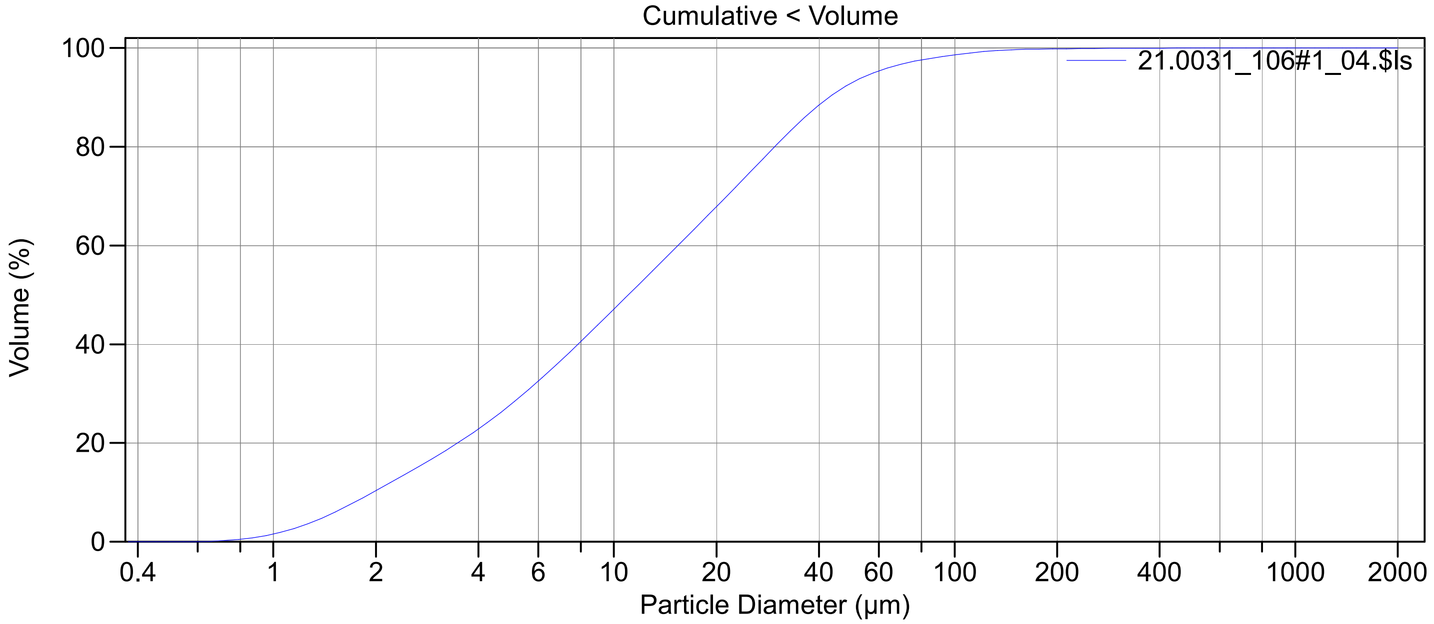
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.42 µm	S.D.:	26.67 µm
Median:	10.92 µm	Variance:	711.3 μm^2
D(3,2):	5.325 µm	C.V.:	137%
Mean/Median ratio:	1.779	Skewness:	4.475 Right skewed
Mode:	28.70 µm	Kurtosis:	31.82 Leptokurtic
Specific Surf. Area:	11268 cm^2/mL		

d_{10}: 1.949 µm d_{50}: 10.92 µm d_{90}: 43.13 µm

<10%	<25%	<50%	<75%	<90%
1.949 µm	4.394 µm	10.92 µm	25.18 µm	43.13 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_106#1_04.$ls 21.0031_106#1_04.$ls		
File ID:	21.0031_106#1		
Sample ID:	21.0031_118464_R2339018A 31-32 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,115 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 8:55	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_106#1_04.$ls

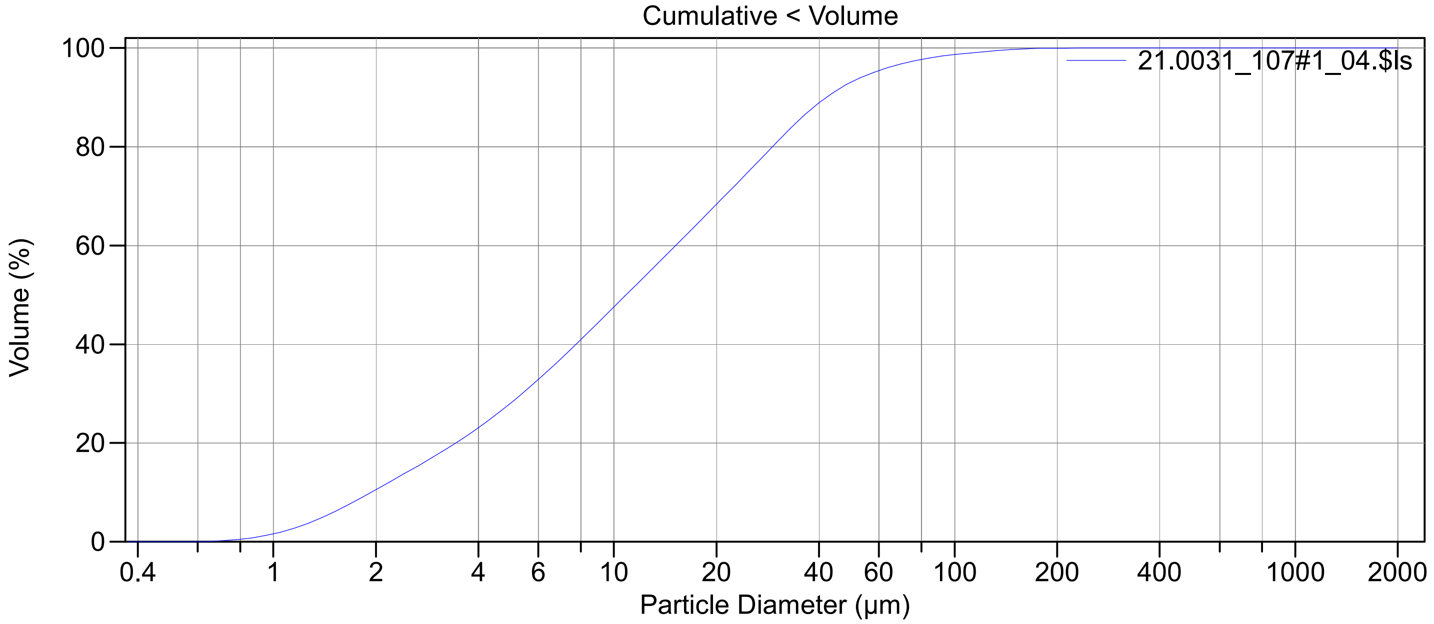
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.70 µm	S.D.:	23.26 µm
Median:	11.03 µm	Variance:	541.2 $µm^2$
D(3,2):	5.353 µm	C.V.:	124%
Mean/Median ratio:	1.696	Skewness:	4.032 Right skewed
Mode:	28.70 µm	Kurtosis:	31.02 Leptokurtic
Specific Surf. Area:	11208 cm^2/mL		

d_{10}: 1.960 µm d_{50}: 11.03 µm d_{90}: 42.76 µm

<10%	<25%	<50%	<75%	<90%
1.960 µm	4.418 µm	11.03 µm	25.23 µm	42.76 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_107#1_04.$ls 21.0031_107#1_04.$ls
File ID:	21.0031_107#1
Sample ID:	21.0031_118465_R2339018A 32-33 cm
Operator:	MSH
Run number:	4
Comment 1:	0,116 g + disp.middel, springvann
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 9:11 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_107#1_04.$ls

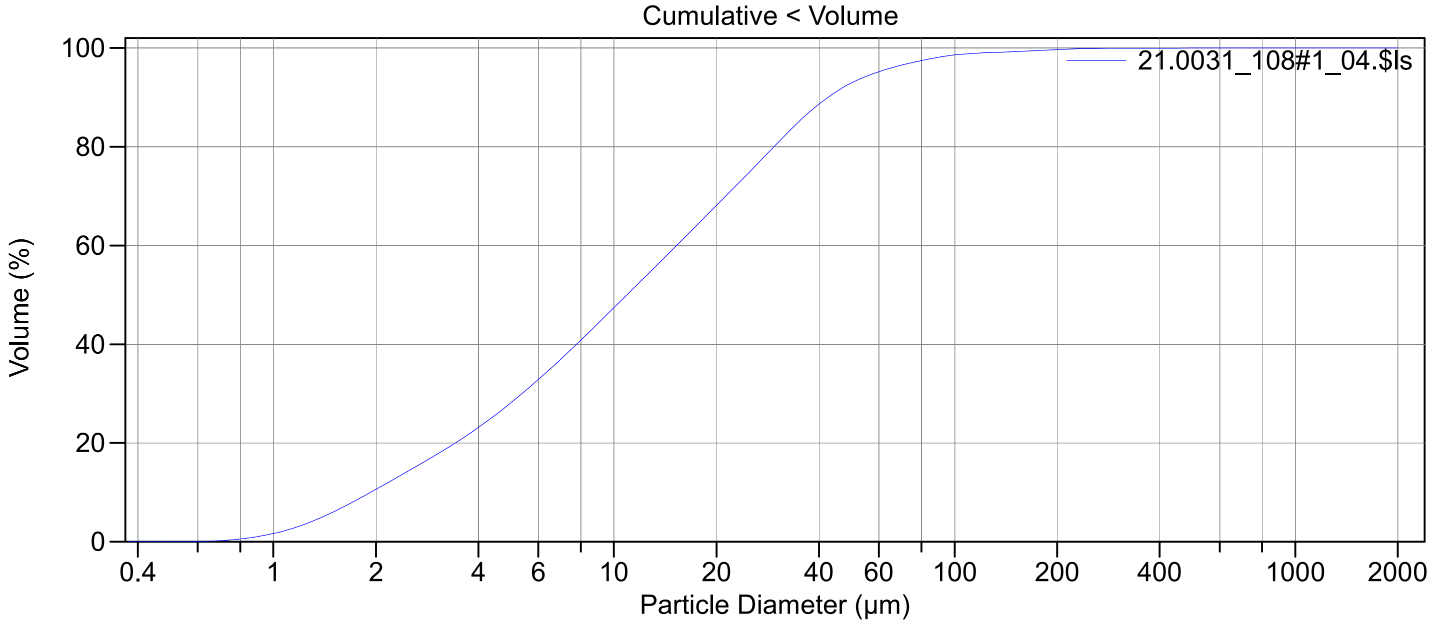
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.28 µm	S.D.:	21.52 µm
Median:	10.85 µm	Variance:	462.9 $µm^2$
D(3,2):	5.302 µm	C.V.:	118%
Mean/Median ratio:	1.684	Skewness:	2.826 Right skewed
Mode:	28.70 µm	Kurtosis:	11.58 Leptokurtic
Specific Surf. Area:	11317 cm^2/mL		

d_{10}: 1.940 µm d_{50}: 10.85 µm d_{90}: 42.03 µm

<10%	<25%	<50%	<75%	<90%
1.940 µm	4.367 µm	10.85 µm	24.85 µm	42.03 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_108#1_04.$ls 21.0031_108#1_04.$ls		
File ID:	21.0031_108#1		
Sample ID:	21.0031_188466_R2339018A 33-34 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,116 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 9:32	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_108#1_04.$ls

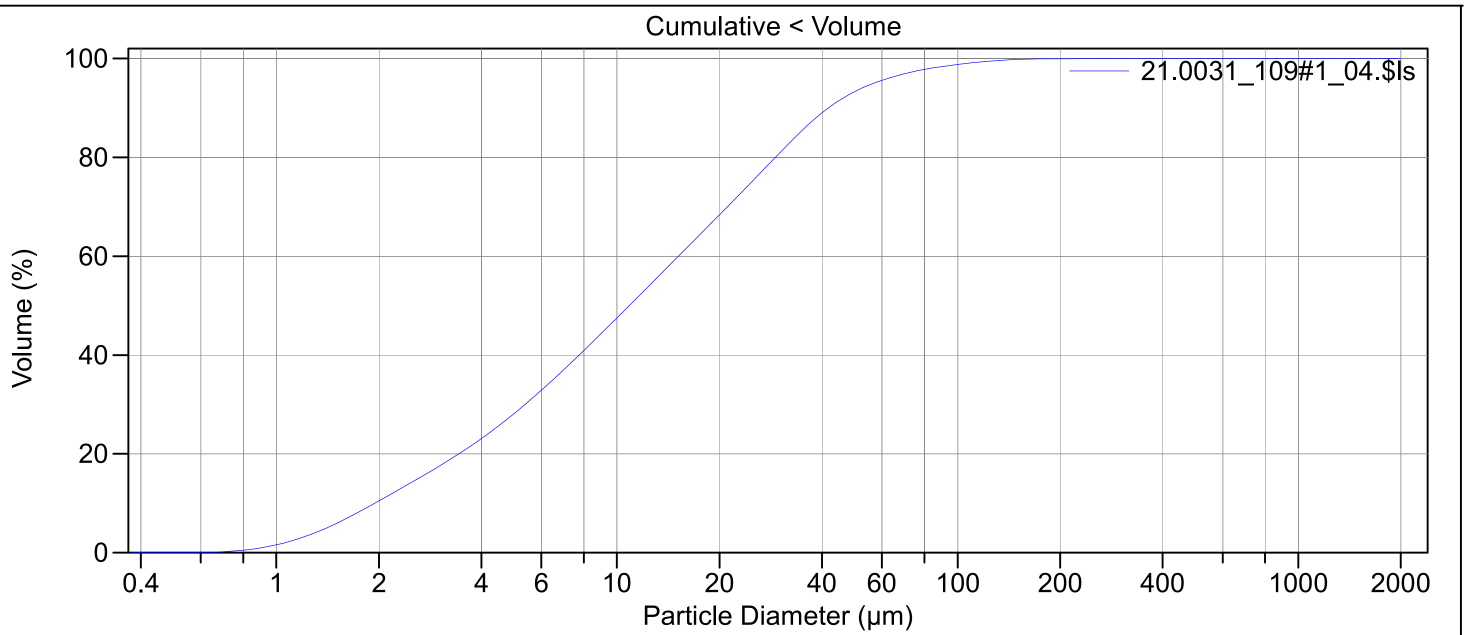
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.95 µm	S.D.:	25.08 µm
Median:	10.91 µm	Variance:	628.9 $µm^2$
D(3,2):	5.284 µm	C.V.:	132%
Mean/Median ratio:	1.736	Skewness:	4.346 Right skewed
Mode:	28.70 µm	Kurtosis:	31.24 Leptokurtic
Specific Surf. Area:	11355 cm^2/mL		

d_{10}: 1.930 µm d_{50}: 10.91 µm d_{90}: 42.44 µm

<10%	<25%	<50%	<75%	<90%
1.930 µm	4.356 µm	10.91 µm	25.07 µm	42.44 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_109#1_04.$ls 21.0031_109#1_04.$ls		
File ID:	21.0031_109#1		
Sample ID:	21.0031_188467_R2339018A 34-35 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,116 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 9:48	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic)   21.0031_109#1_04.$ls

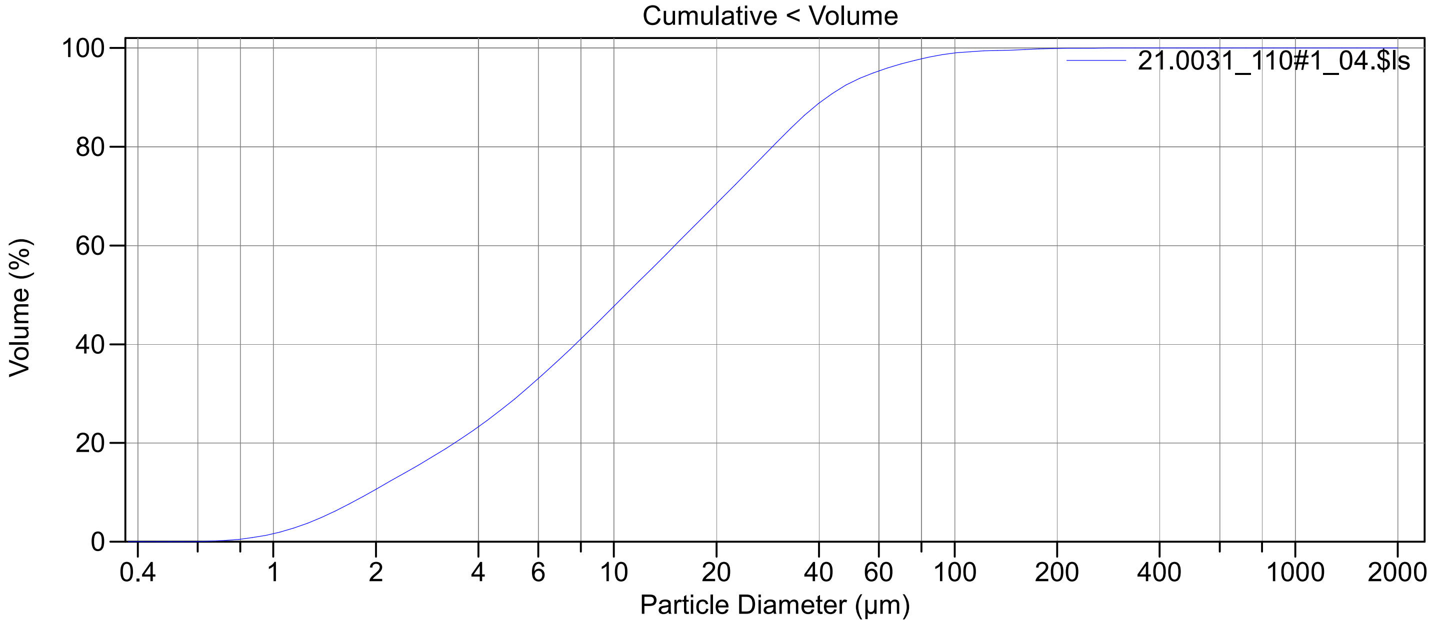
Calculations from 0.375 μm to 2000 μm

Volume:	100%		
Mean:	18.09 μm	S.D.:	20.78 μm
Median:	10.86 μm	Variance:	431.6 μm^2
D(3,2):	5.305 μm	C.V.:	115%
Mean/Median ratio:	1.666	Skewness:	2.639 Right skewed
Mode:	28.70 μm	Kurtosis:	10.02 Leptokurtic
Specific Surf. Area:	11309 cm^2/mL		

d_{10}: 1.945 μm d_{50}: 10.86 μm d_{90}: 41.78 μm

<10%	<25%	<50%	<75%	<90%
1.945 μm	4.366 μm	10.86 μm	24.84 μm	41.78 μm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_110#1_04.$ls 21.0031_110#1_04.$ls		
File ID:	21.0031_110#1		
Sample ID:	21.0031_188468_R2339018A 35-36 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,116 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.23%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 10:04	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_110#1_04.$ls

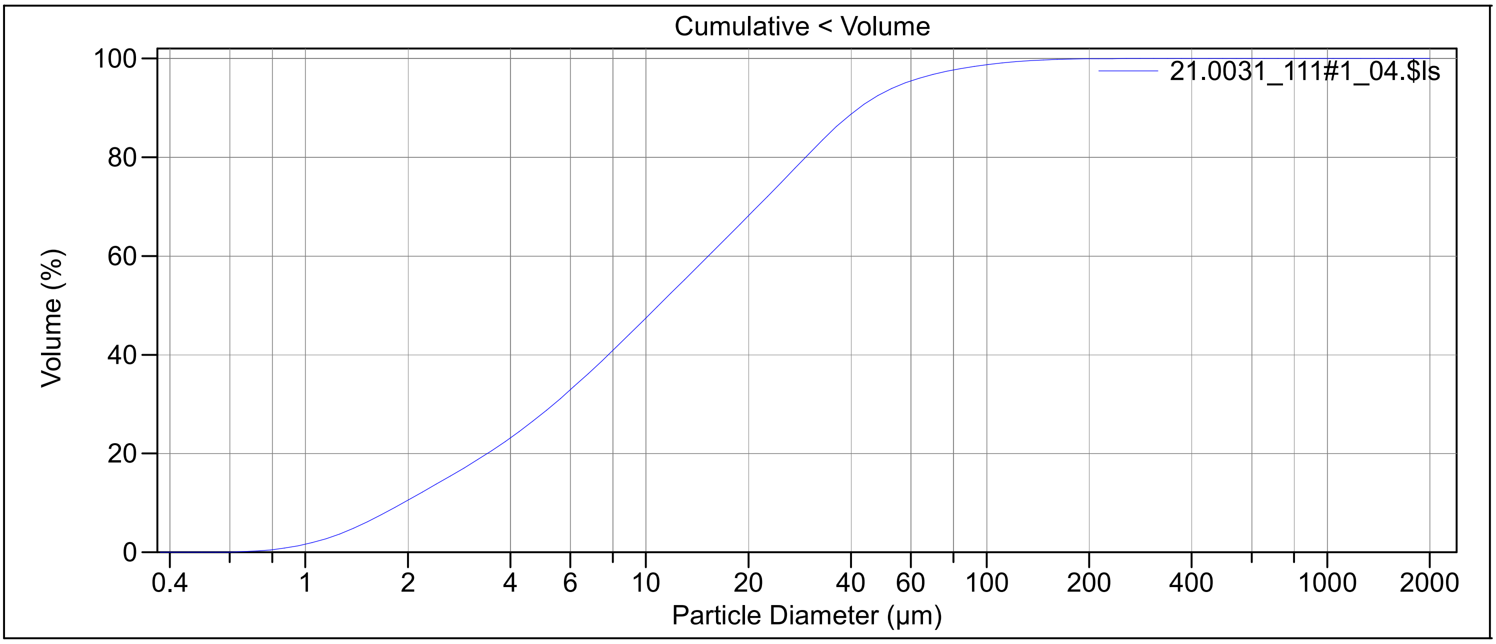
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.23 µm	S.D.:	21.69 µm
Median:	10.80 µm	Variance:	470.3 μm^2
D(3,2):	5.270 µm	C.V.:	119%
Mean/Median ratio:	1.689	Skewness:	3.115 Right skewed
Mode:	28.70 µm	Kurtosis:	15.73 Leptokurtic
Specific Surf. Area:	11384 cm^2/mL		

d_{10}: 1.930 µm d_{50}: 10.80 µm d_{90}: 42.15 µm

<10%	<25%	<50%	<75%	<90%
1.930 µm	4.329 µm	10.80 µm	24.80 µm	42.15 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_111#1_04.$ls		
	21.0031_111#1_04.$ls		
File ID:	21.0031_111#1		
Sample ID:	21.0031_188469_R2339018A 36-37 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,116 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 10:18	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_111#1_04.$ls

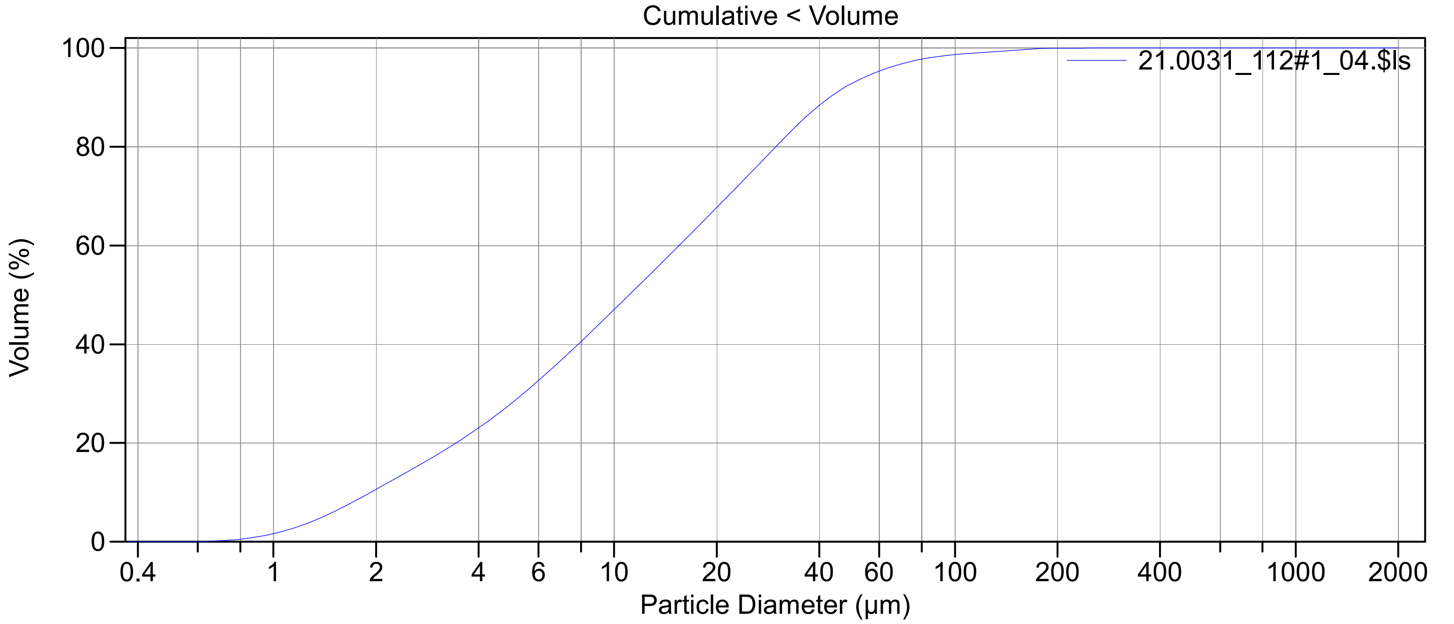
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.32 µm	S.D.:	21.42 µm
Median:	10.89 µm	Variance:	458.7 $µm^2$
D(3,2):	5.296 µm	C.V.:	117%
Mean/Median ratio:	1.681	Skewness:	2.789 Right skewed
Mode:	28.70 µm	Kurtosis:	11.52 Leptokurtic
Specific Surf. Area:	11329 cm^2/mL		

d_{10}: 1.938 µm d_{50}: 10.89 µm d_{90}: 42.30 µm

<10%	<25%	<50%	<75%	<90%
1.938 µm	4.353 µm	10.89 µm	25.03 µm	42.30 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_112#1_04.$ls
	21.0031_112#1_04.$ls
File ID:	21.0031_112#1
Sample ID:	21.0031_188470_R2339018A 37-38 cm
Operator:	MSH
Run number:	4
Comment 1:	0,116 g + disp.middel, springvann
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 10:38	Run length:	60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_112#1_04.$ls

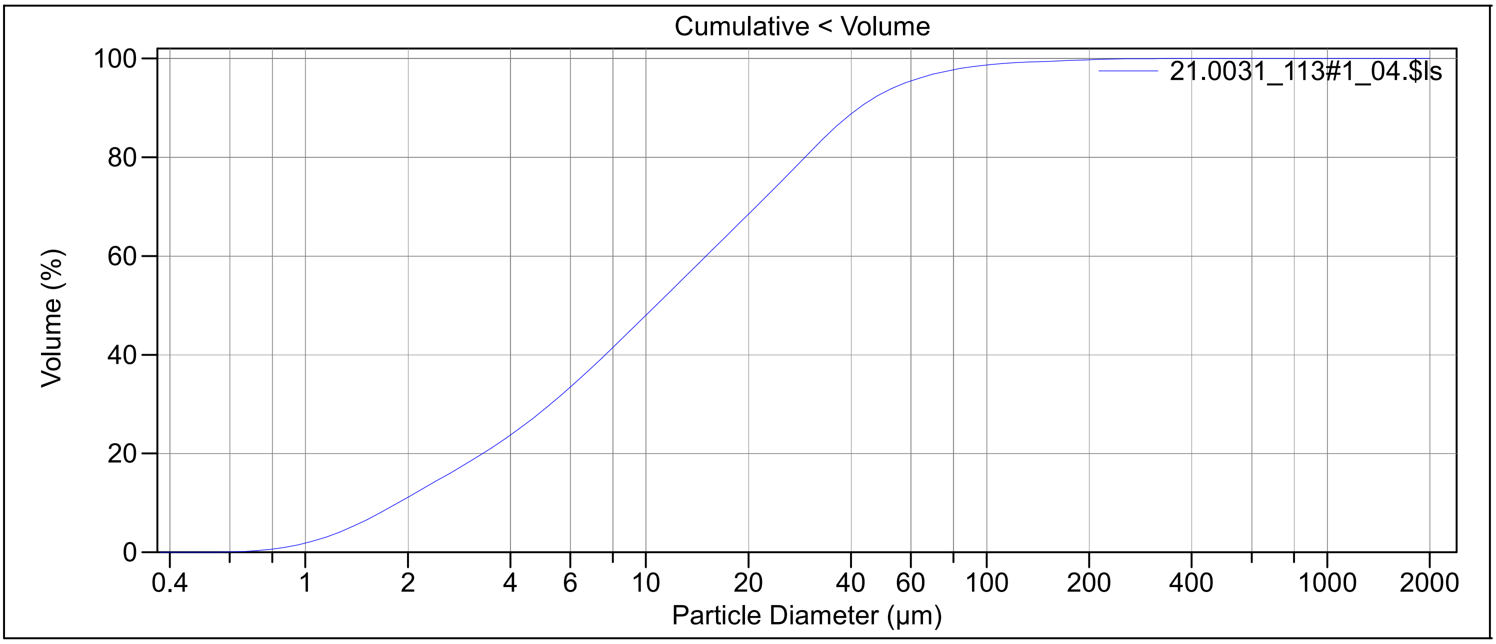
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.65 µm	S.D.:	22.28 µm
Median:	11.07 µm	Variance:	496.4 μm^2
D(3,2):	5.310 µm	C.V.:	119%
Mean/Median ratio:	1.684	Skewness:	3.021 Right skewed
Mode:	28.70 µm	Kurtosis:	13.62 Leptokurtic
Specific Surf. Area:	11300 cm^2/mL		

d_{10}: 1.933 µm d_{50}: 11.07 µm d_{90}: 42.82 µm

<10%	<25%	<50%	<75%	<90%
1.933 µm	4.380 µm	11.07 µm	25.39 µm	42.82 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_113#1_04.$ls 21.0031_113#1_04.$ls
File ID:	21.0031_113#1
Sample ID:	21.0031_188471_R2339018A 38-39 cm
Operator:	MSH
Run number:	4
Comment 1:	0,116 g + disp.middel, springvann
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.23%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 11:58 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_113#1_04.$ls

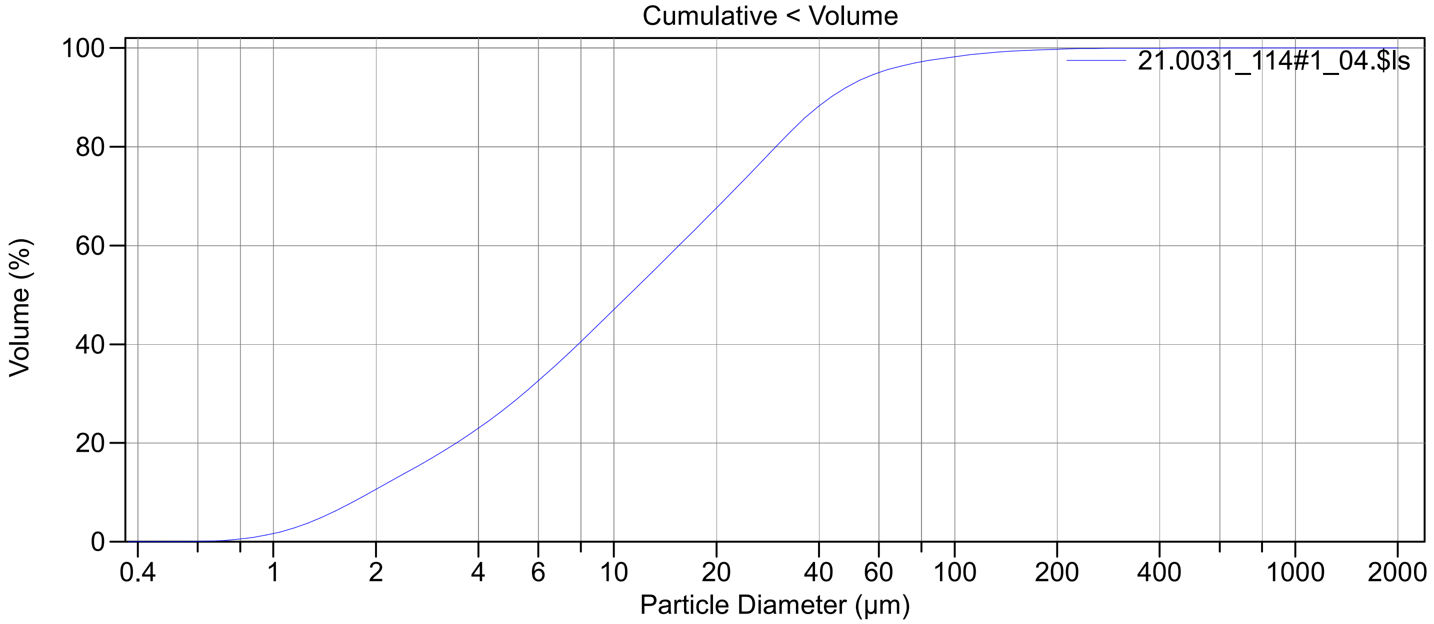
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.50 µm	S.D.:	23.51 µm
Median:	10.70 µm	Variance:	552.8 µm^2
D(3,2):	5.153 µm	C.V.:	127%
Mean/Median ratio:	1.729	Skewness:	3.799 Right skewed
Mode:	28.70 µm	Kurtosis:	23.13 Leptokurtic
Specific Surf. Area:	11645 cm^2/mL		

d_{10}: 1.873 µm d_{50}: 10.70 µm d_{90}: 42.25 µm

<10%	<25%	<50%	<75%	<90%
1.873 µm	4.241 µm	10.70 µm	24.87 µm	42.25 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_114#1_04.$ls 21.0031_114#1_04.$ls
File ID:	21.0031_114#1
Sample ID:	21.0031_188472_R2339018A 39-40 cm
Operator:	MSH
Run number:	4
Comment 1:	0,116 g + disp.middel, springvann
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 12:17 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_114#1_04.$ls

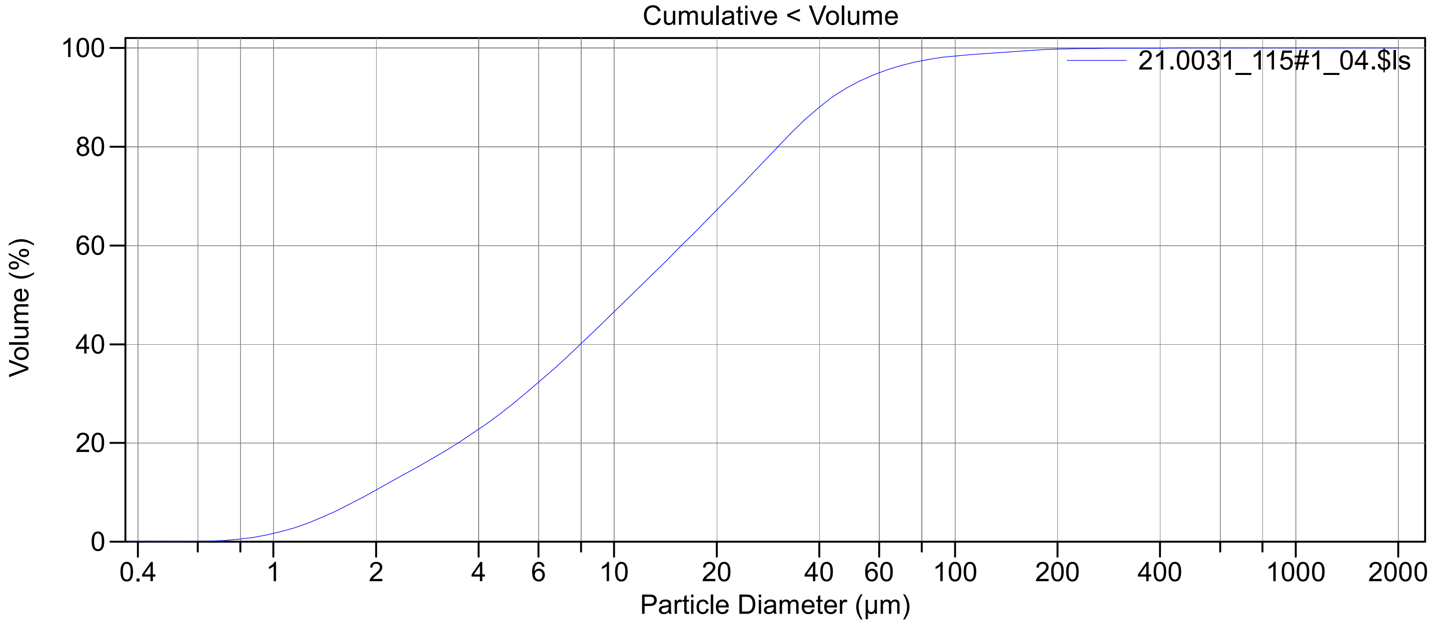
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.22 µm	S.D.:	24.99 µm
Median:	11.08 µm	Variance:	624.4 µm^2
D(3,2):	5.313 µm	C.V.:	130%
Mean/Median ratio:	1.735	Skewness:	3.991 Right skewed
Mode:	28.70 µm	Kurtosis:	26.21 Leptokurtic
Specific Surf. Area:	11293 cm^2/mL		

d_{10}: 1.934 µm d_{50}: 11.08 µm d_{90}: 43.17 µm

<10%	<25%	<50%	<75%	<90%
1.934 µm	4.392 µm	11.08 µm	25.45 µm	43.17 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_115#1_04.$ls 21.0031_115#1_04.$ls		
File ID:	21.0031_115#1		
Sample ID:	21.0031_188473_R2339018A 40-41 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,116 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 12:35	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_115#1_04.$ls

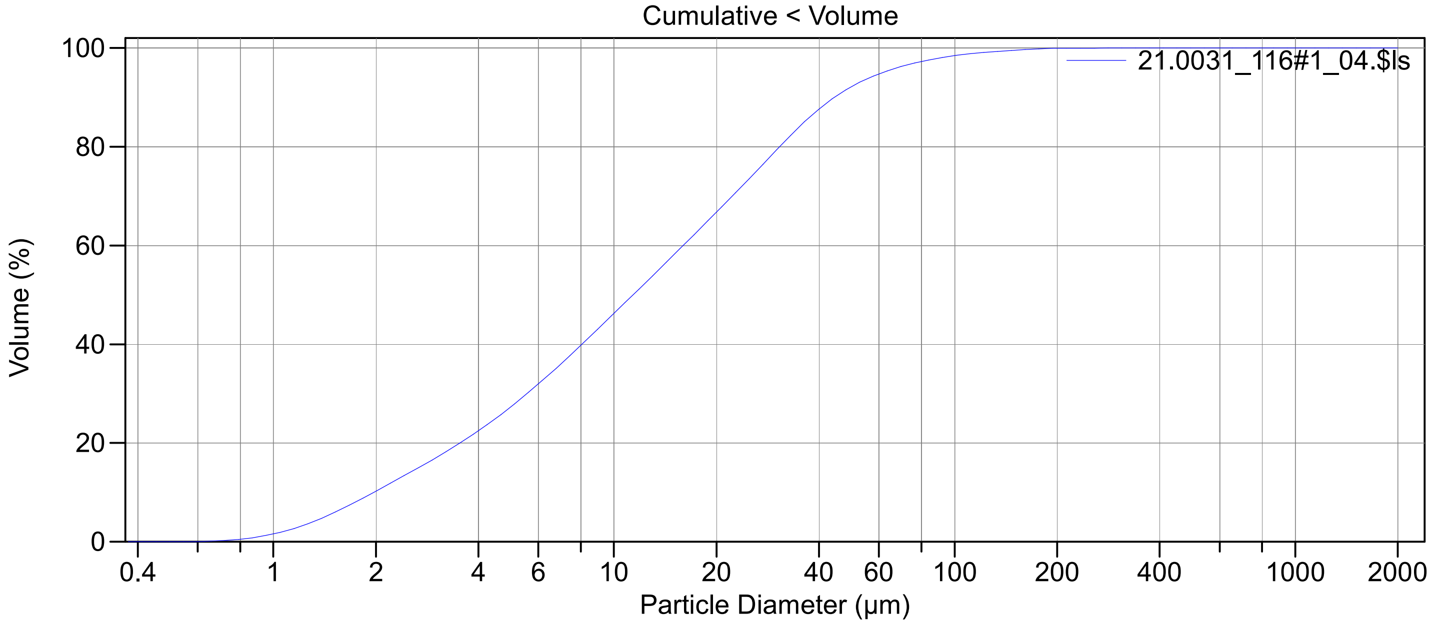
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.37 µm	S.D.:	25.11 µm
Median:	11.26 µm	Variance:	630.6 $µm^2$
D(3,2):	5.350 µm	C.V.:	130%
Mean/Median ratio:	1.721	Skewness:	4.107 Right skewed
Mode:	28.70 µm	Kurtosis:	28.63 Leptokurtic
Specific Surf. Area:	11214 cm^2/mL		

d_{10}: 1.946 µm d_{50}: 11.26 µm d_{90}: 43.50 µm

<10%	<25%	<50%	<75%	<90%
1.946 µm	4.441 µm	11.26 µm	25.82 µm	43.50 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_116#1_04.$ls 21.0031_116#1_04.$ls		
File ID:	21.0031_116#1		
Sample ID:	21.0031_188474_R2339018A 41-42 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,116 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 12:48	Run length:	60 seconds
Pump speed:	45		
Obscuration:	10%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_116#1_04.$ls

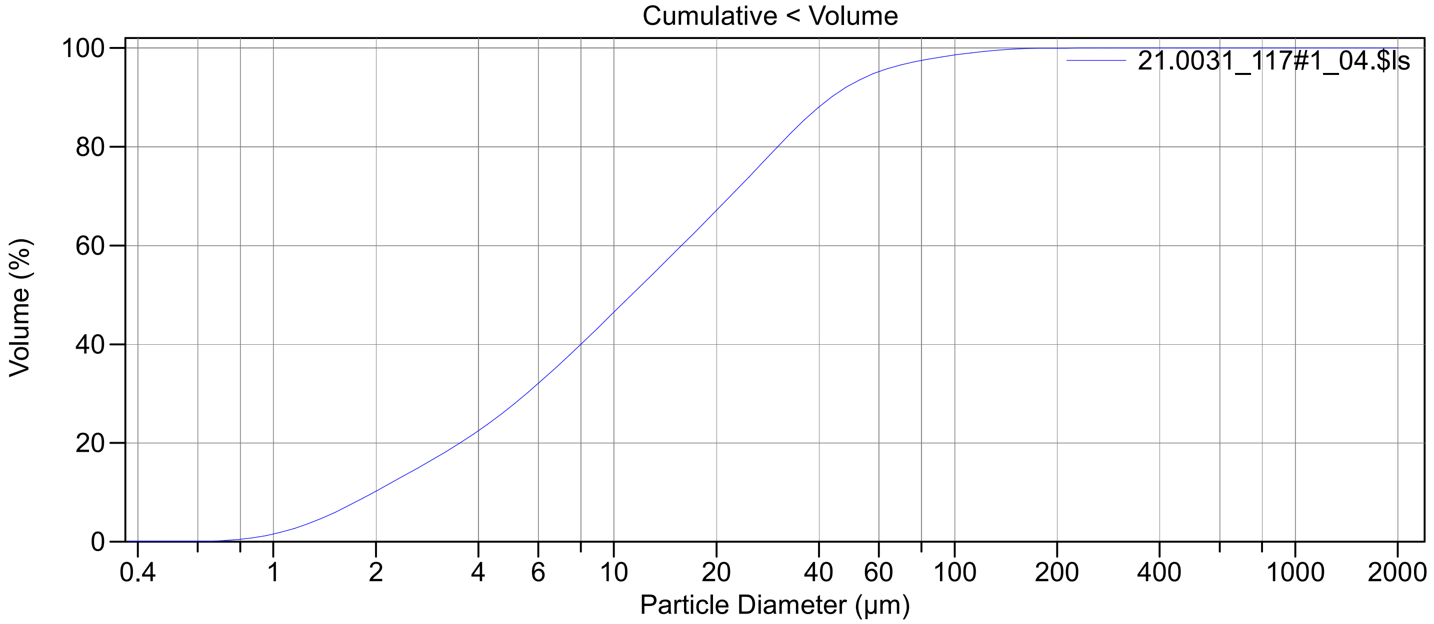
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	19.28 µm	S.D.:	23.01 µm
Median:	11.39 µm	Variance:	529.6 µm^2
D(3,2):	5.420 µm	C.V.:	119%
Mean/Median ratio:	1.694	Skewness:	2.911 Right skewed
Mode:	28.70 µm	Kurtosis:	12.47 Leptokurtic
Specific Surf. Area:	11071 cm^2/mL		

d_{10}: 1.972 µm d_{50}: 11.39 µm d_{90}: 44.28 µm

<10%	<25%	<50%	<75%	<90%
1.972 µm	4.504 µm	11.39 µm	26.16 µm	44.28 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_117#1_04.$ls 21.0031_117#1_04.$ls		
File ID:	21.0031_117#1		
Sample ID:	21.0031_188475_R2339018A 42-43 cm		
Operator:	MSH		
Run number:	4		
Comment 1:	0,116 g + disp.middel, springvann		
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire		
Optical model:	Leire-1-65.rf780d		
Fluid R.I.:	1.333	Sample R.I.:	1.65 i0.0099
Residual:	0.22%		
LS 13 320	Aqueous Liquid Module		
Start time:	2021-04-12 13:09	Run length:	61 seconds
Pump speed:	45		
Obscuration:	11%		
Fluid:	Water		
Software:	6.01	Firmware:	4.00



Volume Statistics (Arithmetic) 21.0031_117#1_04.$ls

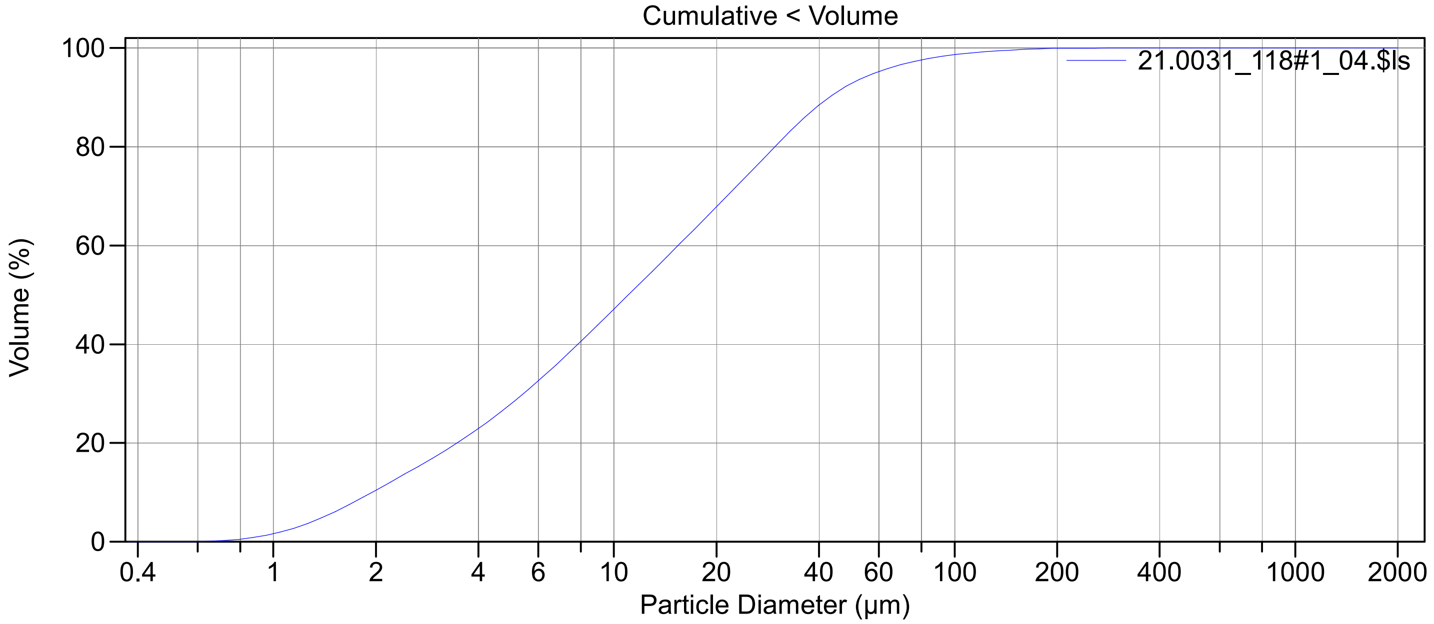
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.79 µm	S.D.:	21.59 µm
Median:	11.28 µm	Variance:	466.1 µm^2
D(3,2):	5.410 µm	C.V.:	115%
Mean/Median ratio:	1.666	Skewness:	2.588 Right skewed
Mode:	28.70 µm	Kurtosis:	9.398 Leptokurtic
Specific Surf. Area:	11091 cm^2/mL		

d_{10}: 1.971 µm d_{50}: 11.28 µm d_{90}: 43.34 µm

<10%	<25%	<50%	<75%	<90%
1.971 µm	4.494 µm	11.28 µm	25.83 µm	43.34 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_118#1_04.$ls
	21.0031_118#1_04.$ls
File ID:	21.0031_118#1
Sample ID:	21.0031_188476_R2339018A 43-44 cm
Operator:	MSH
Run number:	4
Comment 1:	0,116 g + disp.middel, springvann
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.22%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 13:22 — Run length: 61 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic)   21.0031_118#1_04.$ls

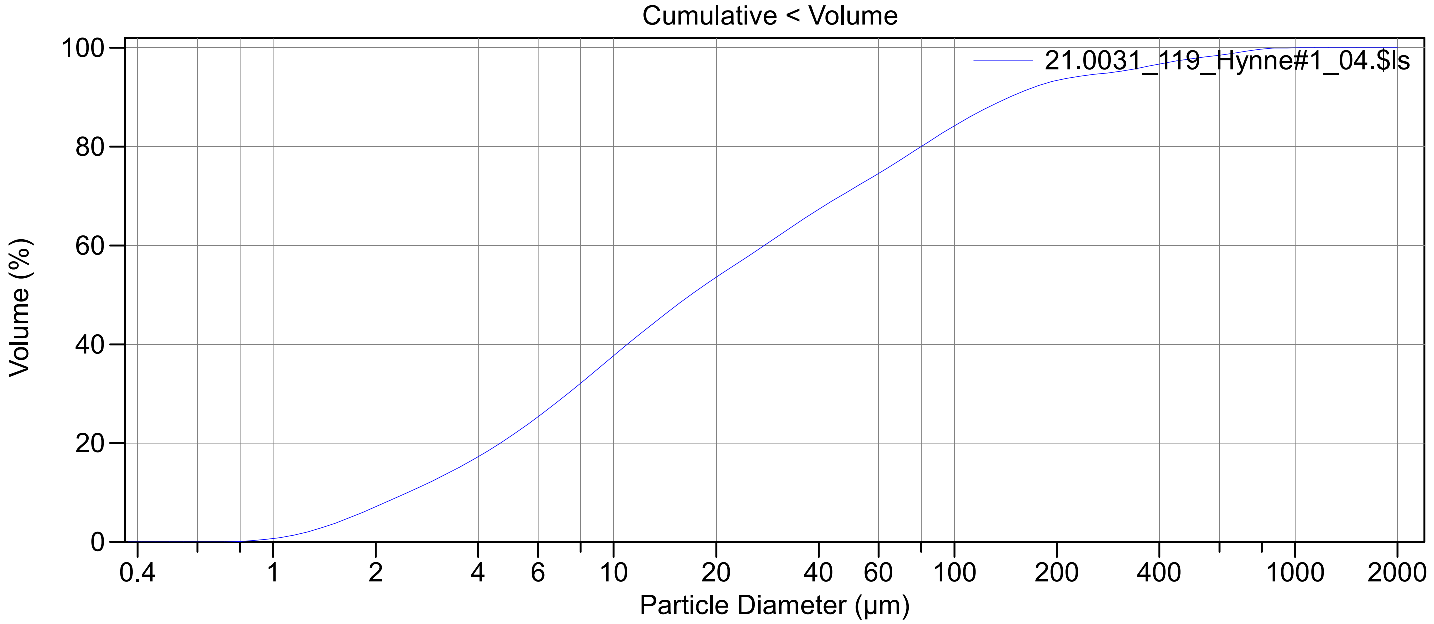
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	18.62 µm	S.D.:	22.17 µm
Median:	11.03 µm	Variance:	491.3 $µm^2$
D(3,2):	5.333 µm	C.V.:	119%
Mean/Median ratio:	1.688	Skewness:	2.990 Right skewed
Mode:	28.70 µm	Kurtosis:	13.59 Leptokurtic
Specific Surf. Area:	11252 cm^2/mL		

d_{10}: 1.951 µm d_{50}: 11.03 µm d_{90}: 42.80 µm

<10%	<25%	<50%	<75%	<90%
1.951 µm	4.403 µm	11.03 µm	25.28 µm	42.80 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_119_Hynne#1_04.$ls 21.0031_119_Hynne#1_04.$ls
File ID:	21.0031_119_Hynne#1
Sample ID:	21.0031_Hynne_40107
Operator:	MSH
Run number:	4
Comment 1:	0,154 g + disp.middel, springvann
Comment 2:	UL Probe 2 (naken), 5 ampl, 5 min, Leire
Optical model:	Leire-1-65.rf780d
Fluid R.I.:	1.333 — Sample R.I.: 1.65 i0.0099
Residual:	0.24%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 13:35 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_119_Hynne#1_04.$ls

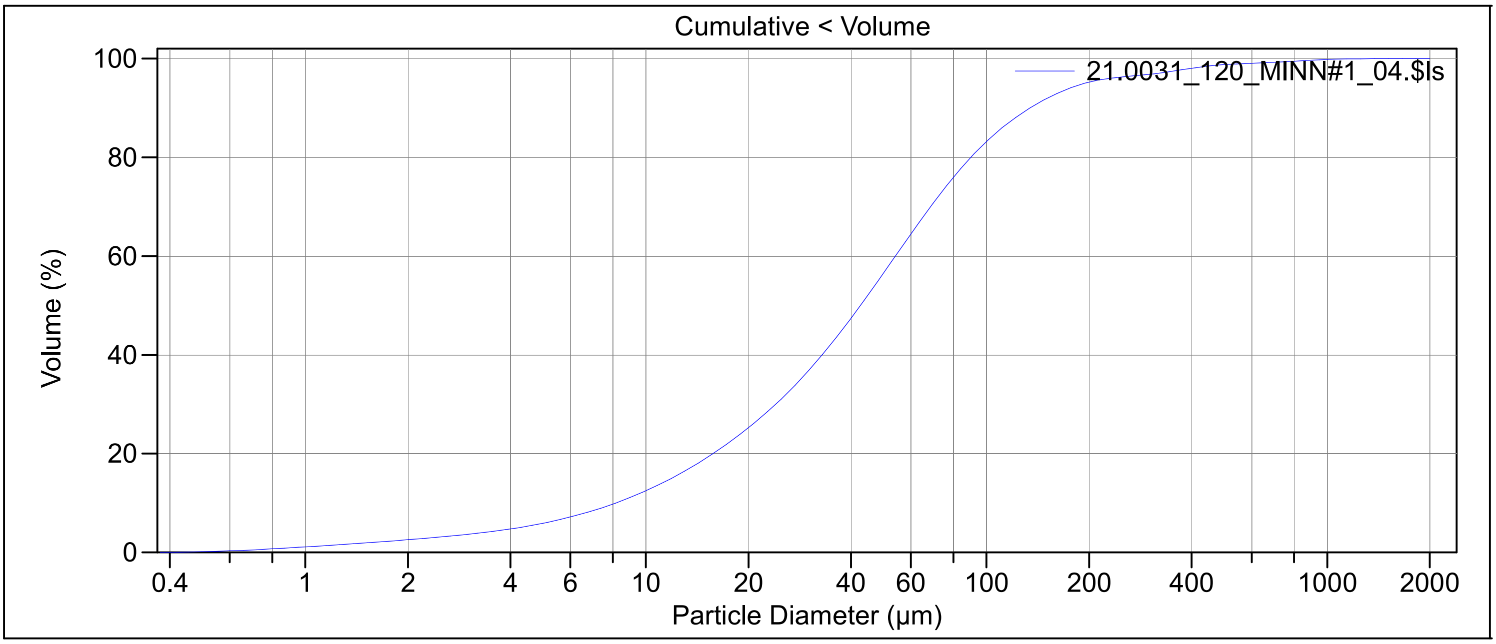
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	60.76 µm	S.D.:	118.3 µm
Median:	16.85 µm	Variance:	13992 µm^2
D(3,2):	7.143 µm	C.V.:	195%
Mean/Median ratio:	3.607	Skewness:	3.795 Right skewed
Mode:	9.370 µm	Kurtosis:	16.34 Leptokurtic
Specific Surf. Area:	8399 cm^2/mL		

d_{10}: 2.484 µm d_{50}: 16.85 µm d_{90}: 145.0 µm

<10%	<25%	<50%	<75%	<90%
2.484 µm	5.909 µm	16.85 µm	61.39 µm	145.0 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_120_MINN#1_04.$ls 21.0031_120_MINN#1_04.$ls
File ID:	21.0031_120_MINN#1
Sample ID:	21.0031_MINN_Split 1
Operator:	MSH
Run number:	4
Comment 1:	0,334 g + disp.middel, Springvann
Comment 2:	UL probe 2 (naken), 5 ampl-5 min,Fraunhofer
Optical model:	Fraunhofer.rf780d
Residual:	0.18%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 14:05 Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_120_MINN#1_04.$ls

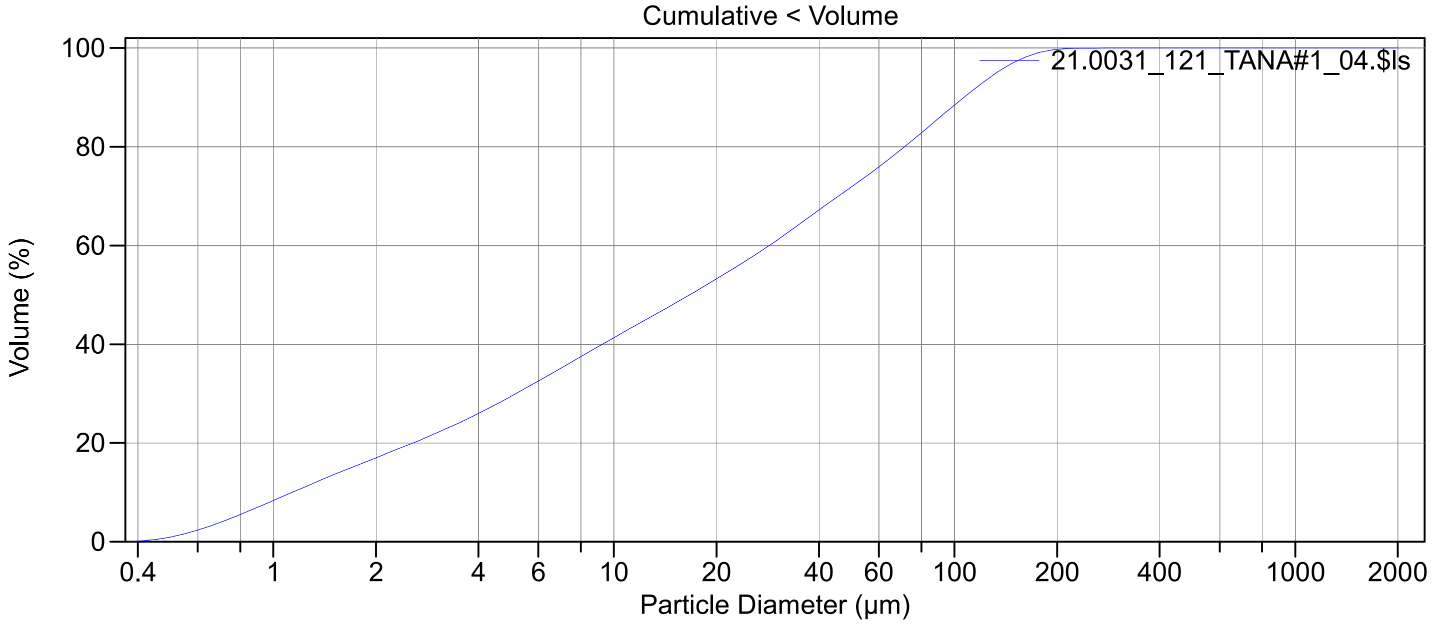
Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	68.68 µm	S.D.:	103.2 µm
Median:	42.61 µm	Variance:	10646 µm^2
D(3,2):	14.37 µm	C.V.:	150%
Mean/Median ratio:	1.612	Skewness:	5.146 Right skewed
Mode:	55.14 µm	Kurtosis:	35.11 Leptokurtic
Specific Surf. Area:	4174 cm^2/mL		

d_{10}: 8.161 µm d_{50}: 42.61 µm d_{90}: 133.8 µm

<10%	<25%	<50%	<75%	<90%
8.161 µm	19.80 µm	42.61 µm	77.94 µm	133.8 µm

File name:	C:\LS13320\Raadata LS 13320 Analyse\2021\Uten PIDS\20210031\21.0031_121_TANA#1_04.$ls 21.0031_121_TANA#1_04.$ls
File ID:	21.0031_121_TANA#1
Sample ID:	21.0031_TANA (3)
Operator:	MSH
Run number:	4
	Control Sample
Comment 1:	0,140 g + disp.middel, Springvann
Comment 2:	ultralyd, Probe 2 (naken), 5 ampl-5 min
Optical model:	Fraunhofer.rf780d
Residual:	0.26%
LS 13 320	Aqueous Liquid Module
Start time:	2021-04-12 8:38 — Run length: 60 seconds
Pump speed:	45
Obscuration:	10%
Fluid:	Water
Software:	6.01 — Firmware: 4.00



Volume Statistics (Arithmetic) 21.0031_121_TANA#1_04.$ls

Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	36.87 µm	S.D.:	44.20 µm
Median:	16.66 µm	Variance:	1954 µm^2
D(3,2):	3.821 µm	C.V.:	120%
Mean/Median ratio:	2.213	Skewness:	1.452 Right skewed
Mode:	87.90 µm	Kurtosis:	1.445 Leptokurtic
Specific Surf. Area:	15702 cm^2/mL		

d_{10}: 1.135 µm d_{50}: 16.66 µm d_{90}: 106.5 µm

<10%	<25%	<50%	<75%	<90%
1.135 µm	3.746 µm	16.66 µm	57.49 µm	106.5 µm

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Totalt karbon / Totalt svovel / Totalt organisk karbon
GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031

NORSK AKKREDITERING TEST 020

INSTRUMENT: **Forbrenningsovn Leco SC-632**
METODER: Bestemmelse av totalt karbon (TC) (LABdok_G03)
Bestemmelse av totalt organisk karbon (TOC) (LABdok_G04)
Bestemmelse av totalt svovel (TS) (LABdok_G05)

I) TOTALT KARBON (TC)
Nedre bestemmelsesgrense [vekt% TC]: **0.06**

Analyseusikkerhet

Måleområde	Usikkerhet
0.06 - 0.4 vekt%	± 0.06 vekt%
0.4 - 60 vekt%	± 15 % rel.
60 - 100 vekt%*	± 15 % rel.*

II) TOTALT SVOVEL (TS)
Nedre bestemmelsesgrense [vekt% TS]: **0.02**

Analyseusikkerhet

Måleområde	Usikkerhet
0.02 - 2.0 vekt%	± 30 % rel.
2.0 - 52 vekt%	± 20 % rel.

III) TOTALT ORGANISK KARBON (TOC)
Nedre bestemmelsesgrense [vekt% TOC]: **0.1**

Analyseusikkerhet

Måleområde	Usikkerhet
0.1 - 3.0 vekt%	± 25 % rel.
3.0 - 60 vekt%	± 20 % rel.
60 - 100 vekt%*	± 20 % rel.*

*Metoden som benyttes for konsentrasjonsområdet 60 - 100 vekt% karbon omfattes ikke av akkrediteringen. For andre unntak se Anmerkninger

Oppgitte usikkerheter har dekningsfaktor 2 (2 standardavvik), noe som tilsvarer et konfidensintervall på 95 %.

PRESISJON: Det analyseres rutinemessig kontrollprøver som føres i kontrolldiagram (X-diagram). Disse kan forevises om ønskelig.

Analysekontrakt nr.: 2021.0031 Prøvematerial: GEOLOGISK MATERIALE
Antall prøver: 121
Anmerkninger: Svovel (TS) ble reanalysert grunnet et instrumentproblem (jfr. Avvik 1137)

Delrapport med forside ("Forside_TC-TS-TOC") og sider med analysedata ("TC-TS-TOC"). Fullstendig analyserapport finnes kun i papirformat.
Gjengivelse av analysedata skal skje på en slik måte at meningsinnholdet i rapporten ikke endres.
Merk! Data i rapporten er skrivebeskyttet

Analyser fullført dato: 03.05.2021

Operatør: Anne Nordtømme / Clea Fabian

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GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031 - foreløpig

NORSK AKKREDITERING TEST 020

NGU-nr	Prøve ID	TS [vekt%]	TC [vekt%]	TOC [vekt%]
Hynne	Hynne	0.0561	0.926	0.430
Minn	Minn	< 0.02	0.738	0.394
Tana	Tana	< 0.02	< 0.06	< 0.1
188003	R2132MC006A 0-1 cm	0.0479	1.18	0.317
188042	R2139MC008A 0-1 cm	0.110	2.24	0.563
188044	R2139MC008A 2-3 cm	0.0854	2.33	0.599
188046	R2139CMC008A 4-5 cm	0.0835	2.29	0.562
188051	R2139CMC008A 9-10 cm	0.0672	2.34	0.515
188056	R2139CMC008A 14-15 cm	0.0522	2.26	0.431
188066	R2139CMC008A 24-25 cm	0.0770	2.47	0.425
188070	R2139CMC008A 28-29 cm	0.0698	2.28	0.370
188076	R2183MC009A 0-1 cm	0.158	2.71	0.897
188078	R2183MC009A 2-3 cm	0.108	2.67	0.831
188080	R2183MC009A 4-5 cm	0.0920	2.74	0.754
188085	R2183MC009A 9-10 cm	0.0911	2.70	0.747
188090	R2183MC009A 14-15 cm	0.0761	2.68	0.699
188100	R2183MC009A 24-25 cm	0.0794	2.53	0.580
188110	R2183MC009A 34-35 cm	0.0863	2.67	0.570
188123	R2229MC010A 0-1 cm	0.106	2.50	0.629
188125	R2229MC010A 2-3 cm	0.0743	2.29	0.543
188127	R2229MC010A 4-5 cm	0.0768	2.34	0.506
188132	R2229MC010A 9-10 cm	0.0687	2.56	0.533
188137	R2229MC010A 14-15 cm	0.0583	2.41	0.455
188147	R2229MC010A 24-25 cm	0.0623	1.90	0.332
188153	R2229MC010A 30-31 cm	0.0567	1.45	0.239
Hynne	Hynne	0.0494	0.900	0.492
Minn	Minn	< 0.02	0.715	0.395
188164	R2242MC012A 0-1 cm	0.163	3.36	0.742
188166	R2242MC012A 2-3 cm	0.123	3.30	0.679
188168	R2242MC012A 4-5 cm	0.113	3.30	0.662
188173	R2242MC012A 9-10 cm	0.115	3.44	0.602
188178	R2242MC012A 14-15 cm	0.0865	3.30	0.545
188188	R2242MC012A 24-25 cm	0.0826	2.87	0.500
188202	R2242MC012A 38-39 cm	0.0737	2.23	0.408

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GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031 - foreløpig

NORSK AKKREDITERING TEST 020

NGU-nr	Prøve ID	TS [vekt%]	TC [vekt%]	TOC [vekt%]
188208	R2270MC013A 0-1 cm	0.138	2.59	0.577
188210	R2270MC013A 2-3 cm	0.0941	2.44	0.543
188212	R2270MC013A 4-5 cm	0.0771	2.30	0.472
188217	R2270MC013A 9-10 cm	0.120	1.61	0.480
188222	R2270MC013A 14-15 cm	0.0938	1.44	0.422
188232	R2270MC013A 24-25 cm	0.161	1.24	0.529
188241	R2270MC013A 32-33 cm	0.252	1.32	0.674
188246	R2276MC014A 0-1 cm	0.146	3.17	0.711
188248	R2276MC014A 2-3 cm	0.116	3.06	0.690
188250	R2276MC014A 4-5 cm	0.112	3.01	0.658
188255	R2276MC014A 9-10 cm	0.0951	3.25	0.683
188260	R2276MC014A 14-15 cm	0.105	3.13	0.680
188270	R2276MC014A 24-25 cm	0.0943	3.08	0.609
188289	R2276MC014A 43-44 cm	0.0855	2.68	0.511
188293	R2279BC060 0-1 cm	0.114	2.65	0.648
188294	R2289MC015A 0-1 cm	0.156	3.08	0.765
Hynne	Hynne	0.0385	0.999	0.417
Minn	Minn	< 0.02	0.712	0.405
Tana	Tana	< 0.02	< 0.06	< 0.1
188339	R2326GR104 0-1 cm	0.142	3.25	0.799
188340	R2331MC016A 0-1 cm	0.186	3.29	0.909
188381	R2338MC017A 0-1 cm	0.165	3.14	0.750
188383	R2338MC017A 2-3 cm	0.112	2.95	0.667
188385	R2338MC017A 4-5 cm	0.108	3.09	0.700
188390	R2338MC017A 9-10 cm	0.0944	3.08	0.692
188395	R2338MC017A 14-15 cm	0.0973	3.15	0.681
188405	R2338MC017A 24-25 cm	0.0874	3.09	0.651
188428	R2338MC017A 47-48 cm	0.0947	2.80	0.547
188486	R2354GR125 0-1 cm	0.154	2.84	0.632
188487	R2359GR129 0-1 cm	0.120	3.03	0.585
188488	R2363MC019A 0-1 cm	0.134	3.21	0.573
188490	R2363MC019A 2-3 cm	0.0978	3.13	0.538
188492	R2363MC019A 4-5 cm	0.0856	3.19	0.525
188497	R2363MC019A 9-10 cm	0.0689	3.14	0.491

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GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031 - foreløpig

NORSK AKKREDITERING TEST 020

NGU-nr	Prøve ID	TS [vekt%]	TC [vekt%]	TOC [vekt%]
188502	R2363MC019A 14-15 cm	0.0743	3.18	0.444
188512	R2363MC019A 24-25 cm	0.0793	2.37	0.433
188525	R2363MC019A 37-38 cm	0.161	1.47	0.580
188531	R2365GR141 0-1 cm	0.144	3.36	0.663
Hynne	Hynne	0.0517	0.977	0.405
Minn	Minn	< 0.02	0.742	0.409
188433	R2339MC018A 0-1 cm	0.153	3.12	0.757
188434	R2339MC018A 1-2 cm	0.143	3.01	0.730
188435	R2339MC018A 2-3 cm	0.118	2.95	0.732
188436	R2339MC018A 3-4 cm	0.132	3.08	0.728
188437	R2339MC018A 4-5 cm	0.140	2.93	0.714
188438	R2339MC018A 5-6 cm	0.124	2.92	0.696
188439	R2339MC018A 6-7 cm	0.122	3.04	0.706
188440	R2339MC018A 7-8 cm	0.115	3.10	0.675
188441	R2339MC018A 8-9 cm	0.108	3.14	0.672
188442	R2339MC018A 9-10 cm	0.107	3.10	0.665
188443	R2339MC018A 10-11 cm	0.103	3.33	0.668
188444	R2339MC018A 11-12 cm	0.105	3.22	0.677
188445	R2339MC018A 12-13 cm	0.109	3.21	0.664
188446	R2339MC018A 13-14 cm	0.100	3.36	0.656
188447	R2339MC018A 14-15 cm	0.102	3.21	0.546
188448	R2339MC018A 15-16 cm	0.0954	3.15	0.625
188449	R2339MC018A 16-17 cm	0.103	3.15	0.621
188450	R2339MC018A 17-18 cm	0.105	3.02	0.645
188451	R2339MC018A 18-19 cm	0.113	3.04	0.645
188452	R2339MC018A 19-20 cm	0.114	3.03	0.638
188453	R2339MC018A 20-21 cm	0.111	3.07	0.634
188454	R2339MC018A 21-22 cm	0.121	3.09	0.630
188455	R2339MC018A 22-23 cm	0.115	3.08	0.618
188456	R2339MC018A 23-24 cm	0.127	3.02	0.614
188457	R2339MC018A 24-25 cm	0.125	3.08	0.607
188458	R2339MC018A 25-26 cm	0.104	3.11	0.612
188459	R2339MC018A 26-27 cm	0.105	3.03	0.611
188460	R2339MC018A 27-28 cm	0.110	3.03	0.620

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GEOLOGISK MATERIALE
Analysekontrakt nr. 2021.0031 - foreløpig

NORSK AKKREDITERING TEST 020

NGU-nr	Prøve ID	TS [vekt%]	TC [vekt%]	TOC [vekt%]
188461	R2339MC018A 28-29 cm	0.111	3.07	0.624
188462	R2339MC018A 29-30 cm	0.103	3.10	0.627
188463	R2339MC018A 30-31 cm	0.103	3.19	0.624
188464	R2339MC018A 31-32 cm	0.103	3.07	0.601
188465	R2339MC018A 32-33 cm	0.106	3.07	0.610
188466	R2339MC018A 33-34 cm	0.104	3.07	0.613
188467	R2339MC018A 34-35 cm	0.0829	3.04	0.596
188468	R2339MC018A 35-36 cm	0.101	3.01	0.603
188469	R2339MC018A 36-37 cm	0.109	3.03	0.599
188470	R2339MC018A 37-38 cm	0.114	2.99	0.569
188471	R2339MC018A 38-39 cm	0.101	2.97	0.558
188472	R2339MC018A 39-40 cm	0.0984	2.99	0.565
188473	R2339MC018A 40-41 cm	0.0979	2.96	0.562
188474	R2339MC018A 41-42 cm	0.103	3.05	0.588
188475	R2339MC018A 42-43 cm	0.0957	3.07	0.595
188476	R2339MC018A 43-44 cm	0.110	2.98	0.590
Hynne	Hynne	0.0643	0.915	0.406
Minn	Minn	< 0.02	0.720	0.411
Tana	Tana	< 0.02	< 0.06	< 0.1

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Bestemmelse av kationer, ICP-OES metode (LABdok_G09)
GEOLOGISK MATERIALE
ANALYSEKONTRAKTNR. 2021.0031

INSTRUMENT: **ICP-OES Agilent 5110 VDV**

METODE: **LABdok_G09: Analyse av kationer i geologiske materialer basert på ICP-OES metode og oppslutning i autoklav etter NS-4770**
Prøveframstilling følger prosedyre i LABdok_P03: Framstilling av analyseløsninger etter partiell oppslutning i salpetersyre iht. NS-4770.
Merk! Dette er en partielloppslutningsmetode og rapporterte verdier representerer ikke totalt innhold i prøvene.

Nedre bestemmelsesgrenser (LLQ1)), måleområder1) og analyseusikkerheter2)

	Al	As	B	Ba	Be	Ca	Cd	Ce	Co	Cr	Cu	Fe	K	La	Li
LLQ prøve1) (mg/kg)	20	2	10	1	0.1	200	0.1	3	1	1	1	3	100	0.5	0.5
Høyeste målegrense1) (mg/kg)	30000	1000	1000	2000	500	300000	200	1000	1000	1000	1000	50000	20000	1000	1000
Måleområde1) 1 (mg/kg)	20-100	2-10	10-50	1-5	0.1-1	200-1000	0.1-1	3-30	1-5	1-5	1-5	3-30	100-500	0.5-5	0.5-2.5
Analyseusikkerhet 2) 1 (rel.)	25 %	50 %	25 %	25 %	25 %	25 %	25 %	25 %	50 %	25 %	25 %	25 %	25 %	25 %	25 %
Måleområde1) 2 (mg/kg)	100-30000	10-1000	50-1000	5-2000	1-500	1000-300000	1-200	30-1000	5-1000	5-1000	5-1000	30-50000	500-20000	5-1000	2.5-1000
Analyseusikkerhet2) 2 (rel.)	10 %	20 %	10 %	10 %	10 %	10 %	10 %	10 %	20 %	10 %	10 %	10 %	10 %	10 %	10 %
Omfattes av akkreditering3)	JA	JA	JA	Delvis3)	JA	JA	JA	JA	JA	JA	JA	JA	Delvis3)	JA	JA
	Mn	Mo	Na	Ni	P	Pb	S	Sc	Se	Si	Sr	Ti	V	Y	Zn
LLQ prøve1) (mg/kg)	0.5	1	200	1	10	2	10	0.1	10	200	1	1	1	0.1	4
Høyeste målegrense1) (mg/kg)	4000	1000	50000	1000	2000	1000	10000	1000	1000	5000	1000	4000	1000	1000	2000
Måleområde1) 1 (mg/kg)	0.5-2.5	1-5	200-1000	1-5	10-50	2-10	10-50	0.1-1	10-50	200-500	1-5	1-5	1-5	0.1-1	4-20
Analyseusikkerhet 2) 1 (rel.)	25 %	50 %	25 %	25 %	50 %	25 %	50 %	25 %	50 %	25 %	25 %	50 %	50 %	25 %	37.5 %
Måleområde1) 2 (mg/kg)	2.5-4000	5-1000	1000-50000	5-1000	50-2000	10-1000	50-10000	1-1000	50-1000	500-5000	5-1000	5-4000	5-1000	1-1000	20-2000
Analyseusikkerhet2) 2 (rel.)	10 %	20 %	10 %	10 %	20 %	10 %	10 %	10 %	20 %	10 %	10 %	20 %	20 %	10 %	15 %
Omfattes av akkreditering3)	Delvis3)	JA	Delvis3)	JA	JA	JA	nei	JA	nei	nei	JA	Delvis3)	JA	JA	Delvis3)

1) *Angitte LLQ-verdier og måleområder er for fortynningsgrad 100X. For analyser med andre fortynningsfaktorer blir deteksjonsgrensene automatisk omregnet.*
2) *Oppgitte usikkerheter har dekningsfaktor 2 (2 standardavvik), noe som tilsvarer et konfidensintervall på 95 %.*
3) *Akkreditert måleområde (mg/kg) er hhv: 1000 (Ba, Mn, Ti, Zn); 10000 (K) og 20000 (Mg og Na). For andre unntak se Anmerkninger*

Presisjon: Kontrollprøver analyseres rutinemessig. For utfyllende informasjon om rutinene for kvalitetssikring kontaktes laboratoriet.
Analysekontrakt nr.: 2021.0031 **Prøvematerial:** GEOLOGISK MATERIALE
Antall prøver: 121
Anmerkninger: Ingen

Delrapport med forside ("Forside_ICP-OES") og sider med analysedata ("Data_ICP-OES"). Fullstendig analyserapport finnes kun i papirformat.
Gjengivelse av analysedata skal skje på en slik måte at meningsinnholdet i rapporten ikke endres.
Merk! Data i rapporten er skrivebeskyttet!

Oppslutning fullført dato: 09,04,2021 **Oppslutning fullført av:** Clea Fabian

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INSTRUMENT: **ICP-OES Agilent 5110 VDV**

METODE: **LABdok_G09: Analyse av kationer i geologiske materialer basert på ICP-OES metode og oppslutning i autoklav etter NS-4770**

Prøveframstilling følger prosedyre i LABdok_P03: Framstilling av analyseløsninger etter partiell oppslutning i salpetersyre iht. NS-4770.

Analyser fullført dato: 05,05,2021 **Analysert og rapportert av:** Ruikai Xie

Mg
50
70000
50-500
25 %
500-70000
10 %
Delvis[3)]
Zr
2
1000
2-10
25 %
10-1000
10 %
JA

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NGU-nr	Prøve ID	Al mg/kg	As mg/kg	B mg/kg	Ba mg/kg	Be mg/kg	Ca mg/kg	Cd mg/kg	Ce mg/kg	Co mg/kg	Cr mg/kg	Cu mg/kg	Fe mg/kg	K mg/kg	La mg/kg	Li mg/kg	Mg mg/kg
Hynne	Hynne	21100	4.6	29	84.1	0.56	19400	<0.1	59.1	12.0	62.9	20.8	30600	7560	25.0	27.5	15100
Minn	Minn	17900	<2	<10	57.2	0.33	1150	<0.1	28.1	10.5	23.8	11.7	32400	6110	15.6	16.5	6480
Tana	Tana	17900	<2	<10	155	1.55	2970	<0.1	89.5	15.5	43.3	4.6	21100	6330	42.0	22.6	10200
188003	R2132MC006A 0-1 cm	6190	2.7	25	50.0	0.34	31600	<0.1	32.6	4.0	15.4	4.7	11100	2490	14.1	7.78	4320
188042	R2139MC008A 0-1 cm	12300	3.8	43	97.6	0.58	58100	<0.1	43.2	6.6	26.6	9.7	17200	4720	18.8	16.9	8450
188044	R2139MC008A 2-3 cm	13500	5.0	44	135	0.65	59200	<0.1	46.8	7.7	29.5	11.1	19200	5070	20.0	19.0	8790
188046	R2139CMC008A 4-5 cm	14000	5.5	44	90.8	0.67	57800	<0.1	47.7	8.8	30.3	11.4	20000	5210	20.5	19.5	8910
188051	R2139CMC008A 9-10 cm	12900	2.2	41	62.0	0.61	59700	<0.1	45.8	6.1	28.2	10.2	18000	5010	19.4	18.1	8360
188056	R2139CMC008A 14-15 cm	12400	2.0	38	53.9	0.58	61100	0.12	45.5	5.9	26.7	9.4	16600	4830	19.8	17.5	7710
188066	R2139CMC008A 24-25 cm	12400	3.5	37	53.1	0.58	64100	<0.1	46.2	6.6	27.2	9.1	17200	4840	19.7	17.5	7800
188070	R2139CMC008A 28-29 cm	12900	3.0	37	54.5	0.61	62700	0.10	47.4	6.8	28.0	9.4	17400	5020	20.5	18.2	8110
188076	R2183MC009A 0-1 cm	18200	5.8	59	113	0.81	61200	0.11	52.0	10.5	40.8	15.1	24400	6940	22.0	24.7	12100
188078	R2183MC009A 2-3 cm	18600	8.5	58	112	0.84	62800	<0.1	54.0	11.9	42.1	15.4	26100	7090	23.2	25.9	11800
188080	R2183MC009A 4-5 cm	18100	4.4	55	102	0.82	63400	0.11	53.6	8.9	41.1	14.8	24300	7060	22.3	25.3	11300
188085	R2183MC009A 9-10 cm	17800	2.6	54	83.2	0.81	63800	<0.1	52.1	8.6	39.6	14.1	23400	6930	22.3	24.9	10900
188090	R2183MC009A 14-15 cm	17200	2.1	51	72.2	0.77	66000	0.19	51.8	8.3	38.5	13.3	22400	6670	22.1	24.1	10500
188100	R2183MC009A 24-25 cm	16700	2.9	49	67.7	0.75	65500	<0.1	52.7	8.3	37.7	12.1	22400	6590	22.3	23.7	10300
188110	R2183MC009A 34-35 cm	17400	2.9	50	71.3	0.79	66800	0.12	53.4	8.5	39.1	12.3	22900	6780	22.8	24.2	10400
188123	R2229MC010A 0-1 cm	13200	3.7	45	90.5	0.58	61500	<0.1	41.1	7.5	31.2	9.8	18100	4970	17.7	17.6	9420
188125	R2229MC010A 2-3 cm	13000	4.7	41	83.9	0.57	59100	<0.1	40.5	7.9	30.7	9.1	18000	4700	17.4	17.2	8770
188127	R2229MC010A 4-5 cm	12900	2.3	40	75.1	0.58	59900	<0.1	40.8	6.1	30.1	9.1	16800	4940	17.9	17.4	8490
188132	R2229MC010A 9-10 cm	13600	2.3	42	60.9	0.61	63300	<0.1	42.1	6.3	31.3	8.9	17600	5090	18.7	18.1	8700
188137	R2229MC010A 14-15 cm	13700	<2	41	55.7	0.61	63500	0.11	42.5	6.5	31.4	8.9	17500	5070	18.5	18.4	8580
188147	R2229MC010A 24-25 cm	10800	2.4	30	41.9	0.48	49100	<0.1	37.6	5.6	25.3	6.5	14400	4010	16.2	14.5	7160
188153	R2229MC010A 30-31 cm	9480	2.7	25	35.4	0.42	40100	<0.1	35.4	5.1	22.1	5.6	12700	3440	15.2	12.5	6430
Hynne	Hynne	21200	3.8	29	85.2	0.56	22400	<0.1	60.2	11.6	62.4	19.4	30400	7550	25.3	26.9	15000
Minn	Minn	17900	<2	<10	57.9	0.34	1160	<0.1	31.1	10.5	24.1	11.7	32700	6080	15.7	16.2	6470
188164	R2242MC012A 0-1 cm	19600	6.0	68	122	0.93	84400	0.18	52.3	11.2	42.7	14.4	26800	8100	22.3	28.1	13800
188166	R2242MC012A 2-3 cm	20300	5.8	65	121	0.97	83400	0.17	54.3	11.9	44.2	15.0	28000	7990	23.4	29.1	13300
188168	R2242MC012A 4-5 cm	20600	5.4	64	113	0.98	82800	0.15	55.0	15.0	45.3	15.0	28500	8000	23.7	29.6	13300
188173	R2242MC012A 9-10 cm	21000	3.0	65	100	0.99	85800	0.20	56.6	10.8	46.4	15.6	28700	8670	23.6	30.6	13200
188178	R2242MC012A 14-15 cm	21400	2.6	64	101	1.01	82700	0.23	57.8	10.9	47.5	15.1	28900	8820	24.5	31.2	13500
188188	R2242MC012A 24-25 cm	22500	2.8	65	102	1.06	74800	0.30	60.0	11.8	49.3	15.9	29600	9270	25.2	33.3	13900
188202	R2242MC012A 38-39 cm	21600	2.4	59	87.4	1.03	60700	0.13	60.0	12.4	47.3	15.7	29300	8980	25.2	32.1	13600
188208	R2270MC013A 0-1 cm	14600	4.6	48	87.1	0.67	61900	0.11	44.0	7.9	31.6	10.1	19400	5700	19.1	20.2	10000

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Hynne	Hynne	417	<1	6400	41.3	597	13.1	644	6.06	<10	225	73.7	1400	63.5	14.7	76.8	23.4
Minn	Minn	238	1.3	208	19.7	385	12.3	103	3.07	<10	325	4.9	2130	33.3	10.2	61.8	10.9
Tana	Tana	370	<1	350	54.6	602	23.1	32	6.28	<10	531	33.9	506	21.0	25.9	74.0	21.9
188003	R2132MC006A 0-1 cm	412	<1	7190	10.6	681	10.7	669	2.39	<10	519	113	447	23.8	9.52	21.9	5.8
188042	R2139MC008A 0-1 cm	473	<1	13600	19.4	665	16.0	1210	4.13	<10	248	226	688	40.0	12.3	41.1	9.3
188044	R2139MC008A 2-3 cm	680	<1	11300	22.0	689	20.6	1020	4.56	<10	281	237	720	44.3	13.0	47.0	10.3
188046	R2139CMC008A 4-5 cm	1020	<1	10100	23.4	691	20.3	900	4.69	<10	245	229	752	45.7	13.4	48.1	11.0
188051	R2139CMC008A 9-10 cm	216	<1	8930	19.8	642	16.6	800	4.39	<10	256	226	717	42.0	12.9	43.0	10.7
188056	R2139CMC008A 14-15 cm	217	<1	7070	19.3	641	9.6	638	4.21	<10	386	225	726	40.4	12.9	38.2	10.1
188066	R2139CMC008A 24-25 cm	236	<1	6040	20.0	642	8.2	844	4.28	<10	306	235	728	39.3	13.0	38.8	10.4
188070	R2139CMC008A 28-29 cm	245	<1	6380	20.2	644	8.2	788	4.40	<10	353	230	754	40.4	13.3	40.3	11.0
188076	R2183MC009A 0-1 cm	946	<1	18800	29.2	683	24.3	1670	5.87	<10	224	264	917	56.3	14.2	62.1	12.7
188078	R2183MC009A 2-3 cm	865	<1	13200	29.6	765	25.0	1200	6.10	<10	225	262	949	57.6	15.0	64.7	13.6
188080	R2183MC009A 4-5 cm	299	<1	11800	28.0	682	25.3	1060	5.96	<10	209	261	930	56.1	14.8	63.1	13.6
188085	R2183MC009A 9-10 cm	280	<1	11300	27.4	657	21.7	1020	5.80	<10	236	261	929	53.8	14.6	59.7	13.6
188090	R2183MC009A 14-15 cm	280	<1	9910	26.9	662	15.7	908	5.70	<10	209	265	925	54.8	14.5	53.8	13.1
188100	R2183MC009A 24-25 cm	289	<1	8630	25.8	670	10.8	908	5.58	<10	239	259	926	50.1	14.6	51.6	13.2
188110	R2183MC009A 34-35 cm	304	<1	7580	26.8	652	10.0	960	5.76	<10	<200	261	947	52.1	14.8	53.6	13.8
188123	R2229MC010A 0-1 cm	572	<1	14300	21.6	620	15.9	1260	4.60	<10	241	246	819	41.2	12.4	45.0	10.0
188125	R2229MC010A 2-3 cm	563	<1	10100	21.0	635	14.7	920	4.53	<10	295	232	807	39.7	12.2	44.3	10.1
188127	R2229MC010A 4-5 cm	220	<1	9150	20.0	588	14.2	847	4.50	<10	233	231	839	39.3	12.3	42.6	10.3
188132	R2229MC010A 9-10 cm	229	<1	8950	20.8	600	12.1	863	4.68	<10	332	241	858	40.1	12.8	43.1	10.8
188137	R2229MC010A 14-15 cm	240	<1	7420	21.1	589	8.6	711	4.70	<10	263	242	853	40.8	12.7	42.0	10.9
188147	R2229MC010A 24-25 cm	197	<1	5290	16.9	559	5.6	772	3.84	<10	376	176	757	32.5	11.1	33.2	9.5
188153	R2229MC010A 30-31 cm	180	<1	4920	14.6	551	4.7	771	3.43	<10	432	136	715	27.5	10.4	29.2	8.6
Hynne	Hynne	423	<1	6460	40.3	599	13.0	637	6.14	<10	216	81.5	1400	63.4	14.7	76.4	23.7
Minn	Minn	239	1.4	213	19.6	395	12.5	104	3.11	<10	358	4.8	2190	33.8	10.5	62.1	11.8
188164	R2242MC012A 0-1 cm	810	<1	24600	33.5	572	21.3	2070	6.38	<10	222	367	983	59.6	15.2	65.5	14.4
188166	R2242MC012A 2-3 cm	1120	<1	16900	37.2	582	23.9	1400	6.59	<10	210	361	1000	60.9	15.7	69.0	15.3
188168	R2242MC012A 4-5 cm	1980	2.0	15300	40.7	586	23.8	1330	6.74	<10	<200	355	1020	61.9	16.1	70.3	15.7
188173	R2242MC012A 9-10 cm	320	<1	12800	34.7	568	21.3	1090	6.90	<10	<200	365	1040	65.7	16.3	71.0	16.8
188178	R2242MC012A 14-15 cm	328	<1	12900	35.4	542	13.1	1100	7.02	<10	248	345	1050	66.8	16.4	68.9	17.5
188188	R2242MC012A 24-25 cm	340	<1	11700	37.7	552	11.8	959	7.26	<10	<200	305	1100	70.0	16.5	72.2	18.6
188202	R2242MC012A 38-39 cm	343	<1	10800	37.4	535	11.8	880	6.97	<10	219	243	1070	64.1	15.8	70.5	18.8
188208	R2270MC013A 0-1 cm	506	<1	13700	22.4	568	16.0	1220	4.68	<10	250	248	784	44.3	12.8	47.5	11.3

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188210	R2270MC013A 2-3 cm	16500	4.8	50	92.8	0.76	63800	<0.1	49.2	9.2	36.3	11.2	22300	6340	20.7	23.3	10900
188212	R2270MC013A 4-5 cm	16600	5.1	49	80.9	0.77	61600	<0.1	50.7	9.5	37.1	11.0	22900	6350	21.4	23.4	10800
188217	R2270MC013A 9-10 cm	22100	5.8	58	86.8	1.04	31800	0.42	63.7	12.6	48.2	18.1	30400	8490	26.0	33.5	14100
188222	R2270MC013A 14-15 cm	21000	3.9	55	79.7	0.98	33600	0.16	61.8	11.7	45.0	15.9	27600	8240	25.2	31.9	13200
188232	R2270MC013A 24-25 cm	25600	6.3	63	95.3	1.17	22700	0.15	70.7	13.7	55.8	20.3	32900	10100	28.7	39.4	15900
188241	R2270MC013A 32-33 cm	27200	9.5	67	108	1.20	22400	0.15	78.0	15.1	64.4	22.9	37900	11200	31.5	43.2	17500
188246	R2276MC014A 0-1 cm	19100	5.0	65	114	0.91	76400	0.11	53.5	10.9	44.0	15.2	27000	7550	22.5	27.7	13200
188248	R2276MC014A 2-3 cm	19500	5.1	63	114	0.93	77300	0.12	54.2	11.1	44.7	15.1	27500	7510	22.7	28.2	13100
188250	R2276MC014A 4-5 cm	19500	8.2	64	102	0.93	77100	0.10	54.3	12.6	44.9	15.3	28900	7540	22.9	28.6	13000
188255	R2276MC014A 9-10 cm	19800	3.0	64	102	0.95	78700	0.10	55.6	10.5	45.6	15.4	27500	7720	23.2	28.9	13000
188260	R2276MC014A 14-15 cm	19800	3.3	65	92.3	0.94	78700	<0.1	54.5	10.5	45.6	15.5	27900	7680	22.9	28.8	13000
188270	R2276MC014A 24-25 cm	19700	3.1	62	85.0	0.94	78400	<0.1	54.1	10.5	45.2	14.7	27200	8140	22.8	29.1	12800
188289	R2276MC014A 43-44 cm	20900	2.9	60	84.3	1.00	70100	0.14	58.9	11.6	47.6	14.9	28500	8560	24.7	31.2	13300
188293	R2279BC060 0-1 cm	14200	4.5	49	109	0.67	70300	<0.1	42.3	8.5	33.9	11.9	20600	5650	18.0	20.8	10200
188294	R2289MC015A 0-1 cm	17800	4.9	62	152	0.84	76800	<0.1	49.9	10.5	41.4	14.8	25500	7060	20.7	25.1	12700
Hynne	Hynne	20900	4.1	30	81.3	0.55	19000	<0.1	58.2	11.9	61.9	20.1	30500	7410	24.5	27.0	15000
Minn	Minn	17800	<2	<10	56.3	0.34	1040	<0.1	29.9	10.5	23.9	12.4	32500	5990	15.9	16.1	6490
Tana	Tana	16900	<2	<10	148	1.51	2940	<0.1	84.0	15.7	42.2	4.8	20400	5780	39.2	21.9	10200
188339	R2326GR104 0-1 cm	20500	6.4	74	150	0.99	80800	0.14	53.7	12.1	46.3	15.6	29200	8320	22.3	29.9	14800
188340	R2331MC016A 0-1 cm	17800	6.1	67	175	0.85	77600	0.14	46.3	10.3	39.0	13.6	24800	7480	19.5	25.6	13700
188381	R2338MC017A 0-1 cm	20900	5.3	74	126	1.00	77000	0.14	55.4	12.3	47.3	15.6	29700	8440	23.1	30.6	15000
188383	R2338MC017A 2-3 cm	21700	4.8	71	119	1.03	77600	<0.1	56.8	12.4	48.6	15.6	30500	8410	23.8	31.5	14500
188385	R2338MC017A 4-5 cm	22100	5.4	71	124	1.07	77000	0.13	58.3	13.3	50.0	16.5	31400	8500	24.2	33.0	14500
188390	R2338MC017A 9-10 cm	22700	7.2	73	108	1.09	78900	<0.1	58.9	12.9	50.5	16.7	32900	8730	24.7	32.9	14600
188395	R2338MC017A 14-15 cm	22300	8.1	72	105	1.06	77400	0.13	57.6	13.3	49.7	16.3	32600	8700	24.0	32.2	14600
188405	R2338MC017A 24-25 cm	22600	3.7	70	99.9	1.08	81300	0.20	59.8	12.7	50.6	16.4	31200	9050	24.8	33.4	14100
188428	R2338MC017A 47-48 cm	23400	3.4	68	98.7	1.12	74200	0.25	61.8	12.9	52.1	16.6	31800	9570	25.8	34.8	14700
188486	R2354GR125 0-1 cm	19400	4.4	68	126	0.93	74200	0.10	51.5	11.3	43.4	14.1	27500	7820	21.2	28.2	13800
188487	R2359GR129 0-1 cm	17200	4.5	57	169	0.82	80400	<0.1	46.9	9.8	37.5	12.5	24000	6630	19.8	24.4	11600
188488	R2363MC019A 0-1 cm	15700	3.0	55	179	0.75	81600	<0.1	43.7	8.6	34.2	11.4	21800	6120	18.5	22.4	11300
188490	R2363MC019A 2-3 cm	16500	5.1	54	185	0.79	83800	<0.1	46.3	9.1	36.4	12.9	23600	6230	19.3	23.5	11200
188492	R2363MC019A 4-5 cm	17400	5.3	56	122	0.83	83500	<0.1	47.8	10.1	37.8	13.0	24300	6500	20.2	24.8	11500
188497	R2363MC019A 9-10 cm	17100	3.2	56	88.8	0.83	85700	0.10	47.7	8.5	37.3	12.7	23600	6650	20.0	24.7	11400
188502	R2363MC019A 14-15 cm	17000	2.9	56	82.7	0.83	84600	<0.1	48.4	8.9	37.5	12.5	23500	6520	20.1	24.9	11400
188512	R2363MC019A 24-25 cm	18300	4.1	53	72.9	0.91	58400	0.19	50.4	10.9	39.1	14.0	25200	7140	20.7	27.5	11900

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Bestemmelse av kationer, ICP-OES metode (LABdok_G09)
GEOLOGISK MATERIALE
ANALYSEKONTRAKTNR. 2021.0031

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188210	R2270MC013A 2-3 cm	625	<1	12300	26.5	584	17.7	1050	5.36	<10	<200	260	872	49.4	14.1	54.4	12.8
188212	R2270MC013A 4-5 cm	576	<1	10200	25.7	587	16.6	900	5.43	<10	220	246	893	49.7	14.4	54.7	13.7
188217	R2270MC013A 9-10 cm	304	<1	8530	36.1	543	15.7	1580	6.94	<10	210	119	913	73.1	15.6	73.8	21.3
188222	R2270MC013A 14-15 cm	297	<1	7660	32.8	520	12.6	935	6.55	<10	259	122	924	63.7	15.4	69.1	21.2
188232	R2270MC013A 24-25 cm	351	<1	8990	38.3	536	14.8	1690	7.76	<10	<200	80.3	1020	77.6	16.5	81.2	22.1
188241	R2270MC013A 32-33 cm	406	<1	9450	42.3	593	14.5	2710	8.55	<10	203	80.8	1280	82.1	17.9	91.4	24.1
188246	R2276MC014A 0-1 cm	714	<1	18500	32.6	596	20.3	1640	6.33	<10	<200	332	918	58.9	15.3	65.8	14.6
188248	R2276MC014A 2-3 cm	668	<1	15800	33.4	609	21.0	1340	6.44	<10	<200	327	928	59.8	15.5	67.2	14.9
188250	R2276MC014A 4-5 cm	724	<1	14700	33.1	696	21.3	1240	6.46	<10	<200	326	928	60.4	15.5	67.7	15.3
188255	R2276MC014A 9-10 cm	345	<1	13500	33.2	598	21.7	1200	6.55	<10	<200	331	946	61.5	15.7	68.8	15.5
188260	R2276MC014A 14-15 cm	393	<1	14300	33.3	600	21.1	1260	6.54	<10	<200	331	937	60.9	15.7	67.9	15.4
188270	R2276MC014A 24-25 cm	331	<1	13900	33.1	575	13.8	1230	6.48	<10	<200	329	938	59.6	15.4	64.4	15.6
188289	R2276MC014A 43-44 cm	362	<1	10600	34.8	586	12.3	961	6.84	<10	<200	284	1020	63.2	15.9	68.4	17.4
188293	R2279BC060 0-1 cm	629	<1	15400	24.6	548	19.0	1330	4.72	<10	218	280	709	46.3	12.3	50.3	10.9
188294	R2289MC015A 0-1 cm	745	<1	20700	30.8	616	22.7	1880	5.90	<10	<200	333	846	57.8	14.4	62.1	13.1
Hynne	Hynne	427	<1	6540	40.8	641	13.5	669	5.85	<10	221	77.0	1360	61.9	14.8	77.5	23.2
Minn	Minn	236	1.3	218	19.7	372	12.2	101	3.07	<10	347	4.8	2140	33.4	10.1	62.3	10.6
Tana	Tana	366	<1	339	54.4	606	23.4	32	6.06	<10	522	33.8	474	19.7	25.4	73.9	21.1
188339	R2326GR104 0-1 cm	793	<1	24700	35.3	575	21.2	2220	6.75	<10	<200	361	927	64.2	15.4	70.7	15.4
188340	R2331MC016A 0-1 cm	651	<1	28900	29.7	524	20.0	2430	5.72	<10	209	341	800	55.1	13.5	60.1	13.1
188381	R2338MC017A 0-1 cm	781	<1	23900	35.9	576	20.6	2060	6.88	<10	<200	342	963	65.0	15.7	71.7	15.8
188383	R2338MC017A 2-3 cm	822	<1	17900	36.7	579	19.2	1550	7.07	<10	<200	337	991	65.1	16.2	73.0	16.8
188385	R2338MC017A 4-5 cm	1900	1.7	15000	40.2	587	20.5	1280	7.26	<10	<200	339	1000	68.7	16.5	75.7	17.2
188390	R2338MC017A 9-10 cm	630	<1	15200	38.2	628	24.0	1300	7.33	<10	<200	346	1030	70.7	16.6	77.7	17.4
188395	R2338MC017A 14-15 cm	749	<1	16800	40.7	639	23.4	1400	7.22	<10	<200	344	1010	69.2	16.3	75.9	16.9
188405	R2338MC017A 24-25 cm	413	<1	11600	38.7	584	14.8	1030	7.34	<10	<200	348	1030	69.1	16.7	73.9	18.0
188428	R2338MC017A 47-48 cm	404	<1	11900	38.9	572	13.7	1110	7.54	<10	<200	311	1070	71.8	16.9	76.0	19.3
188486	R2354GR125 0-1 cm	638	<1	21200	32.5	515	17.8	1820	6.33	<10	<200	323	882	59.7	14.5	65.8	15.4
188487	R2359GR129 0-1 cm	640	<1	15700	29.0	530	19.1	1340	5.59	<10	233	345	818	52.0	14.0	58.1	13.8
188488	R2363MC019A 0-1 cm	454	<1	17200	25.1	497	15.1	1600	5.11	<10	226	339	751	47.7	13.1	52.2	13.0
188490	R2363MC019A 2-3 cm	663	<1	12600	28.3	545	18.1	1110	5.42	<10	255	351	781	50.9	13.9	57.0	13.8
188492	R2363MC019A 4-5 cm	905	<1	12400	29.1	538	19.2	1040	5.61	<10	229	347	815	52.8	14.2	58.8	14.3
188497	R2363MC019A 9-10 cm	279	<1	12100	26.7	504	15.6	1020	5.56	<10	233	349	813	51.7	14.2	56.3	14.8
188502	R2363MC019A 14-15 cm	300	<1	10900	27.5	493	11.8	920	5.57	<10	<200	343	794	51.4	14.1	56.0	15.0
188512	R2363MC019A 24-25 cm	282	<1	7730	31.5	462	10.9	866	5.78	<10	<200	221	748	56.4	13.6	60.4	18.7

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188525	R2363MC019A 37-38 cm	23400	9.6	60	81.7	1.13	27900	0.17	61.3	13.2	51.6	20.6	30500	8880	24.9	36.5	14900
188531	R2365GR141 0-1 cm	16800	4.8	58	293	0.80	86300	0.11	45.5	9.6	36.5	13.4	23700	6530	19.3	24.0	12100
Hynne	Hynne	21200	4.1	30	83.5	0.57	23500	<0.1	59.7	12.0	64.4	20.4	31000	7490	24.9	27.0	15500
Minn	Minn	17900	<2	<10	57.3	0.33	1120	<0.1	28.9	10.6	23.8	12.4	32400	6020	15.3	16.0	6460
188433	R2339MC018A 0-1 cm	22000	5.9	73	142	1.06	78800	0.12	57.0	13.2	49.3	16.3	31400	8610	23.9	32.2	14900
188434	R2339MC018A 1-2 cm	21900	6.2	72	145	1.05	77800	0.11	57.5	13.3	49.3	16.3	31400	8640	23.7	32.0	14900
188435	R2339MC018A 2-3 cm	22600	6.3	74	159	1.10	77600	0.14	59.7	14.0	51.1	17.2	32600	8790	24.9	33.7	14900
188436	R2339MC018A 3-4 cm	22200	6.5	73	158	1.08	76200	0.15	58.1	14.4	50.1	17.2	32200	8650	24.1	33.8	15100
188437	R2339MC018A 4-5 cm	22100	7.0	72	143	1.06	77400	0.15	57.8	14.9	49.7	16.7	32200	8580	23.8	32.5	14900
188438	R2339MC018A 5-6 cm	22200	7.2	71	126	1.08	77100	<0.1	58.3	14.8	50.2	16.8	32600	8660	24.3	32.6	14900
188439	R2339MC018A 6-7 cm	23100	7.3	73	123	1.11	77600	0.13	59.4	17.3	50.9	17.1	32100	8890	24.2	33.4	14800
188440	R2339MC018A 7-8 cm	23900	8.1	74	108	1.13	78500	0.12	60.3	14.7	51.4	16.7	33000	9200	24.7	34.1	14900
188441	R2339MC018A 8-9 cm	23600	9.7	74	103	1.13	78500	0.10	59.0	13.6	50.9	16.5	33100	9220	24.5	33.8	14700
188442	R2339MC018A 9-10 cm	23900	8.5	73	97.8	1.13	79100	<0.1	60.1	12.2	52.0	16.4	33800	9450	24.8	34.2	14800
188443	R2339MC018A 10-11 cm	23500	6.0	73	98.5	1.13	77000	0.11	59.1	11.9	51.3	16.2	32500	9210	24.4	33.7	14600
188444	R2339MC018A 11-12 cm	23600	5.0	73	101	1.13	78000	0.13	59.3	11.9	51.4	16.8	32000	9230	24.3	33.8	14700
188445	R2339MC018A 12-13 cm	24300	3.8	74	102	1.15	79700	0.19	60.8	11.9	52.2	17.3	31800	9720	25.1	35.0	14700
188446	R2339MC018A 13-14 cm	23900	4.1	75	98.0	1.14	78000	0.17	60.2	12.0	51.9	16.6	31400	9430	25.2	34.4	14600
188447	R2339MC018A 14-15 cm	24300	4.0	75	96.6	1.16	78700	0.25	60.9	12.2	52.6	16.9	31500	9520	25.4	34.8	14700
188448	R2339MC018A 15-16 cm	24100	3.3	73	94.9	1.15	78100	0.30	60.6	12.3	52.2	16.7	31100	9670	25.2	34.7	14600
188449	R2339MC018A 16-17 cm	24400	3.1	73	94.6	1.14	78300	0.26	60.8	12.5	52.4	16.9	31400	9500	25.2	34.4	14600
188450	R2339MC018A 17-18 cm	24000	3.6	75	94.1	1.15	78700	0.16	60.1	12.5	51.7	16.1	31100	9540	24.9	34.4	14700
188451	R2339MC018A 18-19 cm	23700	4.7	76	95.3	1.13	78900	0.17	59.8	12.6	51.7	16.8	31100	9420	24.9	34.0	14700
188452	R2339MC018A 19-20 cm	23700	3.4	74	93.3	1.15	78900	0.11	59.9	12.4	51.6	16.2	31100	9760	25.0	34.3	14700
188453	R2339MC018A 20-21 cm	23400	4.0	74	93.3	1.14	79200	0.13	59.6	12.3	51.0	16.0	31200	9560	24.8	33.8	14700
188454	R2339MC018A 21-22 cm	23600	4.1	75	92.3	1.14	79400	0.15	59.5	12.5	51.4	15.9	30900	9670	25.0	34.2	14700
188455	R2339MC018A 22-23 cm	23800	4.1	74	92.1	1.14	79000	0.18	59.4	12.7	51.5	16.0	31100	9820	24.8	34.3	14700
188456	R2339MC018A 23-24 cm	23800	4.1	74	94.3	1.13	80100	0.14	60.2	12.6	51.6	16.3	31300	9800	24.8	34.4	14700
188457	R2339MC018A 24-25 cm	23600	3.8	73	92.4	1.13	78700	0.12	59.3	12.6	51.1	15.7	31100	9820	24.8	34.2	14500
188458	R2339MC018A 25-26 cm	23600	3.5	73	91.3	1.14	78500	0.10	58.9	12.7	50.7	15.3	31000	9750	24.7	33.9	14400
188459	R2339MC018A 26-27 cm	24300	3.6	75	94.5	1.16	79700	0.12	60.5	12.9	52.3	16.2	31800	10000	25.3	34.9	14800
188460	R2339MC018A 27-28 cm	24300	3.7	75	95.7	1.16	79600	0.12	60.5	13.0	52.6	16.1	32100	10000	25.2	35.0	14800
188461	R2339MC018A 28-29 cm	24600	4.2	75	96.9	1.18	79100	0.18	60.4	13.1	52.6	16.8	31900	10000	25.3	35.3	14800
188462	R2339MC018A 29-30 cm	24400	3.8	74	94.3	1.18	79000	0.19	60.4	13.1	52.3	16.8	31500	9980	25.5	35.0	14600
188463	R2339MC018A 30-31 cm	24200	3.8	72	96.2	1.16	80000	0.15	60.1	13.0	52.2	16.3	31500	9830	24.9	34.4	14500

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188525	R2363MC019A 37-38 cm	330	<1	9310	38.3	506	14.3	1950	7.14	<10	<200	90.0	778	74.5	15.1	74.1	21.2
188531	R2365GR141 0-1 cm	687	<1	19000	28.6	540	19.9	1710	5.46	<10	<200	377	786	52.1	13.9	57.3	13.3
Hynne	Hynne	467	<1	6470	41.4	595	12.8	642	6.00	<10	<200	80.7	1390	63.2	14.6	78.8	23.6
Minn	Minn	241	1.3	218	19.4	392	12.4	104	3.07	<10	267	4.8	2140	33.7	10.4	62.1	11.0
188433	R2339MC018A 0-1 cm	1040	<1	19000	38.0	596	22.4	1570	7.17	<10	<200	351	1000	67.7	16.2	75.5	16.6
188434	R2339MC018A 1-2 cm	1050	<1	19700	38.3	588	22.6	1750	7.21	<10	<200	348	988	67.5	16.2	75.4	16.9
188435	R2339MC018A 2-3 cm	1660	1.3	16200	42.6	603	24.8	1320	7.46	<10	<200	351	1020	70.1	16.8	79.0	17.5
188436	R2339MC018A 3-4 cm	3060	2.9	18100	44.7	599	26.0	1530	7.31	<10	<200	344	994	69.9	16.5	78.6	17.1
188437	R2339MC018A 4-5 cm	1780	1.1	17900	40.2	596	25.9	1480	7.25	<10	<200	346	984	68.4	16.4	77.1	16.9
188438	R2339MC018A 5-6 cm	1380	<1	16900	39.2	613	25.9	1390	7.29	<10	<200	346	996	69.6	16.5	78.1	17.1
188439	R2339MC018A 6-7 cm	1490	<1	17100	41.1	624	26.4	1360	7.41	<10	260	336	1050	70.3	16.5	78.6	16.9
188440	R2339MC018A 7-8 cm	908	<1	16300	40.1	644	25.1	1320	7.47	<10	220	337	1060	71.2	16.7	78.7	17.3
188441	R2339MC018A 8-9 cm	716	<1	15800	38.4	650	23.6	1260	7.38	<10	238	333	1070	71.0	16.4	77.7	17.3
188442	R2339MC018A 9-10 cm	426	<1	14400	38.6	637	22.1	1190	7.53	<10	218	330	1070	71.9	16.8	78.3	17.8
188443	R2339MC018A 10-11 cm	445	<1	15000	37.8	594	19.5	1210	7.40	<10	<200	321	1060	70.1	16.5	76.0	17.5
188444	R2339MC018A 11-12 cm	515	<1	15600	37.9	581	19.6	1300	7.42	<10	<200	323	1070	71.2	16.6	76.2	17.6
188445	R2339MC018A 12-13 cm	389	<1	14100	38.6	575	19.6	1170	7.54	<10	<200	330	1100	75.4	16.8	77.5	18.2
188446	R2339MC018A 13-14 cm	427	<1	14800	38.3	575	18.1	1220	7.50	<10	<200	319	1100	70.9	16.7	76.2	17.8
188447	R2339MC018A 14-15 cm	429	<1	13800	38.9	574	17.1	1120	7.58	<10	205	324	1100	72.0	16.9	77.3	18.2
188448	R2339MC018A 15-16 cm	391	<1	13900	39.3	566	16.3	1170	7.54	<10	231	318	1100	72.6	16.7	76.7	18.3
188449	R2339MC018A 16-17 cm	411	<1	13300	39.4	569	15.5	1060	7.54	<10	209	320	1090	73.3	16.7	76.6	18.3
188450	R2339MC018A 17-18 cm	456	<1	15100	39.0	568	16.1	1240	7.49	<10	<200	322	1090	70.4	16.6	75.9	18.0
188451	R2339MC018A 18-19 cm	466	<1	15400	38.6	572	17.1	1310	7.47	<10	<200	326	1080	71.1	16.5	76.5	17.8
188452	R2339MC018A 19-20 cm	404	<1	15300	38.5	571	16.9	1270	7.48	<10	221	329	1080	68.4	16.5	76.3	17.7
188453	R2339MC018A 20-21 cm	418	<1	15700	38.1	567	17.9	1250	7.40	<10	246	324	1070	69.2	16.4	75.7	17.6
188454	R2339MC018A 21-22 cm	424	<1	15900	38.2	571	16.3	1300	7.46	<10	226	326	1090	69.7	16.5	75.0	17.6
188455	R2339MC018A 22-23 cm	406	<1	15900	38.5	571	15.2	1300	7.46	<10	223	326	1090	70.1	16.5	75.2	17.8
188456	R2339MC018A 23-24 cm	410	<1	15200	38.6	575	16.2	1200	7.47	<10	242	328	1080	70.3	16.6	75.3	17.9
188457	R2339MC018A 24-25 cm	408	<1	14800	38.3	568	14.9	1220	7.41	<10	<200	325	1090	69.4	16.4	74.2	17.9
188458	R2339MC018A 25-26 cm	411	<1	14800	37.9	569	14.7	1190	7.36	<10	<200	326	1080	67.9	16.3	73.9	17.6
188459	R2339MC018A 26-27 cm	430	<1	14800	39.4	580	14.9	1210	7.57	<10	208	326	1110	70.2	16.7	76.2	18.2
188460	R2339MC018A 27-28 cm	434	<1	14100	39.6	580	14.3	1150	7.56	<10	215	328	1110	71.7	16.7	76.5	18.4
188461	R2339MC018A 28-29 cm	432	<1	14600	39.7	581	14.5	1150	7.59	<10	223	325	1110	72.2	16.7	76.5	18.4
188462	R2339MC018A 29-30 cm	431	<1	13900	39.6	577	14.7	1150	7.57	<10	212	327	1110	71.9	16.7	76.1	18.2
188463	R2339MC018A 30-31 cm	414	<1	12600	39.4	578	14.3	1070	7.53	<10	221	328	1100	71.6	16.6	75.8	18.4

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GEOLOGISK MATERIALE
ANALYSEKONTRAKTNR. 2021.0031

NORSK AKKREDITERING TEST 020

NB! S, Se, Si omfattes ikke av akkreditering. For andre unntak se Anmerkninger

NGU-nr	Prøve ID	Al mg/kg	As mg/kg	B mg/kg	Ba mg/kg	Be mg/kg	Ca mg/kg	Cd mg/kg	Ce mg/kg	Co mg/kg	Cr mg/kg	Cu mg/kg	Fe mg/kg	K mg/kg	La mg/kg	Li mg/kg	Mg mg/kg
188464	R2339MC018A 31-32 cm	24000	3.7	72	95.1	1.16	78600	0.18	60.7	12.8	52.0	16.5	31200	9730	24.9	34.2	14400
188465	R2339MC018A 32-33 cm	24700	3.5	72	99.0	1.17	79300	0.19	61.0	12.9	53.0	16.8	31800	9850	25.3	35.0	14400
188466	R2339MC018A 33-34 cm	25000	4.0	73	98.2	1.18	79300	0.22	61.2	12.7	52.7	17.2	31600	9980	25.6	35.2	14600
188467	R2339MC018A 34-35 cm	23900	3.7	71	97.0	1.15	77100	0.24	60.4	12.6	52.0	17.2	31400	9720	25.0	34.3	14400
188468	R2339MC018A 35-36 cm	24200	3.5	71	97.2	1.15	76900	0.33	60.6	12.8	52.1	16.9	31400	9720	25.1	34.4	14400
188469	R2339MC018A 36-37 cm	24100	3.9	71	97.2	1.15	77700	0.31	60.9	12.7	51.9	16.2	31200	9720	25.2	34.4	14500
188470	R2339MC018A 37-38 cm	24000	3.8	71	94.9	1.14	77800	0.23	60.4	13.0	51.6	16.1	31300	9660	25.2	34.6	14400
188471	R2339MC018A 38-39 cm	24400	3.6	72	97.6	1.17	78800	0.21	61.3	13.0	52.7	16.2	32000	9910	25.9	35.3	14500
188472	R2339MC018A 39-40 cm	24000	3.9	71	94.2	1.15	78600	0.16	60.4	12.7	51.6	15.9	31200	9670	25.1	34.3	14300
188473	R2339MC018A 40-41 cm	23800	4.1	71	94.8	1.15	79200	0.17	60.5	12.8	51.8	15.9	31300	9660	25.3	34.3	14300
188474	R2339MC018A 41-42 cm	23900	4.7	72	93.5	1.14	78500	0.22	59.5	12.8	51.1	16.5	31000	9660	25.1	34.2	14300
188475	R2339MC018A 42-43 cm	24400	3.5	71	96.8	1.16	77000	0.16	62.1	13.0	52.9	16.7	31900	9790	25.7	35.0	14400
188476	R2339MC018A 43-44 cm	24500	4.1	72	95.2	1.16	80000	0.16	61.0	13.6	52.0	16.4	31600	9790	25.6	34.9	14400
Hynne	Hynne	21500	4.4	29	78.7	0.59	18800	<0.1	61.0	11.8	62.5	20.3	29800	7610	25.4	26.4	15000
Minn	Minn	18200	2.2	<10	55.8	0.35	1100	<0.1	29.1	10.8	23.6	12.1	31700	6090	16.0	15.9	6440
Tana	Tana	17600	<2	<10	143	1.56	2960	<0.1	85.5	15.3	42.1	4.7	20000	6110	40.1	21.4	9980

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NGU-nr	Prøve ID	Mn mg/kg	Mo mg/kg	Na mg/kg	Ni mg/kg	P mg/kg	Pb mg/kg	S mg/kg	Sc mg/kg	Se mg/kg	Si mg/kg	Sr mg/kg	Ti mg/kg	V mg/kg	Y mg/kg	Zn mg/kg	Zr mg/kg
188464	R2339MC018A 31-32 cm	408	<1	13000	39.3	570	13.8	1070	7.51	<10	<200	323	1100	72.0	16.6	75.7	18.2
188465	R2339MC018A 32-33 cm	407	<1	11000	39.8	584	13.7	916	7.63	<10	<200	321	1110	73.6	16.8	76.9	18.7
188466	R2339MC018A 33-34 cm	410	<1	13000	39.6	575	13.7	1050	7.61	<10	221	328	1130	73.5	16.8	76.7	18.6
188467	R2339MC018A 34-35 cm	399	<1	11900	39.2	567	13.5	998	7.48	<10	<200	312	1100	73.4	16.6	76.2	18.4
188468	R2339MC018A 35-36 cm	399	<1	12000	39.7	568	13.4	1000	7.52	<10	<200	319	1100	73.6	16.6	76.3	18.6
188469	R2339MC018A 36-37 cm	401	<1	12000	39.5	571	13.7	1060	7.50	<10	<200	317	1110	71.6	16.6	76.1	18.5
188470	R2339MC018A 37-38 cm	408	<1	11500	39.6	597	13.6	1000	7.47	<10	<200	321	1100	70.4	16.5	75.6	18.5
188471	R2339MC018A 38-39 cm	415	<1	10600	39.8	586	13.3	871	7.60	<10	202	325	1130	72.1	16.9	77.3	19.0
188472	R2339MC018A 39-40 cm	409	<1	11700	38.7	576	14.6	1020	7.46	<10	<200	322	1100	70.0	16.5	75.6	18.4
188473	R2339MC018A 40-41 cm	409	<1	10800	39.0	582	13.9	981	7.49	<10	<200	321	1110	70.7	16.6	75.6	18.6
188474	R2339MC018A 41-42 cm	411	<1	12900	39.4	575	15.2	1150	7.38	<10	<200	320	1100	71.2	16.3	74.9	17.9
188475	R2339MC018A 42-43 cm	408	<1	10300	40.0	578	13.8	883	7.62	<10	<200	309	1130	72.6	16.8	77.2	19.0
188476	R2339MC018A 43-44 cm	412	<1	11200	41.3	585	15.3	993	7.52	<10	<200	329	1120	70.7	16.7	76.2	18.6
Hynne	Hynne	440	<1	6280	40.8	610	12.8	625	5.95	<10	238	73.2	1450	62.3	14.5	80.6	22.9
Minn	Minn	330	1.3	217	19.6	378	12.9	101	3.03	<10	388	4.6	2200	32.9	10.1	62.0	11.0
Tana	Tana	368	<1	336	53.4	607	23.0	32	6.03	<10	547	32.1	509	20.3	25.0	73.2	20.6

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Bestemmelse av kvikksølv, CV-AAS metode
GEOLOGISK MATERIALE
Analysekontraktnr. 2021.0031

METODE: **Analyse av kvikksølv i oppsluttete geologiske materialer (LABdok_G10 under etablering)**
Prinsipp: Analysemetoden er basert på kalddamp teknikk (CV-AAS) med $SnCl_2$ som reduksjonsmiddel
Analyseinstrument: Teledyne Leeman Labs QuickTrace® M-7600Mercury Analyzer

Framstilling av analyseløsninger: **iht. prosedyre i LABdok_P03: Framstilling av analyseløsninger etter partiell oppslutning i salpetersyre iht. NS-4770**
Merknad: Prøvebehandling iht. NS-4770 er en selektiv oppslutningsmetode og medfører ikke total dekomponering. Rapporterte analyseverdier representerer derfor ikke totalt innhold i prøve.

Nedre bestemmelsesgrense (LLQ): **0.005** **mg/kg**
**Basert på fortynningsfaktor 100, dvs. 1 (± 0.001) g prøve fortynnes i 100 ml analysevolum.*
For analyser med fortynningsfaktor som avviker fra 100, blir deteksjonsgrensene og måleområdene automatisk omregnet.

Analyseusikkerhet: **± 40 % rel.** *måleområdet 0.005 - 0.025 mg/kg*
± 20 % rel. *måleområdet 0.025 - 2.00 mg/kg*
Oppgitt usikkerhet har dekningsfaktor 2 (2 standardavvik), noe som tilsvarer et konfidensintervall på 95 %

Kontrollrutiner: Det analyseres rutinemessig kontrollprøver som føres i kontrolldiagram (X-diagram). Disse kan forevises om ønskelig.

Analysekontrakt nr.: 2021.0031 Prøvematerial: GEOLOGISK MATERIALE
Antall prøver: 121
Anmerkninger:

Delrapport med forside ("Forside_Hg") og sider med analysedata ("Data_Hg"). Fullstendig analyserapport finnes kun i papirformat.
Gjengivelse av analysedata skal skje på en slik måte at meningsinnholdet i rapporten ikke endres.
Merk! Rapporten er skrivebeskyttet.

Ferdig analysert (dato): 05.05.2021
Operatør: Arlinda F. Ciftja

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GEOLOGISK MATERIALE
Analysekontraktnr. 2021.0031

NGU-nr.	Prøve ID	Hg mg/kg
Hynne	Hynne	0.0261
Minn	Minn	< 0.005
Tana	Tana	< 0.005
188003	R2132MC006A 0-1 cm	0.0134
188042	R2139MC008A 0-1 cm	0.0207
188044	R2139MC008A 2-3 cm	0.0230
188046	R2139CMC008A 4-5 cm	0.0227
188051	R2139CMC008A 9-10 cm	0.0187
188056	R2139CMC008A 14-15 cm	0.0129
188066	R2139CMC008A 24-25 cm	0.0115
188070	R2139CMC008A 28-29 cm	0.0119
188076	R2183MC009A 0-1 cm	0.0305
188078	R2183MC009A 2-3 cm	0.0283
188080	R2183MC009A 4-5 cm	0.0257
188085	R2183MC009A 9-10 cm	0.0244
188090	R2183MC009A 14-15 cm	0.0164
188100	R2183MC009A 24-25 cm	0.0139
188110	R2183MC009A 34-35 cm	0.0125
188123	R2229MC010A 0-1 cm	0.0198
188125	R2229MC010A 2-3 cm	0.0172
188127	R2229MC010A 4-5 cm	0.0154
188132	R2229MC010A 9-10 cm	0.0151
188137	R2229MC010A 14-15 cm	0.0105
188147	R2229MC010A 24-25 cm	0.0078
188153	R2229MC010A 30-31 cm	0.0075
Hynne	Hynne	0.0245
Minn	Minn	< 0.005
188164	R2242MC012A 0-1 cm	0.0253
188166	R2242MC012A 2-3 cm	0.0255
188168	R2242MC012A 4-5 cm	0.0235
188173	R2242MC012A 9-10 cm	0.0232
188178	R2242MC012A 14-15 cm	0.0166
188188	R2242MC012A 24-25 cm	0.0153
188202	R2242MC012A 38-39 cm	0.0142

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NGU-nr.	Prøve ID	Hg mg/kg
188208	R2270MC013A 0-1 cm	0.0202
188210	R2270MC013A 2-3 cm	0.0214
188212	R2270MC013A 4-5 cm	0.0171
188217	R2270MC013A 9-10 cm	0.0192
188222	R2270MC013A 14-15 cm	0.0167
188232	R2270MC013A 24-25 cm	0.0194
188241	R2270MC013A 32-33 cm	0.0151
188246	R2276MC014A 0-1 cm	0.0261
188248	R2276MC014A 2-3 cm	0.0253
188250	R2276MC014A 4-5 cm	0.0254
188255	R2276MC014A 9-10 cm	0.0252
188260	R2276MC014A 14-15 cm	0.0236
188270	R2276MC014A 24-25 cm	0.0161
188289	R2276MC014A 43-44 cm	0.0165
188293	R2279BC060 0-1 cm	0.0293
188294	R2289MC015A 0-1 cm	0.0293
Hynne	Hynne	0.0285
Minn	Minn	< 0.005
Tana	Tana	< 0.005
188339	R2326GR104 0-1 cm	0.0267
188340	R2331MC016A 0-1 cm	0.0274
188381	R2338MC017A 0-1 cm	0.0279
188383	R2338MC017A 2-3 cm	0.0273
188385	R2338MC017A 4-5 cm	0.0243
188390	R2338MC017A 9-10 cm	0.0248
188395	R2338MC017A 14-15 cm	0.0267
188405	R2338MC017A 24-25 cm	0.0200
188428	R2338MC017A 47-48 cm	0.0178
188486	R2354GR125 0-1 cm	0.0238
188487	R2359GR129 0-1 cm	0.0263
188488	R2363MC019A 0-1 cm	0.0203
188490	R2363MC019A 2-3 cm	0.0263
188492	R2363MC019A 4-5 cm	0.0252
188497	R2363MC019A 9-10 cm	0.0194

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NGU-nr.	Prøve ID	Hg mg/kg
188502	R2363MC019A 14-15 cm	0.0163
188512	R2363MC019A 24-25 cm	0.0156
188525	R2363MC019A 37-38 cm	0.0195
188531	R2365GR141 0-1 cm	0.0278
Hynne	Hynne	0.0236
Minn	Minn	< 0.005
188433	R2339MC018A 0-1 cm	0.0225
188434	R2339MC018A 1-2 cm	0.0262
188435	R2339MC018A 2-3 cm	0.0296
188436	R2339MC018A 3-4 cm	0.0255
188437	R2339MC018A 4-5 cm	0.0245
188438	R2339MC018A 5-6 cm	0.0263
188439	R2339MC018A 6-7 cm	0.0255
188440	R2339MC018A 7-8 cm	0.0256
188441	R2339MC018A 8-9 cm	0.0285
188442	R2339MC018A 9-10 cm	0.0240
188443	R2339MC018A 10-11 cm	0.0233
188444	R2339MC018A 11-12 cm	0.0233
188445	R2339MC018A 12-13 cm	0.0175
188446	R2339MC018A 13-14 cm	0.0208
188447	R2339MC018A 14-15 cm	0.0213
188448	R2339MC018A 15-16 cm	0.0194
188449	R2339MC018A 16-17 cm	0.0200
188450	R2339MC018A 17-18 cm	0.0196
188451	R2339MC018A 18-19 cm	0.0213
188452	R2339MC018A 19-20 cm	0.0181
188453	R2339MC018A 20-21 cm	0.0217
188454	R2339MC018A 21-22 cm	0.0197
188455	R2339MC018A 22-23 cm	0.0193
188456	R2339MC018A 23-24 cm	0.0187
188457	R2339MC018A 24-25 cm	0.0180
188458	R2339MC018A 25-26 cm	0.0173
188459	R2339MC018A 26-27 cm	0.0184
188460	R2339MC018A 27-28 cm	0.0181

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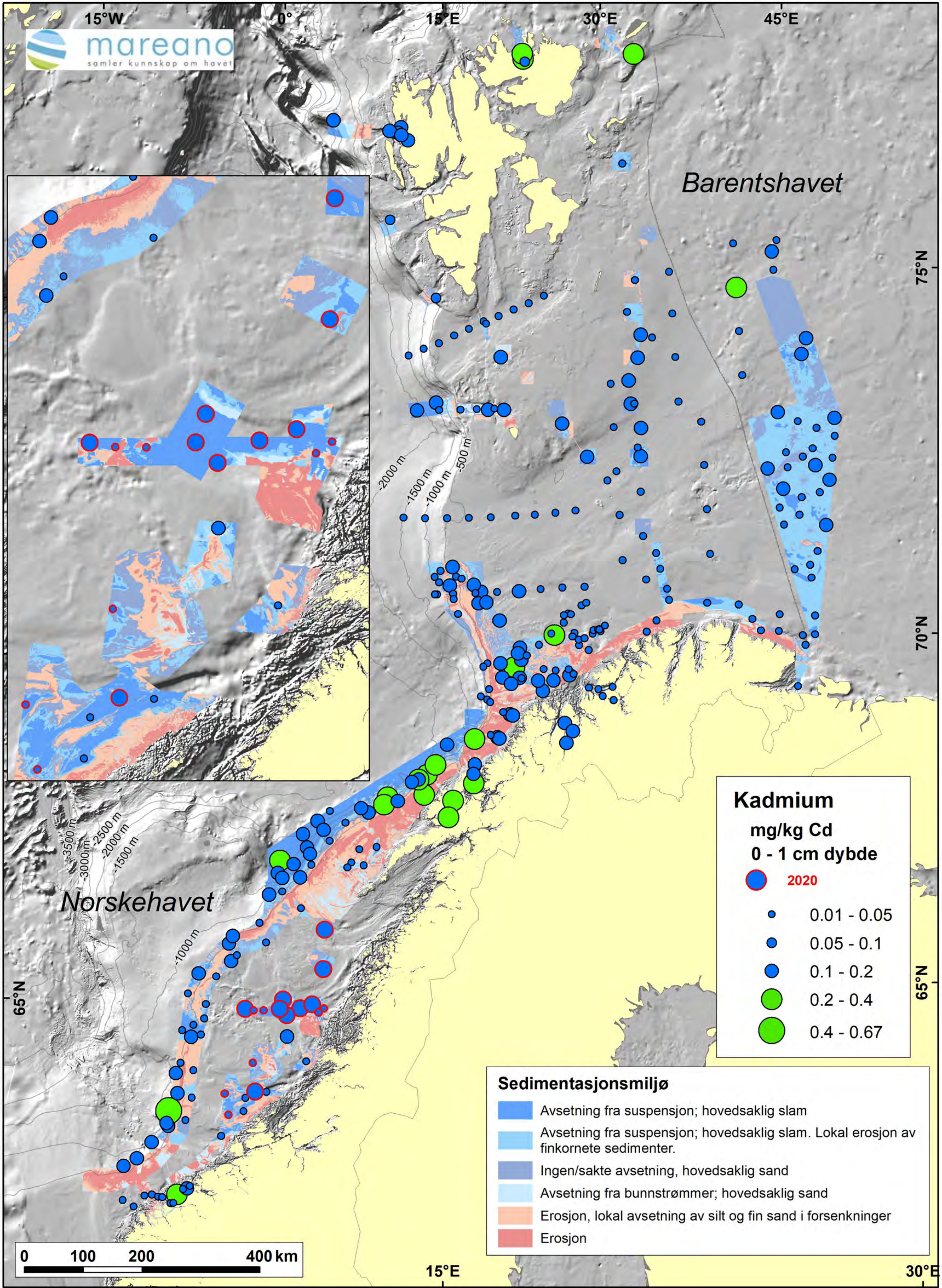
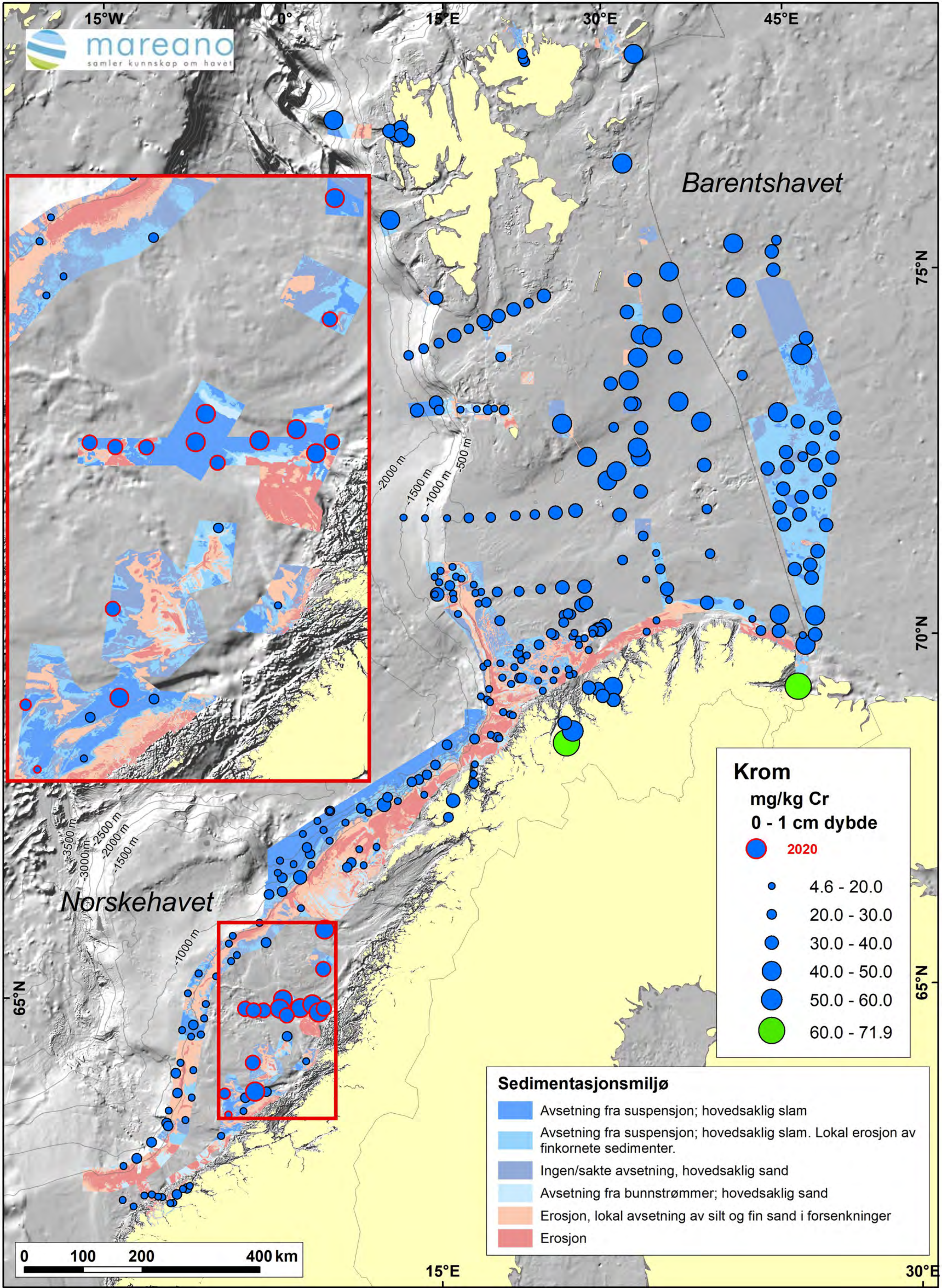
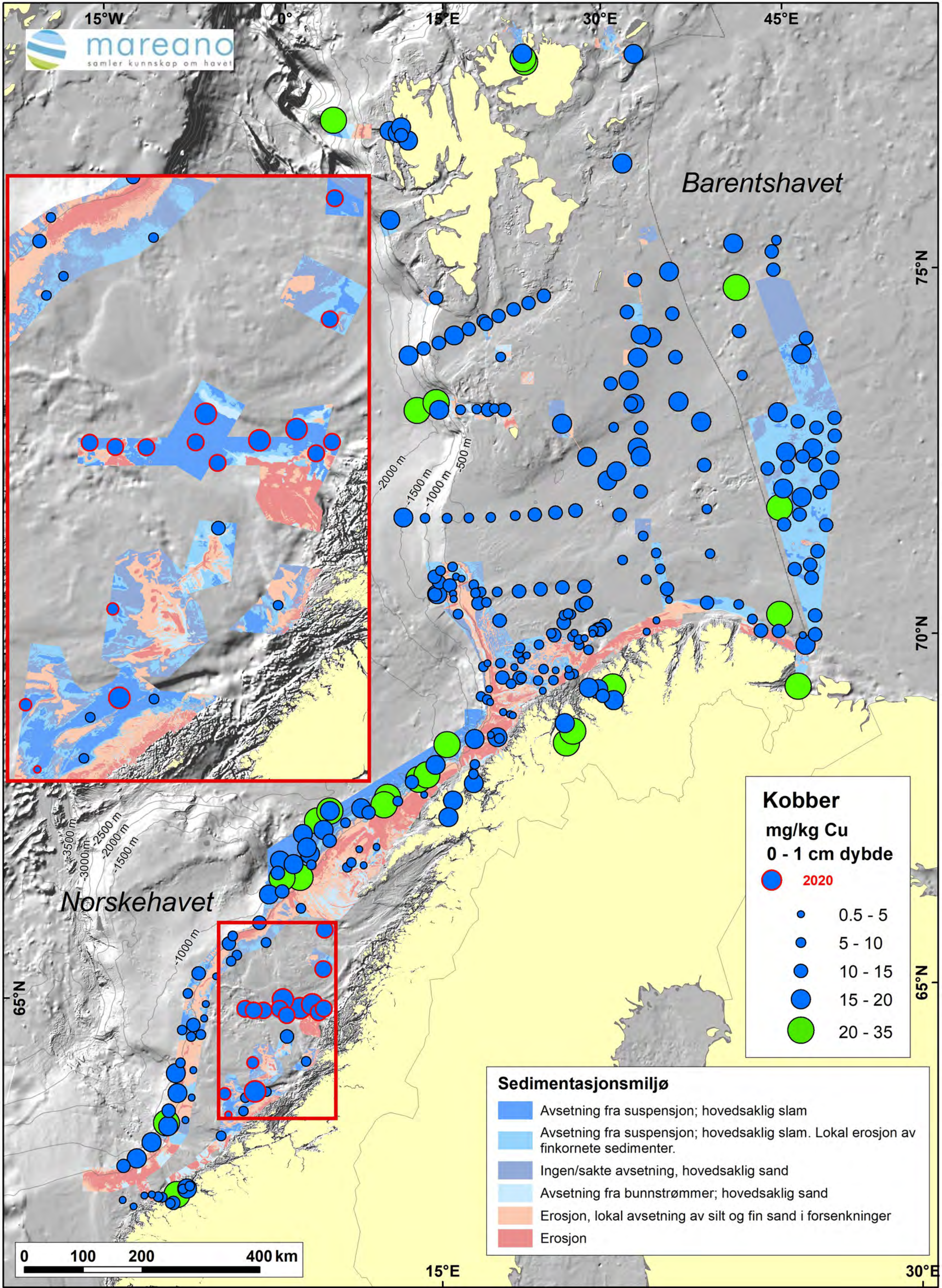
NGU-nr.	Prøve ID	Hg
		mg/kg
188461	R2339MC018A 28-29 cm	0.0191
188462	R2339MC018A 29-30 cm	0.0174
188463	R2339MC018A 30-31 cm	0.0175
188464	R2339MC018A 31-32 cm	0.0183
188465	R2339MC018A 32-33 cm	0.0186
188466	R2339MC018A 33-34 cm	0.0168
188467	R2339MC018A 34-35 cm	0.0162
188468	R2339MC018A 35-36 cm	0.0187
188469	R2339MC018A 36-37 cm	0.0169
188470	R2339MC018A 37-38 cm	0.0171
188471	R2339MC018A 38-39 cm	0.0174
188472	R2339MC018A 39-40 cm	0.0171
188473	R2339MC018A 40-41 cm	0.0177
188474	R2339MC018A 41-42 cm	0.0183
188475	R2339MC018A 42-43 cm	0.0171
188476	R2339MC018A 43-44 cm	0.0180
Hynne	Hynne	0.0246
Minn	Minn	< 0.005
Tana	Tana	< 0.005

Vedlegg 2

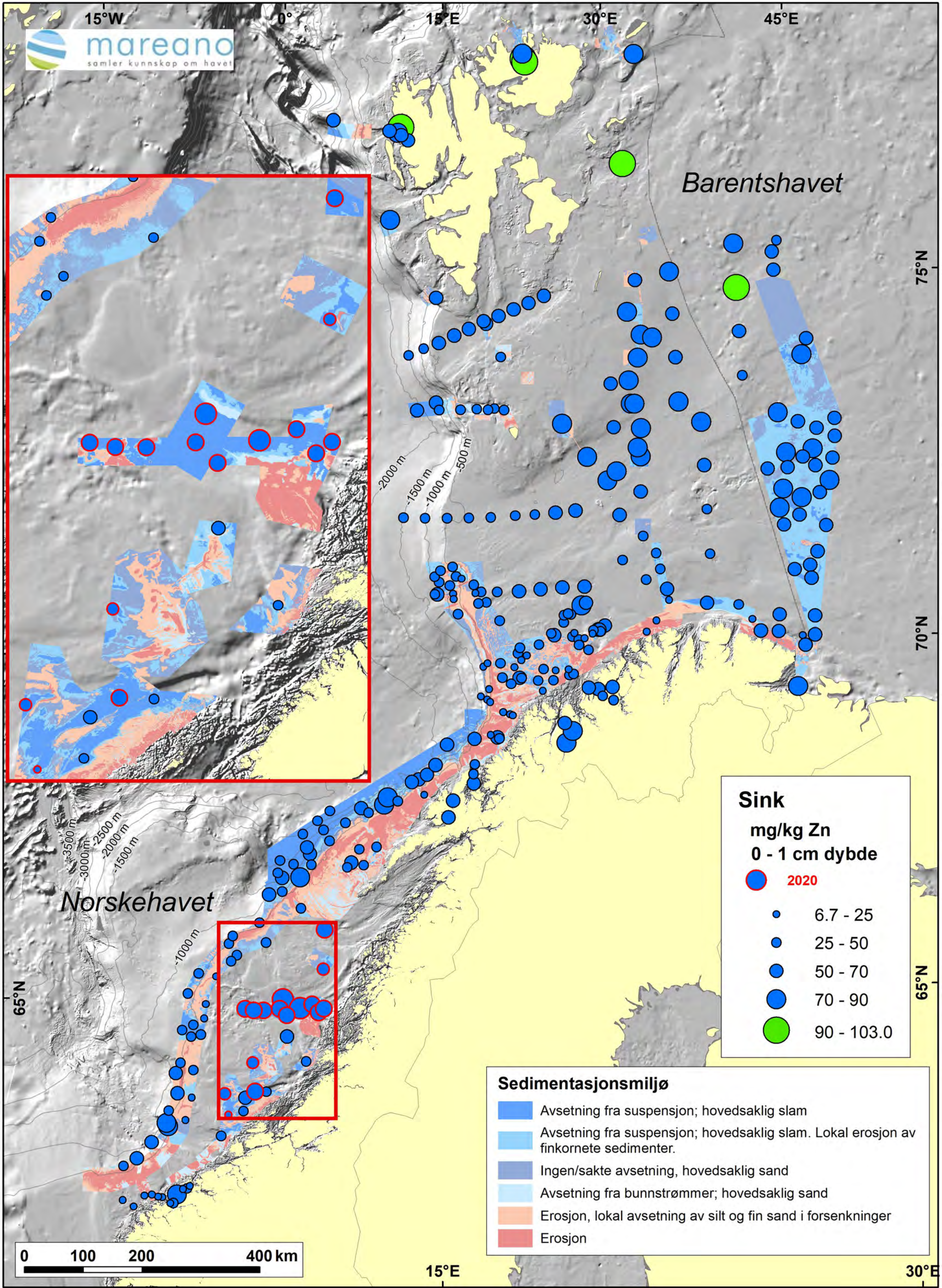
Cd, Cr, Cu og Zn kart i prøvene 0-1 cm dyp og sedimentasjonsrater basert på ^{210}Pb-data.


15°W
0°
15°E
30°E
45°E
mareano
samler kunnskap om havet
Barentshavet
Norskehavet
75°N
70°N
65°N
-2000 m
-1500 m
-1000 m
-500 m
-3500 m
-3000 m
-2500 m
Kadmium
mg/kg Cd
0 - 1 cm dybde
2020
0.01 - 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.4
0.4 - 0.67
Sedimentasjonsmiljø
Avsetning fra suspensjon; hovedsaklig slam
Avsetning fra suspensjon; hovedsaklig slam. Lokal erosjon av finkornete sedimenter.
Ingen/sakte avsetning, hovedsaklig sand
Avsetning fra bunnstrømmer; hovedsaklig sand
Erosjon, lokal avsetning av silt og fin sand i forsenkninger
Erosjon
0
100
200
400 km

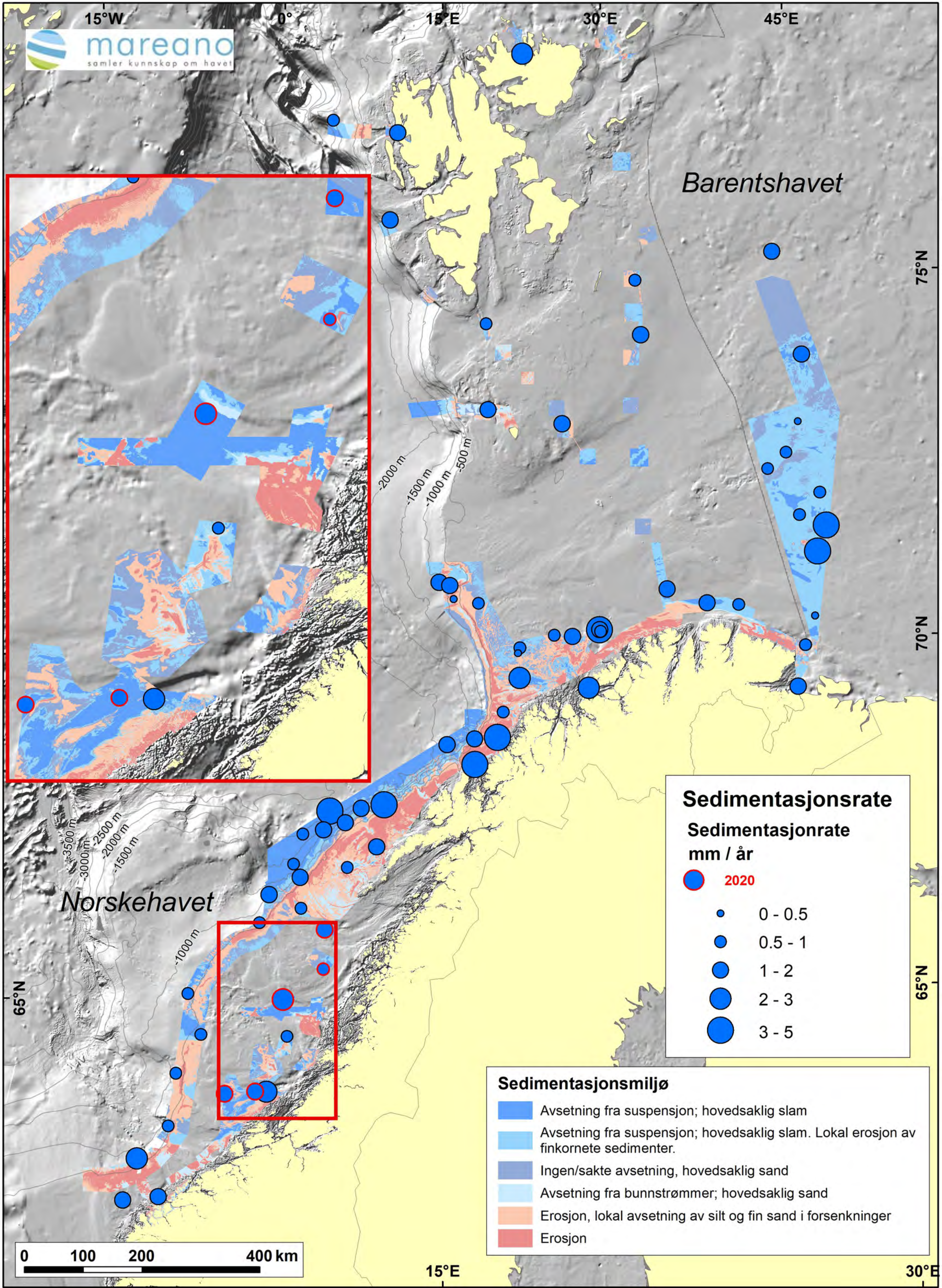

15°W
0°
15°E
30°E
45°E
Barentshavet
Norskehavet
75°N
70°N
65°N
-2000 m
-1500 m
-1000 m
-500 m
-3500 m
-3000 m
-2500 m
Krom
mg/kg Cr
0 - 1 cm dybde
2020
4.6 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 71.9
Sedimentasjonsmiljø
Avsetning fra suspensjon; hovedsaklig slam
Avsetning fra suspensjon; hovedsaklig slam. Lokal erosjon av finkornete sedimenter.
Ingen/sakte avsetning, hovedsaklig sand
Avsetning fra bunnstrømmer; hovedsaklig sand
Erosjon, lokal avsetning av silt og fin sand i forsenkninger
Erosjon
0 100 200 400 km



15°W
0°
15°E
30°E
45°E
mareano
samler kunnskap om havet
Barentshavet
Norskehavet
75°N
70°N
65°N
65°N
-2000 m
-1500 m
-1000 m
-500 m
-3500 m
-3000 m
-2500 m
-2000 m
-1500 m
-1000 m
Kobber
mg/kg Cu
0 - 1 cm dybde
2020
0.5 - 5
5 - 10
10 - 15
15 - 20
20 - 35
Sedimentasjonsmiljø
Avsetning fra suspensjon; hovedsaklig slam
Avsetning fra suspensjon; hovedsaklig slam. Lokal erosjon av finkornete sedimenter.
Ingen/sakte avsetning, hovedsaklig sand
Avsetning fra bunnstrømmer; hovedsaklig sand
Erosjon, lokal avsetning av silt og fin sand i forsenkninger
Erosjon
0
100
200
400 km
15°E
30°E



mareano
samler kunnskap om havet
15°W
0°
15°E
30°E
45°E
Barentshavet
Norskehavet
75°N
70°N
65°N
-2000 m
-1500 m
-1000 m
-500 m
-3500 m
-3000 m
-2500 m
-2000 m
-1500 m
-1000 m
Sink
mg/kg Zn
0 - 1 cm dybde
2020
6.7 - 25
25 - 50
50 - 70
70 - 90
90 - 103.0
Sedimentasjonsmiljø
Avsetning fra suspensjon; hovedsaklig slam
Avsetning fra suspensjon; hovedsaklig slam. Lokal erosjon av finkornete sedimenter.
Ingen/sakte avsetning, hovedsaklig sand
Avsetning fra bunnstrømmer; hovedsaklig sand
Erosjon, lokal avsetning av silt og fin sand i forsenkninger
Erosjon
0 100 200 400 km
15°E
30°E

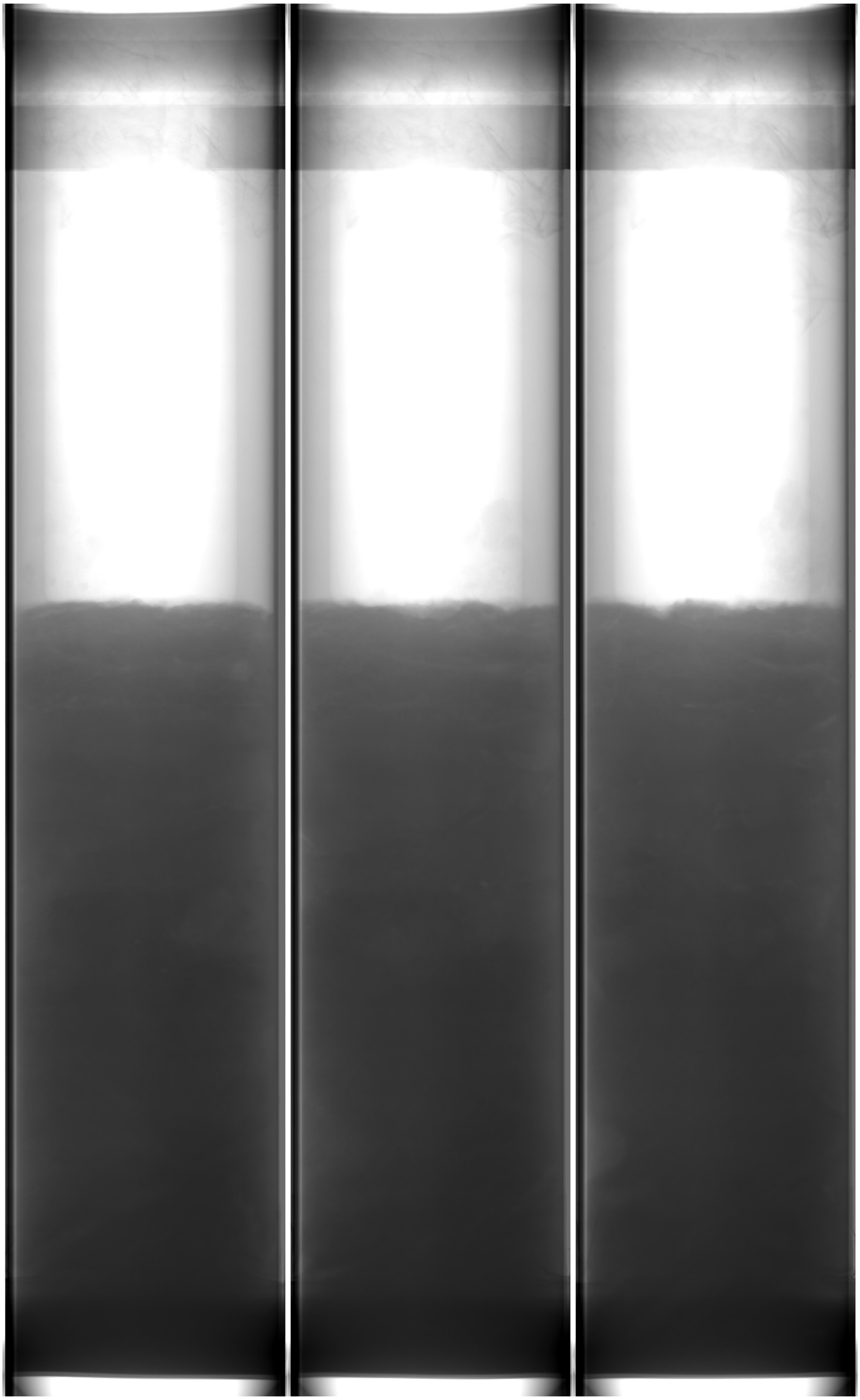

mareano
samler kunnskap om havet
15°W
0°
15°E
30°E
45°E
Barentshavet
Norskehavet
75°N
70°N
65°N
65°N
-2000 m
-1500 m
-1000 m
-500 m
-3500 m
-3000 m
-2500 m
-2000 m
-1500 m
-1000 m
Sedimentasjonsrate
Sedimentasjonrate
mm / år
2020
0 - 0.5
0.5 - 1
1 - 2
2 - 3
3 - 5
Sedimentasjonsmiljø
Avsetning fra suspensjon; hovedsaklig slam
Avsetning fra suspensjon; hovedsaklig slam. Lokal erosjon av finkornete sedimenter.
Ingen/sakte avsetning, hovedsaklig sand
Avsetning fra bunnstrømmer; hovedsaklig sand
Erosjon, lokal avsetning av silt og fin sand i forsenkninger
Erosjon
0
100
200
400 km
15°E
30°E

Vedlegg 3

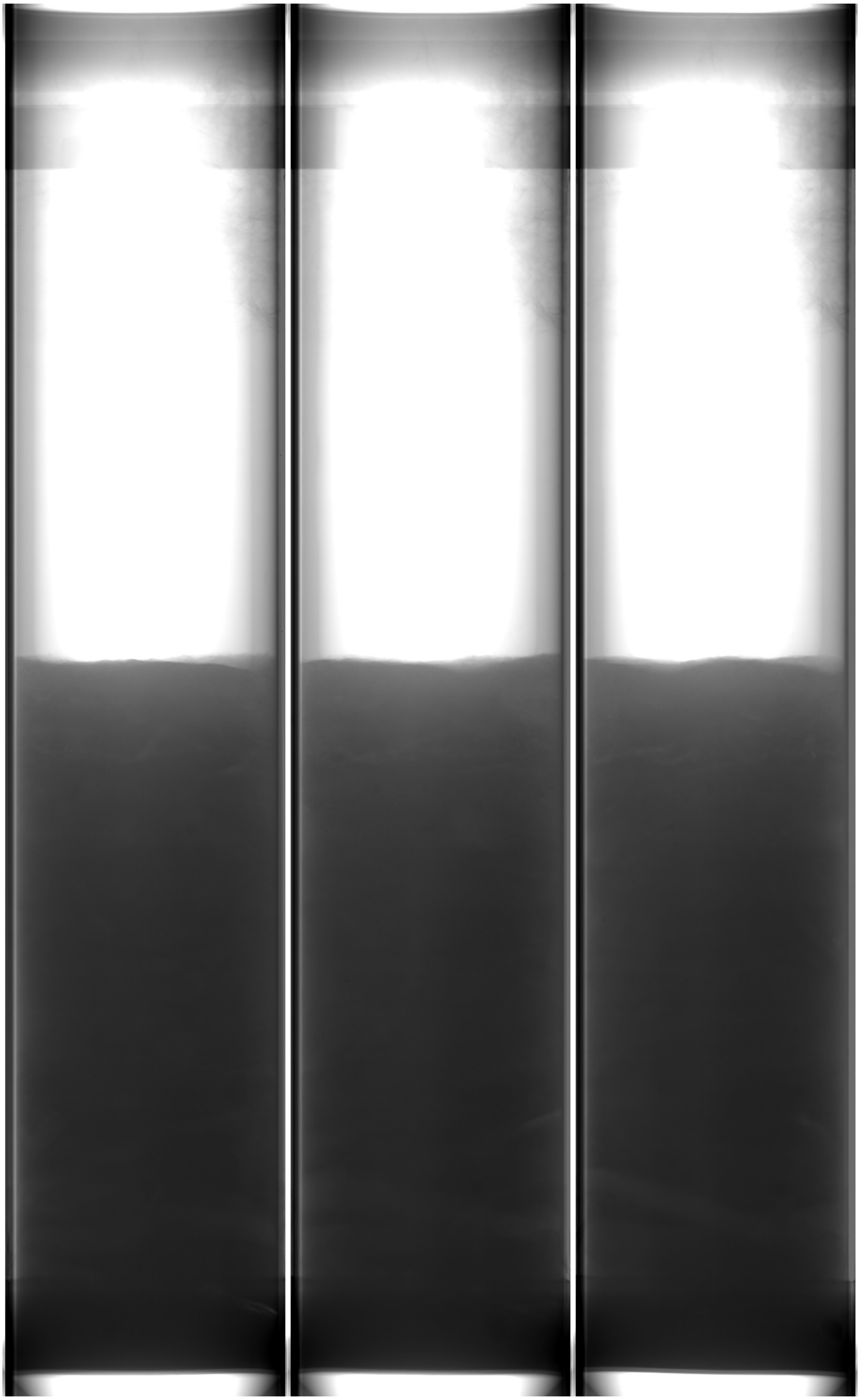
XRI-bilder av sedimentkjerner

R2132MC006E – XRI - 0°/45°/90°

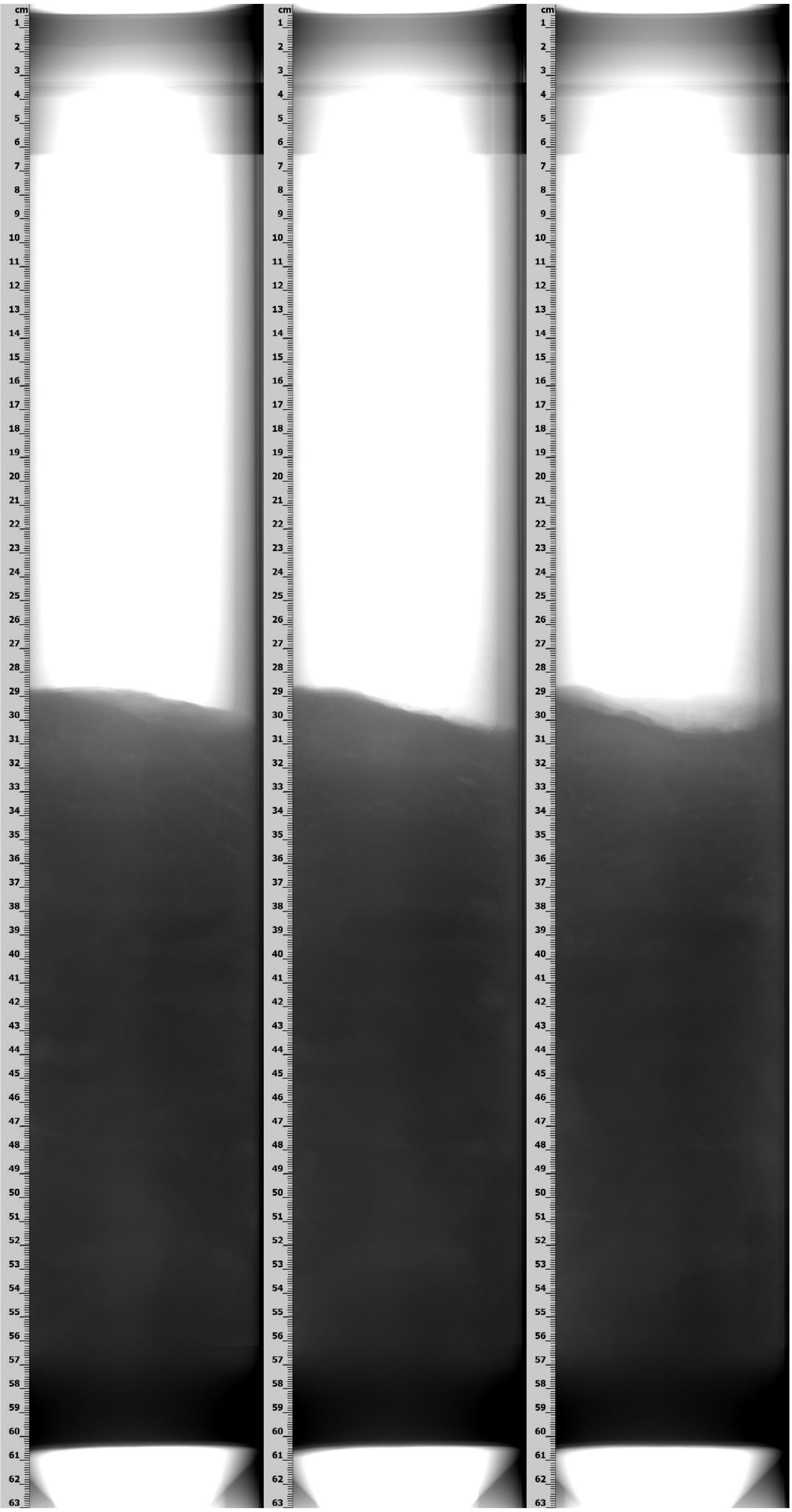
R2139MC008C – XRI - 0°/45°/90°



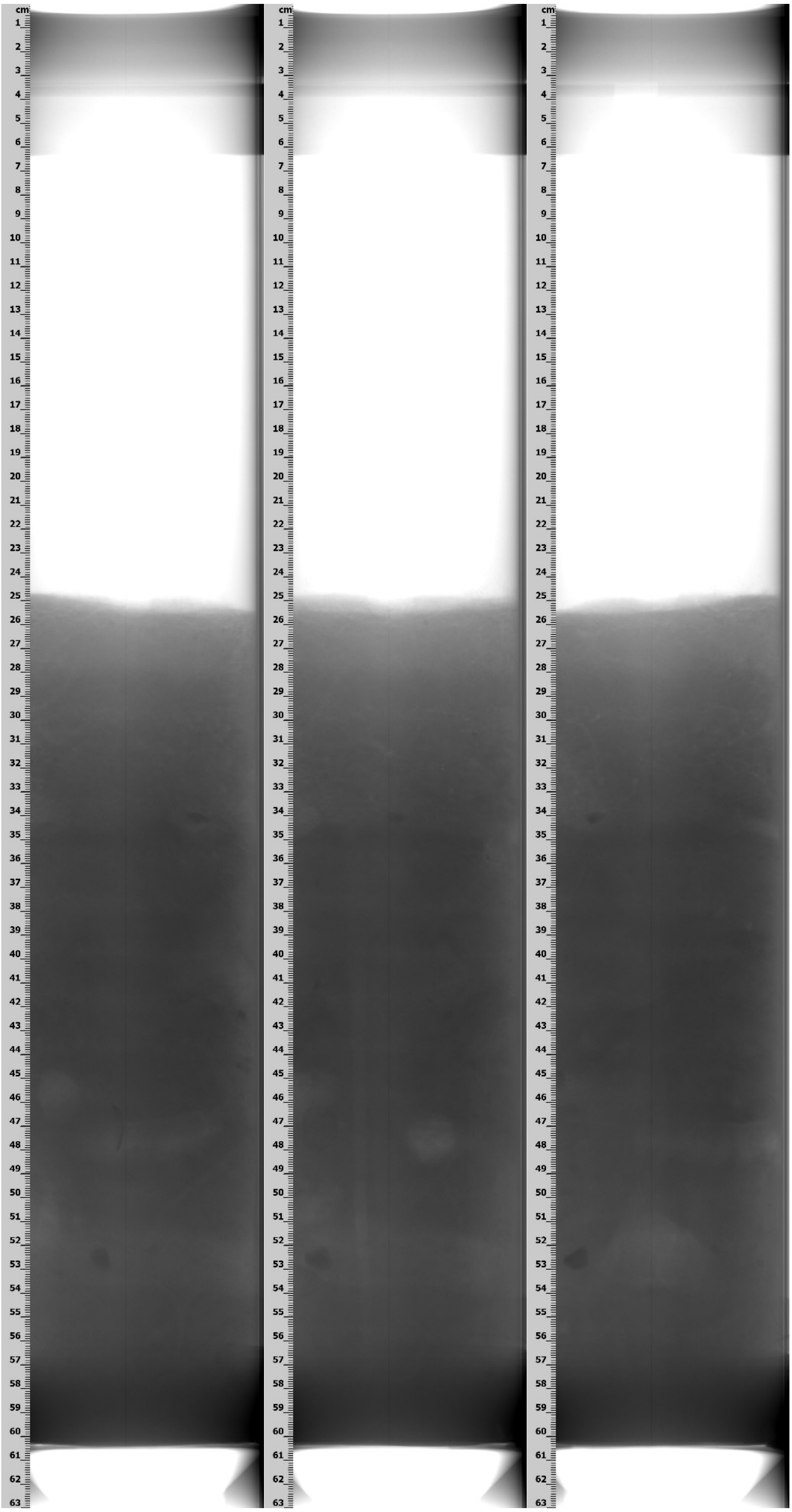
R2183MC009C – XRI - 0°/45°/90°



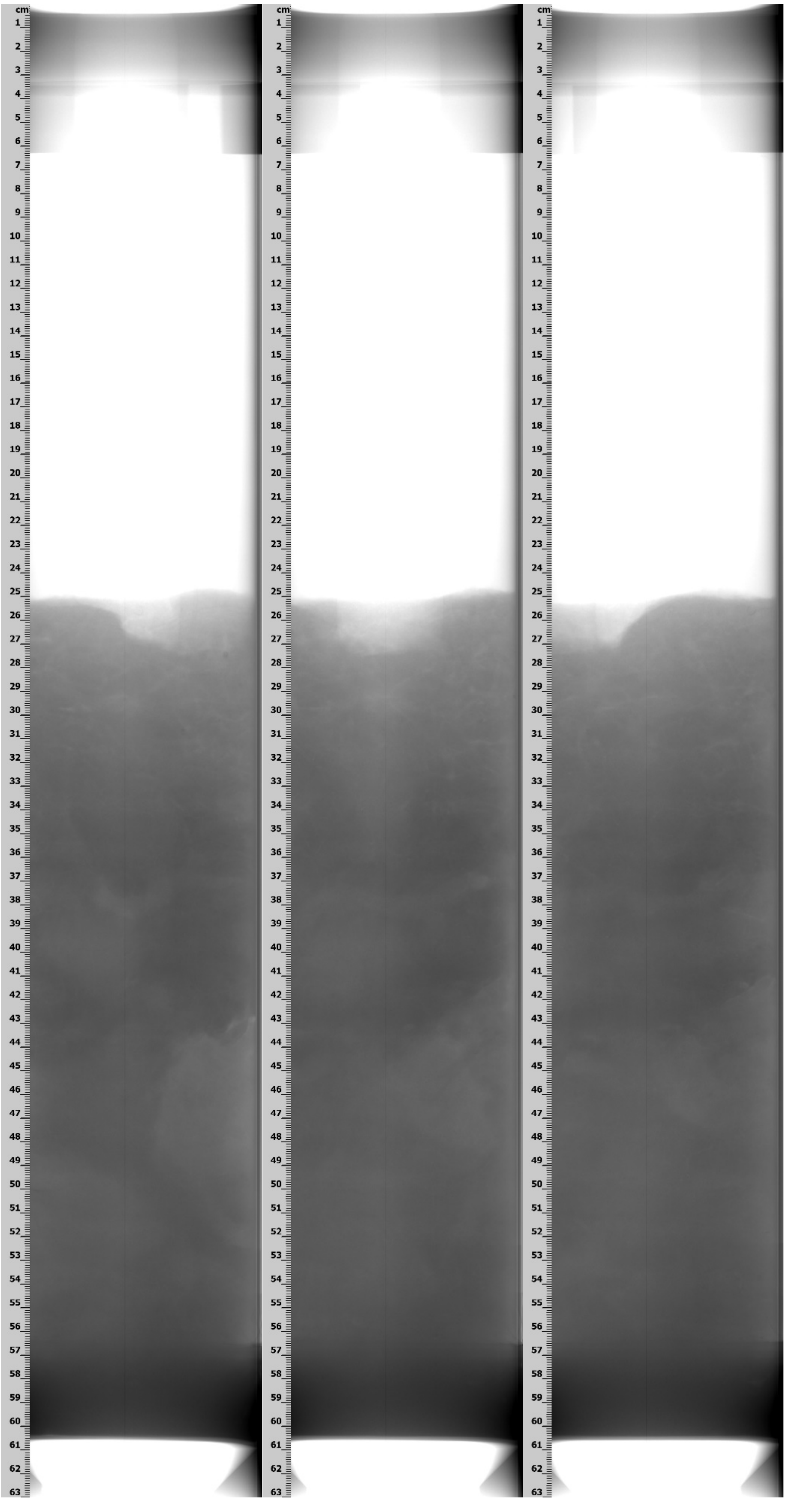
R2229MC011C – XRI - 0°/45°/90°



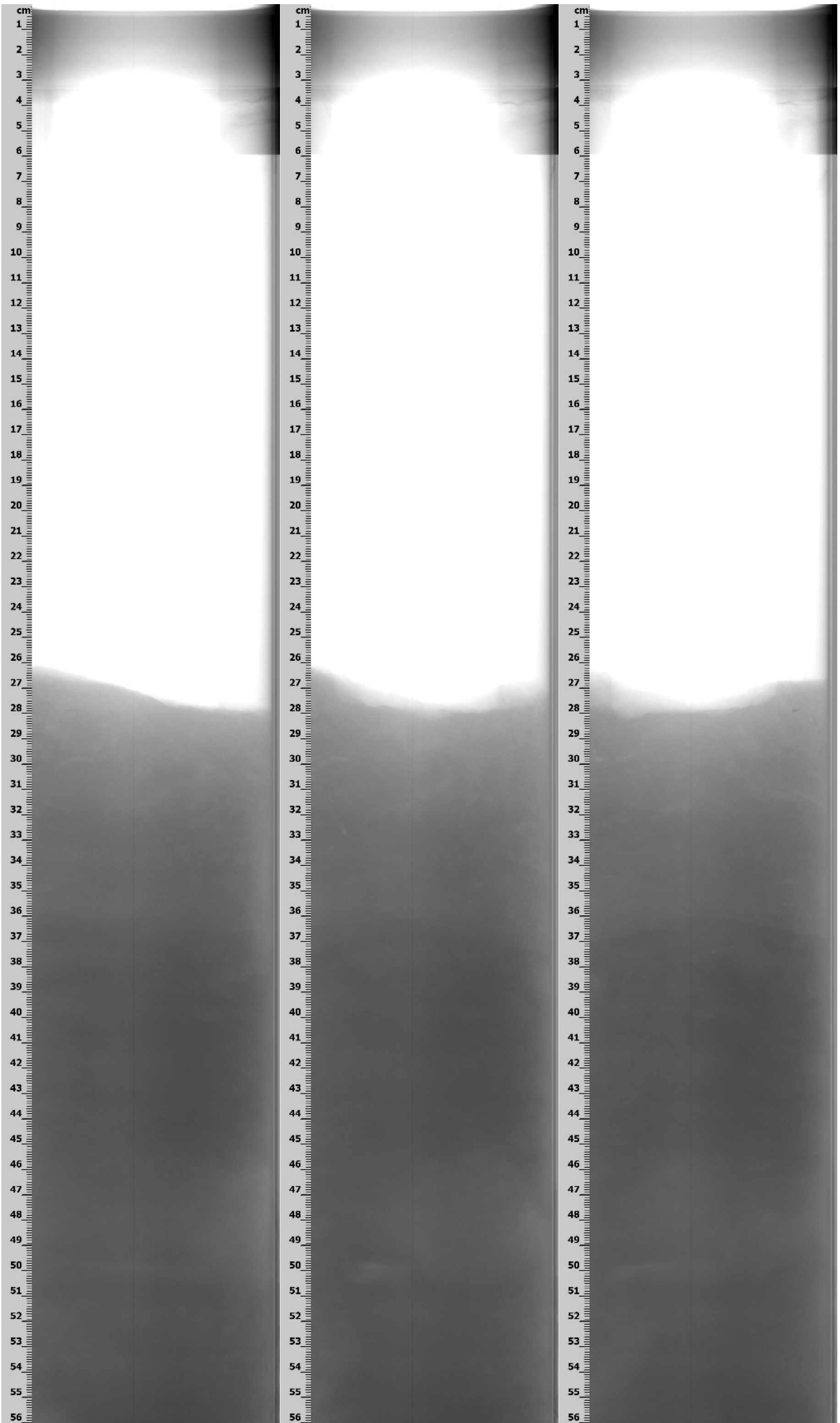
R2242MC012C – XRI - 0°/45°/90°



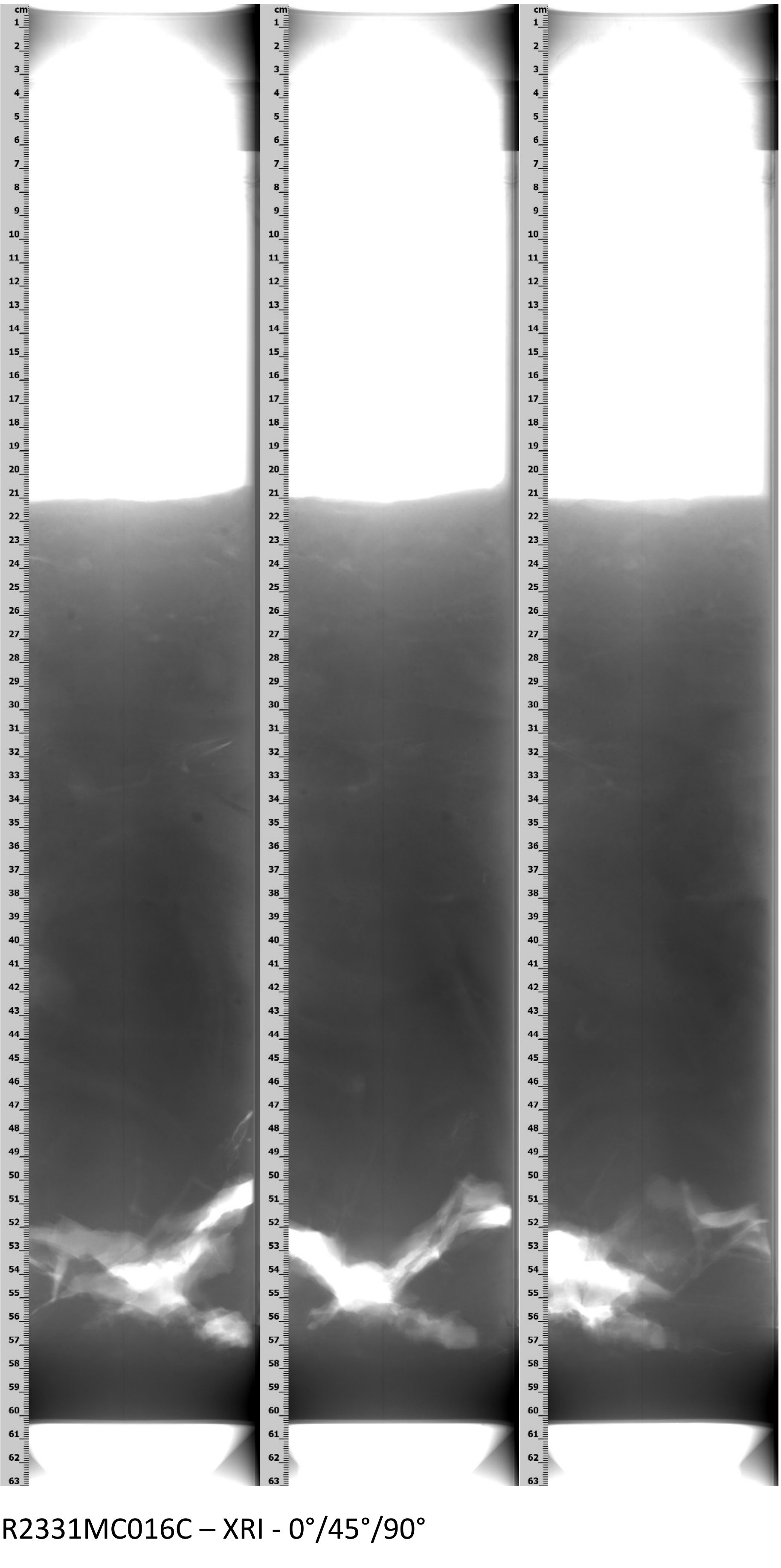
R2270MC013C – XRI - 0°/45°/90°



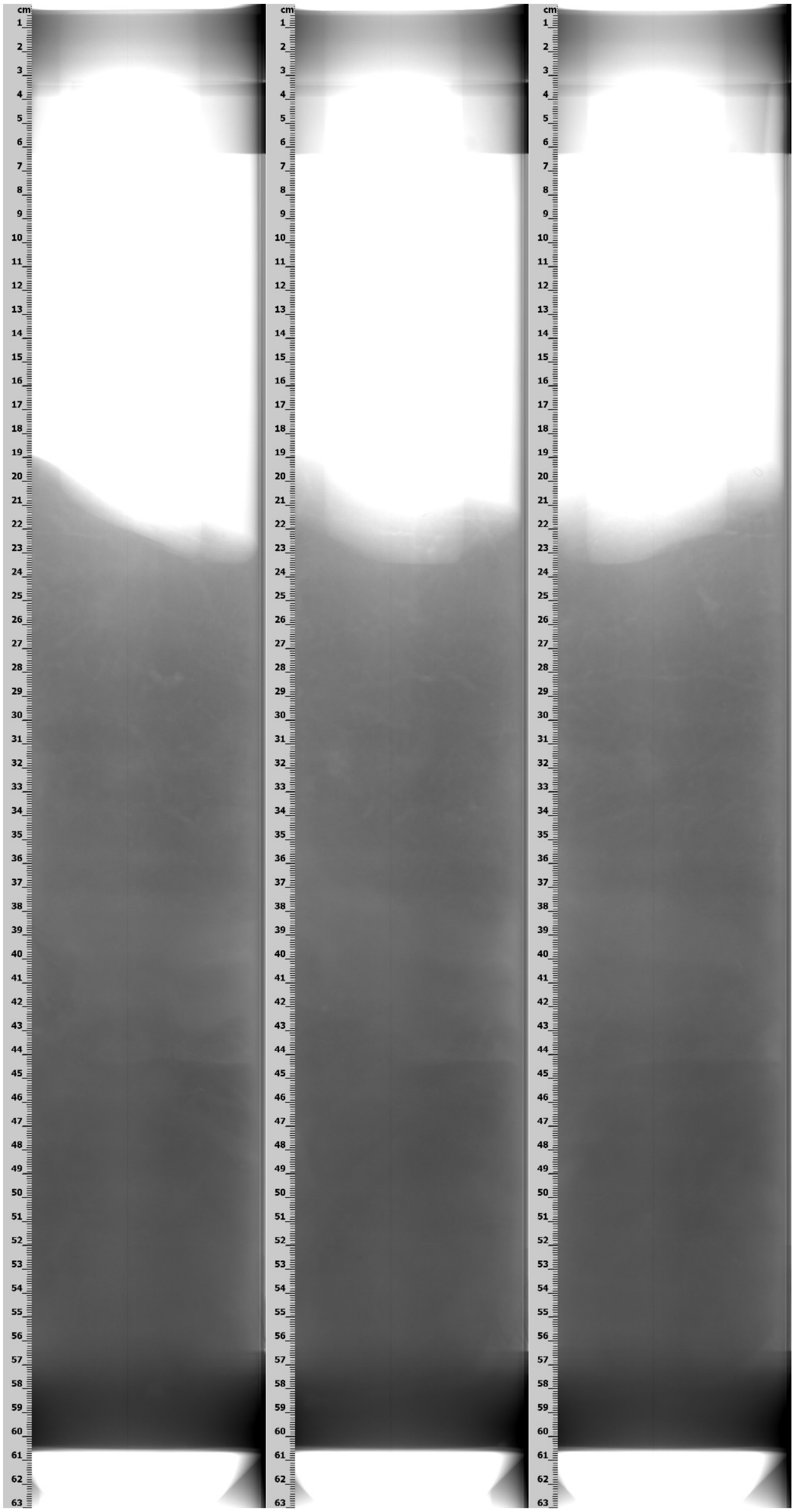
R2276MC014C – XRI - 0°/45°/90°



R2289MC015C – XRI - 0°/45°/90°



R2331MC016C – XRI - 0°/45°/90°



R2338MC017C – XRI - 0°/45°/90°

Vedlegg 4

^{137}Cs aktivitet og ^{210}Pb datering av 5 sedimentkjerner (R2139MC008A, R2183MC009A, R2242MC012A, R2270MC013A og R2338MC017A).
Leverandør av data: Gamma Dating Center (GDC), Københavns Universitet, Danmark

Gamma Dating Center Copenhagen

Copenhagen, Oct 19th, 2021

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Dating of core R2139MC008A

Dating of core R2139MC008A

Methods
The samples have been analysed for the activity of ^{210}Pb, ^{226}Ra and ^{137}Cs via gammaspectrometry at the Gamma Dating Center, Institute of Geography, University of Copenhagen. The measurements were carried out on a Canberra ultralow-background Ge-detector. ^{210}Pb was measured via its gamma-peak at 46,5 keV, ^{226}Ra via the granddaughter ^{214}Pb (peaks at 295 and 352 keV) and ^{137}Cs via its peak at 661 keV.

Results
The core showed surface contents of unsupported ^{210}Pb of around 320 Bq kg^{-1} with a clear tendency for exponential decline with (fig 1). The calculated flux of unsupported ^{210}Pb is 391 Bq m^{-2} y^{-1} which is about 3 times higher than the expected flux (based on data shown in Appleby, 2001). This indicates that the site is subject to sediment focusing.

The content of the isotope ^{137}Cs was very low with no distinct peaks. Low contents was also observed of 241Am with a small subsurface peak at 8 cm depth.

CRS-modelling has been applied on the profile using a modified method (Appleby, 2001; Andersen 2017) where the activity below 16 cm is calculated on the basis of the regression shown in fig 2. The result is given in table 2 and fig 3 and 4.

The chronology given in table 2 is only valid if bioturbation and other sediment mixing is negligible. If this is not the case, ages given in table 2 are underestimated and accumulation rates are overestimated. However, the subsurface peak in ^{241}Am in dated to early 1960´s (fig 4) which is consistent with its global peak in that period and the chronology is therefore considered to be reliable.

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References:

Andersen, T.J., 2017. Some Practical Considerations Regarding the Application of ^{210}Pb and ^{137}Cs Dating to Estuarine Sediments. Applications of Paleoenvironmental Techniques in Estuarine Studies . Developments in Paleoenvironmental Research (DPER), Vol. 20, p 121-140.

Appleby, P.G., 2001. Chronostratigraphic techniques in recent sediments. In: Last, W.M & Smol, J.P. (eds) Tracking environmental change using lake sediments. Volume 1: Basin analysis, coring and chronological techniques. Kluwer Academic Publishers, the Netherlands.

Table 1. Raw data, R2139MC008A

Depth	Pb-210tot	error Pb-210 tot	Pb-210 sup	error pb-210 sup	Pb-210 unsup	error pb-210 unsup	Cs-137	error Cs-137
cm	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1
0.5	342	28	18	1	324	29	0	38
1.5	290	23	19	11	271	34	0	0
2.5	262	19	20	0	242	19	7	0
3.5	233	17	23	4	210	21	0	0
4.5	156	13	26	1	130	14	0	0
5.5	106	9	23	4	83	13	0	0
6.5	67	6	17	1	50	8	0	0
7.5	79	7	19	3	60	10	2	16
8.5	52	5	21	4	31	9	4	23
9.5	86	7	23	2	63	9	0	0
10.5	69	6	21	2	48	8	0	0
11.5	52	5	23	3	29	8	0	0
12.5	41	4	17	2	23	6	4	0
13.5	28	3	21	1	7	4	0	0
14.5	32	3	20	1	12	4	0	0
15.5	22	2	19	0	3	2	0	0
16.5	23	2	23	3	0	5	0	0
17.5	28	3	23	3	5	6	0	0
18.5	19	2	22	3	0	5	0	0
19.5	22	2	22	1	0	4	0	0
20.5	15	2	25	5	0	7	0	0

Table 2, chronology core R2139MC008A

Depth	Age	error age	Date	acc rate	error rate
cm	y	y	y	(kg m-2 y-1)	(kg m-2 y-1)
			2020		
0.5	3	1	2017	1.16	0.11
1.5	9	2	2011	1.10	0.13
2.5	16	2	2004	1.03	0.09
3.5	25	2	1995	0.92	0.10
4.5	34	2	1986	0.93	0.11
5.5	41	2	1979	1.15	0.19
6.5	47	3	1973	1.50	0.24
7.5	53	3	1967	1.50	0.26
8.5	59	3	1961	1.51	0.41
9.5	66	4	1954	1.18	0.19
10.5	79	4	1941	0.74	0.15
11.5	92	6	1928	0.72	0.20
12.5	107	7	1913	0.68	0.21
13.5	121	8	1899	0.75	0.39

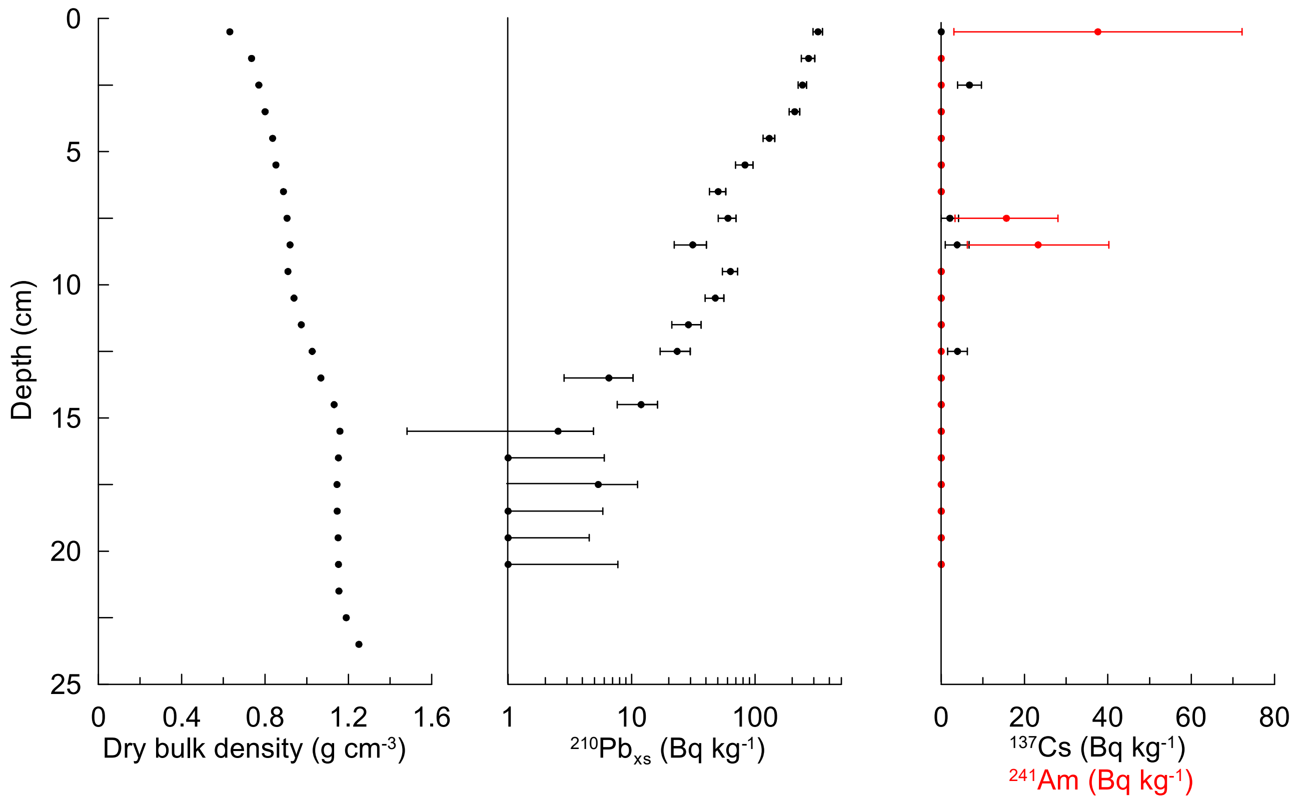


Fig 1

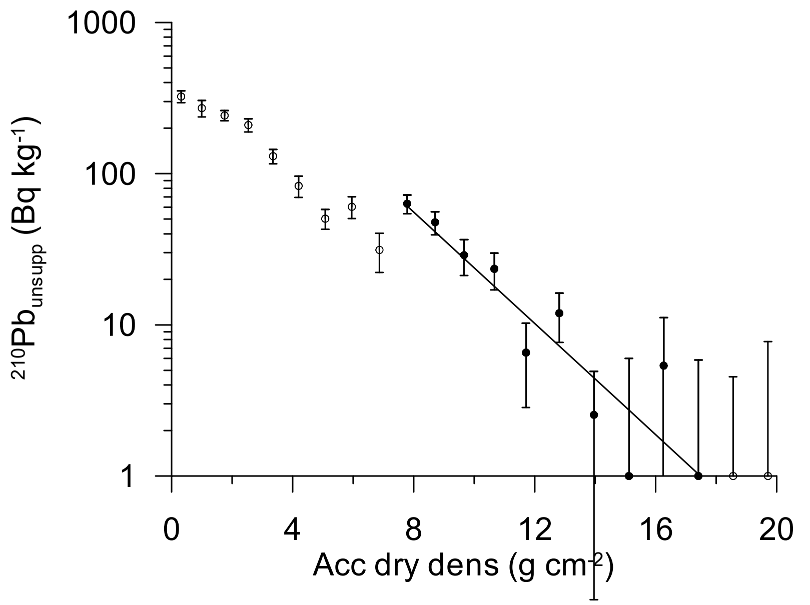
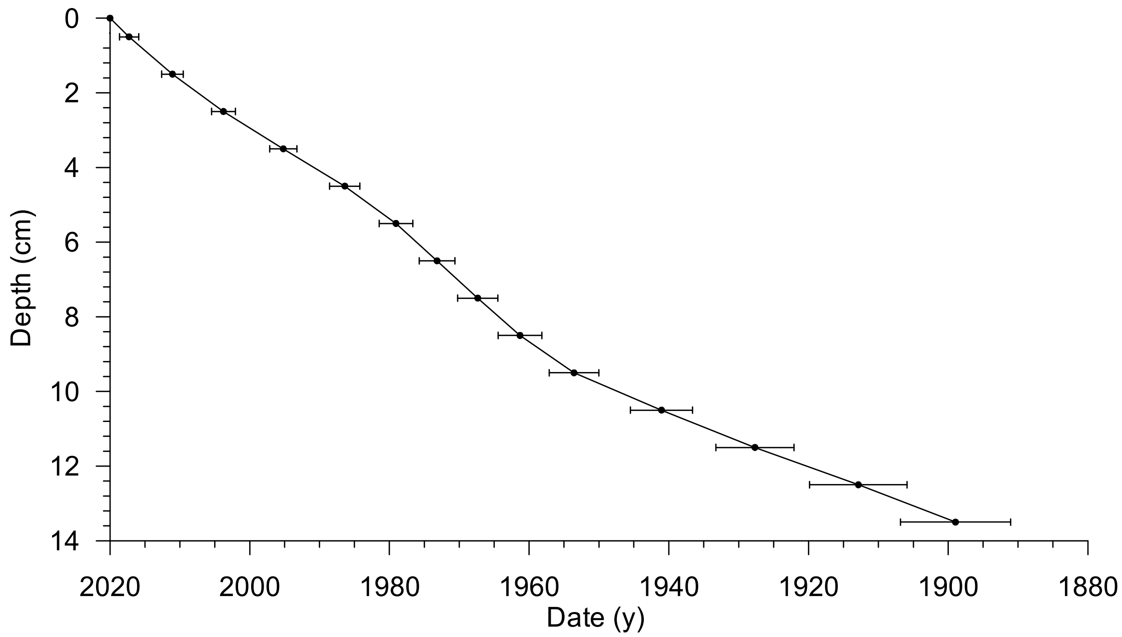
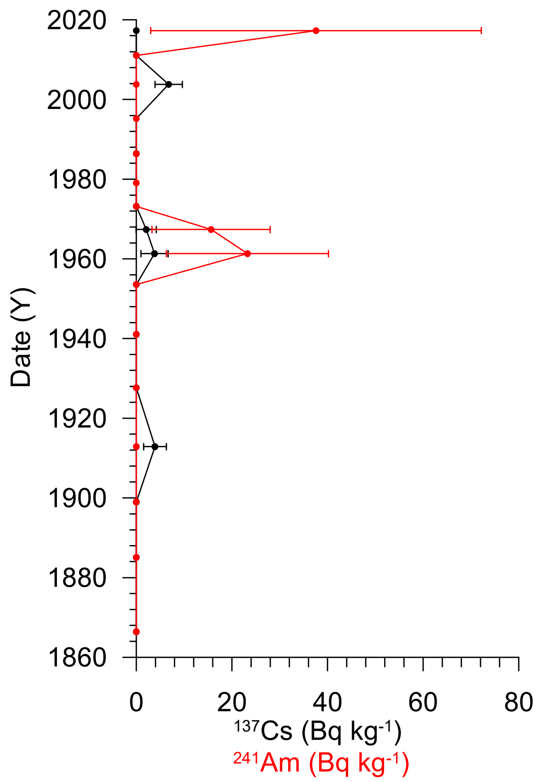


Fig 2. Regression of unsupported ^{210}Pb vs accumulated dry density.



Depth (cm)
0
2
4
6
8
10
12
14
2020
2000
1980
1960
1940
1920
1900
1880
Date (y)

Fig 3



2020
2000
1980
1960
1940
1920
1900
1880
1860
Date (Y)
0
20
40
60
80
^{137}Cs (Bq kg^{-1})
^{241}Am (Bq kg^{-1})

Fig 4

Gamma Dating Center Copenhagen

Copenhagen, Oct 15th, 2021

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Dating of core R2183MC009A

Dating of core R2183MC009A

Methods

The samples have been analysed for the activity of ^{210}Pb, ^{226}Ra and ^{137}Cs via gammaspectrometry at the Gamma Dating Center, Institute of Geography, University of Copenhagen. The measurements were carried out on a Canberra ultralow-background Ge-detector. ^{210}Pb was measured via its gamma-peak at 46,5 keV, ^{226}Ra via the granddaughter ^{214}Pb (peaks at 295 and 352 keV) and ^{137}Cs via its peak at 661 keV.

Results

The core showed surface contents of unsupported ^{210}Pb of around 300 Bq kg^{-1} with a clear tendency for exponential decline with depth in the upper 14 cm and a more irregular profile below that level (fig 1). The calculated flux of unsupported ^{210}Pb is 343 Bq m^{-2} y^{-1} which is about 3 times higher than the expected flux (based on data shown in Appleby, 2001). This indicates that the site is subject to sediment focusing.

The content of the isotope ^{137}Cs was low and only consistently above detection limits in the upper 10 cm of the core.

CRS-modelling has been applied on the profile using a modified method (Appleby, 2001; Andersen 2017) where the activity below 14 cm is calculated on the basis of the regression shown in fig 2. The result is given in table 2 and fig 3 and 4.

The chronology given in table 2 is only valid if bioturbation and other sediment mixing is negligible. If this is not the case, ages given in table 2 are underestimated and accumulation rates are overestimated. The general exponential decline in unsupported ^{210}Pb in the core gives confidence in the chronology and the measured content of ^{137}Cs is broadly in line with the known release-history of the isotope if allowing for possible slight downward mixing of 1 – 2 cm. The chronology is therefore believed to be reliable, especially the upper 14cm.

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References:

Andersen, T.J., 2017. Some Practical Considerations Regarding the Application of ^{210}Pb and ^{137}Cs Dating to Estuarine Sediments. Applications of Paleoenvironmental Techniques in Estuarine Studies . Developments in Paleoenvironmental Research (DPER), Vol. 20, p 121-140.

Appleby, P.G., 2001. Chronostratigraphic techniques in recent sediments. In: Last, W.M & Smol, J.P. (eds) Tracking environmental change using lake sediments. Volume 1: Basin analysis, coring and chronological techniques. Kluwer Academic Publishers, the Netherlands.

Table 1. Raw data, R2183MC009A

Depth	Pb-210tot	error Pb-210 tot	Pb-210 sup	error Pb-210 sup	Pb-210 unsup	error Pb-210 unsup	Cs-137	error Cs-137
cm	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1
0.5	329	20	14	0	316	20	4	1
1.5	265	17	18	0	247	17	3	1
2.5	220	16	16	1	204	17	2	2
3.5	157	13	16	4	141	17	9	1
4.5	148	16	17	7	131	23	9	3
5.5	91	9	13	0	78	9	5	1
6.5	125	12	8	3	117	15	9	2
7.5	105	10	15	4	90	14	6	2
8.5	68	7	16	3	52	10	6	1
9.5	63	7	17	3	46	9	7	2
10.5	58	5	15	2	43	7	2	1
11.5	49	6	12	1	37	6	0	0
12.5	81	8	18	2	63	11	0	0
13.5	23	2	15	2	7	4	1	1
14.5	25	3	15	2	10	5	1	1
15.5	23	3	16	5	7	8	0	0
16.5	10	1	17	1	1	2	0	0
20.5	5	1	15	1	1	2	0	0

Table 2, chronology core R2183MC009A

Depth	Age	error age	Date	acc rate	error rate
cm	y	y	y	(kg m-2 y-1)	(kg m-2 y-1)
			2020		
0.5	2	1	2018	1.05	0.08
1.5	8	1	2012	1.04	0.08
2.5	14	2	2006	1.09	0.10
3.5	20	2	2000	1.18	0.15
4.5	26	2	1994	1.24	0.22
5.5	32	2	1988	1.35	0.17
6.5	38	2	1982	1.19	0.17
7.5	47	3	1973	0.88	0.15
8.5	55	3	1965	0.98	0.19
9.5	62	4	1958	1.11	0.24
10.5	71	4	1949	0.97	0.19
11.5	81	5	1939	0.81	0.17
12.5	100	9	1920	0.41	0.12
13.5	131	17	1889	0.27	0.18

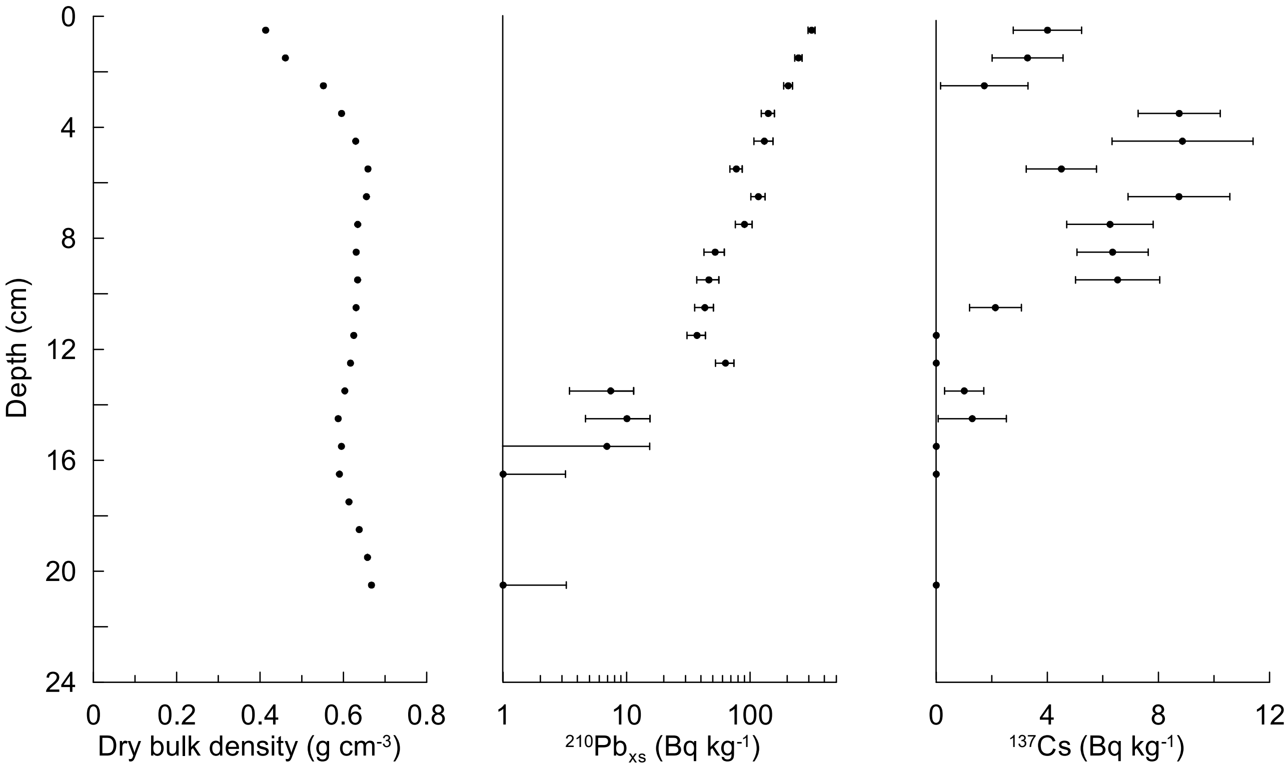


Fig 1

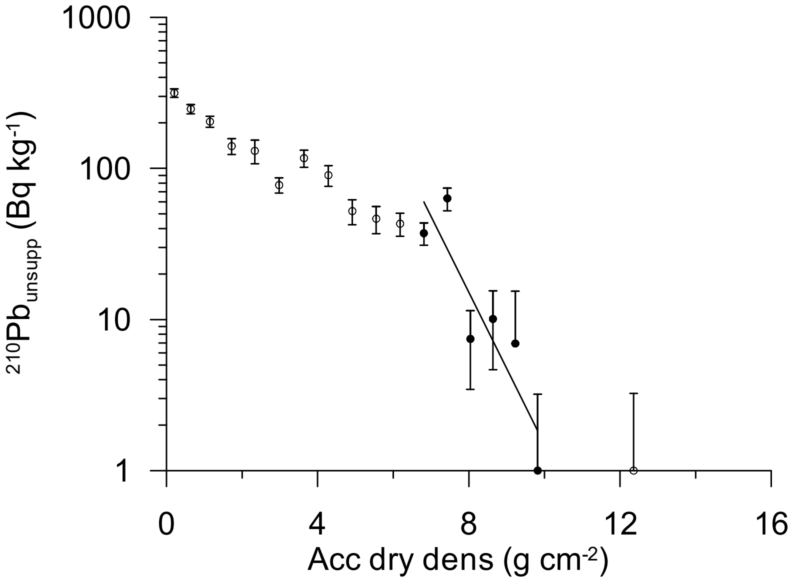
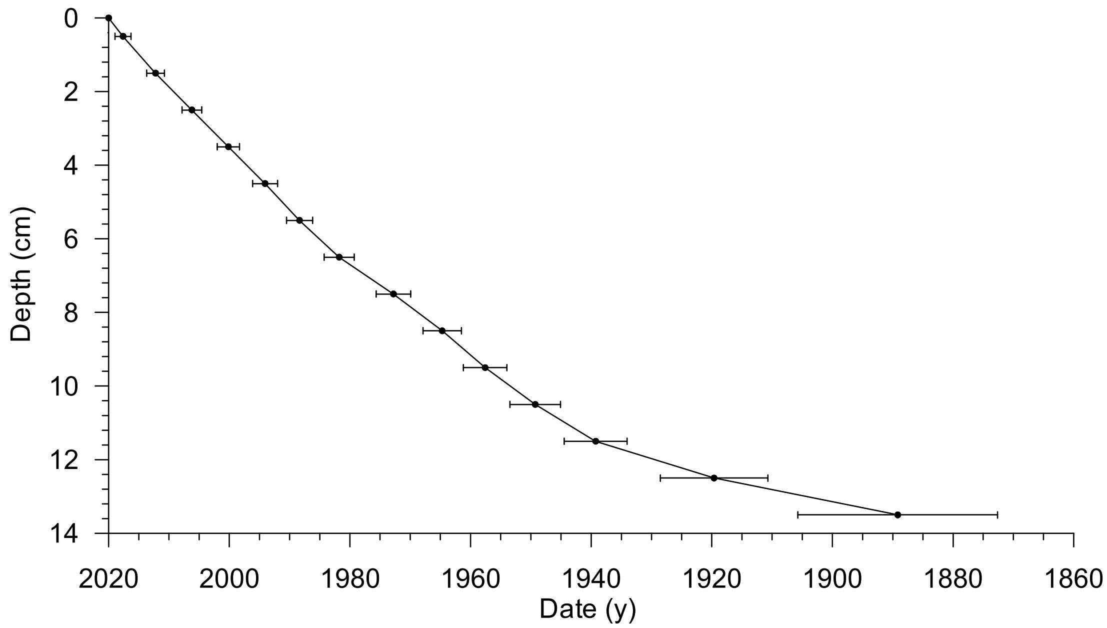
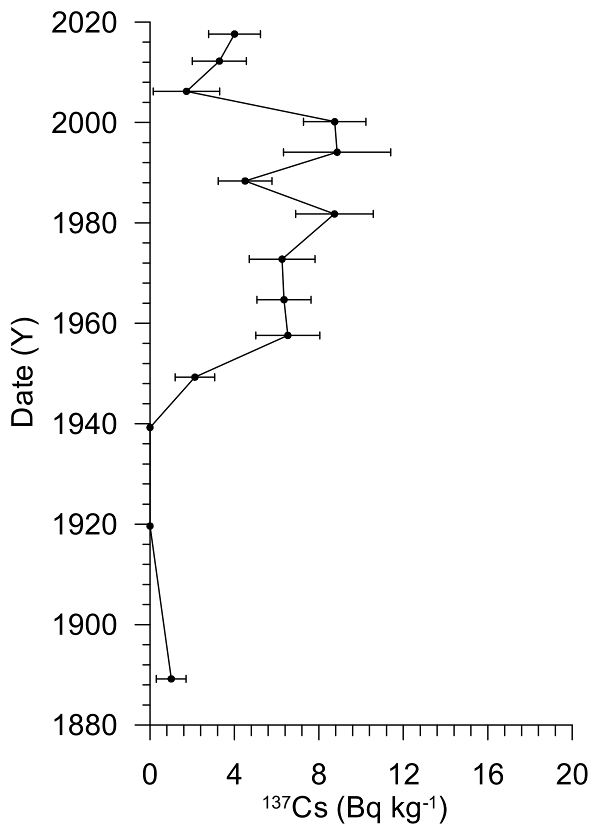


Fig 2. Regression of unsupported ^{210}Pb vs accumulated dry density.



Depth (cm)
0
2
4
6
8
10
12
14
2020
2000
1980
1960
1940
1920
1900
1880
1860
Date (y)

Fig 3



Date (Y)
2020
2000
1980
1960
1940
1920
1900
1880
0
4
8
12
16
20
137Cs (Bq kg-1)

Fig 4

Gamma Dating Center Copenhagen

Copenhagen, Oct 15th, 2021

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Dating of core R2242MC012A

Dating of core R2242MC012A

Methods

The samples have been analysed for the activity of ^{210}Pb, ^{226}Ra and ^{137}Cs via gammaspectrometry at the Gamma Dating Center, Institute of Geography, University of Copenhagen. The measurements were carried out on a Canberra ultralow-background Ge-detector. ^{210}Pb was measured via its gamma-peak at 46,5 keV, ^{226}Ra via the granddaughter ^{214}Pb (peaks at 295 and 352 keV) and ^{137}Cs via its peak at 661 keV.

Results

The core showed surface contents of unsupported ^{210}Pb of around 480 Bq kg^{-1} with a clear tendency for exponential decline with depth (fig 1). The calculated flux of unsupported ^{210}Pb is 369 Bq m^{-2} y^{-1} which is about 3 times higher than the expected flux (based on data shown in Appleby, 2001). This indicates that the site is subject to sediment focusing.

The content of the isotope ^{137}Cs showed a distinct peak centered around 4 – 5 cm depth and was consistently above detection limits in the upper 10 cm of the core.

CRS-modelling has been applied on the profile using a modified method (Appleby, 2001; Andersen 2017) where the activity below 21 cm is calculated on the basis of the regression shown in fig 2. The result is given in table 2 and fig 3 and 4.

The general exponential decline in unsupported ^{210}Pb in the core gives confidence in the chronology and the measured content of ^{137}Cs clearly shows a Chernobyl-origin of the peak activities and suggest only minor downward mixing.
The chronology is believed to be reliable.

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References:

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Appleby, P.G., 2001. Chronostratigraphic techniques in recent sediments. In: Last, W.M & Smol, J.P. (eds) Tracking environmental change using lake sediments. Volume 1: Basin analysis, coring and chronological techniques. Kluwer Academic Publishers, the Netherlands.

Table 1. Raw data, R2242MC012A

Depth	Pb-210tot	error Pb-210 tot	Pb-210 sup	error pb-210 sup	Pb-210 unsup	error pb-210 unsup	Cs-137	error Cs-137
cm	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1
0.5	503	26	27	2	476	28	9	3
1.5	352	20	27	1	325	21	16	2
2.5	283	20	26	0	257	20	18	4
3.5	284	20	28	4	256	24	43	4
4.5	185	14	24	0	161	14	46	4
5.5	116	9	24	2	92	11	28	2
6.5	130	10	26	0	103	11	16	3
7.5	105	9	25	7	79	15	14	3
8.5	108	9	27	1	81	9	5	3
9.5	91	5	24	3	67	8	7	1
10.5	68	6	28	1	41	8	5	3
11.5	68	6	31	6	38	12	3	3
12.5	54	5	28	2	26	7	0	0
13.5	37	4	23	7	14	11	0	0
14.5	16	2	22	1	1	3	3	2
15.5	38	4	25	0	13	4	2	2
16.5	40	4	29	4	11	8	4	3
17.5	36	3	28	2	8	5	0	0
18.5	37	3	28	0	9	4	0	0
19.5	29	3	27	1	2	4	0	0
20.5	30	3	27	2	3	5	0	0

Table 2, chronology core R2242MC012A

Depth	Age	error age	Date	acc rate	error rate
cm	y	y	y	(kg m-2 y-1)	(kg m-2 y-1)
			2020		
0.5	3	1	2017	0.74	0.05
1.5	9	1	2011	0.77	0.06
2.5	15	1	2005	0.87	0.07
3.5	22	2	1998	0.80	0.08
4.5	31	2	1989	0.78	0.08
5.5	37	2	1983	1.02	0.13
6.5	43	2	1977	1.10	0.13
7.5	50	3	1970	0.96	0.18
8.5	58	3	1962	0.87	0.12
9.5	67	4	1953	0.72	0.11
10.5	76	5	1944	0.74	0.16
11.5	85	6	1935	0.77	0.25
12.5	95	7	1925	0.70	0.23
13.5	103	8	1917	0.84	0.65
14.5	107	7	1913	1.87	4.67
15.5	112	8	1908	1.75	0.66
16.5	120	10	1900	0.84	0.60
17.5	130	10	1890	0.79	0.48
18.5	142	12	1878	0.63	0.33
19.5	152	15	1868	0.71	1.26
20.5	159	15	1861	1.12	0.52

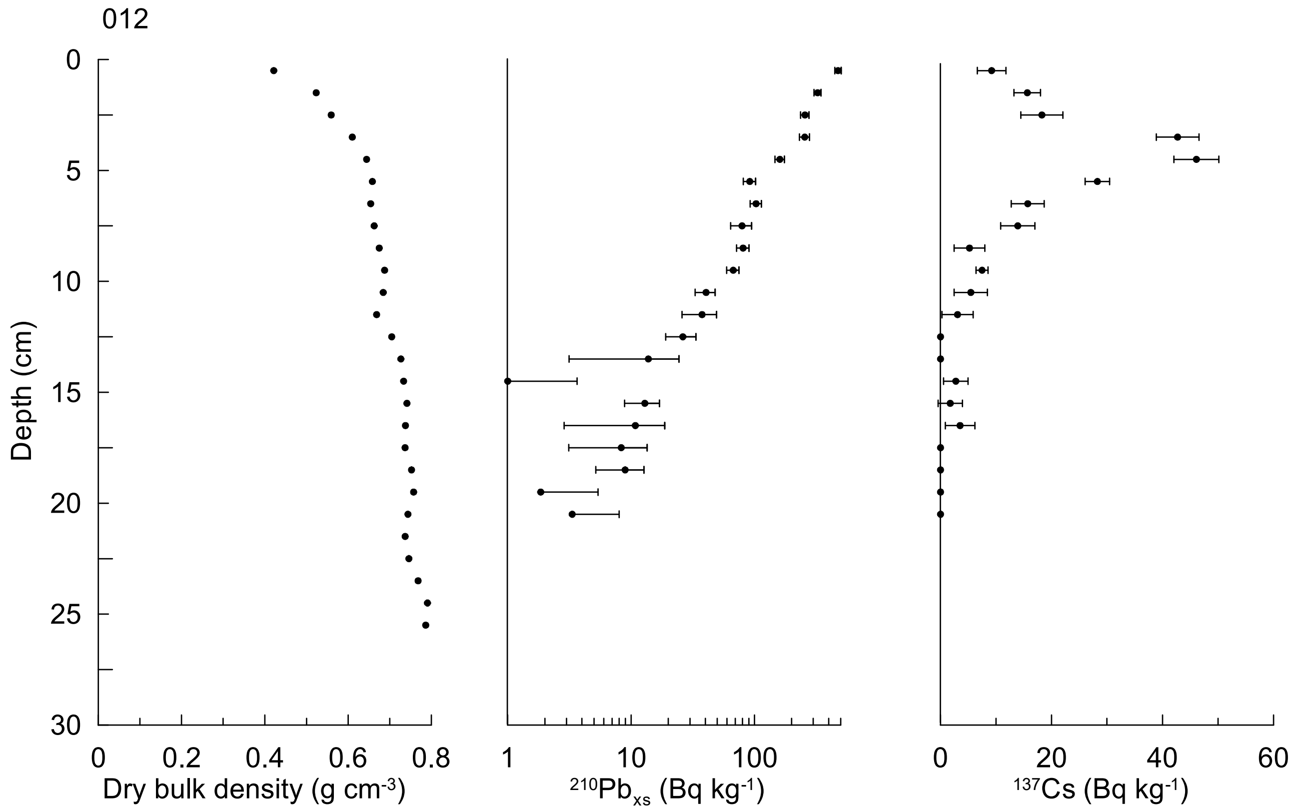


Fig 1

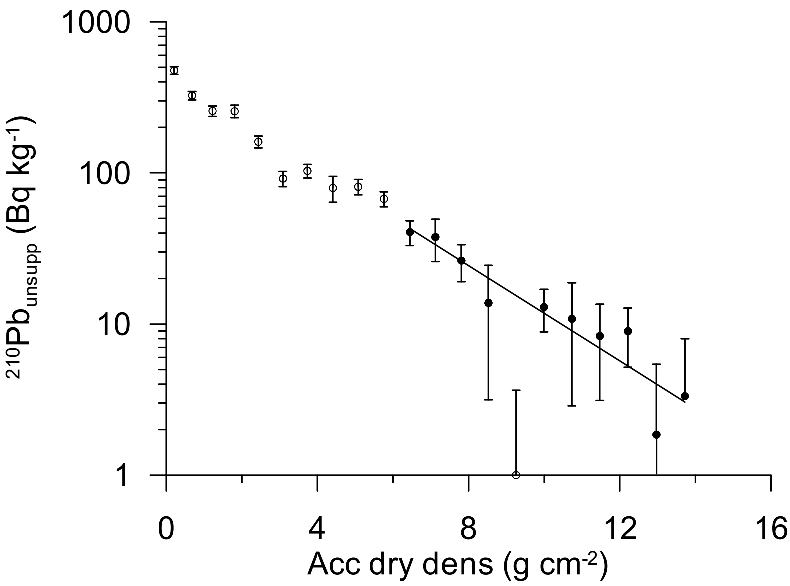
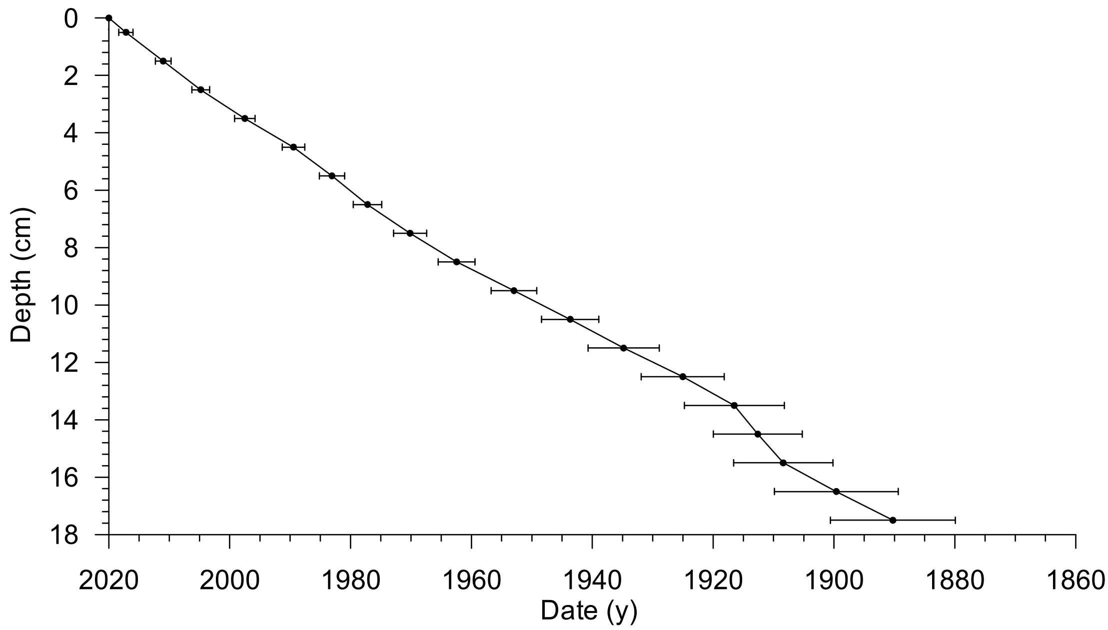
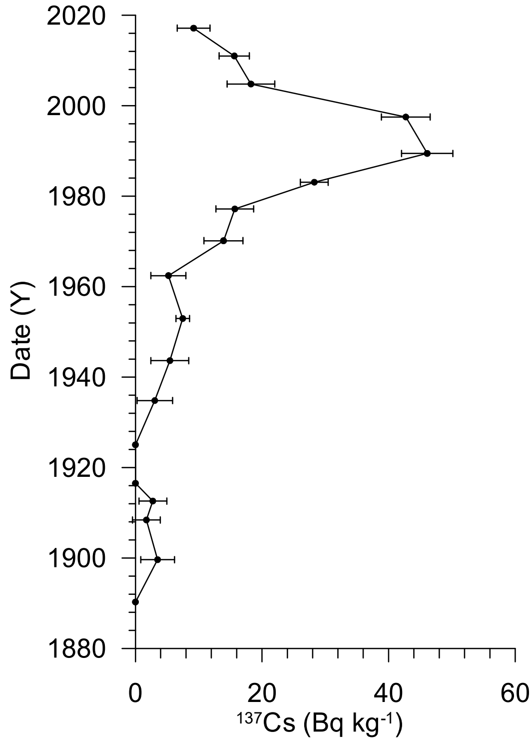


Fig 2. Regression of unsupported ^{210}Pb vs accumulated dry density.



0
2
4
6
8
10
12
14
16
18
Depth (cm)
2020
2000
1980
1960
1940
1920
1900
1880
1860
Date (y)

Fig 3



2020
2000
1980
1960
1940
1920
1900
1880
Date (Y)
0
20
40
60
^{137}Cs (Bq kg^{-1})

Fig 4

Gamma Dating Center Copenhagen

Copenhagen, Oct 19th, 2021

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Dating of core R2270MC013A

Dating of core R2270MC013A

Methods

The samples have been analysed for the activity of ^{210}Pb, ^{226}Ra and ^{137}Cs via gammaspectrometry at the Gamma Dating Center, Institute of Geography, University of Copenhagen. The measurements were carried out on a Canberra ultralow-background Ge-detector. ^{210}Pb was measured via its gamma-peak at 46,5 keV, ^{226}Ra via the granddaughter ^{214}Pb (peaks at 295 and 352 keV) and ^{137}Cs via its peak at 661 keV.

Results

The core showed surface contents of unsupported ^{210}Pb of around 270 Bq kg^{-1} with a clear tendency for exponential decline with (fig 1). The calculated flux of unsupported ^{210}Pb is 391 Bq m^{-2} y^{-1} which is about twice the expected flux (based on data shown in Appleby, 2001). This indicates that the site is subject to some sediment focusing.

The content of the isotope ^{137}Cs was very low with no distinct peaks.

CRS-modelling has been applied on the profile using a modified method (Appleby, 2001; Andersen 2017) where the activity below 9 cm is calculated on the basis of the regression shown in fig 2. The result is given in table 2 and fig 3 and 4.

The chronology given in table 2 is only valid if bioturbation and other sediment mixing is negligible. If this is not the case, ages given in table 2 are underestimated and accumulation rates are overestimated. The clear tendency for exponential decline with depth of unsupported ^{210}Pb gives confidence in the result but some mixing is indicated by the presence of ^{137}Cs in layers dated to well before the 1950´s.

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References:

Andersen, T.J., 2017. Some Practical Considerations Regarding the Application of ^{210}Pb and ^{137}Cs Dating to Estuarine Sediments. Applications of Paleoenvironmental Techniques in Estuarine Studies . Developments in Paleoenvironmental Research (DPER), Vol. 20, p 121-140.

Appleby, P.G., 2001. Chronostratigraphic techniques in recent sediments. In: Last, W.M & Smol, J.P. (eds) Tracking environmental change using lake sediments. Volume 1: Basin analysis, coring and chronological techniques. Kluwer Academic Publishers, the Netherlands.

Table 1. Raw data, R2270MC013A

Depth	Pb-210tot	error Pb-210 tot	Pb-210 sup	error pb-210 sup	Pb-210 unsup	error pb-210 unsup	Cs-137	error Cs-137
cm	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1
0.50	284	27	13	2	271	30	5	3
1.50	292	25	16	0	276	25	9	2
2.50	213	17	20	4	194	22	6	2
3.50	159	14	15	1	144	14	0	0
4.50	83	8	18	5	65	13	0	0
5.50	68	8	19	4	50	12	0	0
6.50	57	6	11	7	46	13	2	1
7.50	42	5	18	5	24	10	6	2
8.50	28	4	17	2	11	6	0	0
9.50	11	2	20	1	0	3	3	1
10.50	5	1	16	1	0	1	0	0
11.50	17	2	17	0	0	2	1	1
12.50	16	2	17	1	0	3	1	1
13.50	20	3	21	2	0	5	0	0

Table 2, chronology core R2270MC013A

Depth	Age	error age	Date	acc rate	error rate
cm	y	y	y	(kg m-2 y-1)	(kg m-2 y-1)
			2020		
0.5	3	2	2017	0.82	0.09
1.5	12	2	2008	0.67	0.07
2.5	24	3	1996	0.57	0.07
3.5	38	3	1982	0.53	0.07
4.5	53	5	1967	0.54	0.12
5.5	67	6	1953	0.63	0.17
6.5	85	9	1935	0.46	0.16
7.5	115	17	1905	0.30	0.17

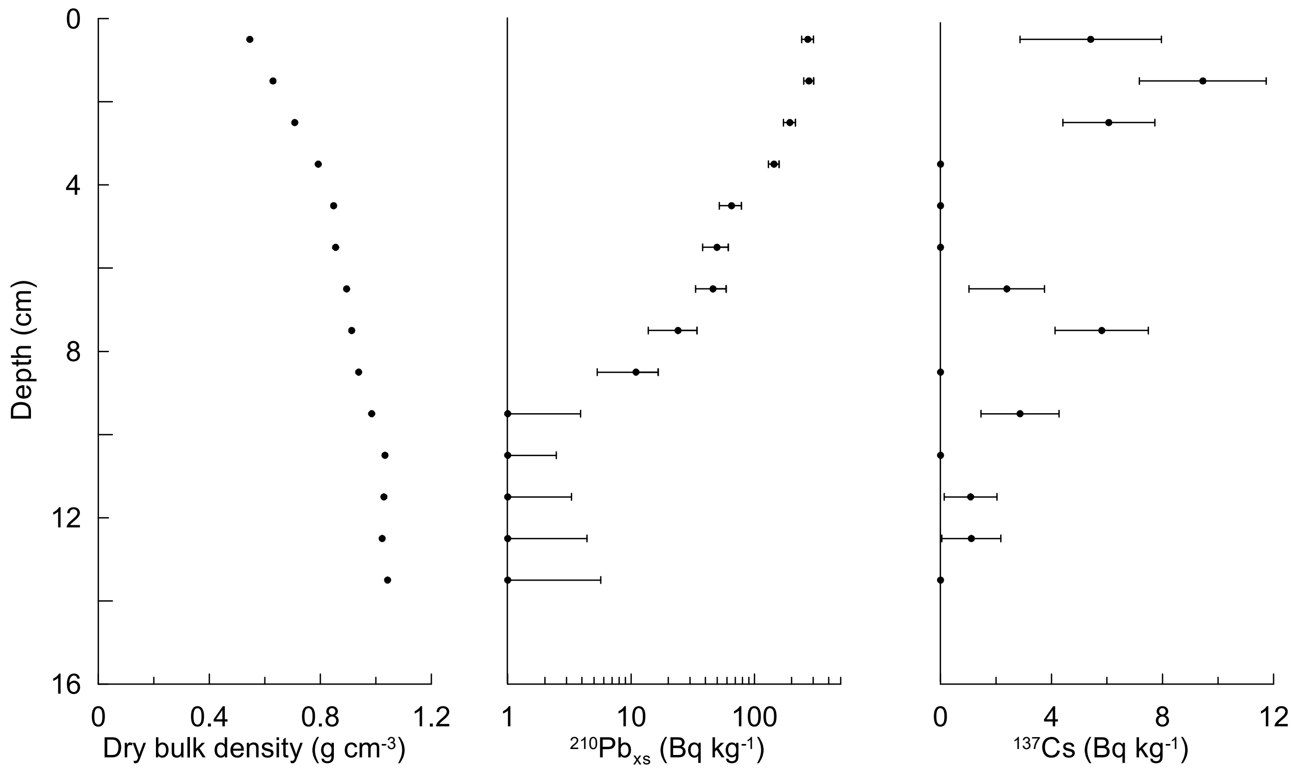

Fig 1

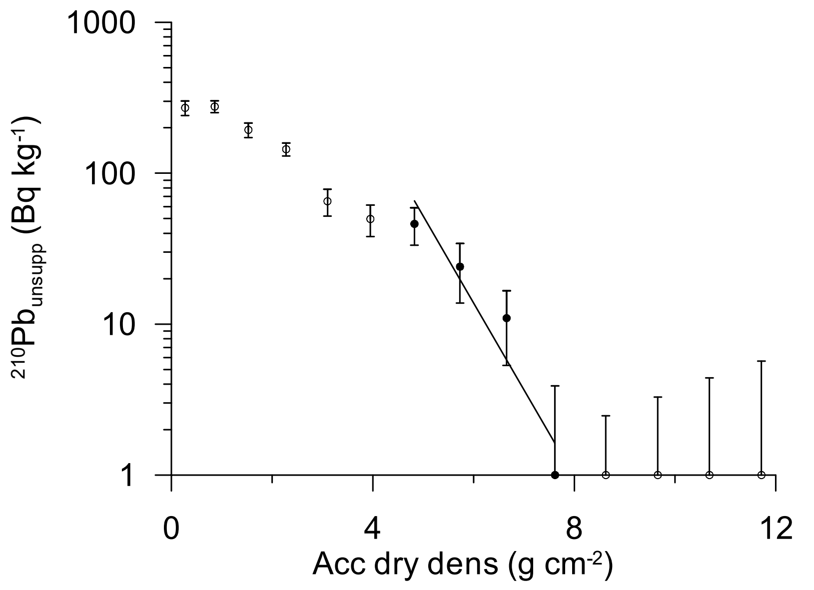

Fig 2. Regression of unsupported ^{210}Pb vs accumulated dry density.

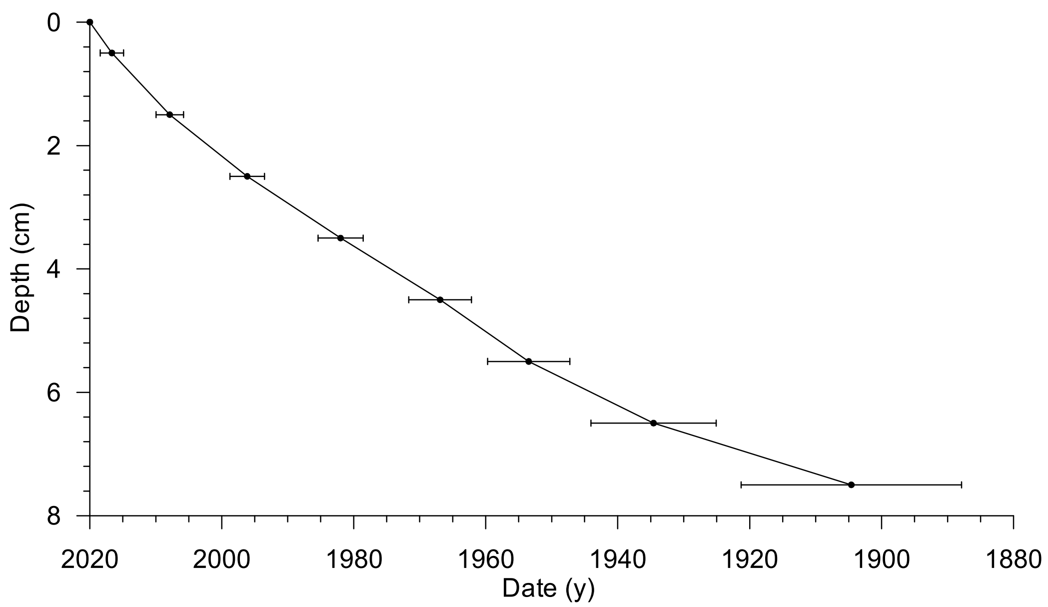
0
2
4
6
8
Depth (cm)
2020
2000
1980
1960
1940
1920
1900
1880
Date (y)

Fig 3

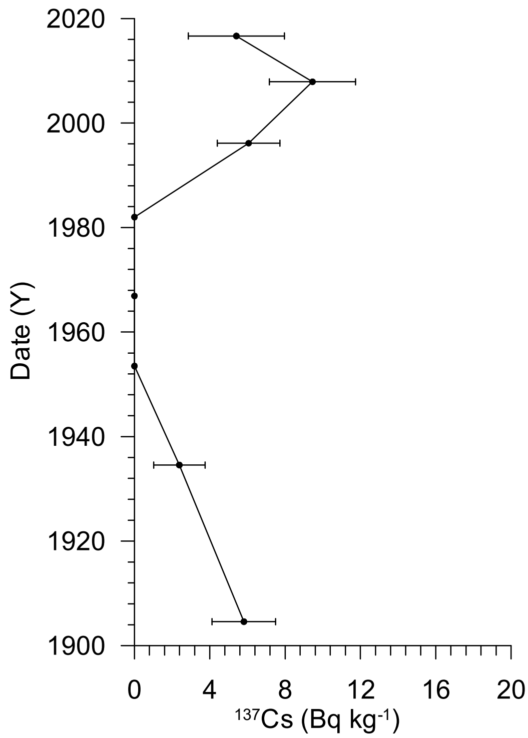
2020
2000
1980
1960
1940
1920
1900
Date (Y)
0
4
8
12
16
20
137Cs (Bq kg-1)

Fig 4

Gamma Dating Center Copenhagen

Copenhagen, Oct 27th, 2021

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Dating of core R2338MC017A

<u>Dating of core R2338MC017A</u>

Methods

The samples have been analysed for the activity of ^{210}Pb, ^{226}Ra and ^{137}Cs via gammaspectrometry at the Gamma Dating Center, Institute of Geography, University of Copenhagen. The measurements were carried out on a Canberra ultralow-background Ge-detector. ^{210}Pb was measured via its gamma-peak at 46,5 keV, ^{226}Ra via the granddaughter ^{214}Pb (peaks at 295 and 352 keV) and ^{137}Cs via its peak at 661 keV.

Results

The core showed surface contents of unsupported ^{210}Pb of around 230 Bq kg^{-1} with a clear tendency for exponential decline with depth in the upper 14 cm and a more irregular profile below that level (fig 1). The calculated flux of unsupported ^{210}Pb is 306 Bq m^{-2} y^{-1} which is about 3 times higher than the expected flux (based on data shown in Appleby, 2001). This indicates that the site is subject to sediment focusing.

The content of the isotope ^{137}Cs was low but measurable contents was found down to a depth of about 20 cm.

CRS-modelling has been applied on the profile using a modified method (Appleby, 2001; Andersen 2017) where the activity below 22 cm is calculated on the basis of the regression shown in fig 2. The result is given in table 2 and fig 3 and 4.

The chronology given in table 2 is only valid if bioturbation and other sediment mixing is negligible. If this is not the case, ages given in table 2 are underestimated and accumulation rates are overestimated. The general exponential decline in unsupported ^{210}Pb in the core gives confidence in the chronology. However, the rather uniform content of ^{137}Cs suggests that some mixing takes place and the chronology should therefore only be considered to be indicative. The mixing does not penetrate to depths deeper than 23 cm.

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<u>References:</u>

Andersen, T.J., 2017. Some Practical Considerations Regarding the Application of ^{210}Pb and ^{137}Cs Dating to Estuarine Sediments. Applications of Paleoenvironmental Techniques in Estuarine Studies . Developments in Paleoenvironmental Research (DPER), Vol. 20, p 121-140.

Appleby, P.G., 2001. Chronostratigraphic techniques in recent sediments. In: Last, W.M & Smol, J.P. (eds) Tracking environmental change using lake sediments. Volume 1: Basin analysis, coring and chronological techniques. Kluwer Academic Publishers, the Netherlands.

Table 1. Raw data, R2338MC017

Depth	Pb-210tot	error Pb-210 tot	Pb-210 sup	error pb-210 sup	Pb-210 unsup	error pb-210 unsup	Cs-137	error Cs-137
cm	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1	Bq kg-1
0.5	244	18	18	2	226	20	3	2
1.5	180	15	18	0	162	15	0	0
2.5	136	12	17	0	119	12	0	0
3.5	105	10	17	2	87	12	0	0
4.5	143	13	19	3	124	16	2	2
5.5	165	15	16	4	149	19	3	2
7.5	98	10	21	5	77	15	4	2
8.5	98	10	19	2	79	12	6	2
9.5	82	5	19	1	64	6	4	1
10.5	80	7	18	6	62	13	7	1
11.5	62	5	18	2	44	7	5	1
12.5	56	6	16	0	41	7	4	2
14.5	63	7	22	2	40	10	4	2
16.5	77	8	18	3	59	11	4	2
17.5	73	8	17	6	56	14	0	0
18.5	56	6	18	2	38	7	3	1
20.5	33	4	15	2	18	6	6	1
21.5	36	4	19	6	16	11	3	1
22.5	19	3	16	3	3	6	0	0
23.5	18	3	19	3	0	6	2	1
32.5	19	3	18	6	0	8	0	0

Table 2, chronology core R2338MC017

Depth	Age	error age	Date	acc rate	error rate
cm	y	y	y	(kg m-2 y-1)	(kg m-2 y-1)
			2020		
0.5	2	1	2018	1.32	0.13
1.5	5	2	2015	1.43	0.15
2.5	7	2	2013	1.80	0.20
3.5	10	2	2010	2.26	0.31
4.5	13	2	2007	2.02	0.28
5.5	18	2	2002	1.39	0.18
7.5	27	2	1993	1.35	0.27
8.5	31	2	1989	1.58	0.25
9.5	35	3	1985	1.51	0.18
10.5	40	3	1980	1.51	0.33
11.5	44	3	1976	1.58	0.30
12.5	47	3	1973	1.76	0.32
14.5	55	4	1965	1.54	0.36
16.5	68	5	1952	0.92	0.21
17.5	79	6	1941	0.54	0.14
18.5	93	7	1927	0.45	0.11

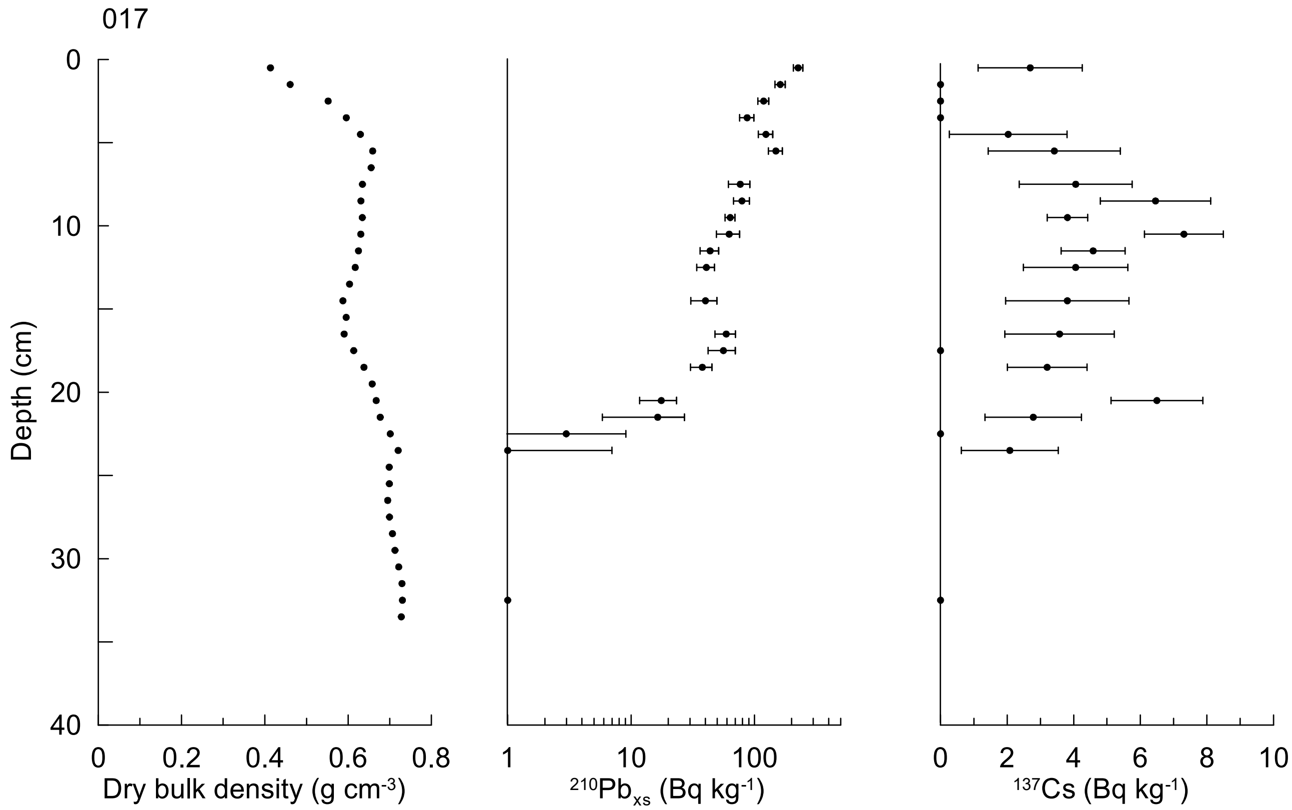


Fig 1

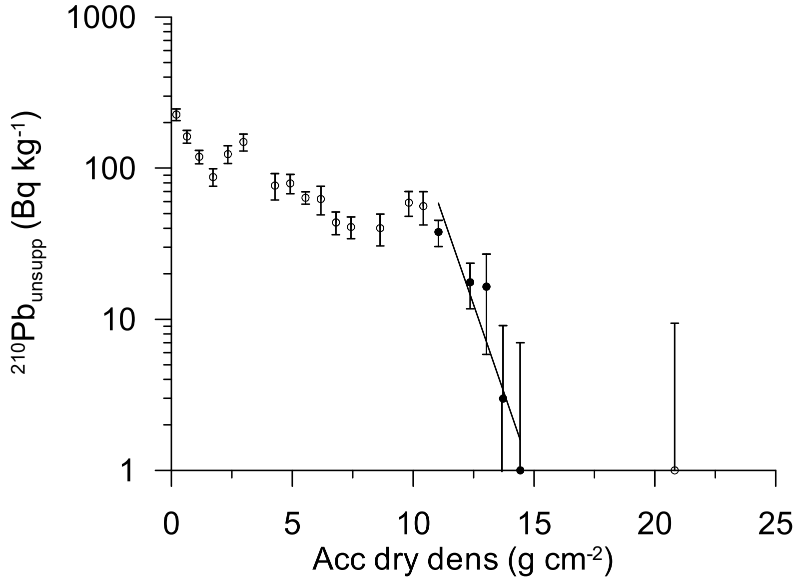
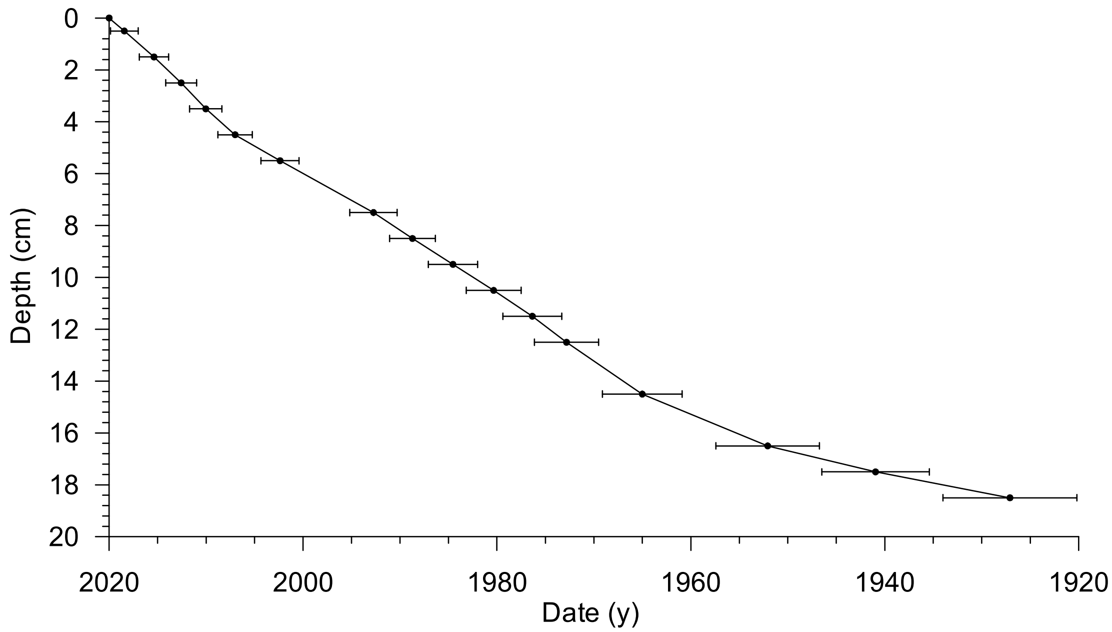
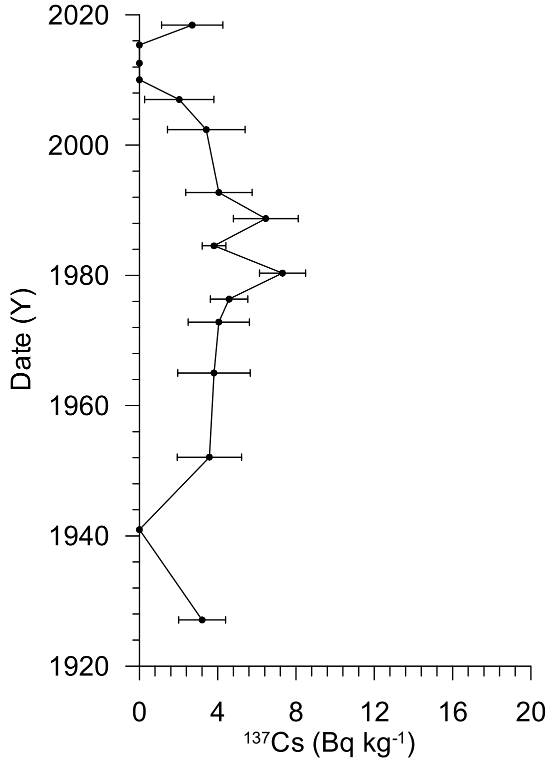


Fig 2. Regression of unsupported ^{210}Pb vs accumulated dry density.



Depth (cm)
0
2
4
6
8
10
12
14
16
18
20
2020
2000
1980
1960
1940
1920
Date (y)

Fig 3



Date (Y)
2020
2000
1980
1960
1940
1920
0
4
8
12
16
20
137Cs (Bq kg-1)

Fig 4

Vedlegg 5

Mikroplastrapport
NGI-rapport

REPORT

Microplastics in sediment from the Norwegian Sea

MAREANO

DOC.NO. 20210378-01-R
REV.NO. 1 / 2022-01-26

NORWEGIAN GEOTECHNICAL INSTITUTE
NGI.NO

Project

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Client contact person: Henning Jensen
Contract reference: Contract signed 2021-05-19

for NGI

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FS 32989/EMS 612006

Summary

A MAREANO survey of the Norwegian Sea was conducted in 2020, where sediment from the mid-Norwegian Continental Shelf were sampled for the analysis of microplastics and other contaminants using a multicorer equipped with steel tubes. The Norwegian Geotechnical Institute (NGI) has, on behalf of The Geological Survey of Norway (NGU) and MAREANO, performed the microplastics analyses of the sediment samples (n = 24), covering both surface samples and sediment cores, as described in this report.

Deep-sediment from the bottom of the sediment cores (i.e. samples dated precious to the existence of plastic) was used as field blanks (n = 2), quantifying microplastic contamination from the expedition and sample processing as well as the analytical method, assuming that the samples should be plastic-free. Method blanks (n = 10) were prepared and analysed to quantify microplastic contribution from the analytical method in the laboratory. Microplastics were found in all method blanks, with the main contributor being the high numbers of polyethylene particles detected. Due to the polyethylene contamination in the lab, is was concluded that this plastic type could not be correctly quantified and is therefore not reported. Generally, the field blanks contained less microplastic that the method blanks, indicating the analytical method was the main contributor to the contamination of the samples. A higher level of some microplastics were, however, found in the field blanks, namely rubber and chlorinated polyethylene/PVC. Concentrations stated in this report was corrected for both the concentration found in method blanks and field blanks.

In surface sediments (top 2 cm; n = 11) from the Norwegian Sea microplastic concentrations ranged widely, from 51 to 2187 particles/kg dry sediment (mean ± standard deviation: 679 ± 663 particles/kg). These concentrations are comparable with previously reported levels of microplastic found in sediments from the Northern North Sea (top 1 cm; n = 10, range; n.d. to 3400 particles/kg; mean: 525 ± 1030 particles/kg). In both studies, chlorinated polyethylene/PVC and rubber particles were frequently encountered, along with other microplastics.

The microplastic profile in three sediment cores was investigated by analysing deeper sediment (n = 13). A generally decreasing abundance downcore was observed, with some variations. The MP concentration in samples from the top 10 cm of the cores S-06, S-10 and S-11 ranged from n.d. – 1084 particles/kg (mean: 562 ± 472 particles/kg), 41 – 352 particles/kg (mean: 233 ± 125 particles/kg) and 654 – 1579 particles/kg (mean: 1069 ± 331), respectively. In two of the cores (S-10 and S-11), the highest concentration of MP was found in sediment from 2-4 cm, whereas sediment from 6-8 cm depth displayed highest MP levels in the last core (S-06). This is likely due to bioturbation, as dating results suggests that this core has been affected by sediment mixing. No clear trend in microplastic composition was seen downcore. One of the cores (S-11) had a rather homogenous distribution of plastic types downcore, however the other cores displayed more variable microplastic composition. Several future recommendations for future sampling campaigns and analysis are provided.

Contents

Appendix

Review and reference page

1 Introduction

1.1 MAREANO survey of the Norwegian Sea

The Geological Survey of Norway (NGU) participates in the MAREANO programme as part of the Executive Groups responsible for carrying out field sampling and other scientific activities. The MAREANO programme maps depth and topography, sediment composition, biodiversity, habitats and biotopes as well as pollution in the seabed in Norwegian offshore areas, to address critical questions related to the Norwegian seabed.

In 2020, a MAREANO survey of the mid-Norwegian continental shelf in the Norwegian Sea was conducted, where sediment from stations along Trøndelag to Helgeland (n = 11) was collected for the analysis of microplastics and other contaminants. Surface sediment (0-2 cm) was sampled from all stations, as well as deeper sediment samples from three of the stations, using multicorer sampling equipment. The Norwegian Geotechnical Institute (NGI) has, on behalf of NGU/MAREANO, performed the microplastic analyses of in total 26 sediment samples, including two field blanks, as described in this report.

1.2 Plastic pollution

In 1907 Bakelite, the first polymer considered to be truly synthetic, was developed, marking the start of the plastic age [1]. After this, commercial production of PVC and PS started in the 1920s and 1930s, respectively, followed by the subsequent discovery the other now commonly used plastics PE (1930), PET (1941) and PP (1954). The mid-20th century is considered the start of large-scale production of everyday plastic products. From this time onwards, the use of plastics has increased exponentially, with a large portion of plastics being made for single use purposes.

In 2015 the production rate of plastic was 380 million metric tons (MT) plastic, and since then production rates are forecasted to be increasing [2]. Unfortunately, many countries still have inefficient waste management and water treatment systems that allow for leakage to the environment. Mismanaged plastic waste could triple from 60-99 million MT in 2015 to 155-265 MT by 2060, assuming a business-as-usual scenario. [3] Plastics are designed to be extremely durable and resistant to decay. While these characteristics are highly valued during usage, it has the implication that plastic emitted into the environment will remain for long periods of time. Plastic is currently found to be accumulating on remote islands, the sea surface, within the water column of the sea and on deep seafloor.

Recently, concern has been raised regarding smaller plastic pieces, referred to as microplastics; which may pose a threat to sensitive marine ecosystems. Microplastics are generally defined as plastic items smaller than 5 mm. These can originate from weathering of larger plastic items due to the influence of e.g. UV-light, mechanic abrasion, waves and temperature fluctuations (so-called secondary microplastics), or from direct emissions of plastics that were manufactured smaller than 5 mm (so-called primary microplastics). A variety of studies suggest that the seafloor is the ultimate sink for microplastics [4] [5] [6]. However, there have been relatively few surveys of microplastics on the sea floor, and few studies on the impacts of microplastics on benthic ecosystems as well.

Previously, microplastics (between 5 µm – 1 mm) have been found in marine sediments along the Norwegian Continental Shelf (NCS), sampled during a MAREANO pilot study [7]. Ten sediment samples were collected from a large area along the NCS, where eight of these were in proximity to the sampling region of the present study. The results reported the presence of microplastics at all stations (23 to 290 particles/kg sediment; mean ± standard error: 120 ± 97 particles/kg), with polyethylene and polypropylene being common plastic types. In sediment from the northern North Sea (NNS), microplastic have also been reported, indicating a wider range and higher microplastic concentrations (n.d. to 3400 particles/kg; mean ± standard error: 525 ± 1030 particles/kg) [8]. Chlorinated polyethylene was among the most frequently encountered microplastics in the NNS sampling region, as well as PET, rubber and phenoxy resin.

To understand the history of plastic pollution, reconstruction of sedimentary microplastic archives based on MP concentrations and dated sediment cores, is gaining more and more attention. This is yet to be performed on sediments along the Norwegian Sea shelf. The MAREANO sediment samples reported here are of great interest regarding the distribution and presence of microplastics on the seabed on the mid-Norwegian Continental Shelf and its evolution with time using ^{210}PB dated sediment cores.

2 Materials and methods

2.1 Field work and sampling strategy

Sediment cores were sampled during two sampling cruises with the Institute of Marine Research (IMR) research vessel, G.O Sars, at stations in the Norwegian Sea in 2020. The geographical area studied consisted of ten stations along the Trøndelag coast and Helgeland with varying distance from land, as well as one station in the deeper parts of the Norwegian Sea (Figure 2). Sediment cores were sampled by NGU and HI using a multicorer (produced by KC-Denmark, model 73.000), which gives six sediment cores with a maximum depth of ca. 50 cm. The mlticorer was equipped with four transparent PVC-tubes and two stainless steel tubes (inner diameter of 106 mm) which were used to sample cores for microplastic analysis. The sampling was performed as described in MAREANO's chemistry program (Metodedokument-Kjemiprogram-MAREANO-versjon-16.08.2021.pdf).

The core samples were briefly (for 2-3 s) opened during tube recovery from the multicorer, and then kept sealed until opening at NGU in Trondheim, Norway. Care was taken to avoid potential contamination from microplastic in the ambient air by keeping the contact between samples and surroundings to a minimum. After storing the sediment cores in a cooling rom for 8-11 months, the samples were opened outdoors at NGU and transferred to glass jars for shipping to NGI. For some of the sediment cores, leakage of seawater had occurred due to issues with the sealing of the cores, affecting the dry weigh % of some of the sediment samples (Photo 1).

Figure 1 Sediment cores sampled for microplastic analysis in steel tubes, showing a core where seawater is intact (left) and where seawater has leaked out during storage/transfer (Photos from NGU).

At NGI, the samples were stored at 2-4 °C until processing.

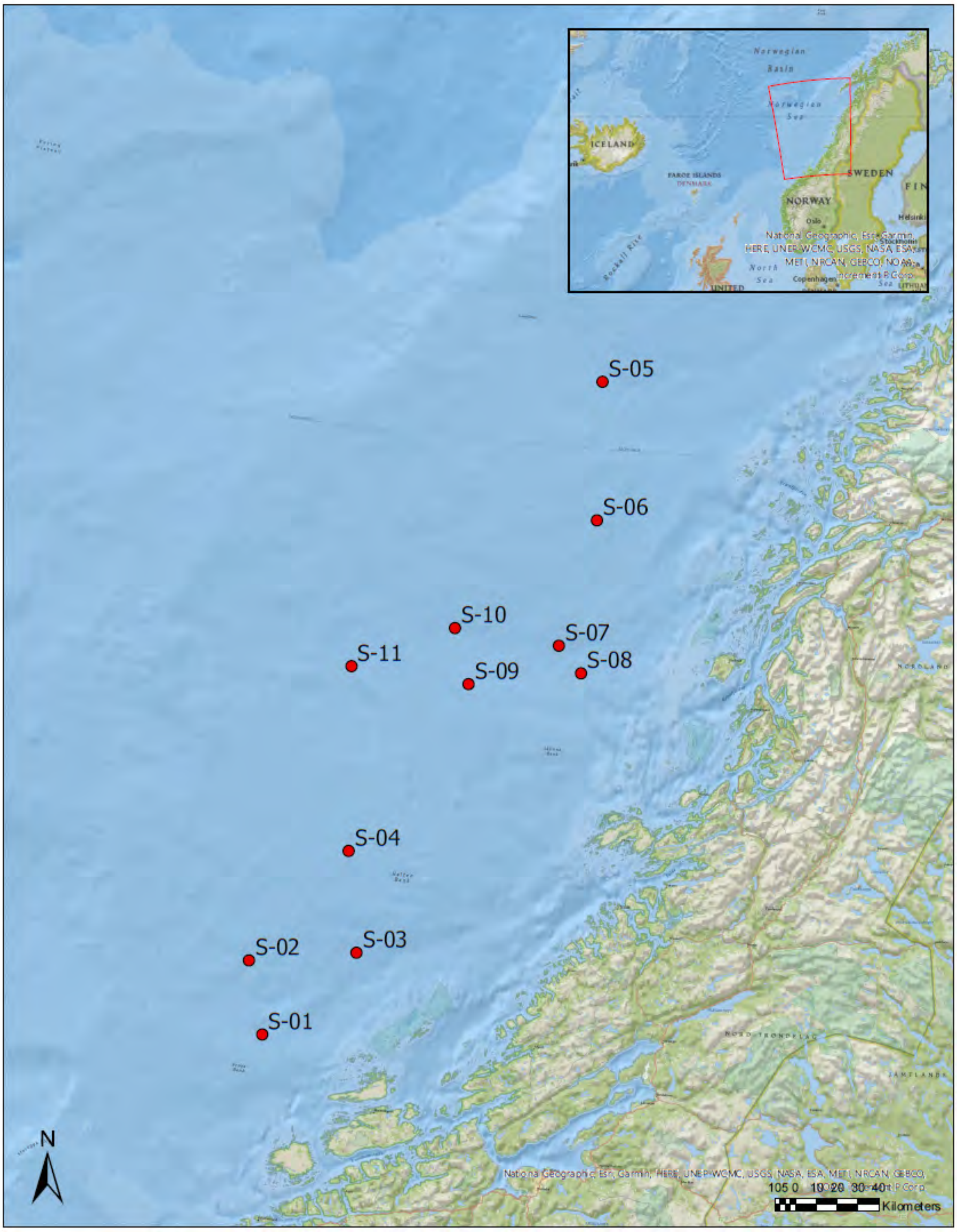

Figure 2 Microplastic sampling stations S-01 to S-11 in the Norwegian Sea.

2.1.1 Surface samples

Sediment surface samples from all stations (n = 11, Table 1) were prepared from the sediment cores, by slicing off the top 2 cm with a metal spatula.

Table 1 List of surface samples with station specific information provided by NGU.

Sample ID	Sample depth (cm)	Station	Latitude	Longitude	Bottom depth (m)
S-01	0-2	R2132MC006	63.88470	07.57127	235.61
S-02	0-2	R2139MC008	64.19527	07.35512	332.41
S-03	0-2	R2183MC009	64.28006	08.40502	356.67
S-04	0-2	R2229MC010	64.71354	08.22013	237.98
S-05	0-2	R2242MC012	66.83023	10.43077	400.05
S-06	0-2	R2270MC013	66.23164	10.47961	293.51
S-07	0-2	R2276MC014	65.67928	10.17709	395.79
S-08	0-2	R2289MC015	65.56744	10.42937	410.77
S-09	0-2	R2331MC016	65.48132	09.27189	368.30
S-10	0-2	R2338MC017	65.71696	09.07689	448.96
S-11	0-2	R2363MC019	65.50764	08.04405	372.93

2.1.2 Sediment profile samples

For three of the stations (S-06, S-10 and S-11), deeper sediment samples were prepared in addition to the surface samples to assess the vertical microplastic profile of the sediment. The S-06, S-10 and S-11 sediment cores were sliced at 2 cm intervals to depths of 10 cm. From the S-10 core, a deeper sediment sample at 20-22 cm depth was also prepared. For sediment core S-06 and S-10, dating has been performed via gamma spectrometry at the Gamma Dating Centre, Institute of Geography, University of Copenhagen [9].

2.1.3 Field blank

A field blank is often defined as a sample which is initially free of analyte (here microplastics), prepared in the field and treated as a real sample (includes contact with sampling equipment and exposure to the sampling site, stored in the same way as regular samples and which undergoes the analytical procedure). This type of blank controls for both field and analytical contamination.

In this project, field blanks (n = 2, Table 2) were prepared by sampling deep-sediment (> 20 cm depth) from sediment cores in the same area as the surface samples, assuming that the deeper sediment was from a time prior to plastic production (meaning they should in theory be free from microplastics). Also, the selected samples S-10-FB-01 at 30 – 32 cm depth and S-11-FB-02 at 20 – 22 cm depth are well below the depth of bioturbating animals, which potentially could mix microplastics into deeper sediment layers. The purpose of the field blanks was to correct for microplastic abundance in the environmental samples due to contamination.

Table 2 List of field blanks used for correction of the results for surface and core samples.

Sample ID	Sample depth (cm)	Station	Comment
S-10-FB-01	30-32	R2338MC017	From the same core as S-10
S-11-FB-02	20-22	R2363MC019	From the same core as S-11

Dating results provided by the Gamma Dating Centre for a sediment core from the same station as S-10-FB-01 shows that at a depth of 18,5 cm the sediment dates back to year 1927 ± 7 years. According to the dating report, the sedimentation rate at this station is approximately 2,5 mm per year, implying that S-10-FB-01 at 30 – 32 cm depth is equivalent to approximately 120 years back in time, i.e. around the 1900s. According to the dating report, bioturbation and other sediment mixing for this core does not penetrate to depths deeper than 23 cm, strengthening the confidence in the dating of this sample. In regard of the second field blank, S-11-FB-02, there are no ^{210}Pb dating results for this core. However, sedimentation rates in this area are in the range of 1 – 2 mm per year implying that the sediment at a depth of 20 – 22 cm is likely to have deposited between 200 – 100 years ago, i.e. between the 1820s and 1920s [9]. As the first plastic types were not commercially produced until in the late 1920s, the selected sediment layers should be well prior to introduction of microplastics to the marine environment. Thus, it is assumed the field blanks should be plastic-free.

2.2 Microplastics analysis

2.2.1 Sediment preparation

The first step of sample preparation was to homogenize the sediment by stirring the sample with a metal spoon in the glass jar used to store the sample. Then, a portion of the sediment (ca. 20 g wet weight) was transferred to a pre-weighed aluminium tray for dry matter analysis. The weight of the wet sediment sample was noted, and the sample dried at 60 °C for at least two days. The dry weight was obtained and used to calculate the percent dry matter (DM%, Formula 1). A temperature of 60 °C was used instead of 110 °C, which is normally used to calculate DM%, to prevent the potential melting of microplastics in the sample.

$$DM\% = \frac{dry\ weight\ (g)}{wet\ weight\ (g)} * 100\% \qquad \textit{Formula 1}$$

Another portion from the same sample (ca. 100 g wet weight) was transferred to a pre-weighed aluminium tray. This sediment was used for the microplastics-sediment separation. A slurry was made by adding $ZnCl_2$-$CaCl_2$ (ρ ~1.52 g/cm^3) (from now on referred to as zinc-chloride) to the sediment and stirring with a metal spoon or spatula to achieve a smooth, homogeneous consistency. This was considered a crucial step in order to prevent the trapping of microplastic particles inside the sediment.

2.2.2 Sediment density separation

NGI's Bauta Microplastic-Sediment Separator (BMSS) 2.0 was used to separate microplastics from sediment (Figure 3). The separator was updated from NGI's original BMSS design (Figure 2), inspired by the Munich Plastic-Sediment Separator (MPSS) by Imhof et al. (2012) [10] and used in previous studies [11] [12]. The BMSS 2.0 was designed without the constriction of the glass column in the previous BMSS to prevent particles sticking to the walls of the separator. The setup of the BMSS 2.0 consists of a stainless-steel base and sedimentation chamber with a glass column and separation chamber on top. The separation chamber is made up of a stainless-steel part with a shut-off valve and air vent, another glass column and a stainless-steel funnel with a ½" ball valve on top. This unit makes it possible to separate the top-layer of the solution, which after density separation includes non-colloidal particles with a density less than the separation fluid used (i.e. microplastics, organic material and debris with $\rho < 1.52$ g/cm^3), whereas all denser particles are collected in the sediment chamber.

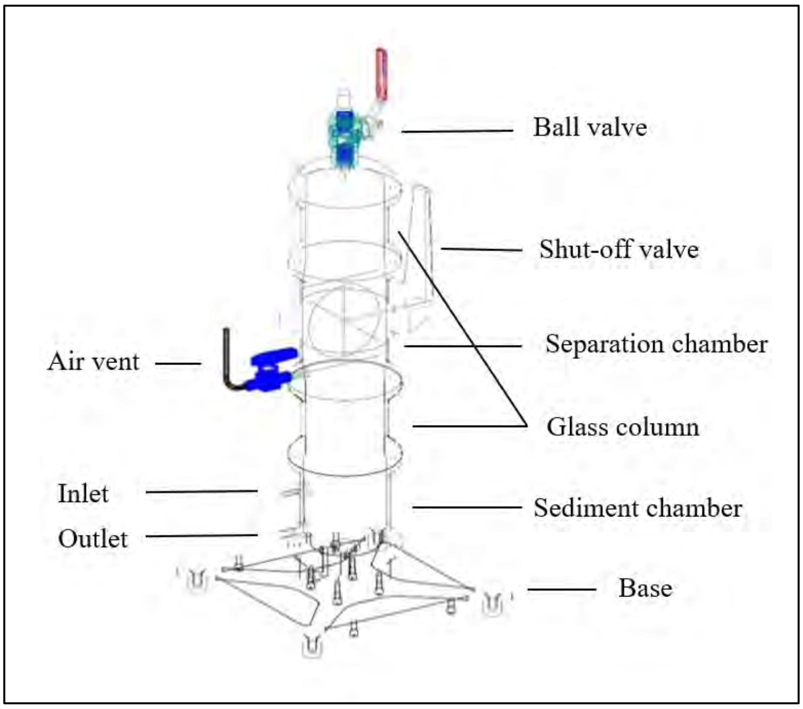

Figure 3 NGI's Bauta Microplastic-Sediment Separator 2.0. (Schematic adapted from Philip Hayes).

The BMSS was thoroughly cleaned, flushed with distilled water and inspected before each use, to ensure minimal particle contamination. The filtered (Whatman glass microfiber filter, grade GF/D, pore size 2.7 µm and diameter 150 mm) high-density zinc-chloride solution (ρ ≥ 1.52 g/cm^3) [13] was filled from the bottom of the sediment chamber and into the lower glass column (until 1/3 of the glass column). Then, the slurry of sediment and zinc-chloride was added to the BMSS from the top, using a metal spoon. After stirring, the sample was left for the separation to start before elevating the zinc-chloride solution by addition of zinc-chloride through the inlet valve. The salt solution was raised into the separation chamber until just below the upper glass column (to prevent particles being trapped on the shelf at the separation chamber – glass column interface). Then, the sample was left for sedimentation overnight.

After sedimentation, the shut off valve of the separation chamber was closed to collect the separated microplastics. Then, the air vent was opened, and the zinc-chloride solution level was lowered before the separator unit was dismounted, turned upside-down and placed on a tripod for filtration onto a 43 µm stainless steel mesh filter (#300 Mesh - 0.043 mm Aperture - 0.04 mm Wire Diameter - SS316 Grade - Woven Wire, purchased from the Mesh Company, Warrington UK) (Figure 5C). A vacuum pump was used for filtration and the separation unit was flushed zinc-chloride. All parts open to the environment was covered with aluminium foil whenever possible. The filtration step was repeated three times by mounting the separator unit back to the bottom parts of the Bauta and filling with zinc-chloride solution. After the last filtration and rinsing with zinc-chloride, the separation unit was also rinsed with Milli-Q water to collect any remaining particles stuck to the Bauta walls. Milli-Q was introduced via water bottles are made of plastic (PE), and were tested to ensure little Microplastic particles; use of glass bottles would be a safer option.

The steel mesh filter containing the combined filtrate sample after rinsing several times (Figure 5, part D) was carefully folded into a "tea-bag" like form using the folding technique shown in Figure 4, and secured with a pre-weighed steel wire (Figure 5, part E). Finally, the samples were dried over night at 60 °C and weighed before treatment by oxidation of organic matter.

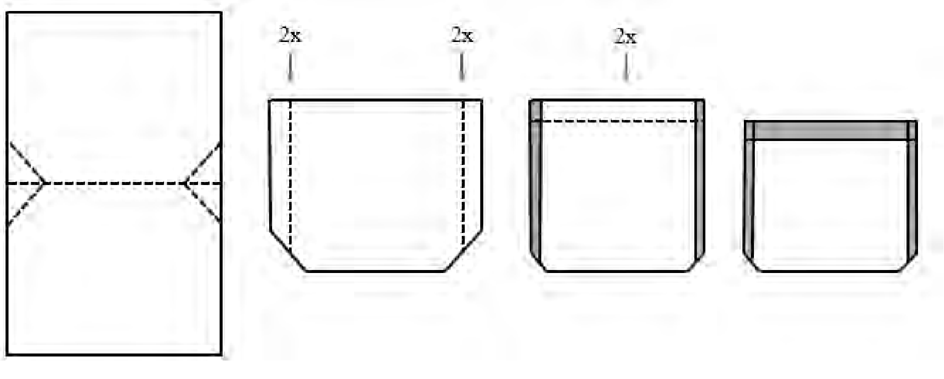

Figure 4 Folding technique used to secure sample material inside steel mesh.

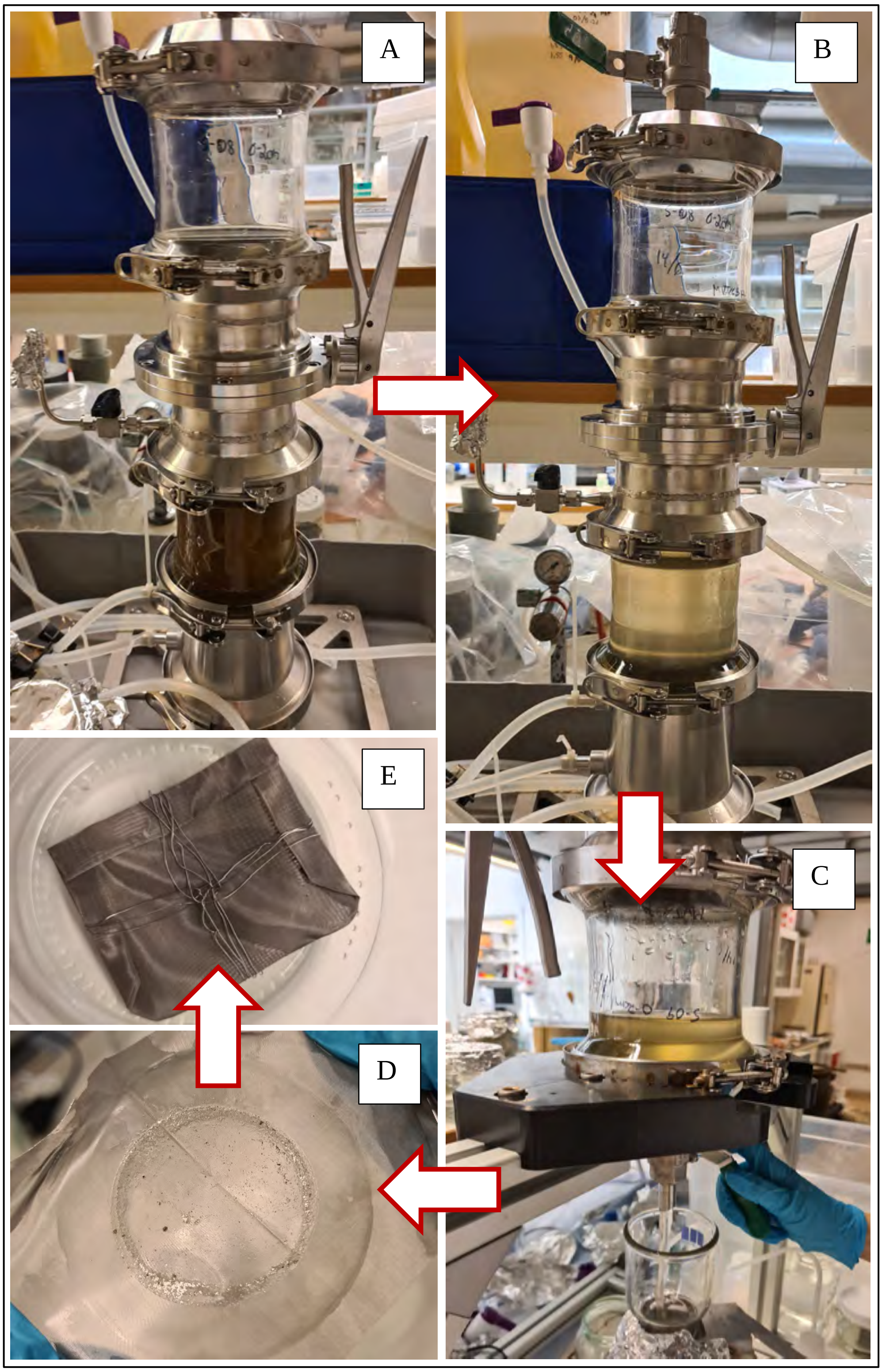

Figure 5 A: sediment sample and zinc chloride solution (ρ ≥ 1.52 g/cm^3) for separation; B: after density separation overnight; C: vacuum filtration of sample onto 43 µm steel mesh; D: close-up of filtered microplastic sample (before chemical digestion of organic matter); E: steel mesh containing sample wrapped into a "tea-bag" like shape.

2.2.3 Oxidation of organic matter

Organic material was removed by performing a chemical digestion process that consisted of two parts. Biogenic polymers, such as chitin and cellulose, were dissolved in the first step by using a mixture of urea, thiourea and NaOH. [14] [15] The samples were submerged in the urea/thiourea/NaOH solution and placed in a freezer (- 20°C) for 45 minutes, lightly shaking the sample every 15 minutes. Then, the solution was left to reach room temperature with continuous stirring. In the second step, the remaining sample is digested with 30 % H_2O_2 (prepared from 50 % stock solution) and 10 M NaOH until the reaction finished (approximately 4 hours). The samples were thoroughly rinsed with Milli-Q water after each step. The two-step oxidation process was done at least once for the separated samples. Pictures of the sample material after removal of organic matter is given in Appendix A, showing microplastics and other floating, non-digestible particles.

2.2.4 FT-IR analysis

Fourier Transform Infrared Spectroscopy (FT-IR) was performed to determine the material composition and to quantify the particles in the density separated and oxidized samples. First, the processed samples were transferred from the "tea bag" steel mesh filters and onto pre-cut, spherical steel mesh filters (pore size of 43 µm, diameter of 20 mm) with a filtration area of 13 mm. This was done by opening the “tea bag” filters into Milli-Q water followed by sonication and vacuum filtration. Once transferred to the 20 mm filters, the samples were imaged using visual microscopy (Olympus SZX16 stereo microscope) provide information about the colours and shapes of the particles and to give an overview of the distribution of particles prior to FT-IR analysis.

The micro FT-IR system used here was a Perkin Elmer Spotlight 200i FT-IR microscope, equipped with a Frontier FTIR spectrometer. The system consists of a microscope, spectrometer, PC, stage controller and joystick (Figure 6).

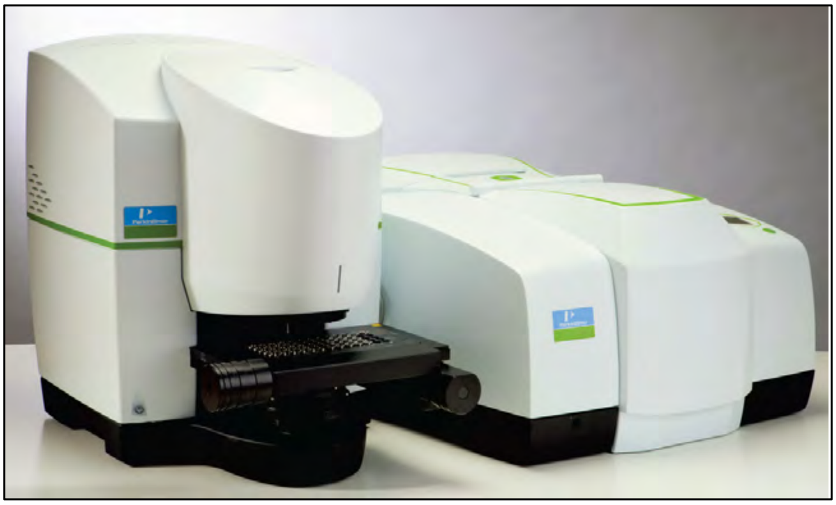

Figure 6 Spotlight 200i – microscope and Frontier IT System

Prior to analysis, the Spotlight 200i was set up, and the microscope was focussed as described in the Spotlight 200 User's Guide. The scan parameters were set to the following settings: resolution: 4 cm^{-1}, wave number range: 4000-600 cm^{-1}, 4 number of accumulations.

For samples with larger particles (approximately > 2 mm based on visual determination), large enough to be picked up by tweezers, their length was measured using Vernier callipers, and thereafter individual particle analyses using the Frontier ATR assembly was conducted. The ATR crystal was cleaned with methanol between each analysis to reduce the chance of cross-contamination between samples. For particles too small to be picked up, the analysis was performed in transmittance mode. In this study, no particles large enough to be picked up by tweezers were observed, hence all particles were analysed in transmittance mode.

In transmittance mode, the infrared radiation penetrates the particle before arriving at the detector, giving an infrared spectrum of the entire volume of the particle. This mode works best with thin or translucent particles. Using the ATR technique allows for the analysis of materials that are too opaque for transmission measurements and too strongly absorbing for good reflectance measurements. The FT-IR microscope only scans the inner 10 mm of the total 20 mm filter, and thereby excludes some of particles on the edge of the filter (though these were a minority).

The obtained IR spectrums were compared with libraries of polymer spectra available through Perkin-Elmer, namely "Polymer", "ATR-Spectra", "Transmission-Spectra" and "Fluka", plus some in house NGI libraries using plastic reference materials. Particle identification is done through the software, which compares the obtained spectrum with those in the spectrum libraries, which includes a wide variety of plastic polymers, organic substances, salts and minerals, many of which are highly unlikely to be a major component of marine samples. The "Polymer" library also included typical polymer blends (e.g. polyethylene and polypropylene blends). Particles with a quality index ≥ 0.7 (i.e. 70 % match with FT-IR library) were accepted, whereas particles with a quality index <0.7 were rejected and are denoted "unknown" in this report. The identified items were categorized into the groups in Table 3.

In this study, a minimum of 200 particles were scanned per sediment sample.

Table 3 Particle categories used in this report.

Particle Category	Description
Unknown	Particles identified by FT-IR with a quality index < 0.7
Mineral	Particles with no organic chemical bond visible in the IR spectrum (such as inorganic salts, glass, etc.)
Coatings-adhesives*	Particles containing oxy-resins, such as ethoxy resin, epoxy resin, phenoxy resin, or bisphenol-a containing particles.
Petro-Pyro	Typical petroleum substances, such as hydrocarbon resins, petroleum products, etc.
Plastic*	Commercial synthetic polymers, or a weathered derivative thereof, such as oxygenated polymers; semi-synthetics derived from biopolymers like cellulose, such as rayon, viscose etc are not included
Rubber*	Particles identified as rubbers, polymers used as rubbers (e.g. SBR, silicon rubber), or resins containing rubber compounding products
Organic	Particles identified as organic macromolecules like cellulose, rayon, chitin, proteins, or in general particles containing organic carbon molecular bonds, that do not fit into any of the above categories

**Microplastics are in this report defined as coatings-adhesives, plastic polymers and rubbers.*

Plastic polymers were further subdivided into the plastic types in the table below. In case of blends, the main polymers in the composition was chosen.

Table 4 Plastic particle categories used in this report.

Plastic category	Description
PE	Polyethylene (E.g. LDPE, HDPE, LLDPE, etc.)
PE-chlorinated	Chlorinated polyethylene
PE-chlorosulfonated	Chlorosulfonated polyethylene
PE-oxidized	Oxidized polyethylene
PE:PP	Blends of polyethylene:polypropylene
PP	Polypropylene
PET	Polyester, polyethylene terephthalates
PS	Polystyrene
PTFE	Polytetrafluoroethylenes
PP-chlorinated	Chlorinated polypropylenes
PAM	Polyacrylamide
PMMA	Polymethylmethacrylate and other polyacrylates
PU	Polyurethane foam
PVF	Polyvinyl fluoride
PVC	Polyvinyl chloride
Melamine	Melamine (all resin blends)
Nylon	Nylon and polyamide
Other	Synthetic polymers not belonging to the above list

2.3 Chemicals and solvents

Chemicals used during solution preparation and spiking materials are listed below (Table 5 and Table 6, respectively).

Table 5 Chemicals used during solution preparation.

Chemical	Molecular formula	Manufacturer/ Distributor	Purity (%)
Zink chloride	$ZnCl_2$	VWR International	97
Calcium chloride	$CaCl_2$		90-98
Hydrogen peroxide	50 % H_2O_2		Analytical grade
Urea	$CO(NH_2)_2$	Sigma Aldrich	≥ 98
Sodium dodecyl sulphate	$CH_3(CH_2)_{11}SO_4Na$		≥ 99
Thiourea	CH_4N_2S	Merck K GaA	≥ 98
Sodium hydroxide	NaOH		99-100

Table 6 Microplastics used in spiked blanks

Form	Polymer type	Manufacturer/ Distributor	Properties	
			Density (g/cm^3)	Diameter (µm)
Powder	Polyester (PET)	Goodfellow Cambridge Ltd. (UK)	1.40	45-300
Fibre	Polyester (PET)		1.39	17
Granulate	Polyester (PET)		1.40	3000-5000

2.4 Quality assurance

Contamination control was carried out throughout the sampling, processing and analysis. Several steps were taken to reduce contamination, which included:

- Cotton lab coats and clothing were used in the laboratory.
- All glassware was flushed with Milli-Q water and visually inspected before each use.
- All steel mesh filters were inspected with visual microscopy before use. If particles were observed, ultrasonic cleaning in Milli-Q was performed.
- The samples were kept sealed as much as possible to prevent airborne contamination.

Presence of contamination in blank samples was accounted for in the results.

2.4.1 Method blank

Method blanks (n = 10) were used to check for contamination from the laboratory method. Method blanks were prepared in the laboratory, by adding zinc chloride to a sediment-free aluminium tray and followed by the exact same analysis as for sediment samples. The method blanks were exposed to the ambient air for comparable time periods as the sediment samples, hence the blanks should account for airborne contamination as well as procedural contamination. No separate air contamination blanks were therefore performed.

2.4.2 Field blank

The field blanks (n = 2) were analysed in the same way as sediment samples and used to correct the microplastic concentrations in surface samples from the same geographical area. The field blanks were thus used to correct for contamination from sampling, transport and extraction as well as the laboratory method.

2.4.3 Spiked blanks

Spiked blanks were prepared after processing an actual sample by transferring some of the remaining "high-density material-free sediment" after separation in the BMSS from the sediment chamber, to a pre-weighed aluminium tray and spiked with either plastic fibres and granules or plastic powder and granules (Table 6). Five granules were used, and the weight of the granules, fibres and powder was noted before spiking the sediment. The spiked sediment was then re-introduced to the Bauta. The purpose of the spiked blanks was to test the recoveries of the method. The spiked sample recovery ($f_{recovery}$) was calculated by using the following equation:

$f_{recovery}$ (%) = m $-(m$ $\pm m$ $)$ m *Formula 2*

2.5 Microplastic concentrations

The number of particles of a specific type of microplastic based on the type of polymer in the analysed sediment surface samples ($n_{p,sample}$) was corrected according to the average number of particles plus the standard deviation (SD) in the average value for field blanks ($n_{p,field\ blank}$) or the method blanks ($n_{p,method\ blank}$), whatever was highest as shown in Formula 3. The particle concentrations were also corrected for the recovery factor ($f_{recovery}$).

if $n_{p,field\ blank} > n_{p,method\ blank}$:

$$n_{plastic} = (n_{p,sample} - n_{p,field\ blank} - SD_{p,field\ blank})/f_{recovery}$$ *Formula 3*

Else: $n_{plastic} = (n_{p,sample} - n_{p,method\ blank} - SD_{p,method\ blank})/f_{recovery}$

Weight results (m_p) were also corrected according to the recovery correction factor ($f_{recovery}$) obtained from the spiked blanks (formula 4), which were based on mass.

if $m_{p,field\ blank} > m_{p,method\ blank}$:

$$m_{plastic} = (m_{p,sample} - m_{p,field\ blank})/f_{recovery} \qquad \textit{Formula 4}$$

Else: $m_{plastic} = (m_{p,sample} - m_{p,method\ blank})/f_{recovery}$

The field blank should account for microplastics introduced from the field sampling as well as from the laboratory method, but as the method blank samples could periodically contain additional microplastics that were not all present in the field blanks, such as variations in microplastic in the laboratory atmosphere, it was considered important to include this correction factor.

Based on the weight of the processed samples after density separation and chemical digestion (mg potential MP) and the percentage of identified microplastics in the samples, microplastic concentrations were estimated on weight basis.

$$c_{MP}\left(\frac{mg\ MP}{kg\ d.w.}\right) = \frac{mg\ potential\ MP}{kg\ d.w.} * \frac{n_{plastic}}{n_{tot}} \qquad \textit{Formula 5}$$

Microplastic concentrations were also calculated as number of microplastic particles (blank-corrected) per kg sediment:

$$c_{MP}\left(\frac{items\ MP}{kg\ d.w.}\right) = \frac{n_{plastic}}{kg\ d.w.} \qquad \textit{Formula 5}$$

The presence of non-plastic particles (organic, mineral, petro-pyro and unknown particles) in the sediment samples were corrected by subtracting the average number amount in the method blanks only. This was done as the composition of non-plastic material in the sediment samples likely will vary with the geographical position, depth and characteristics of the sediments, and we do not have blanks for each station. Further, the number or organic particles in the sample after chemical digestion will vary depending on the number of treatments preformed and how successful it has been at removing organic matter, as has been described in Olsen et al. (2020) [15]. In these samples, the digestion removed enough particles to be below the analytical detection limit of the weighing balances used. Thus, the success of the digestion cannot be quantified; however, this is generally interpreted as implying that the sample is free of enough organic particles to avoid interferences in FT-IR analysis. There is also concern that too many repeated digestion procedures could destroy some of the plastics, like PET [15].

3 Results and discussion

3.1 Visual microscopy

Pictures from visual microscopy are shown in Appendix A. The most abundant particle shape was granules, followed by fibres and layers (based on observations through the FT-IR microscope). As previously mentioned for method blanks, a white "veil" suspected to be PE contamination was also observed in some of the sediment samples (e.g. S-01 0-2 cm, S-02 0-2 cm, S-11 2-4 cm; Appendix A).

3.2 Carbonate, Total Carbon and Total Organic Carbon profiles

The carbonate, total carbon (TC) and total organic carbon (TOC) content sediment samples are provided in Table 7.

Table 7 Levels of total carbon (TC), total organic carbon (TOC) and carbonate ($CaCO_3$) in surface sample S-01 to S-11 and deeper sediments (S-06, S-10 and S-11) (TC and TOC-levels provided by NGU – results from LECO analyses) [9].

Sample ID	Depth (cm)	TC (weight %)	TOC (weight%)	Carbonate content (weight %)[1]
S-01	0-1	1.18	0.317	7.2
S-02	0-1	2.24	0.563	14.0
S-03	0-1	2.71	0.897	15.1
S-04	0-1	2.50	0.629	15.6
S-05	0-1	3.36	0.742	21.8
S-06	0-1	2.59	0.577	16.8
	2-3	2.44	0.543	15.8
	4-5	2.30	0.472	15.2
	9-10	1.61	0.480	9.4
S-07	0-1	3.17	0.711	20.5
S-08	0-1	3.08	0.765	19.3
S-09	0-1	3.29	0.909	19.8
S-10	0-1	3.14	0.750	19.9
	2-3	2.95	0.667	19.0
	4-5	3.09	0.700	19.9
	9-10	3.08	0.692	19.9
	14-15	3.15	0.681	20.6
	24-25	3.09	0.651	20.3
	47-48	2.80	0.547	18.8
S-11	0-1	3.21	0.573	22.0
	2-3	3.13	0.538	21.6
	4-5	3.19	0.525	22.2
	9-10	3.14	0.491	22.1

[1]*Calculated as (TC – TOC) x 8.33. Assumes that inorganic carbon is bound as $CaCO_3$ and assumed to be of biogenic origin.*

3.3 Quality assurance

3.3.1 Method blanks

As described previously, method blanks (n = 10) were prepared and analysed for microplastics to control for contamination resulting from the laboratory method. At least one method blank was analysed from each week of ongoing analyses. For week 24, three method blanks (MB-05, MB-07 and MB-08) were analysed to investigate the variation within a single week as well as to check for differences between a new and older Bauta (MB-07 and MB-08, respectively). As the microplastic level in all three blanks were quite similar, the average value was chosen to represent the contamination level in this week. The number of particles in the method blanks are shown in the table below.

Table 8 Number of microplastic particles and other particles in method blanks within each defined FT-IR category. SD = standard deviation.

Particle \ Method blank ID		MB-01	MB-03	MB-05-07-08[1]	MB-10	MB-12	MB-13	MB-16	MB-21	Mean ± SD
Week		22	23	24	25	26	33	34	43	
Plastic polymer	PE	7	2	29	88	128	82	12	38	48 ± 46
	PP	1	10	4	4	10	0	2	10	5 ± 4
	PET	4	6	3	6	4	4	2	6	4 ± 1
	PS	0	0	0	0	0	2	0	0	0 ± 1
	PE-chlorinated	0	0	1	2	2	0	0	0	1 ± 1
	PAM	0	0	0[2]	0	0	0	0	0	0 ± 0
	PMMA	0	0	1	0	0	0	0	0	0 ± 0
	PU	0	0	0	2	0	0	0	2	1 ± 1
	PE-oxidized	3	0	1	26	26	2	0	0	7 ± 12
	PE:PP	0	4	0	0	0	0	0	2	1 ± 1
	PVC	0	0	1	0	0	0	0	0	0 ± 0
	Melamine	1	8	1	0	0	2	2	0	2 ± 3
	Nylon	0	0	2	0	0	0	0	0	0 ± 1
	EVA	0	0	0	0	0	0	2	0	0 ± 1
	Additive	0	2	1	2	4	0	0	0	1 ± 1
	Other	0	2	1	4	2	4	2	0	2 ± 2
	Total	16	34	43	134	176	96	22	58	72 ± 58
Coatings-adhesives		0	2	0	0	0	0	0	2	1 ± 1
Rubber		0	0	1	0	0	0	0	0	0 ± 0
Petro-Pyro		0	4	0	0	0	0	0	2	1 ± 1
Organic		37	116	97	64	132[3]	108[3]	66	112[3]	92 ± 32
Mineral		0	2	0	2	0	0	0	0	1 ± 1
Unknown		156	108	139	148	84	166	134	100	129 ± 29

[1]*Particle counts are given by the mean value of method blanks MB-05, MB-07 and MB-08 from week 24.*
[2]*One PAM particle was found in method blank MB-08.*

[3]*Many particles were identified as "Ethylene/acrylic acid 20 % acrylic acid", accounting for 25 %, 48 % and 27 % of the organic particles in MB-12, MB-13 and MB- 21, respectively*

Contamination by plastic polymers was evident in all method blank samples (Table 8), with an average of 72 ± 58 particles per method blank. The main contributor to this contamination was the high number of PE particles (mean: 48 ± 46 particles) found in the blanks, which seemed to reach a peak in week 26 of analyses (MB-12). For the method blanks with the highest number of PE particles (MB-10, MB-12, and MB-13), a white "veil" was observed on the filters (Appendix A), which was confirmed PE by FT-IR. Through the FT-IR microscope, a "waxy" looking substance was observed on the filters heavily contaminated by PE. This could not be seen in the visual microscope. Despite efforts to identify and limit the contamination, the source of the PE particles could not be found. Tests of laboratory equipment, chemicals used in the analyses and exposure to the ambient air in the lab did not show notable PE contamination. Due to the high abundance of PE resulting in the method blanks, this plastic type could not be quantified in this study. Hence, results for PE in the sediment samples are not reported.

Further, there appeared to be a periodic contamination of PE-oxidized particles (7 ± 12 particles) in the method blanks, with especially high number of particles detected in blanks from week 25 and 26 (MB-10 and MB-12). The third and fourth most abundant plastic polymers found in the method blanks were PP (mean: 5 ± 4 particles) and PET (mean: 4 ± 1 particles). For other plastic polymers as well as coatings-adhesives and rubber particles, the contamination level in the blank samples was relatively low.

Each method blank contained an average of 92 organic particles, and 129 unknown particles (i.e. particles with a match score < 0.7 with the FT-IR library). The impurities collected on the steel mesh filters contributed to 0 ± 1 mg (mean ± standard deviation) average additional weight after chemical digestion.

Out of the particles classified as organics, a large portion was identified as rayon (22 %), a synthetic fibre made of cellulose. The presence of rayon in the method blanks (e.g. seen in MB-08; Appendix A) suggests that airborne contamination from clothing and other fabrics is a substantial contributor to contamination in the lab. Further, fibres contributed to around 25 % the particles found in the method blanks, with the majority of the fibres being unknowns (43 %), followed by organic (32 %) and plastic (16 %) fibres. Out of the plastic fibres, 66 % were classified as PE and 6 % as PP. A potential source of these PE and PP fibres can be the use of surgical face masks in the lab due to COVID-19 restrictions [16]. According to Chowdhury et al. (2021), mismanaged face masks are estimated to contribute to between 1.15 and 0.39 million tonnes of plastic debris entering global oceans within a year, as of April 2021, from the 46 countries analysed in the study [17].

In method blank MB-12, MB-13 and MB-21, particles identified as "Ethylene/acrylic acid 20 % acrylic acid" accounted for 25 %, 48 % and 27 % of the particles classified as organics, respectively. As the transmission spectrum of "Ethylene/acrylic acid 20 % acrylic acid" is similar to that of PE, it is possible that these particles are a part of the PE contamination experienced in the lab and that the number of PE particles in these blanks

shown in Table 8 are underestimated. However, as the level of PE in the environmental samples are not quantified, this potential underestimation does not affect the results.
As shown in Appendix B, relatively high levels of PTFE particles were found in the method blanks (mean: 41 ± 38 particles per blank sample). PTFE is a thermoplastic polymer of tetrafluoroethylene. PTFE, or Teflon, and it has several applications, such as a non-stick coating for pans and other cookware, due to its hydrophobic characteristics. The PTFE contamination was expected as the inner parts of the ball valve used in the density separator previously has been identified as a source of PTFE [12]. As the density of PTFE (2.10-2.30 g/cm^3) is higher than the density of the $ZnCl_2$ solution, the method used in this study is not suitable for quantifying this polymer type. Hence, all PTFE particles found in both blank and sediment samples were regarded as contamination from the analytical method and not included in the results.

3.3.2 Field blanks

The number of particles in the field blanks (n = 2) are shown in Table 9. As previously described, these samples were prepared and analysed for microplastics to control for contamination from sample processing in the field as well as the analytical method. The particles collected on the field blank steel mesh filters contributed to less weight than the uncertainty of the scale (limit of detection set to 0,001 g).

Table 9 Number of microplastic particles and other particles in field blanks within each defined FT-IR category. Colouring in the table corresponds to the colouring in Table 3. SD = standard deviation.

Particle \ Field blank ID		S-10-FB-01	S-11-FB-02	Mean ± SD
Week		26	43	
Plastic polymer	PE	4	10	7 ± 4
	PP	3	0	2 ± 2
	PET	6	2	4 ± 3
	PE-chlorinated	8	24	16 ± 11
	PAM	1	0	1 ± 1
	PMMA	0	2	1 ± 1
	PE-oxidized	2	4	3 ± 1
	PE:PP	7	10	9 ± 2
	Total	31	52	42 ± 15
Coatings-adhesives		4	4	4 ± 0
Rubber		8	24	16 ± 11
Petro-Pyro		1	10	6 ± 6
Organic		126	72	99 ± 38
Mineral		2	2	2 ± 0
Unknown		252	2282[1]	1267 ± 1435

Generally, field blank samples contained similar amounts of plastic polymers, or less, compared to the method blanks. However, PE-chlorinated (16 ± 11) and PE:PP (9 ± 2) particles were more abundant in the field blanks (Figure 7). A relatively high number of rubber particles (16 ± 11) were also observed in the field blanks, which was not recorded in the method blanks. The rubber particles are difficult to identify chemically, as most of these in the FT-IR libraries are provided by trade or brand names. It was found that some of the brand names listed (e.g. Resinall CP-25) were rich in polyethylene, thus some of the rubber results could be due to laboratory contamination. As expected, relatively high levels for PTFE particles were found in the field blanks due to contamination from the valves of the Bauta (17 ± 6, Appendix B). In contrast to the sediment samples from the previous MAREANO survey [12] [18], no PVC particles were recorded in the field blanks in this study, which may be a result of replacing the PVC tubes previously used for core sampling with stainless steel tubes. However, as the FT-IR spectrum of PE-chlorinated is similar to that of PVC due to similarities in their chemical structure, it is possible that PVC particles have been mistaken as PE-chlorinated.

As the deep-sediments used as field blanks originate from a time prior to plastic production, it is assumed that the microplastics found in these samples are contamination from either the analytical method or the field work. The results were corrected by subtracting the background level of contamination, as previously described (chapter 2.5). Correction by this method resulted in over 70 % of the identified microplastics being excluded from the results. From experience, this is not uncommon for samples from pristine areas, which have concentrations only slightly above detection limits.

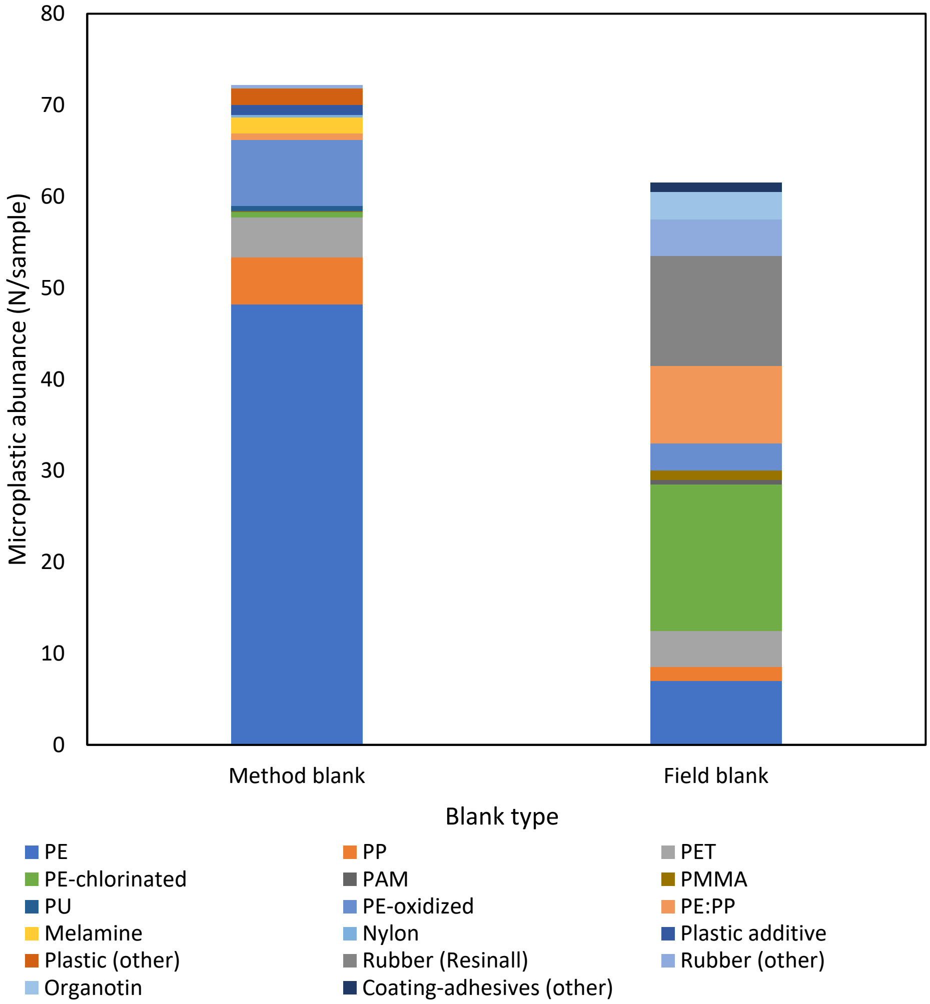

Figure 7 Comparison of average number of microplastic particles encountered in method blanks (n = 10) and field blanks (n = 2), with exclusions of PTFE particles (see Appendix B).

Overall, the number of microplastics (plastic polymers, coatings-adhesives and rubber) in the method blanks were higher than the field blanks, suggesting that the analytical work contributed to more microplastic contamination than the field work and sample processing. Certain types of microplastic (PE:PP, PE-chlorinated, rubber and organotin) were however more abundant in the field blank samples, indicating that these have been introduced during field sampling at some point. It should however be noted that due to their similar FT-IR spectra, the PE:PP particles in the field blanks could potentially be misidentified PP particles (which were found in the method blanks), and thus not a result of contamination in the field. To which extent the presence of microplastics in the field blanks is due to contamination during sampling, transfer of subsamples or transport is uncertain.

In the field blanks, PE particles were present, but less so than in the method blanks. As the PE contamination appeared to vary substantially throughout the analyses, this is likely due to the field blank samples being analysed in a period of low PE contamination in the lab. As previously described, all PE particles were excluded from the further results and are not reported.

After subtracting the level of contamination in the method blanks (mean + SD, both microplastic and other particle types), microplastics accounted for 77 % and 85 % of the identified particles, respectively (Figure 8). As these deep-sediments originate from a time prior to plastic production, it is assumed that the plastics detected are related to contamination from sampling. During sampling, care was taken to avoid contamination of sampling equipment (using steel spatula to cut the samples, covering with aluminium foil as soon as possible etc.), however, field work and sampling still appears to be a be a source of contamination. Also, as the outer edge of the sediment cores were not cut away during sample processing, cross-contamination within the sediment cores cannot be ruled out.

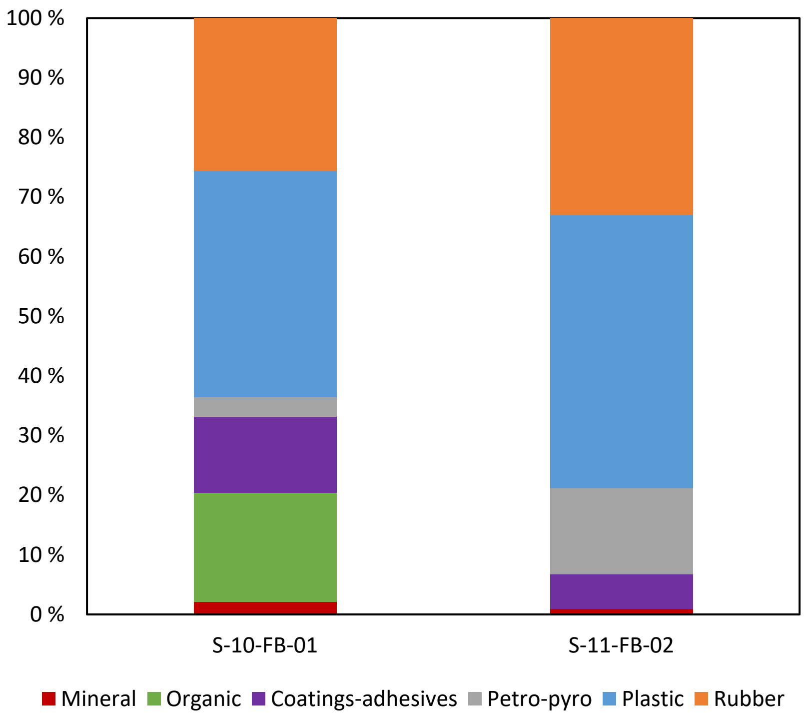

Figure 8 Material composition of identified particles in the field blanks, shown as percentage of each category group, with the exclusion of unknown particles (FT-TR score < 0.7), which accounted for > 70 % of the analysed particles.

The concentration of microplastics in the field blanks (n = 2) after method blank correction are shown in Table 10, and ranged from 471 to 899 particles per kg dry weight sediment. On weight basis, the microplastic concentrations were < LOD by estimation based on measured sample weight and % MP. By estimating an average size and density of the identified microplastic particles, the mass concentration of MPs was on average 685 ± 303 mg/kg (Table 10).

Table 10 Microplastics (MP) abundance (dry weight basis) in field blank samples (sample blank corrected). LOD = 1 mg/kg. SD = standard deviation.

Sample ID	Depth (cm)	mg MP/kg d.w.[1]	mg MP/kg d.w.[2]	MP particles /kg	PVC and PE-chlorinated particles/kg[3]	Most frequent plastic
S-10-FB-01	30-32	n.d.	0,3	471	127	Rubber (Resinall) (34 %), PE-chlorinated (27 %), PE:PP (21 %)
S-11-FB-02	20-22	n.d.	0,6	899	345	PE-chlorinated (38 %); rubber (Resinall) (27 %), PE:PP (14 %)
All (mean ± SD)			0,4 ± 0,2	685 ± 303	236 ± 155	-

[1]Based on measured weight of floating, non-digestible material and the percentage of MP in the samples. n.d.= weight of sample material was below the limit of detection for the analytical balance (<0,001 g)
[2]Based on an estimated mean particle diameter of 100 µm and density of 1.2 g/cm^3, assuming spherical particles.
[3]No PVC particles were identified by FT-IR. All particles were identified as PE-chlorinated.

3.3.3 Spiked blanks

Six spiked blanks were prepared and weighed to predict the recovery rates of microplastics from the environmental samples, as shown in the table below.

Table 11 Recovery rates for three types of PET microplastics used for spiking.

Spiked blank	**Depth (cm)**	**Date**	**Density of ZnCl2:CaCl2 (g/cm^3)**	**Weight recovery fraction (%)***		
				Powder	**Fibre**	**Pellet**
S-11	0-2	25.08.2021	1,54	90	-	100
S-11	4-6	25.08.2021	1,55	88	-	100
S-11	8-10	25.08.2021	1,54	79	-	100
S-10	0-2	05.10.2021	1,53	-	0	100
S-10	4-6	05.10.2021	1,53	-	1	100
S-10	8-10	05.10.2021	1,53	-	-1	100
Mean ± SD			1,54 ± 0	86 ± 5,7	0 ± 1	100 ± 0

**Based on blank corrected weight result, SD = standard deviation.*

The total average recovery fraction obtained for PET powder was 86 % (Table 11). Thus, a fraction ($f_{recovery}$) of 0.86 was used for recovery correction for the dry weights of sample microplastics. The recovery rate of PET powder was higher compared to the recovery recorded in the previous study on behalf of NGU as part of the MAREANO program (73 %) [12] [19]. This could be due to the optimized BMSS setup (Bauta 2.0) used in the present study, where the constriction of the glass column was removed to avoid potential loss due to particles sticking to the glass walls during separation.

For the PET fibres used for spiking, no recovery was recorded (0 ± 1 %.), indicating that all the fibres were lost during the analytical procedure. As the sediments in this study had high clay contents [9], this could be due to aggregation with clay particles hindering separation from the sediment during density separation. The PET fibres used were approximately 1 cm long and had a diameter of 17 µm and are made up of a weave of even smaller fibres, which are less than the pore size of the steel mesh filters of 43 µm; in previous project we did however have better recoveries. Knutsen et al. (2020) have reported an average recovery of 77± 19 % for PE fibres (38 µm), PET powder (75-300 µm) and PET pellets (3-5 mm) [8]. Relatively low recoveries for PET fibres (16 ± 16 %) were also seen in the previous study of microplastics in sediments form the MAREANO survey, especially for sediment with high clay content [18]. Therefore, it is considered not possible to accurately quantify small PET fibres in these sediments, likely due to aggregation with sediment.

Although fibres were observed in all environmental samples in this study, they could not be correctly quantified with this method due to the poor recovery for the PET fibres used for spiking. Much higher recovery rates have however been documented for other types of plastic fibres. Spiking with PE fibres (density of 0.92 g/cm^3 and a larger diameter than PET fibres) have previously resulted in recovery rates of 91 ± 6 % [20]. Other types of microplastic fibres present in the environmental samples may therefore have been successfully separated from the sediment samples.

3.3.4 Limitations of the method

<u>Density limitation</u>

Typical densities for sand or other sediments are approximately 2.65 g/cm^3, whereas density values for virgin plastic resins range from 0.8 to 1.4 g/cm^3 [21]. Density separation with zinc-chloride solution ($\rho \sim 1.52$ g/cm^3) will thus separate the lighter plastic particles from the heavier sediment grains. However, there are some types of plastic with densities higher than this, such as pure Teflon and mixtures of polymers and glass, polymers and minerals or polymers and metals. This means that plastics with a density higher than the zinc-chloride solution are not extracted from the sediment, which might have led to an underestimation of the total microplastics concentration present in the sample.

Particle size limitation

Due to the filter size of 43 µm, the microplastic quantities in this report may have been underestimated. Bergmann et al. (2017) reported that a significant amount of the counted microplastic particles were smaller than 25 µm in their study [4]. Thus, some of the smaller particles (including nanoplastics) would have gone unnoticed in this study. Though these particles would have minimum influence on the weight.

Digestion limitation

The digestion method used here was optimised to be as destructive as possible to organic matter (including cellulose, chitin, proteins, lipids, etc.), while leaving synthetic polymers intact. During the method development, this was tested systematically, and recalcitrant organic matter like cellulose was found to be digested 98 ± 4 %, while there was no weight change to microplastic granules [15].

Most of the material separated in the BMSS was < 1 mm. Thus, it is likely that the digestion removed most of the organic matter, as it is more difficult and time consuming to completely digest larger organic matter particles than smaller ones. Some organic matter did survive, as evident from the FT-IR results. Further, other low-density carbonaceous materials like coal, charcoal, bitumen, etc., or possibly non-carbonaceous low-density materials such as porous glass and ceramics, would have been unaffected by digestion.

Characterisation by FT-IR microscopy

There are also limitations regarding to the FT-IR analysis used. In literature, it is common to use a quality index of 0.7 as the limit [22]. This limit was also used in this study. However, weathering of the polymers affects their surface and thereby their spectra, which makes comparison with reference spectra more difficult. Therefore, a score limit of 0.7 could lead to an underestimation of plastics, as particles with a lower score in fact could be plastics. At the same time, the cut-off of 0.7 could have resulted in an overestimation of plastics if the limit is not conservative enough, as the uncertainty increases with decreasing score.

Furthermore, there are uncertainties associated with the actual FT-IR apparatus. For instance, to obtain high quality spectra in transmission mode, it is best with samples that are translucent, and they should sit as flat on the window as possible. However, particles from environmental samples, like in this project, are often irregularly shaped and with an uneven surface, or they can be highly opaque and thick, which may reduce the quality of the recorded spectra using ATR. Further, in order to get good transmission signals, the beam path should not be obstructed by the steel mesh threads during analysis. To avoid this, effort was made to only scan a part of the particles that were not overlapping with the steel mesh. However, keeping the steel filters completely flat during sample preparation prior to FT-IR analysis was challenging and may have led to the pore size appearing smaller in bent areas of the filter. When slightly bent, the risk of losing particles during transfer of the filters from the filtration apparatus to the sample holder

appeared to be higher as they were more inclined to move around on the filter. It is uncertain to what extent this may have led to an underestimation of the results.
Unknown particles are particles whose FT-IR spectra gave a match score < 0.7 with the library. In addition to the fact that the particles classified as unknown may have been particles missing in the library database, their relatively low scores could be caused by other factors, such as differences between the surface of the reference sample and measurement target and bad transmission signals of opaque particles. E.g. if the surface of the sample is weathered and oxidized, or if it is coated, the spectrum will not match well with the reference. A relatively poorer match is also expected if an analysed microplastics particle consists of a mixture of different polymers and additives, such as many coatings-adhesives and epoxides. Hence, if the samples contained highly weathered microplastics and composite particles, this could lead to an underestimation of the microplastic concentration. It is, however, considered more likely that most of the unknowns consists of other materials such as coal, charcoal and incompletely digested organic material.

3.4 Microplastics in surface samples

3.4.1 Microplastic abundance

In all analysed sediments, microplastics were detected above the levels in method blanks and field blanks. Microplastic concentrations in the surface samples (0 – 2 cm, n = 11) are provided Table 12. The number of microplastic particles per kg sediment ranged from 51 to 2187 (average of 679 ± 663 particles/kg). Using two different methods to estimate the amount of microplastics on weight basis (mg MP/kg sediment), the weight concentration was 0.7 ± 0.8 mg/kg (range: n.d. - 2.2 mg/kg) or 0.4 ± 0.4 mg/kg (range: 0 - 1.4 mg/kg). As this study was not able to quantify potential PE-particles as well as certain microplastic fibres (due to poor recovery factor for PET fibres, discussed in chapter 3.3.3), the reported concentrations may be underestimated. All results prior to blank correction is given in Appendix C.

Table 12 Microplastic abundance (dry weight basis) in surface samples (blank and recovery corrected) and estimated weight concentrations. SD = standard deviation.

Sample ID	mg MP/kg d.w. (estimate 1)[1]	mg MP/kg d.w. (estimate 2)[2]	MP particles/kg d.w.
S-01	n.d.	0.1	194
S-02	2.2	1.4	2187
S-03	0.3	0.9	1369
S-04	n.d.	0.4	692
S-05	n.d.	0.0	51
S-06	0.6	0.5	867
S-07	n.d.	0.4	666
S-08	0.1	0.0	52
S-09	n.d.	0.1	94
S-10	0.5	0.2	301
S-11	n.d.	0.6	992
Mean ± SD (min-max)	0.7 ± 0.8 (0.1 - 2.2)	0.4 ± 0.4 (0 - 1.4)	679 ± 663 (51 - 2187)

[1]Based on measured weight of floating, non-digestible material and the percentage of MP in the samples. n.d.: weight of sample material was below the limit of detection for the analytical balance (<0,001 g)
[2]Based on an estimated mean particle diameter of 100 µm and density of 1.2 g/cm^3, assuming spherical particles.

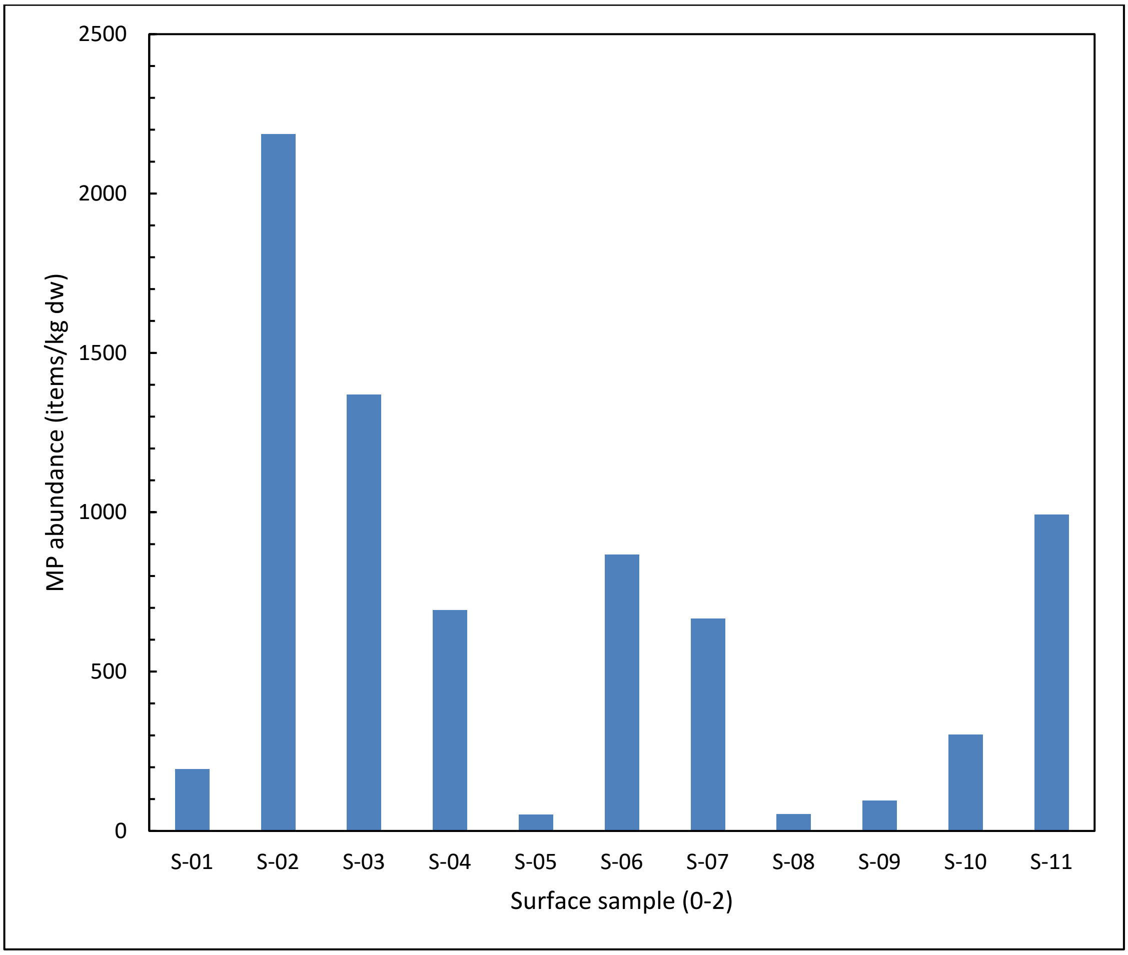

Figure 9 Microplastic (MP) abundance (items/kg dry weight) in surface sediment (0-2 cm) from sampling stations S-01 to S-11 in the Norwegian Sea.

3.4.2 Comparison of microplastic abundance with literature

Microplastic particles have been reported in marine sediments worldwide. It is difficult to make direct comparisons across different regions because of variability and differences in the sampling techniques, sample preparation and detection methods used. In the table below, there is a list of studies of microplastics in sediment from nearby geographical areas and with some methodological similarities to this study. For meaningful comparisons, it is important to define specific methodological conditions, such as the density of the density-solution used and in particular the size range of microplastics quantified, as particle number is expected to increase with decreasing particle size [4]. Differences in methodology which could affect comparison are discussed in the text.

Table 13 Summary of reported microplastic concentrations in sediments. The concentrations are expressed as particles/kg (dry weight basis). SD = standard deviation; SE = standard error; n = number of samples.

Location	Location specification	Particle size (n)	Measured concentration (min-max range and/or mean)	Reference
Norway	The Norwegian Sea / mid-Norwegian Continental Shelf	43 µm – 1 mm[a] (11)	51 – 2187 particles/kg (679 ± 663 SD)	This study
Svalbard/ Arctic	Arctic and Barents Sea	45 µm – 1 mm[a] (10)	0 – 560 particles/kg (220 ± 180 SD)	NGU and NGI, 2019 [12] [19]
	Barents Sea	45 µm – 1 mm[a] (4)	46 – 430 particles/kg (220 ± 190 SD)	
Svalbard/ Arctic	HAUSGARTEN observatory	10 – 275 µm (9)	42 – 6595 particles/kg (4356 ± 675 SE)	Bergmann et al., 2017 [4]
Norway	Norwegian Continental Shelf	5 µm – 1 mm (10)	23 – 290 particles/kg (120 ± 97 SD)	NGU, 2018 [7]
Norway[b]	Norwegian Continental Shelf	45 µm – 5 mm[c] (35)	0 – 3400 particles/kg (370 ± 690 SD)	DNV and NGI, 2018 [11] [20]
	Barents Sea	45 µm – 5 mm[c] (5)	53 – 810 particles/kg (320 ± 330 SD)	
Belgium	Belgium Continental Shelf	38 µm – 1 mm (6)	72 – 270 particles/kg (97 ± 19 SD)	Claessens et al., 2011 [23]

[a]*With the exception of some longer fibres, no granules/layers were over 1 mm in this study.*
[b]*The concentrations in this table differ from the reported data in DNV and NGI (2018)* [11]*, as the reported concentrations were recalculated with a FT-IR cut-off of 0.7 instead of 0.6, as show presented in NGU and NGI (2019)* [12] [18].
[c]*Most particles were in the size range 45-1000 µm, although some were in size group 1-5 mm.*

Up until now, the microplastic content in marine sediments from the Norwegian Sea have only been investigated in a pilot study within the MAREANO program carried out by NGU in 2016-2017 [7]. In this pilot, microplastics were analysed in 10 sediment samples, which were sampled on several MAREANO surveys covering relatively large areas along the Norwegian Continental Shelf (NCS). The pilot study reported microplastic concentrations ranging from 23 to 290 particles/kg (mean: 120 ± 97, Table 13), which is lower than what observed in this study (range: 51-2187 particles/kg; mean 679 ± 663 particles/kg, Table 13), although it includes a wider range of particle sizes. A reason for this could potentially be explained by the differences in analytical methods applied. In the pilot study, sediment cores were sampled by either a multicorer (as in this study) or a boxcorer and the top sediment (0 – 3 cm) were analysed using a different oxidation process, density separation medium (NaI solution, 1.6 g/cm^3) and an identification technique mainly based on visual inspection. In general, with microplastics analysis, confirmation of plastic identity with FT-IR, Raman, or similar methods are considered as more reliable than visual analysis.

The higher quantities reported in the present study compared to the pilot study from the NCS could also be due to the stations examined in this paper being located closer to the Norwegian coastline, as microplastics can tend to be more concentrated in coastal environments compared to continental shelves and deep-sea sediments [24]. However, MP abundance have also been seen to vary greatly within similar environmental settings, deeming such a generalization to not be empirical [25]. One of the largest quantities of microplastics in sediments have been recorded in Arctic deep-sea sediment from the HAUSGARTEN Observatory (2340-5570 m depth) in the Fram Strait at N79°, west of Svalbard, indicating that this area is in or close to a plastic accumulation zone [4]. The HAUSGARTEN study showed concentrations of microplastics ranging from 42 to 6595 particles/kg sediment dry weight (mean: 4356 ± 675 particles/kg), displaying a maximum level nearly three times as high as in this study. However, it should be kept in mind that the HAUSGARTEN study quantified microplastics ≥ 10 µm, while this study investigated particles ≥ 43 µm. As Bergmann et al. reported that the majority of all particles were ≤ 25 µm [4], this could be one explanation of why they found more microplastics than the present study. Further, the results in this study were field blank corrected, whereas the samples in the HAUSGARTEN study were only method blank corrected, which may additionally explain why they reported higher concentrations. As this study was not able to quantify potential PE-particles as well as certain microplastic fibres (due to poor recovery factor for PET fibres, discussed in chapter 3.3.3), the reported concentrations in the present study may also be underestimated.

In 2019 NGI, on behalf of NGU/MAREANO, performed microplastic analyses of surface sediment (0-2 cm) sampled with a multicorer during the MAREANO survey of Svalbard [12] [18]. Although in a different geographical area than this study, the same methodology was used. The sediment was collected from Svalbard fjords (n = 6) as well as the Barents Sea (Bjørnøy transect, n = 4), and the microplastic abundance ranged from n.d. to 560 particles/kg (mean: 230 ± 180, Table 13), substantially lower range than what observed in this study (range: 51-2187 particles/kg; mean 679 ± 663 particles/kg, Table 13). This might be due to the previous MAREANO survey being set in a more remote area with potentially less exposure to microplastics. Although the same methodology was applied in both studies, some small changes have been made since 2019. In the present analyses, a new and improved version of the BMSS (Bauta 2.0) was used, however the change in BMSS design should not affect the results as the potential loss of particles during density separation should be accounted for by the spiked recovery fraction. Further, steel mesh with a pore size of 43 µm instead of 45 µm was used in this study, and the slightly larger particle size range could have resulted in higher microplastic concentrations. This slight change in pore size is however assumed to have negligible effect on the number of particles reported.

During the regional environmental sediment monitoring on the NCS on behalf of the oil and gas industry in 2017, 35 sediment samples from the North Sea and the Barents Sea were sampled, including many stations in the vicinity of offshore oil platforms [11] [20]. The samples were collected by Van Veen Grabs, and the top 1 cm was sent to NGI for analysis of microplastics, using the same analytical method as in this study, but with the earlier BMSS design and slightly smaller particle size range (as in 2019). Microplastic concentrations in the whole study area ranged from n.d. to 3400 particles/kg (mean: 370 ± 690 particles/kg, Table 13), displaying an even larger range than what recorded in this study (range: 51-2187 particles/kg; mean 679 ± 663 particles/kg, Table 13). One of the reasons for the large range in microplastic abundance in the 2017 samples is the great diversity in geographical areas, including the proximity of some samples to oil and gas activities, which tended to have higher microplastic concentrations [11] [20]. When considering only the sediments collected from the Northern North Sea (n = 10), the sampling area in closest proximity to the stations sampled in this study, the average microplastic abundance was 525 ± 1030 particles/kg (range: n.d. to 3400 particles/kg) [8], a comparable level to what is stated in this report (mean 679 ± 663 particles/kg, Table 12). There are many factors that can cause discrepancies in concentrations across different depositional settings. It should also be noted that these samples were taken with a van Veen grab sampler, and not corrected using field blanks (though some sample grab samples had no identifiable microplastics), so this previous study may had different exposure routes to potential ambient air contamination during sampling and sample processing than the current study [8].

3.4.3 Composition of microplastics

PE-chlorinated, rubber resins, PS, PE:PP, PAM, phenoxy resin, nylon, organotin (paint) and plastic additives were among the most frequent plastic types encountered in the sediment samples (Table 14).

Table 14 List of most frequently identified (i.e. FT-IR match > 0.7) microplastics (defined as plastic polymers, coatings-adhesives and rubber) in the surface samples.

Sample ID	**Most frequent** (percentage of total microplastics)	**Second most frequent** (percentage of total microplastics)
S-01	Organotin (paint) (46 %)	Plastic (other) (21 %)
S-02	PE-chlorinated (90 %)	Rubber (Resinall) (3 %)
S-03	PS (31 %)	PE-chlorinated (30 %)
S-04	Plastic (other) (20 %)	Nylon (16 %)
S-05	Rubber[2] (68 %)	n.d.
S-06	PE-chlorinated (30 %)	PS (14 %)
S-07	PE-chlorinated (66 %)	PE:PP (24 %)
S-08	PS (45 %)	PAM (32 %)
S-09	Phenoxy resin (57 %)	Plastic additive (43 %)
S-10	PE-chlorinated (76 %)	PS (24 %)
S-11	Rubber (Resinall) (44 %)	PE:PP (18 %)

As shown in Figure 10, the largest variety in the microplastic types identified in the surface sediment, was seen in sample S-04. In sample S-05, the sample with the lowest level of microplastics, all of the identified particles were synthetic rubber (Resinall). Generally, it appears that samples with larger number of microplastics had more a varied microplastic composition. However, this has not been investigated statistically.

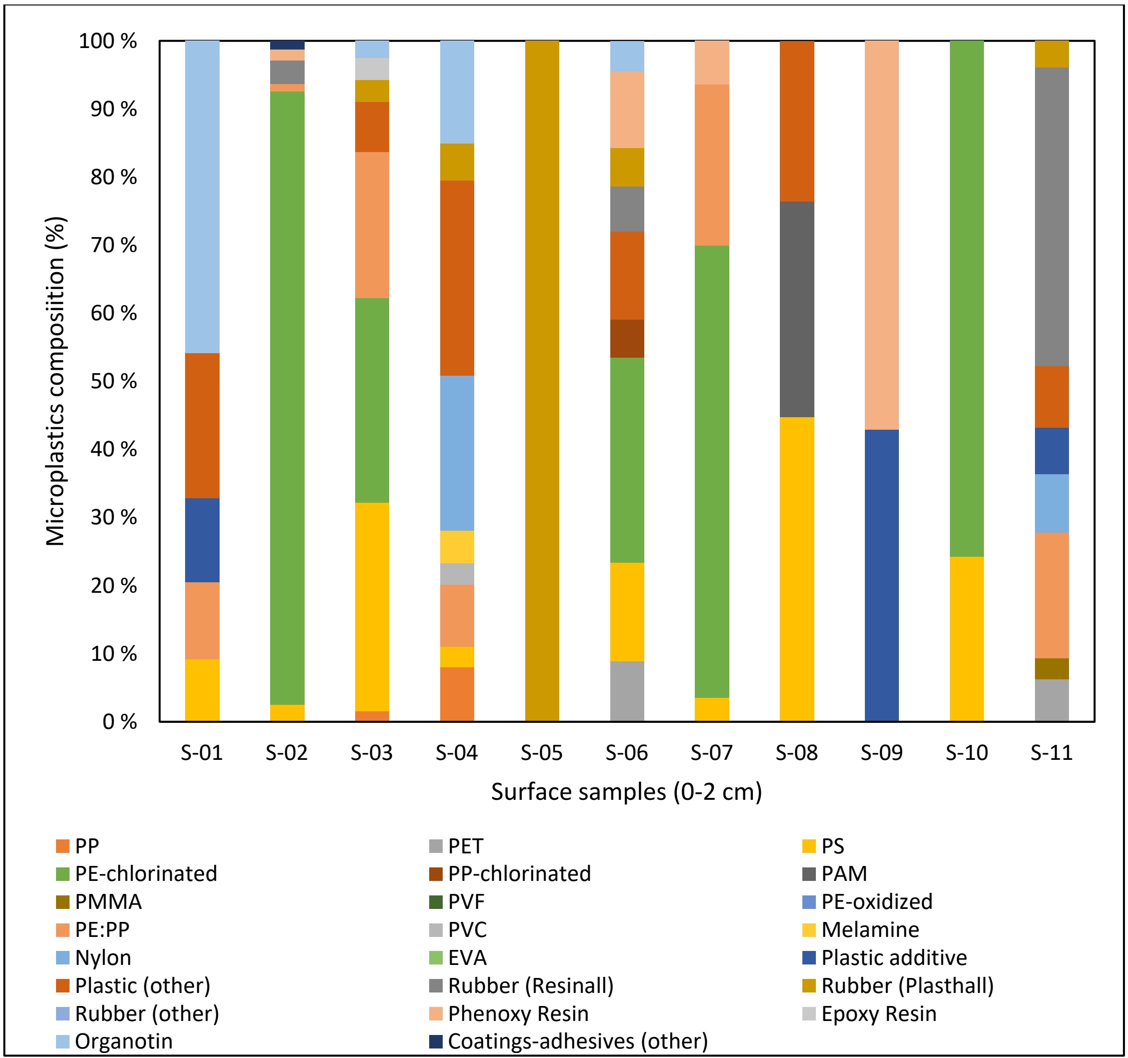

Figure 10 Microplastics composition (%) of surface sample (0-2 cm) S-01 to S-11.

The microplastic types that were encountered in most of the surface samples were PS and PE:PP, which were identified in 8 or 6 out of the 11 samples, respectively. Generally, PE-chlorinated was the type most abundant microplastic, with an average of 301 ± 5 particles per kg dry sediment in the analysed surface samples (Figure 11). It should be noted that PE-chlorinated particles could also be misidentified PVC particles due to their similar FT-IR. Following PE-chlorinated, highest concentrations of PE:PP, rubber, unresolved plastics, PS, organotin, PET and PP are reported.

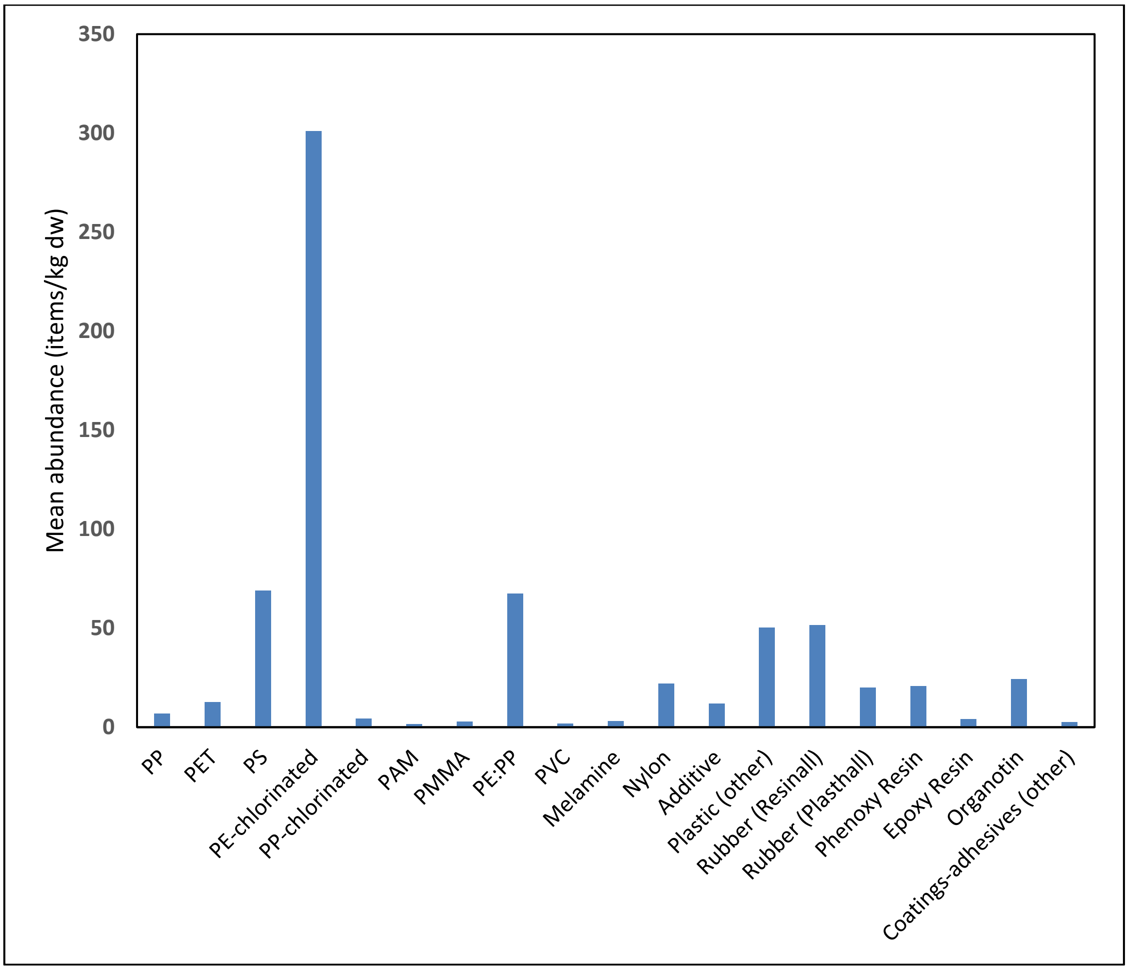

Figure 11 Mean abundance of microplastics (items/kg dry weight sediment) in surface samples (0-2 cm).

The density of surface seawater ranges from about 1.020 to 1.029 g/cm^3, while deep seawater can reach a density of 1.050 g/cm^3 or higher. In Table 15, typical densities of (pristine) plastic polymers identified in the surface samples are listed. As evident by the table, most polymers in the samples had a density higher than seawater, thus expected to sink in the water column after being transported by currents. However, low-density polymers like PE:PP were also found. There are several mechanisms which affect the sinking behaviour of microplastics. For instance, biofouling may increase the specific density, and thereby enhance its sinking behaviour [26]. Other mechanisms could be flocculation with higher density particles and sinking as part of phytoplankton excrement pellets [27]. Different hydrodynamic processes will also influence the distribution of microplastics in the marine environment [28].

Table 15 Density of pristine plastic polymers identified in the surface samples in this study.

Polymer type	Density (g/cm^3)	Reference
PET	1.37-1.45	Hidalgo-Ruz et al., 2012 [21]
PE	0.92-0.97	
PP	0.9-0.91	
PS	1.04-1.1	
PMMA	1.09-1.20	
Nylon	1.02-1.05	
PE-chlorinated/PVC	1.1-1.45	Titow, W., 1984 [29]
PAM	1.20-1.30	www.polymerdatabase.com

A short description of some of the most frequently detected microplastics is as follows:

- PET is the most common thermoplastic of the polyester family. Often used in fibres for clothing, containers for liquids and foods, and in combination with glass fibre for engineering resins.
- PS in its solid form is clear, hard and brittle. It is widely employed in the food-service industry as rigid trays and containers, disposable eating utensils, lids and in protective packaging.
- PVC, or vinyl, is a hard, durable and chemically resistant plastic commonly used in plumbing pipes, electrical wires and for other building and construction applications. PVC is also often found in clear food packaging, children's toys and vinyl tablecloths or flooring. PE-chlorinated is a softer plastic that can be used in blends with PVC to improve impact and weathering resistance. As previously discussed, PVC and PE-chlorinated can be difficult to distinguish due to their similar FT-IR transmission spectra.
- PAM is a water-soluble polymer that can be used as a flocculating agent. PAM is commonly used as a flocculant in water and wastewater treatment, as well as enhanced oil recovery. It's presence in sediments could therefore be due to flocs containing PAM, from such uses [30].
- Synthetic rubbers are artificial elastomers. Rubber material is the core component in tyres, which has been suggested to be one of the most important sources of microplastics in the environment.
- Phenoxy resin is one of the most typical oxy-resin-particulates, commonly used as a marine varnish.
- PE is the most common plastic type. Its primary use is in packaging (plastic bags, containers such as shampoo bottles and more).
- Nylon is a generic designation for a family of synthetic polymers based on polyamides. It is a thermoplastic silky material that can be melt-processed into fibres, films or shapes. Nylon filaments are primarily used in toothbrushes and string trimmers, as well as in fishing lines.

3.4.4 Comparison of microplastic composition with literature

Differences in microplastic detection method used, particle categorization, reporting units and surveyed particle sizes makes comparisons of microplastics composition in environmental samples somewhat biased. However, a short comparison is given in the following.

In agreement with this study, PE-chlorinated was also among the most frequent plastic identified in sediments from the Northern North Sea (NNS) [11] [20] [8]. Other common microplastics were PET, rubber and phenoxy resin, also seen in this study. PE:PP and organotin resin was also found in sediment from the NNS region, being the most frequently identified plastic type in one or two of the in total ten samples in that study.

PE-chlorinated has also been recorded as the most abundant microplastic type in Arctic deep-sea sediment from the HAUSGARTEN observatory, accounting for (38 %) of the particles, followed by polyamide (22 %) and polypropylene (16 %) [4]. PP was also found in several samples in this study, mostly identified as blends polyethylene:polypropylene (PE:PP), but also as PP in some samples. Polyamide was however not detected but could potentially refer to nylon, which was found in a few samples, and possibly also PAM (detected in one of the surface samples). As the analytical methods used and the FT-IR settings and libraries chosen will affect the results, direct comparison is not possible. In agreement this study, several different rubber types were also reported in the HAUSGARTEN samples.

According to a review by Burns et al. (2018), polymer type trends in the literature are similar in the water column and sediment, with the greatest proportion of particles being PE, followed by PET and PAM in water and PP in sediment [31]. In MAREANO sediments from the Norwegian Continental Shelf, PE and PP were also found to be dominating plastic types [7]. The frequency of PP in marine sediments stated in literature, corresponds with it being one of the most commonly detected plastics in this study. PET was also found in this study (and some PAM). As previously discussed, this study was not able to quantify PE in the sediments. Based on literature, it is likely that PE has been present in some of the sediment samples but concealed by the high background level due to contamination.

Further, PE, PP, PVC, rubbers and oxy-resins have been reported as the most common microplastics in harbour sediments close to a water treatment plant in Norway [15]. This corresponds well with the findings of the present study, taken into consideration that particles classified as PE-chlorinated could include misidentified PVC particles.

In sediments from the MAREANO survey of Svalbard, analysed at NGI in 2019, rubber resins, PS and nylon were among the most frequently encountered types of microplastics, which were also among the most abundant types in this study [12] [18]. In 2019, PE-oxidized were also frequently encountered, whereas the percentage of PE-oxidized particles stated in this report are lower, potentially due to ta higher detection limit due to contamination of the field blanks. PE particles were also frequently recorded in the previous MAREANO study, however as this microplastic is not quantified in this report due to high background levels, comparison is not possible.

3.4.5 Composition of microplastics and other particles

Most of the analysed particles in the surface samples were identified as unknown (88 %), followed by organic (4.2 %), petro-pyro (3.5 %) plastic polymers (3.2 %), and rubber particles (0.7 %), as shown in Appendix D1. Generally, minerals and coatings-adhesives contributed to a small number of particles in the samples. Overall, microplastics (defined as plastic polymers, coatings-adhesives and rubber particles) contributed to around 5 % of the analysed particles. The material composition of surface samples in this study is comparable to previous studies, but with somewhat higher percentage of unknown particles (88 ± 6.1 %) than what reported for MAREANO samples in 2019 (76 ± 31 %) [12]. Many of the organic particles found in the samples were cotton or rayon fibres, as shown in Appendix A.

3.5 Microplastics in sediment cores

3.5.1 Microplastic abundance and composition

The microplastic abundance in sediment core S-06 ranged from n.d. – 1084 particles/kg with a mean concentration of 562 ± 472 particles/kg in the upper 10 cm. According to dating results for this core, the sediment at 10 cm depth is well over 100 years old and should include all particles deposited in this area since the start of plastic production. As seen in Figure 13, the results showed no clear trend in microplastic abundance or composition downcore (Figure 12). PE-chlorinated was the most frequently occurring microplastic, accounting for 41 % of the identified plastic particles, followed by melamine (16 %), rubber (Plasthall) (6 %), other plastics (6 %), PE:PP (5 %), PET (5 %) and PS (5 %).

As stated in the dating report, this sediment core seems to be affected by some sediment mixing, indicated by the presence of ^{137}Cs in layers dated to well before the 1950s [9]. As dating results only are valid if bioturbation and other mixing is negligible, the chronology shown in Figure 12 should only be used indicatively.

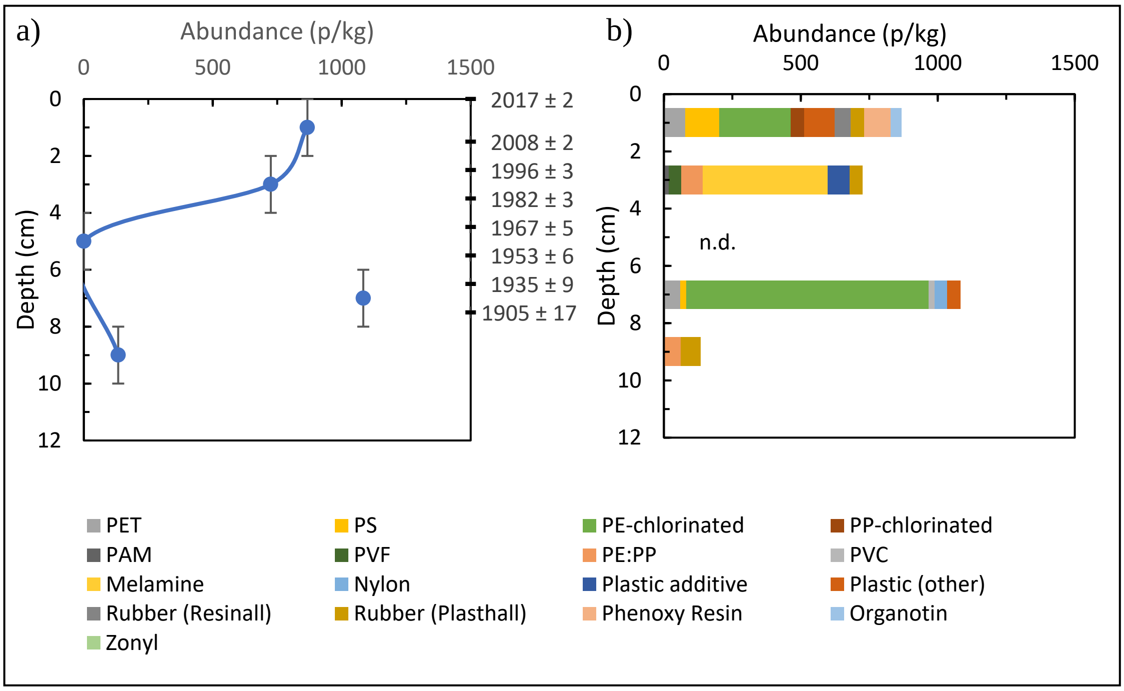

Figure 12 Microplastic profile of sediment core S-06, displaying (a) the total microplastic abundance (number of items per kg dry weight) and (b) microplastic composition. In (a), the date (year ± error) of the sediment at certain depths are provided as dated by the Gamma Dating Centre [9].

The highest number of microplastics were found in sediment from 6 – 8 cm depth, which should, according to the ^{210}Pb dating results have been deposited between approximately the early and mid-20th century. This overlaps with the start of mass production of plastics in the 1940s and 1950s, with mass production of PE-chlorinated/PVC, the most abundant plastic type in this sample, already starting in 1926 [1]. However, compared to the rest of the sediment core, the concentration found in the 6 – 8 cm sample appears to be an outlier which may be a result of contamination (PE-chlorinated particles detected in both field blank samples, although at a much lower level). The high abundance in the 6-8 cm level compared to concentrations in the sediment between 0 and 6 cm may be due to bioturbation. The dating report for S-06 shows a local maximum for ^{137}Cs in the 7-8 cm sample, which can be explained by bioturbation. Benthic fauna can affect the vertical distribution of particulates within the sediment, and it is possible that microplastics might have been “drawn” deeper into the sediments [32].

In the S-10 sediment core, generally, a lower level of microplastics was recorded in the upper 10 cm (range: 41 – 352 particles/kg; mean 233 ± 125 particles/kg) than the other cores examined in this study. In addition to geographical differences (MP sources, transport and accumulation), this could be explained by the higher sedimentation rates at this sampling station. In the S-10 core, the sediment at 10 cm depth dates back to around the 1980s, excluding decades of plastic mass production, whereas the top 10 cm of sediment in the S-06 and S-11 includes a deposition over a larger time period.

In total, the most abundant microplastic found in the S-10 core was rubber (Plasthall, 28 %), followed by melamine (21 %), PE-chlorinated (20 %), other plastics (15 %), PP (12 %), PS (9 %), organotin (7 %) and PET (4%). The composition varied greatly downcore (Figure 13). However, it should be noted that it can be difficult to differentiate between polymer types with similar chemical structures (and thus similar FT-IR spectra) with this method. This could be the case for polyolefins such as PP and PE:PP, different resins and rubber types as well as the previously discussed PVC/PE-chlorinated. In terms of microplastic abundance, a decreasing trend is observed from 0 to 10 cm depth. For the deepest sediment sample from 20 to 22 cm below the sediment surface, a higher number of MPs is recorded. As for core S-06, the chronology (Figure 13), should only be considered as indicative due to the rather uniform content of ^{137}Cs down to depths of 23 cm, suggesting some sediment mixing [9]. According to the Gamma Dating Center, the ^{210}Pb dating results does however give confidence in the reported chronology.

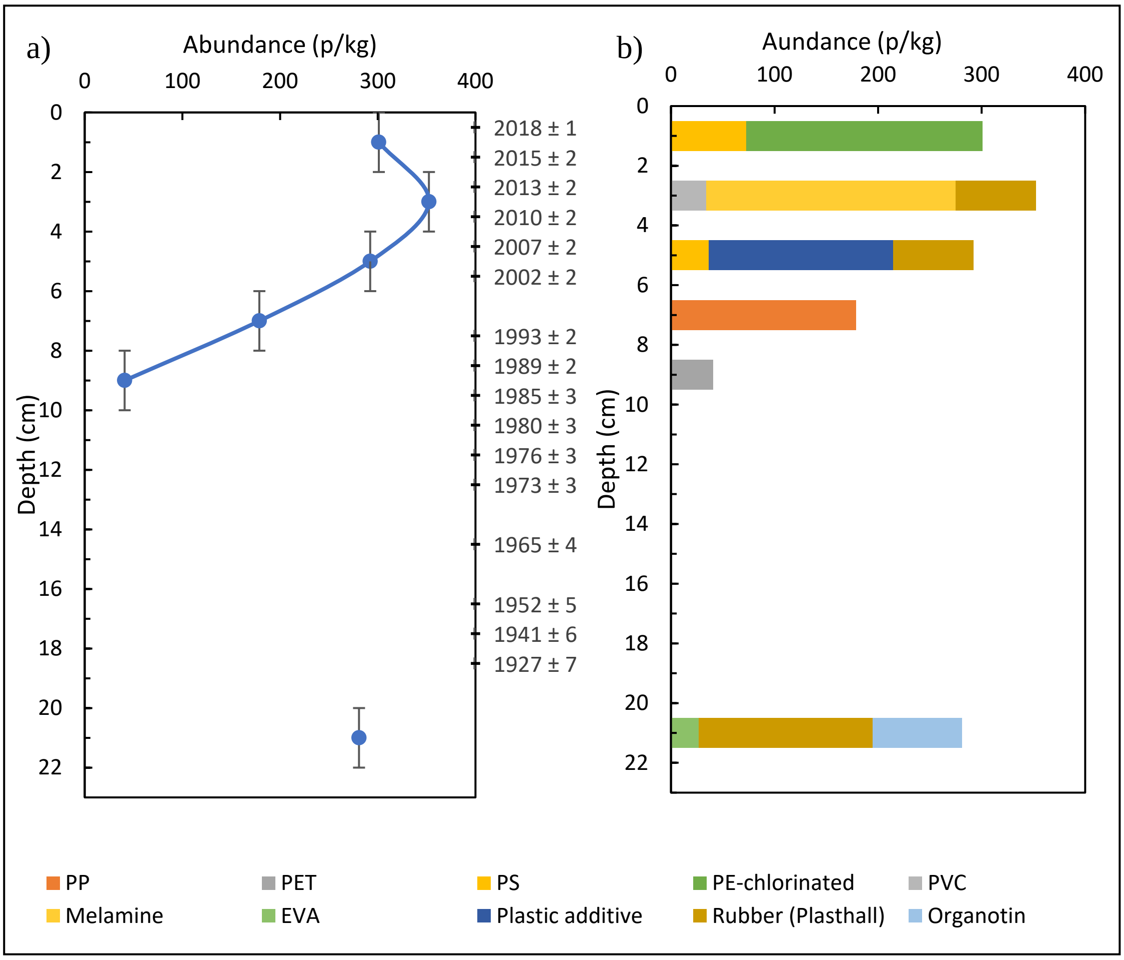

Figure 13 Microplastic profile of sediment core S-10, displaying (a) the total microplastic abundance (number of items per kg dry weight) and (b) microplastic composition. In (a), the date (year ± error) of the sediment at certain depths are provided as dated by the Gamma Dating Centre [9].

The S-11 sediment core displayed the highest level of microplastics in the 0 – 10 cm layer compared to the other cores, with a mean concentration of 1069 ± 331 particles/kg (range: 654 – 1579 particles/kg). According to the sedimentation rate in this area (1 – 2 mm per year [9], the concentration in the top 10 cm should represent the deposition of particles from present day and back to between the 1970s and 1920s. As previously discussed, radioisotope dating was not performed on the S-11 core and the chronology indicated in Figure 14 is based on a sedimentation rate of 2 mm per year.

The highest microplastic concentration in the S-11 core was found at a depth of 2 – 4 cm. From this depth and onwards, a decreasing trend in microplastic abundance was observed (Figure 14). Rubber particles were recorded throughout the sediment profile, which was not seen for the previously discussed sediment cores. Generally, the composition of microplastics appeared to be rather homogeneous downcore. For the whole 10 cm depth, the most abundant microplastics were PE:PP (15 %), PET (11 %), PE-chlorinated (10 %), rubber (Resinall, 10 %), organotin (10 %) and PP (9 %).

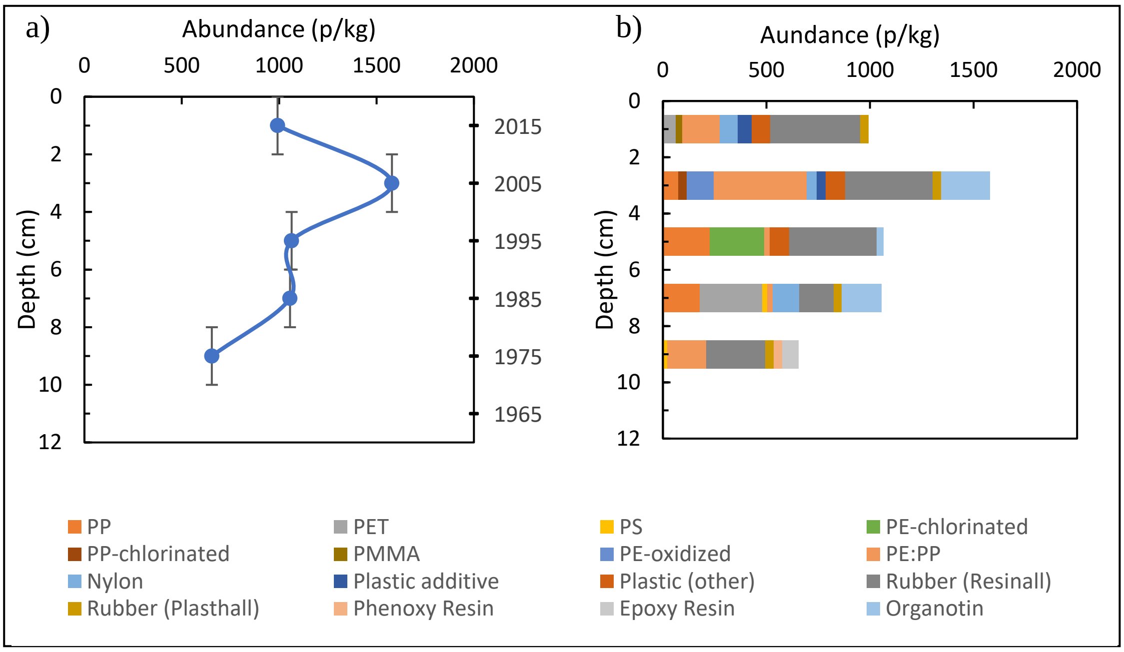

Figure 14 Microplastic profile of sediment core S-11, displaying (a) the total microplastic abundance (number of items per kg dry weight) and (b) microplastic composition. In (a), the date of the sediment at certain depths are provided as calculated from sedimentation rates in this area [9].

3.5.2 Composition of microplastics and other particles

As for the surface samples, most of the analysed particles in the core samples were identified as unknowns, as shown in Figure 15 (and in more detail in Appendix D). On average, the second most frequent particle type in the S-10 core was plastic polymers (mainly due to the 6-8 cm sample containing only plastics after blank correction), In the S-11 core, organic particles accounted for a relatively large part of the scanned particles, which could be due to a less effective oxidation treatment or more airborne contamination of organic fibres in these samples. The S-06 core had the highest percentage of unknowns.

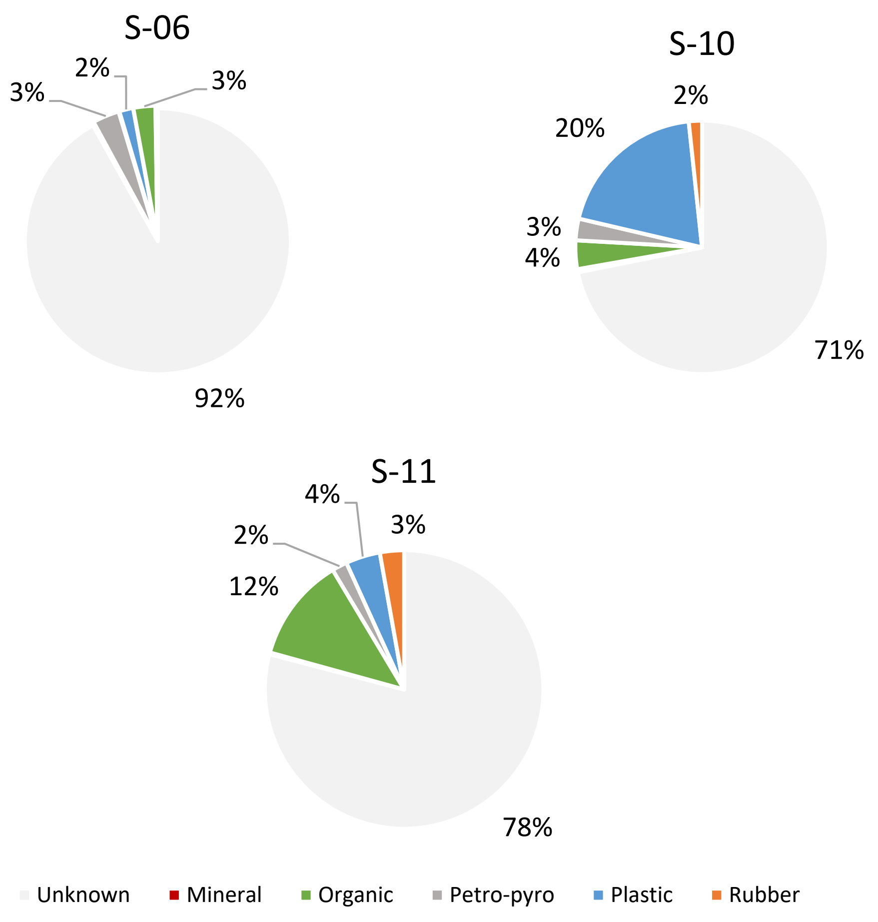

Figure 15 Average composition (%) of identified particles in the samples from sediment core S-06 (n = 5), S-10 (n = 6) and S-11 (n = 5).

3.5.3 Comparison of microplastic profiles with literature

An increase in microplastic pollution of marine sediments over time has been demonstrated by several studies on microplastic abundance in sediment cores. However, to ensure more reliable results and better comparison between studies, the methodology used to chronically reconstruct MP profiles requires standardization [33]. According to a review by Martin et al. (2021), there is a qualitative global trend of decreasing microplastic abundance downcore [34]. However, variable concentrations down individual sediment cores are also frequently reported. Further, higher ratios of fibres and smaller microplastics have commonly been reported deeper within sediment cores.

In this study, variable but generally decreasing microplastic concentrations has been recorded in the S-10 and S-11 sediment cores, whereas no obvious trend was seen in the S-06 core. In the S-11 core, the highest level of microplastics was recorded in the sediment from a depth of 2 – 4 cm. Both the samples from 2 – 4 and 4 – 6 cm depth displayed higher MP contents than the surface sample (0 – 2 cm). One reason for this may be related to bioturbation. In marine sediments from the northern Baltic Sea, benthic animals have been demonstrated to transport microplastics from surface sediments to depths of 1.7 – 5.1 cm, increasing the concentration [32]. A slightly higher MP concentration in the 2-4 cm sample compared to other depths was also seen in core S-10.

In terms of microplastic composition, it appears from literature to be no clear trends in the distribution of individual polymer types downcore, except for an increased diversity of microplastics in sediment deposited later than the 1950s – 1970s. This study showed no trends in microplastic composition in the sediment profiles.

Martin et al. (2021) recently performed a quality assessment on studies investigating microplastics in sediment profiles [34]. In the assessment, the reliability of the studies was given scores in terms of their reliability according to a set of quality criteria covering critical aspects of microplastic analysis. From the criteria described by Martin et al., it appears that this study would be assigned maximum reliability score in terms of sampling method, negative controls, positive controls, sample treatment, polymer ID (criteria: > 50 particles analysed per sample; this study: > 200 particles analysed) and study limitations. Where this study falls short, is however related to lab conditions and sample processing, evident through the high contamination levels found in method blanks and field blank. In terms of sample processing, limited reliability is described to be due to e.g. sediment sides not being cut away and not filtering all chemicals used in the lab. In this study, zinc-chloride and Milli-Q water is filtered, but not methanol used for rinsing and chemical oxidation solutions (although samples were enclosed in the steel mesh during oxidation). In addition, a smaller sample size (100 g ww) was used in this study than what is recommended (400 g ww) for more robust results. Further, the laboratory and air conditions during these analyses do not meet the criteria for maximum reliability.

4 Conclusions

The following conclusions can be drawn based on this study:

- Method blanks (n = 10) were prepared and analysed to control contamination from the analytical method used in the laboratory. At least one method blank was analysed each week of analyses. Microplastic was found in all blank samples, with an average number of 72 particles per method blank (ranging from 16 to 176 particles/blank). The main contributor to this, was the high level of PE particles found in some of the blanks, ranging from 2 to 128 particles per method blank. Despite efforts to identify and eliminate the contamination, the source remains a mystery. Due to the high and variable background level of PE, quantifying this plastic type was not possible in this study. As expected, high numbers of PTFE particles were also found in the method blanks. This is a known contaminant from the unit used during density separation. For remaining microplastic types identified in this study, the concentrations in the method blanks were used to correct the results for the sediment samples.
- Field blanks (n = 2) were prepared by sampling deep-sediment (> 20 cm depth) from two of the sediment cores, assuming the sediment to be from a time prior to plastic production (meaning they should in theory be free from microplastics). This type of blank controls for both field and analytical contamination. The purpose of the field blanks was to correct for microplastics abundance in the environmental samples. The microplastic concentrations ranged from 471 to 899 particles/kg (mean; 685 ± 303 particles/kg) after method blank correction. PE-chlorinated, rubber and PE:PP were the most abundant microplastics in the field blanks. The microplastics detected are likely due to contamination during sample processing, since the sediments were pre-date plastic. The source of this contamination is unknown, as no plastic equipment was used during sample preparation (steel cores and cutting gear). Exposure to ambient air can always be a cause. Field blanks from deep in the sediment core are the best type of blank to use for sediment analysis, provided that the grain size and other properties are similar throughout the entire core. For areas with highly varying sediment deposits over time, deep core field blanks would be less representative. Reported results were also corrected for field blank concentrations when they were higher than those in the method blank.
- Sediment samples from the mid-Norwegian Continental Shelf in the Norwegian Sea (n = 24) have been analysed for microplastics (43-1000 µm). In top sediment (0-2 cm, n = 11), the amount of microplastics ranged widely, from 51 to 2187 particles/kg dry sediment (mean ± standard deviation: 679 ± 663 particles/kg).
- The microplastic profile in three sediment cores was investigated by analysing deeper sediment (n = 13). A generally decreasing abundance downcore was observed, with some variations. The MP concentration in samples from the top 10 cm of the cores S-06, S-10 and S-11 ranged from n.d. – 1084 particles/kg (mean: 562 ± 472 particles/kg), 41 – 352 particles/kg (mean: 233 ± 125 particles/kg) and 654 – 1579 particles/kg (mean: 1069 ± 331), respectively. In two of the cores (S-10 and S-11), the highest concentration of MP was found in

sediment from 2-4 cm, whereas sediment from 6-8 cm depth displayed highest MP levels in the last core (S-06). This is likely due to bioturbation, as dating results suggests that this core has been affected by sediment mixing. No clear trend in microplastic composition was seen downcore. One of the cores (S-11) had a rather homogenous distribution of plastic types downcore, however the other cores displayed more variable microplastic composition.

- The results for the Norwegian Sea sediments compare well with an earlier study [8] [20], using the same method and in relatively close geographical proximity to the present study. The previous study reported microplastic concentrations ranging from n.d. to 3400 particles/kg (mean: 525 ± 1030 particles/kg) in 10 surface samples (0 - 1 cm) from the northern North Sea, overlapping the range of microplastic concentrations found in surface samples from this study (51 – 2187 particles/kg; mean: 679 ± 663 particles/kg. In both studies, PE-chlorinated/PVC and rubber particles were frequently encountered, along with other microplastics.

5 Recommendations

Based on the results in this study, the following recommendations are suggested for the future:

Future field sampling:

- Continue to use steel corers for sediment sampling and be sure to keep the tubes sealed as much as possible to limit airborne contamination.
- Instead of using sediment samples from the bottom of the core, samples 1-3 cm up may be preferred to avoid exposure to air/lid, etc.
- The use of any plastic equipment should be limited as much as possible. Continue to use glass jars (or other non-plastic containers) sealed with aluminium foil to store the sediment samples, as well as steel spatulas to cut samples etc. Make sure that all equipment is rinsed prior to use.
- Continue the use of deep sediment (i.e. deep in the sampling tubes, ideally older than 1900) as field blanks to correct for contamination during sampling, transport and laboratory analysis.
- Consider cutting off the sides of the sediment cores prior to microplastic analysis to prevent potential cross-contamination downcore. However, to increase robustness, enough sample material is crucial (400 g wet sediment) [34]. Hence there is a trade-off between sample size and contamination control that should be considered.
- Continue with field blanks and method blanks as part of the sampling strategy and as a control of whether recommendations have worked well or not.
- Consider including sampling blanks (as in the 2018 and 2019 MAREANO surveys) to be able to identify potential contamination sources from the transport route, the containers themselves etc. This can be done by taking pre-washed, empty glass jars on the field trip and exposing them to the surroundings during

sampling and sample processing. The sampling blanks would not be in direct contact with sampling equipment but can be included to control for other field effects. A minimum of three sampling blanks is recommended.

- To see the continuity of samples from years to years, a reference sample could be established, which is a several kg of homogenized sample, were each time the survey is repeated, the results from the reference sample are compared each year to see if they give similar data. This reference sample could be spiked with known quantities of plastic.

Laboratory considerations:

- If field blanks are not available, include as a minimum method blanks to control for laboratory contamination. In this study, the method blanks showed that the laboratory method was the most substantial source of plastic contamination in the samples. Weekly (or more) method blanks are recommended, as the contamination in this study was seen to vary greatly throughout the analyses.
- Conduct as much of the experiment as possible in fume hoods that blow filtered air out, as ambient atmospheric microplastic in dust is a major source of contamination.
- Include air contamination blanks during future analyses to quantify airborne contamination in the lab.
- During sample preparation prior to FT-IR analysis, keep the steel mesh filters as flat as possible to optimize transmissions signals and limit the potential loss of particles.
- Limit the use of plastic equipment as much as possible (e.g. use of glass bottles instead of plastic bottles for Milli-Q). If plastic is considered essential and could not be avoided, take regular checks to make sure this equipment is not contributing to microplastic. This check can be done by filtering liquid that has been in long contact with the plastic (e.g. shaken for several days) and filtered through the steel mesh used for FT-IR analysis, to see if it is a major contributor to the method blank.
- Report method specific details, as these are important for comparison of results (e.g. size of microplastics investigated, chemicals for oxidation, density of separation fluid if used, etc.).
- Compare the dry weight percentages of the sediments obtained in the lab with those obtained by NGU/MAREANO from freeze-drying and consider correcting for any differences in the results.

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Appendix A

PHOTOS FROM MICROSCOPY

Contents

A1 Method blanks

A1.1 MB-01

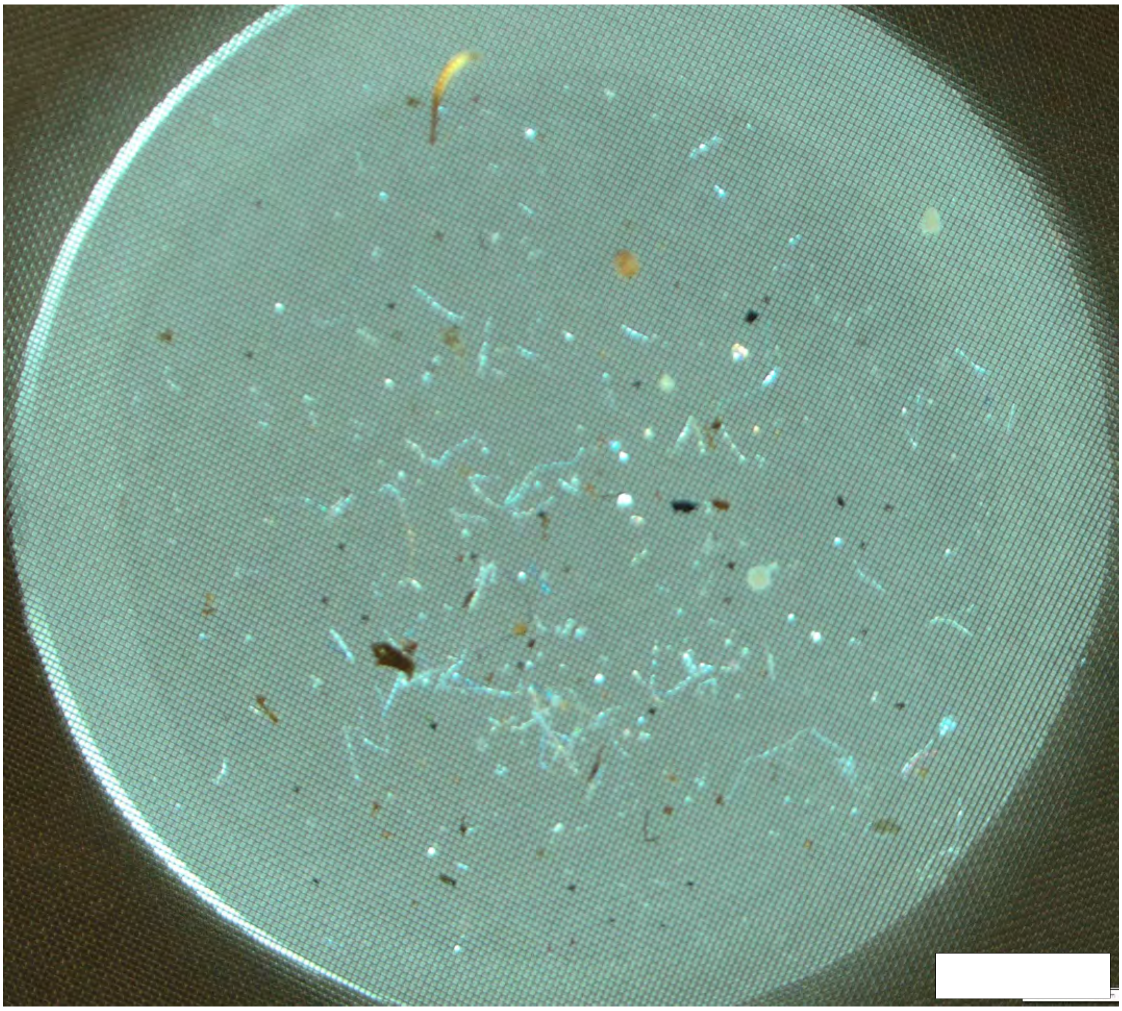

Figure A1.1 Method blank MB-01. Mostly PTFE granules, organic (rayon) fibres, and some PE and PET particles. Photo taken in polarized mode.

A1.2 MB-03

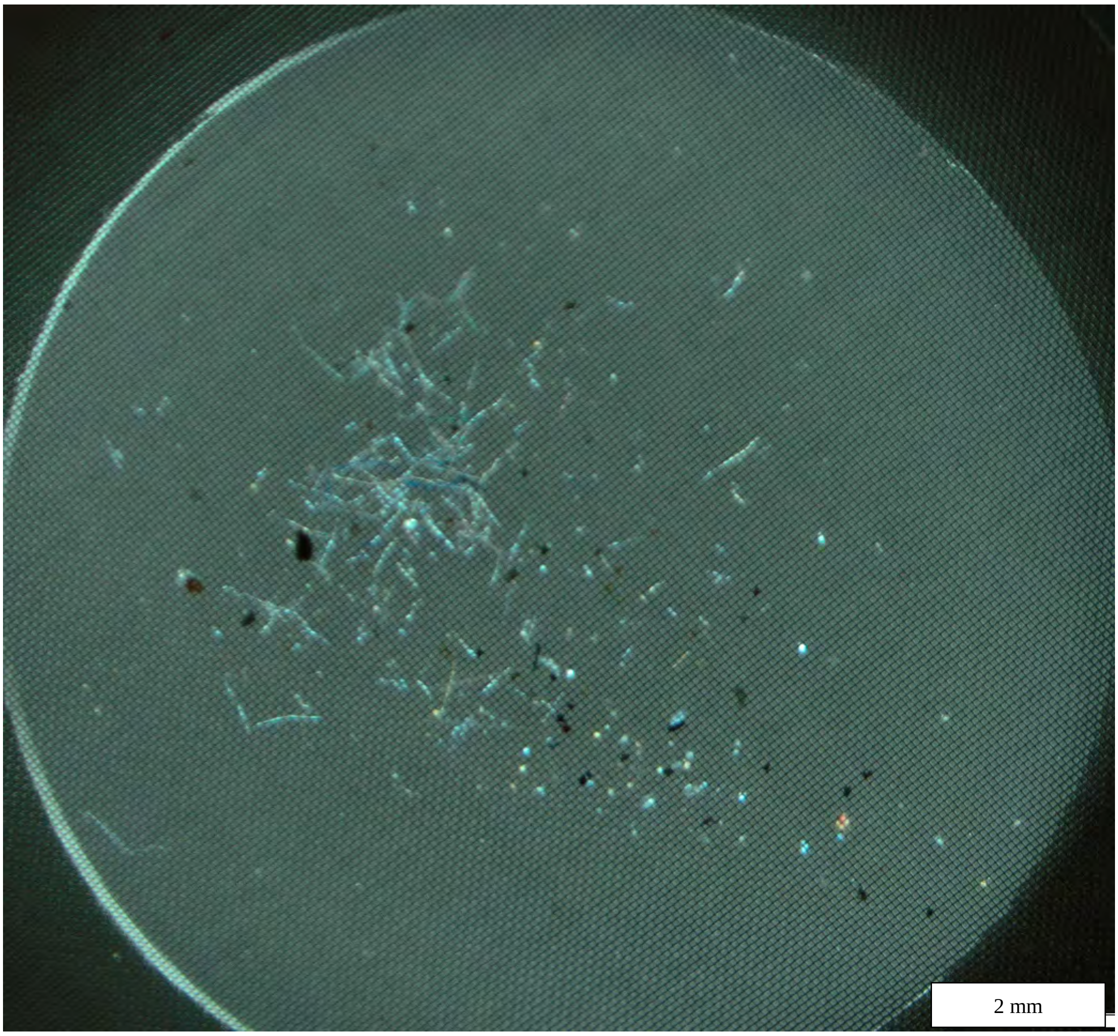

Figure A1.2 Method blank MB-03. Mostly organic (rayon) fibres, also some PP, PET, PTFE and melamine particles. Photo taken in polarized mode.

A1.3 MB-05

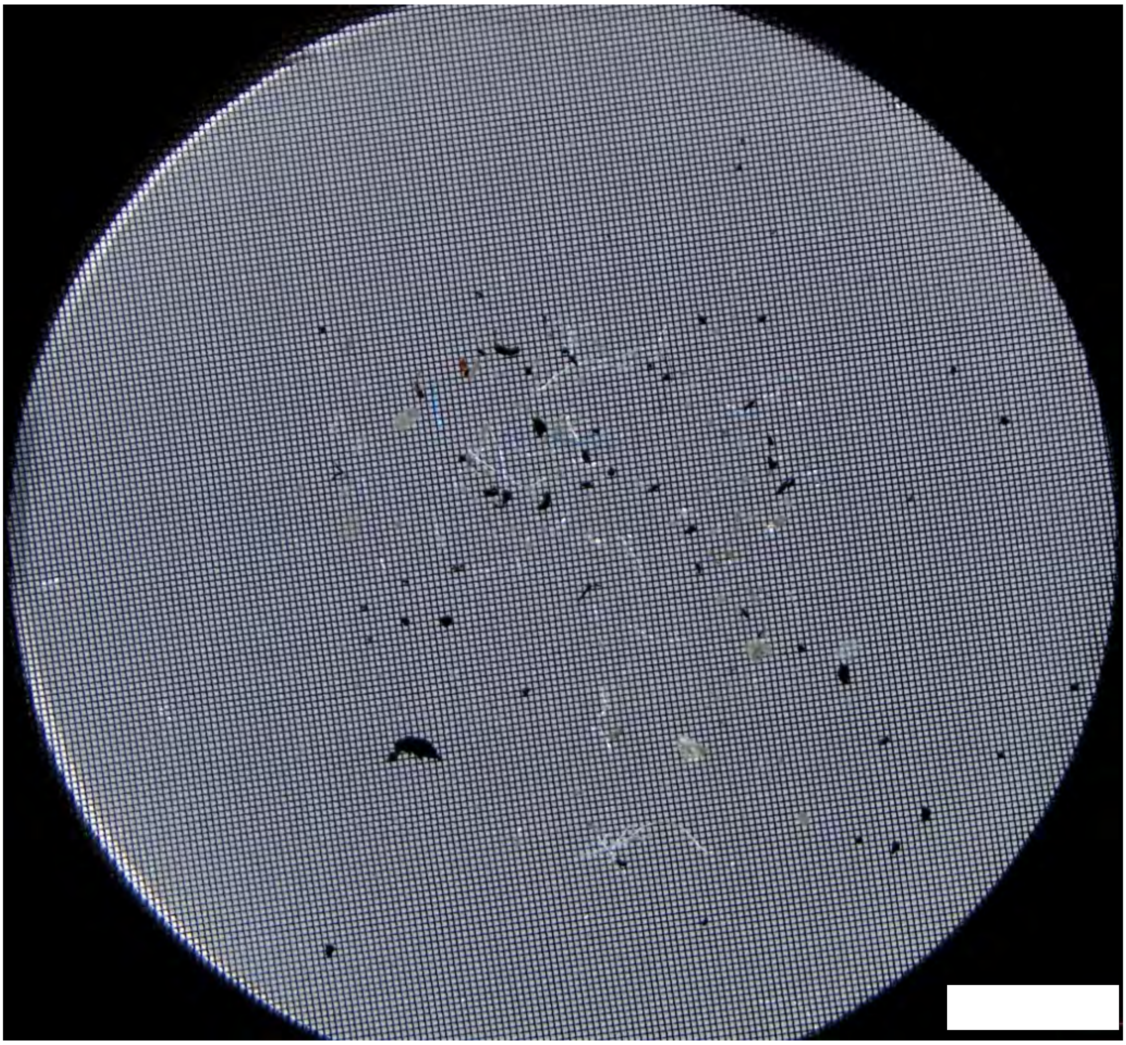

Figure A1.3 Method blank MB-05, filter 1. Mostly PTFE granules and organic (cotton and rayon) fibres. Some PE and PP particles. Photo taken in polarized mode.

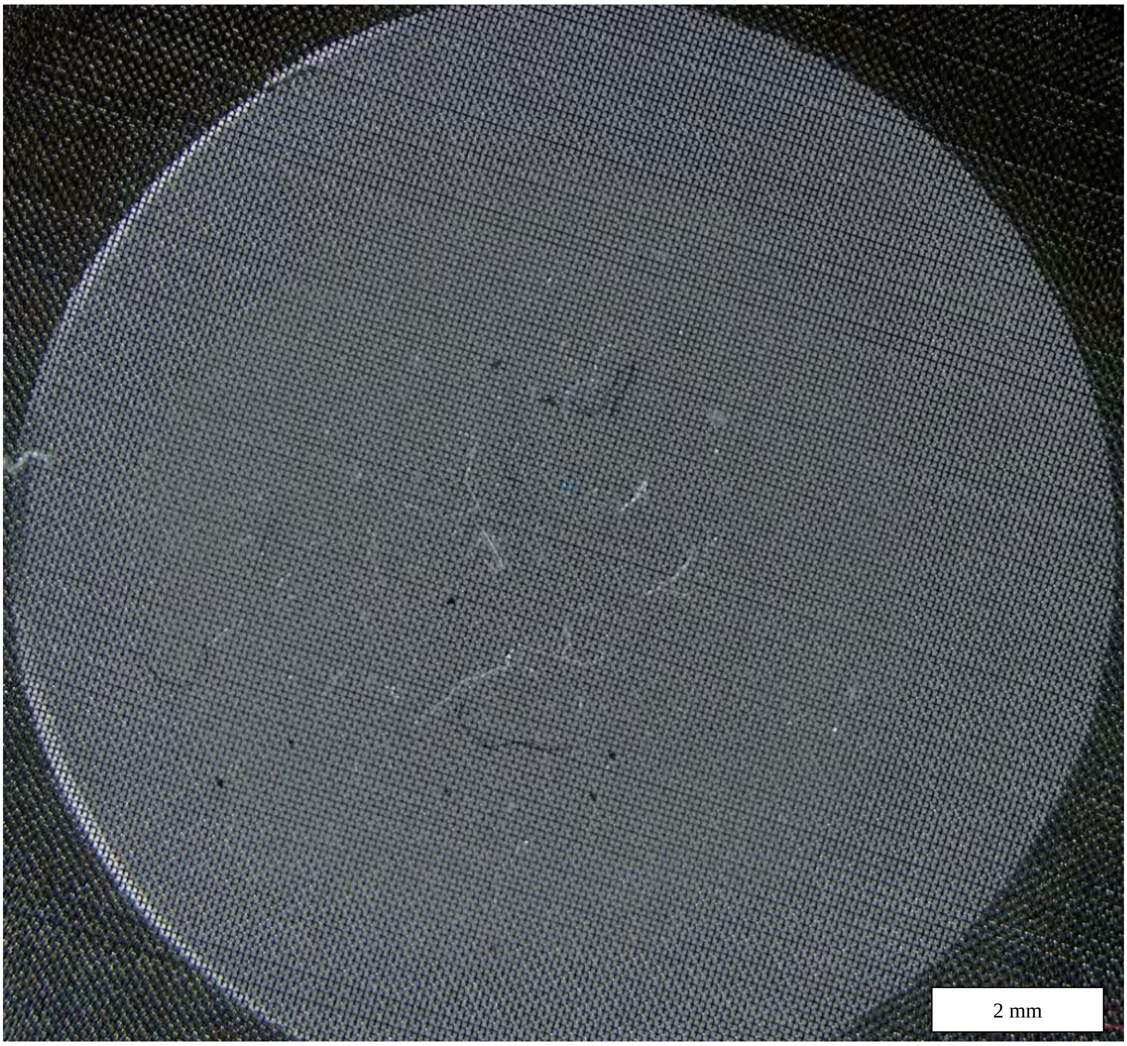

Figure A1.4 Method blank MB-05, filter 2. Mostly PE particles and organic (azlon and rayon) particles. Photo taken in polarized mode.

A1.4 MB-07

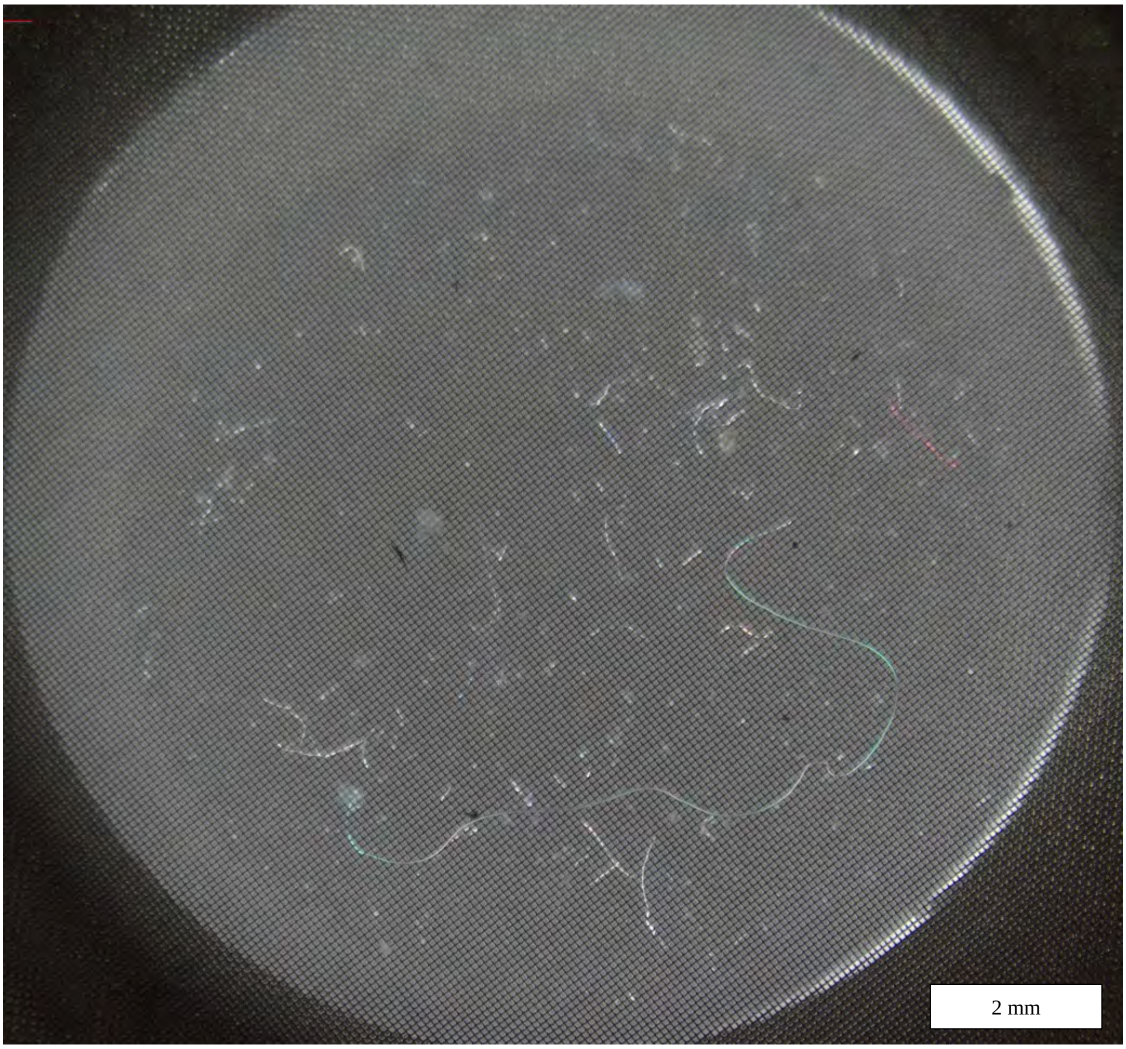

Figure A1.5 Method blank MB-07, filter 1. Mainly PTFE particles, some PE and PET.

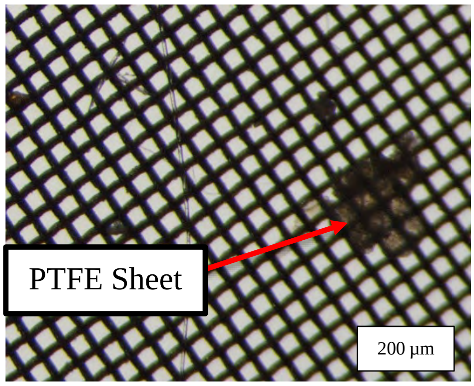

Figure A1.6 Close-up of MB-07, filter 1, with an identified PTFE sheet.

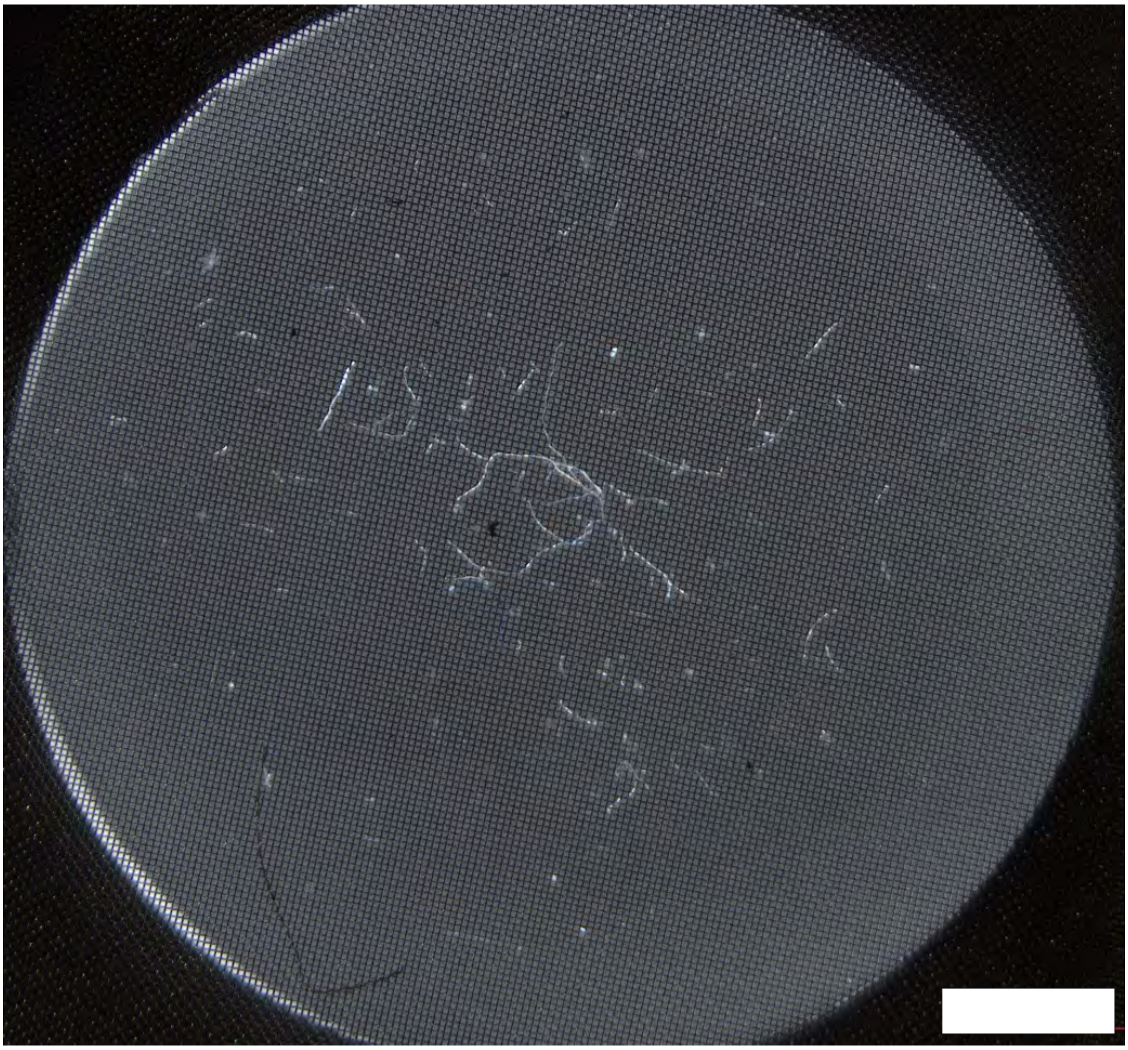

Figure A1.7 Method blank MB-07, filter 2. Mainly PE and PTFE particles. Photo taken in polarized mode.

A1.5 MB-08

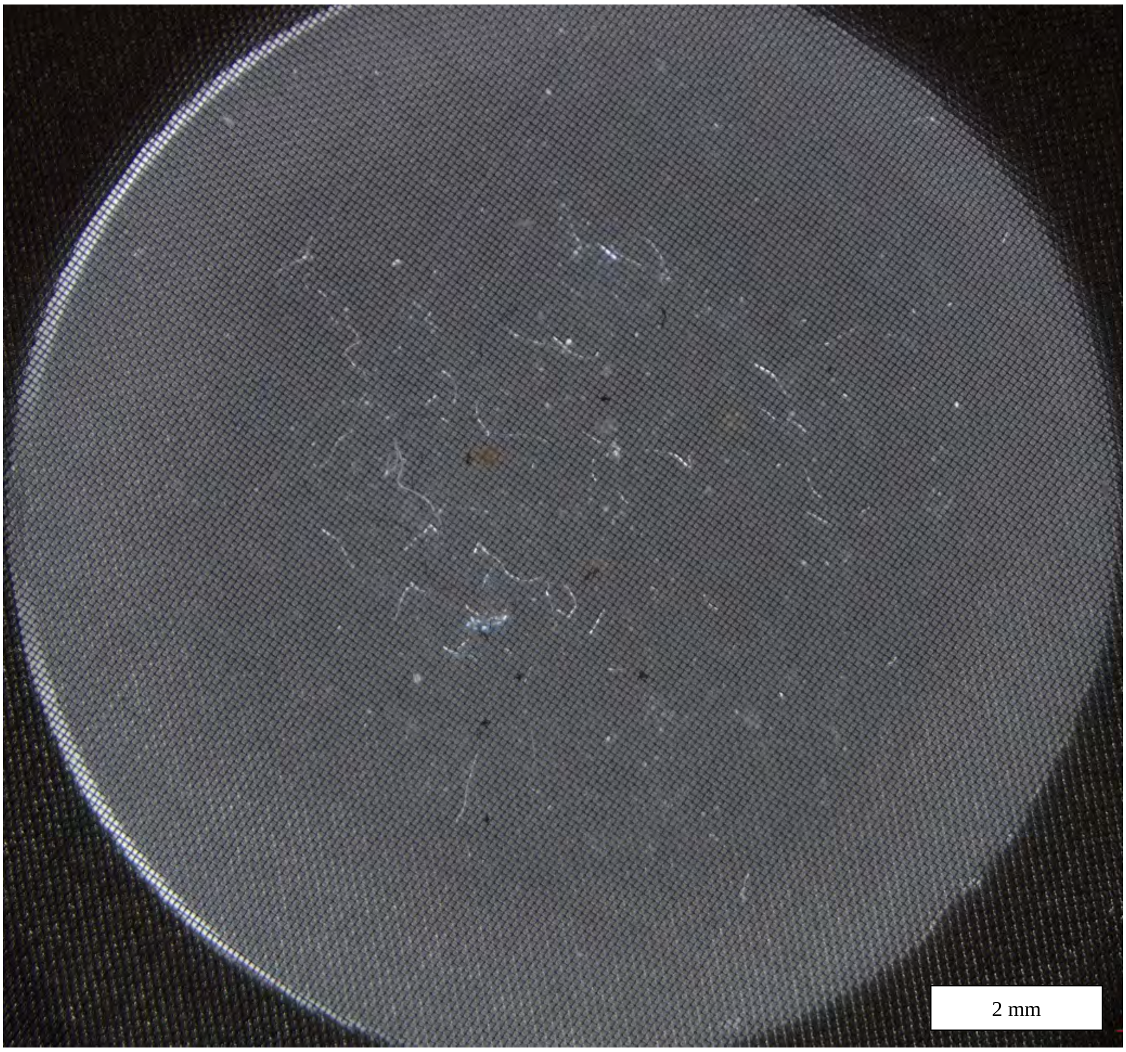

Figure A1.8 Method blank MB-08, filter 1. Mainly PTFE and PE particles, some PP, and organic (azlon, ryon). Photo taken in polarized mode.

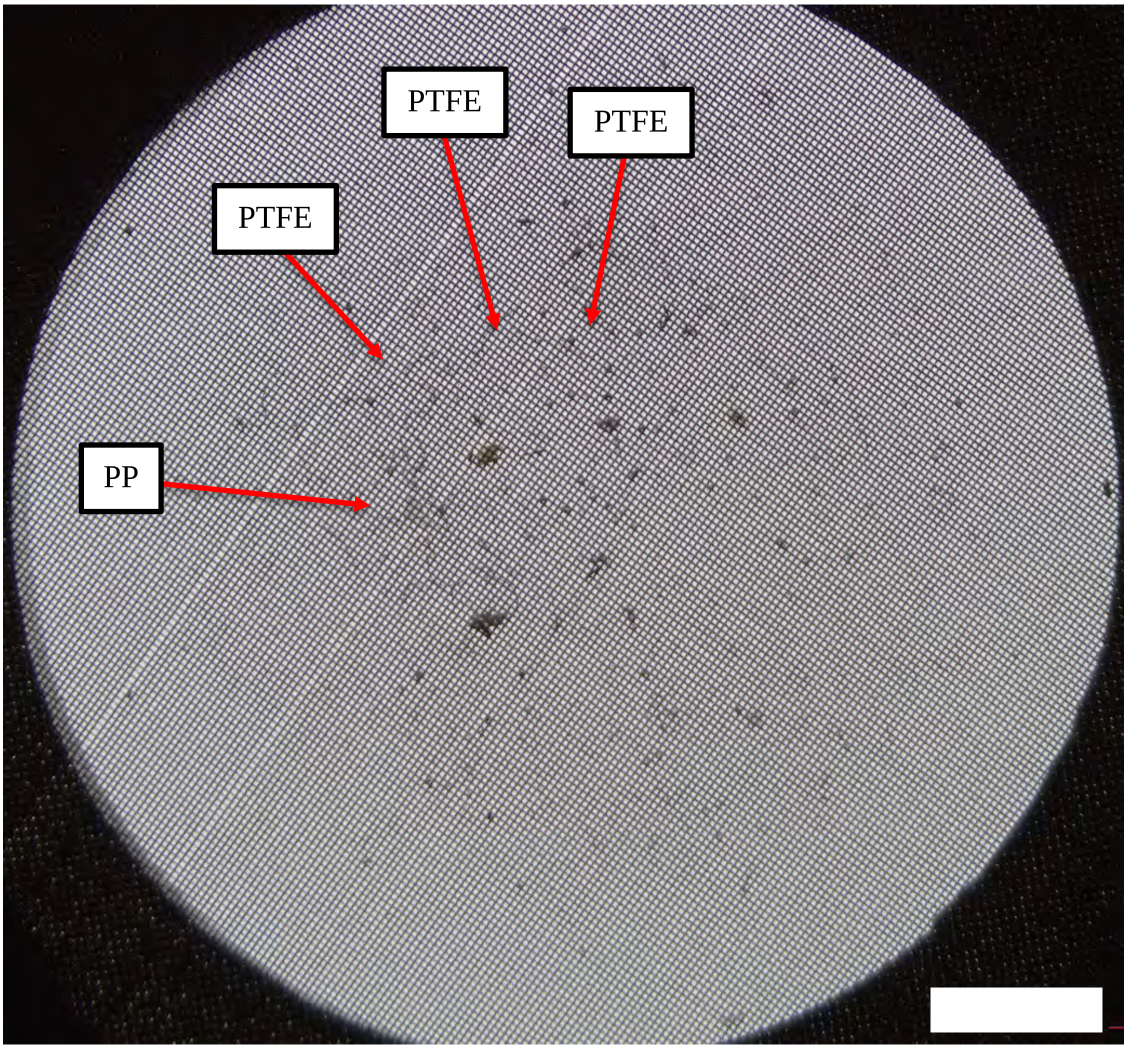

Figure A1.9 Method blank MB-08, filter 1, with identified particles. Photo taken in bright-field mode.

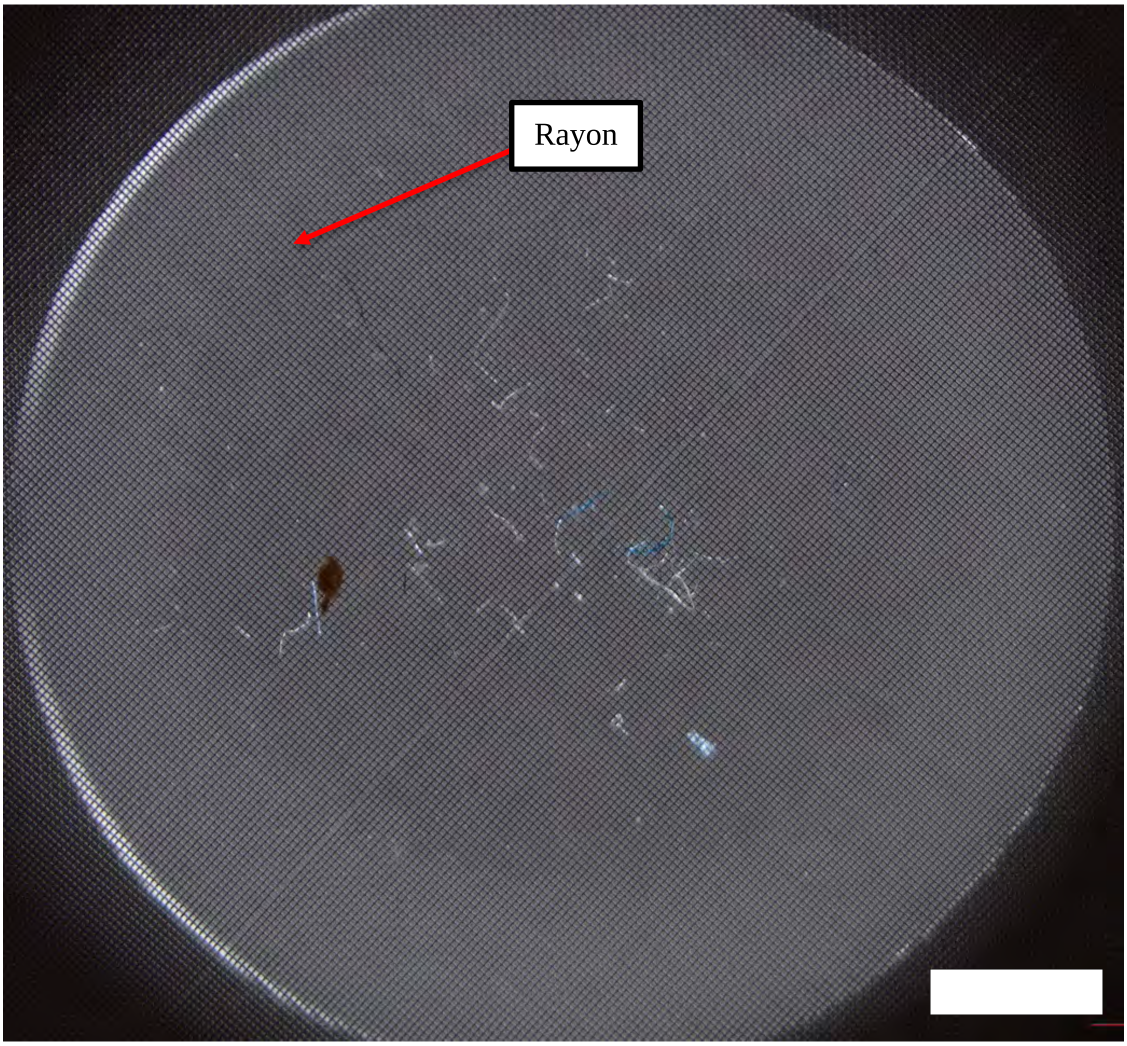

Figure A1.10 Method blank MB-08, filter 2, with an identified rayon fibre. Mainly PE and organic (rayon) particles. Photo taken in polarized mode.

A1.6 MB-10

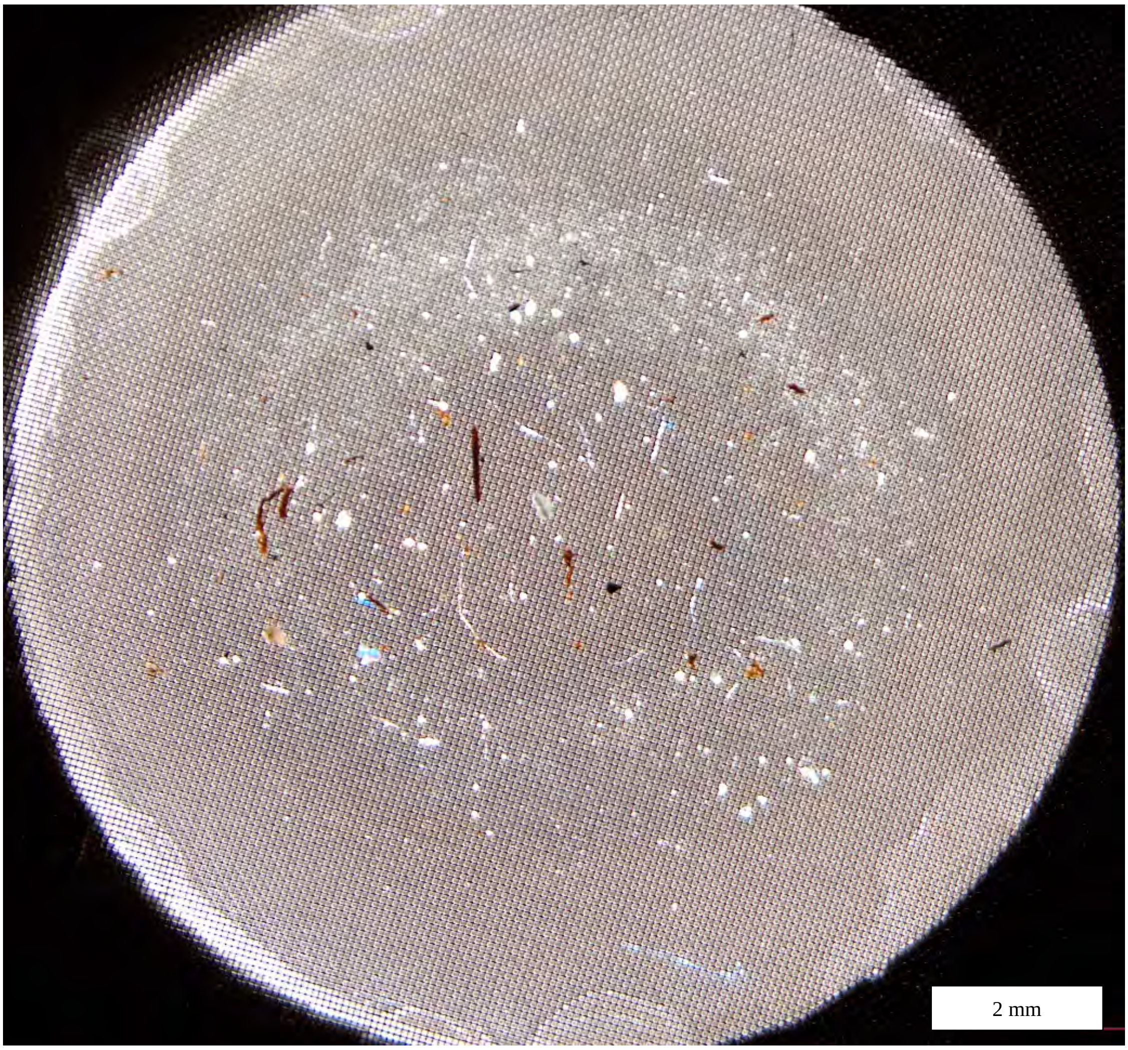

Figure A1.11 Method blank MB-10. Lots of PE, some PTFE, PE-pxidized and PET particles.

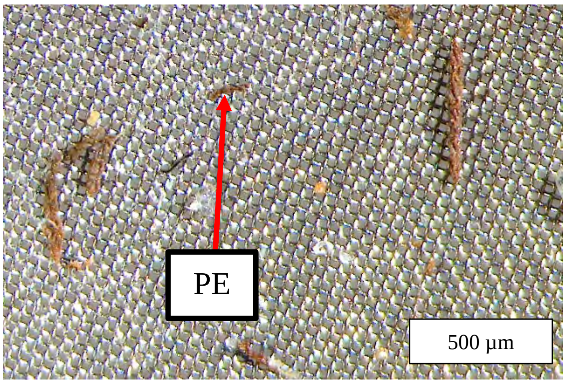

Figure A1.12 Close-up of method blank MB-10, showing an identified PE particle.

A1.7 MB-12

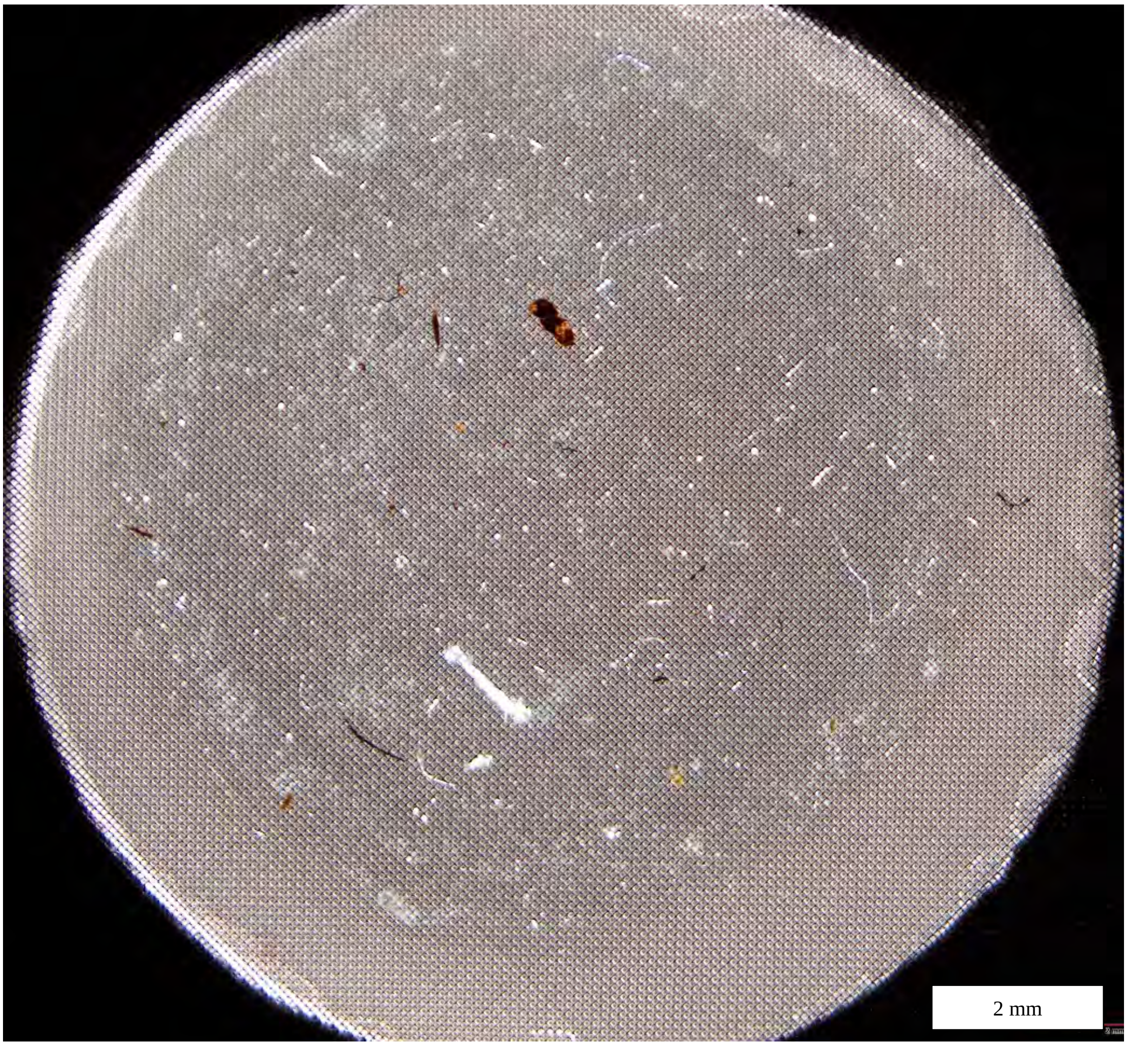

Figure A1.13 method blank MB-12. Mostly PE, some PE-oxidized, PP and PET particles. Photo taken in polarized mode.

A1.8 MB-13

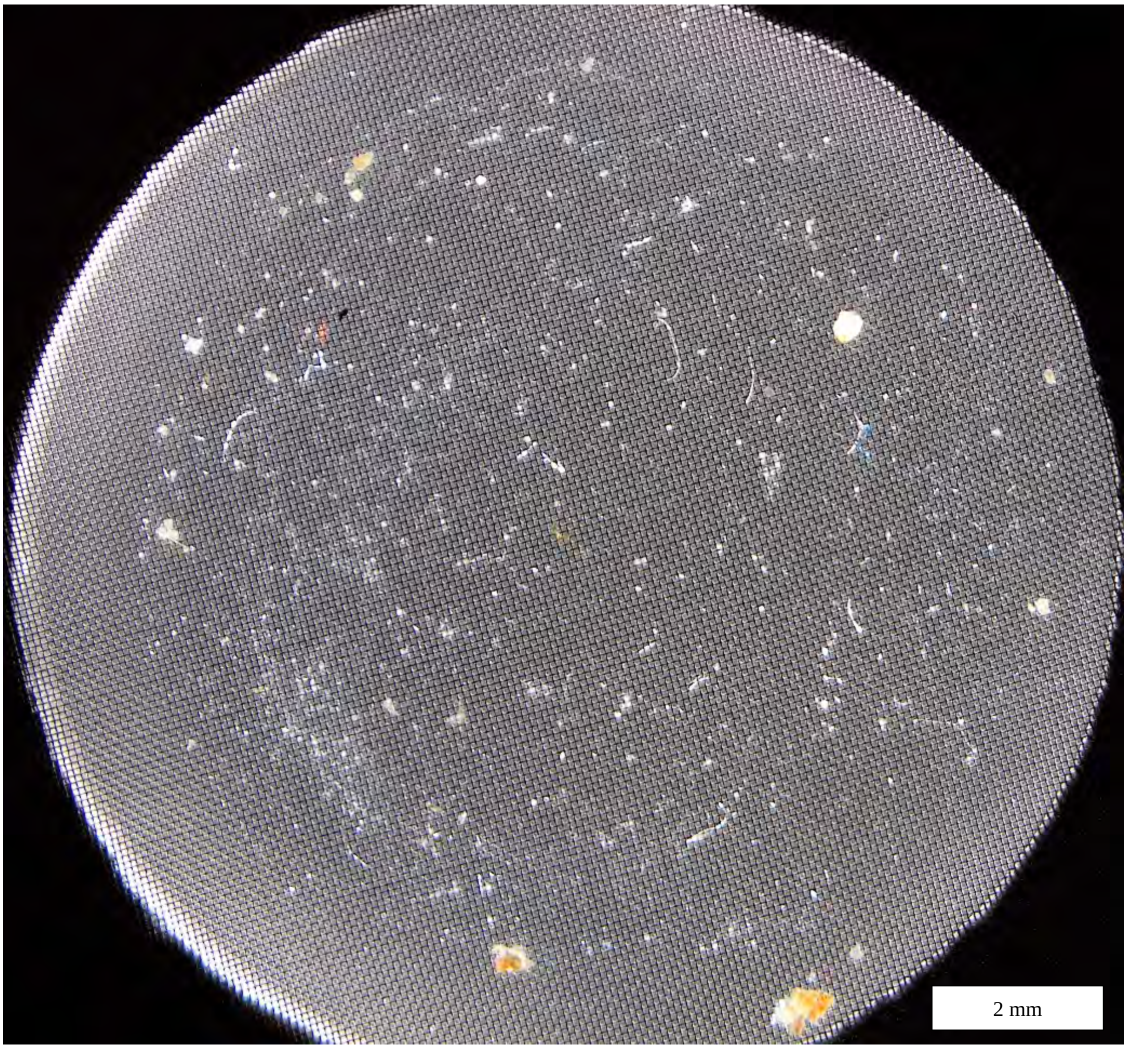

Figure A1.14 Method blank MB-13. Mostly PE, some PTFE, PE-oxidized and PET. Photo taken in polarized mode.

A1.9 MB-16

Figure A1.15 Method blank MB-16. Mostly PTFE and PE. Photo taken in polarized mode.

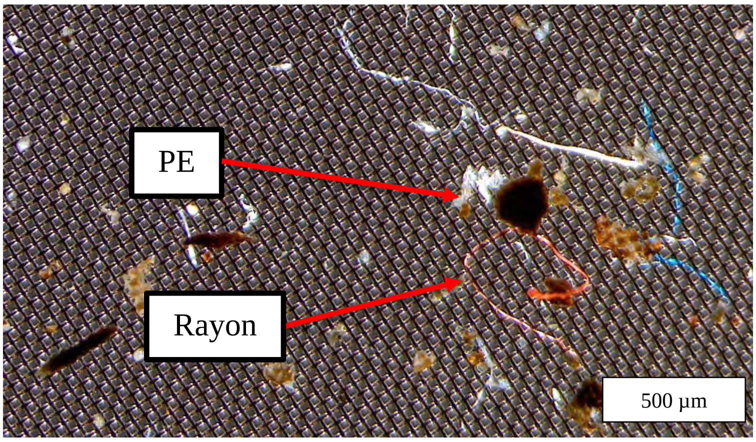

Figure A1.16 Close-up of method blank MB-16, showing an identified rayon fibre and PE sheet. Photo taken in polarized mode.

A1.10 MB-21

Figure A1.17 Method blank MB-21. Mostly PTFE, PE and PP. Some organic fibres (mostly rayon). Photo taken in polarized mode.

A2 Sediment samples

A2.1 S-01 (0-2 cm)

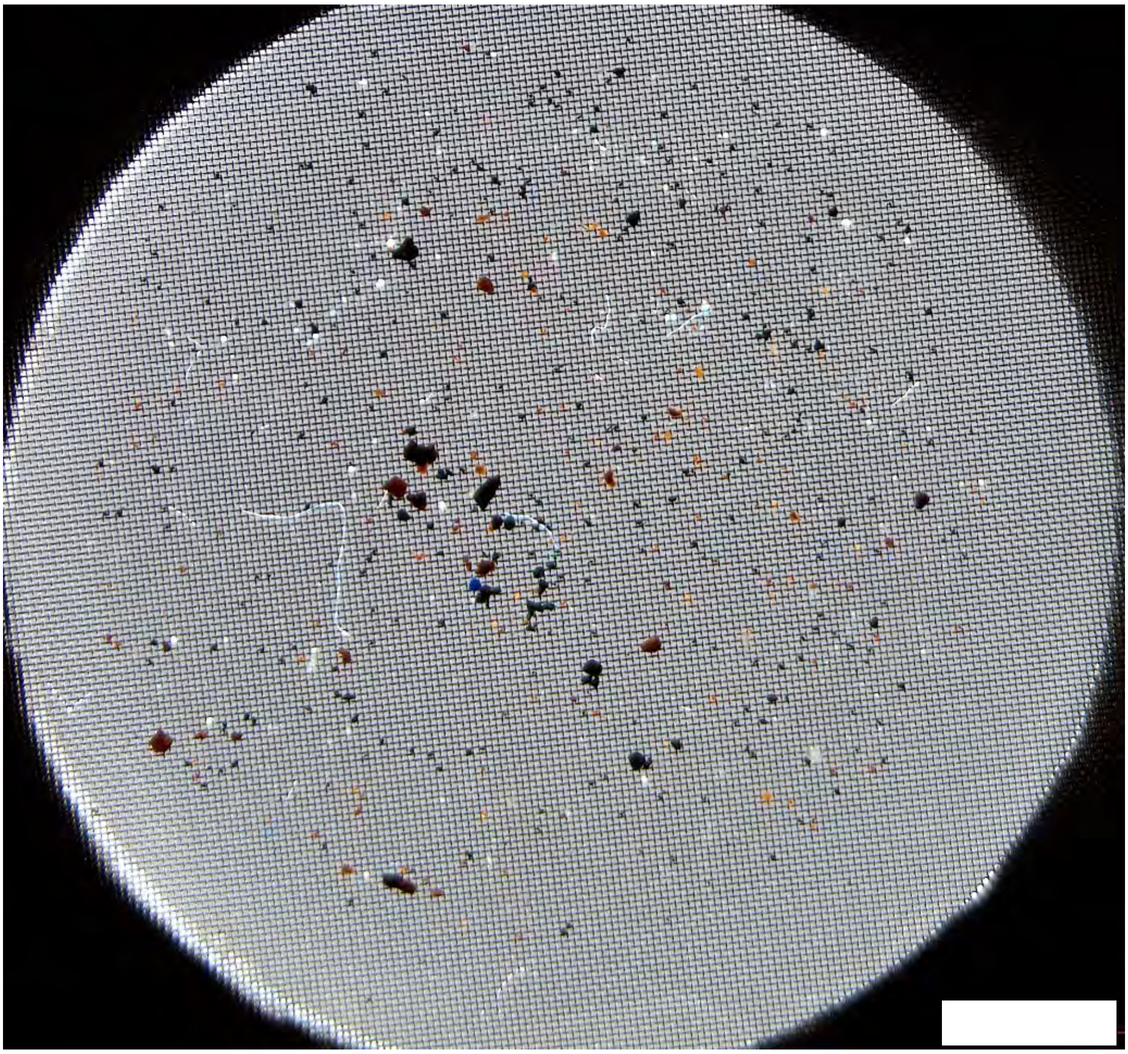

Figure A2.1 Sample S-01 (0-2 cm), filter 1. Mostly petro-pyro particles, some PTFE, PE:PP and organotin particles. Photo taken in polarized mode.

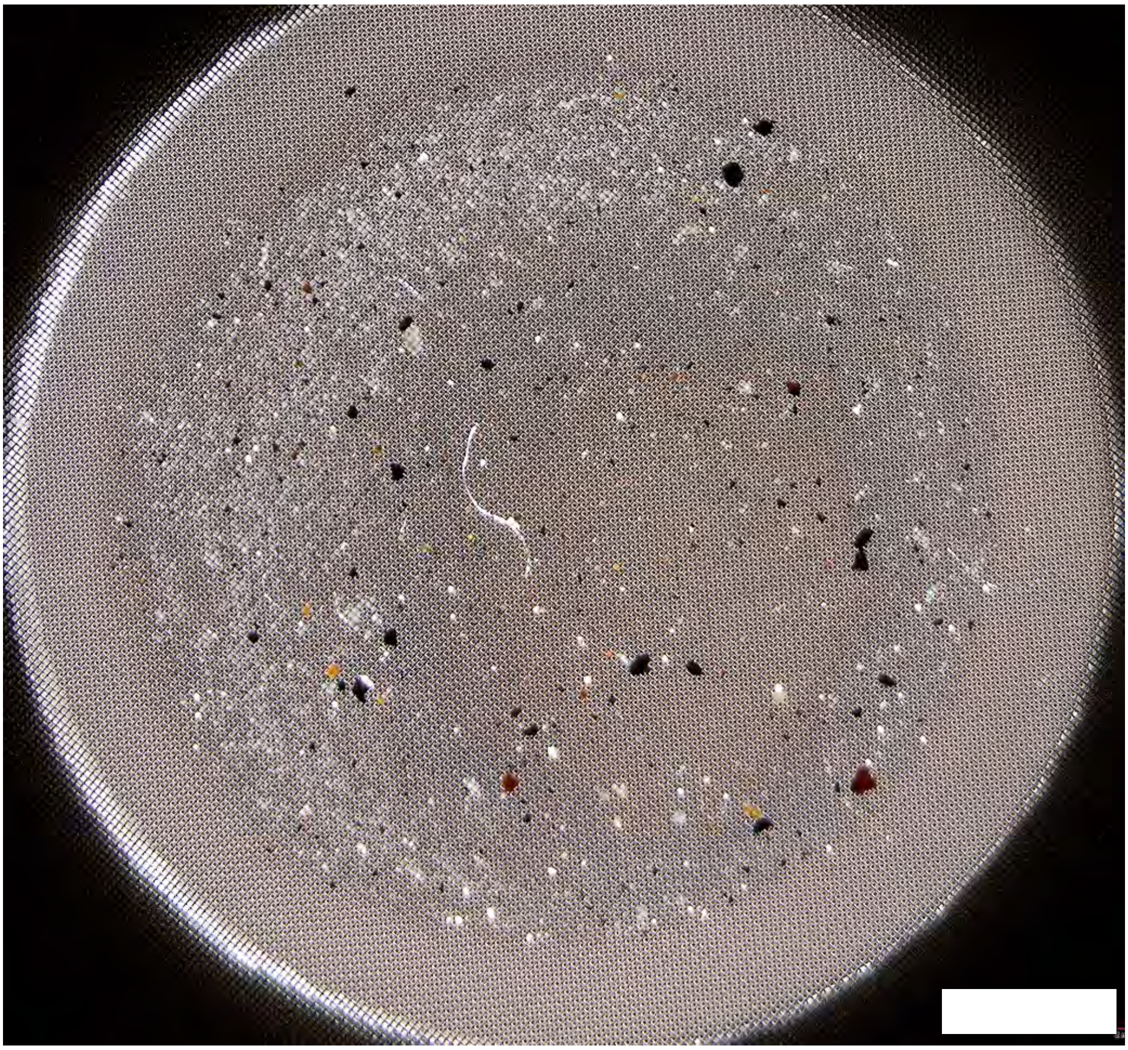

Figure A2.2 Sample S-01 (0-2 cm), filter 2. Mostly PE particles. Photo taken in polarized mode.

A2.2 S-02 (0-2 cm)

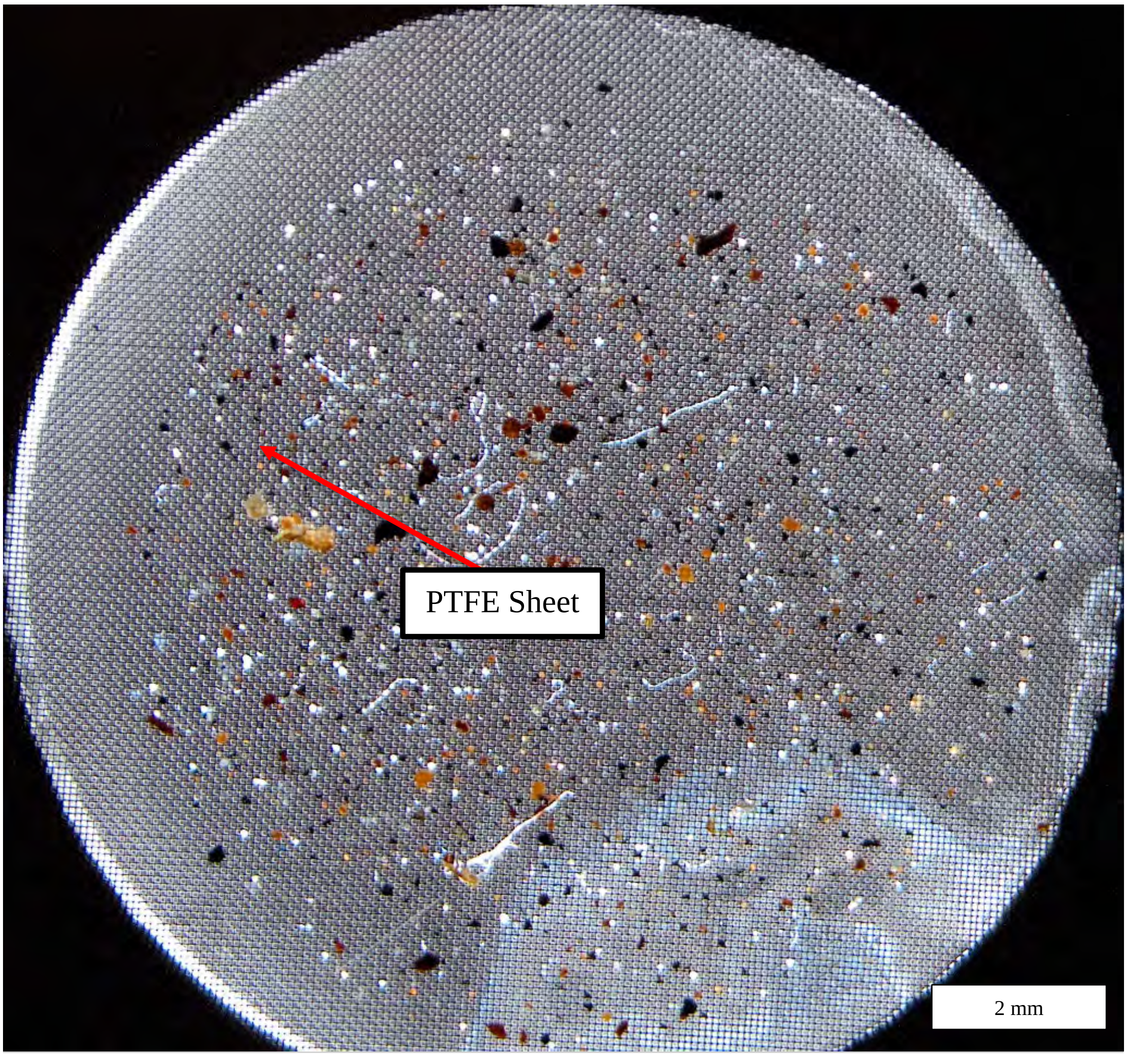

Figure A2.3 Sample S-02 (0-2 cm), filter 1. Mostly PE-chlorinated, some PTFE, PE:PP and PE-oxidized particles. Photo taken in polarized mode.

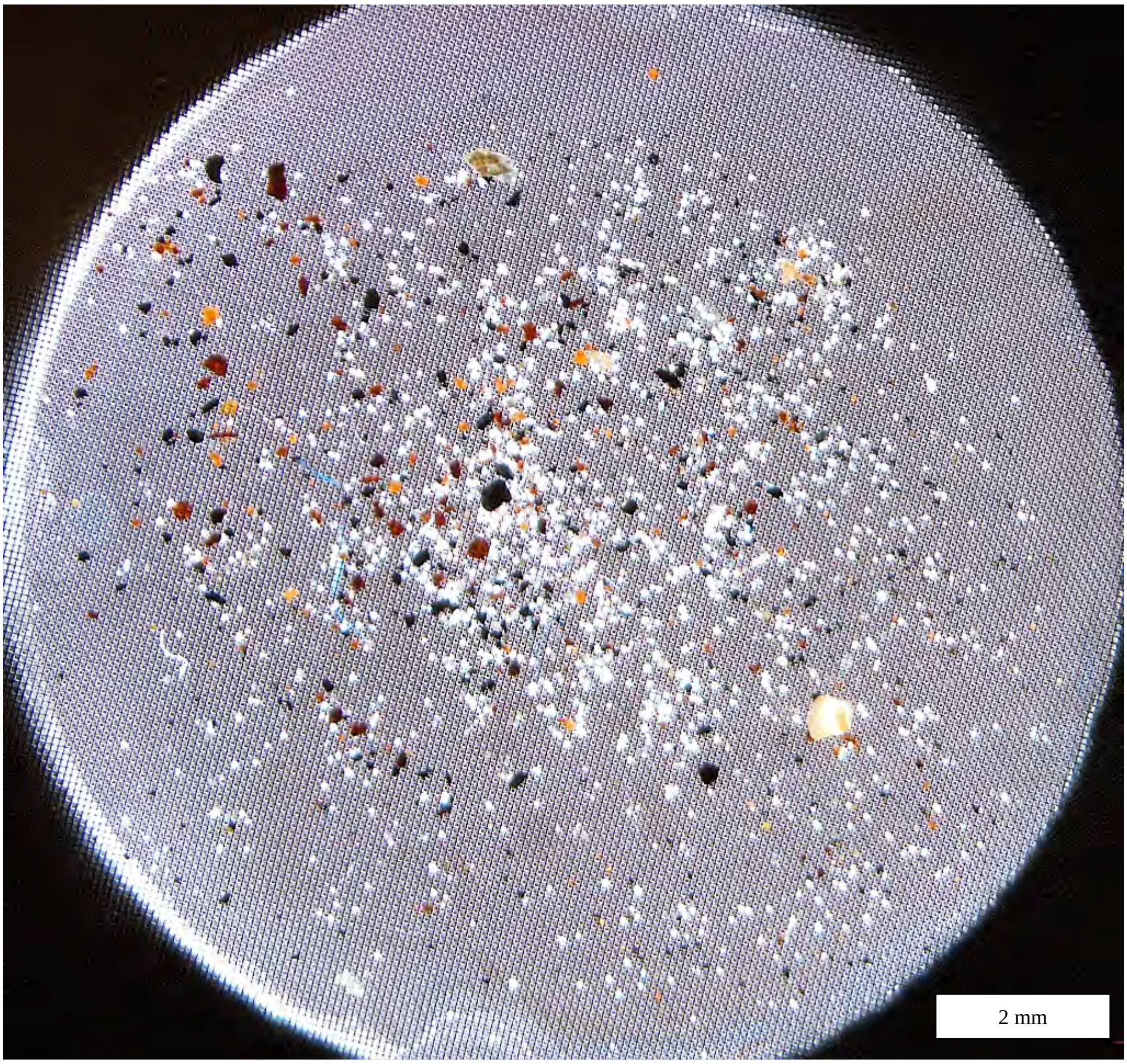

Figure A2.4 Sample S-02 (0-2 cm), filter 2. Mostly PE-chlorinated, some PTFE and organic (azlon) particles. Photo taken in polarized mode.

A2.3 S-03 (0-2 cm)

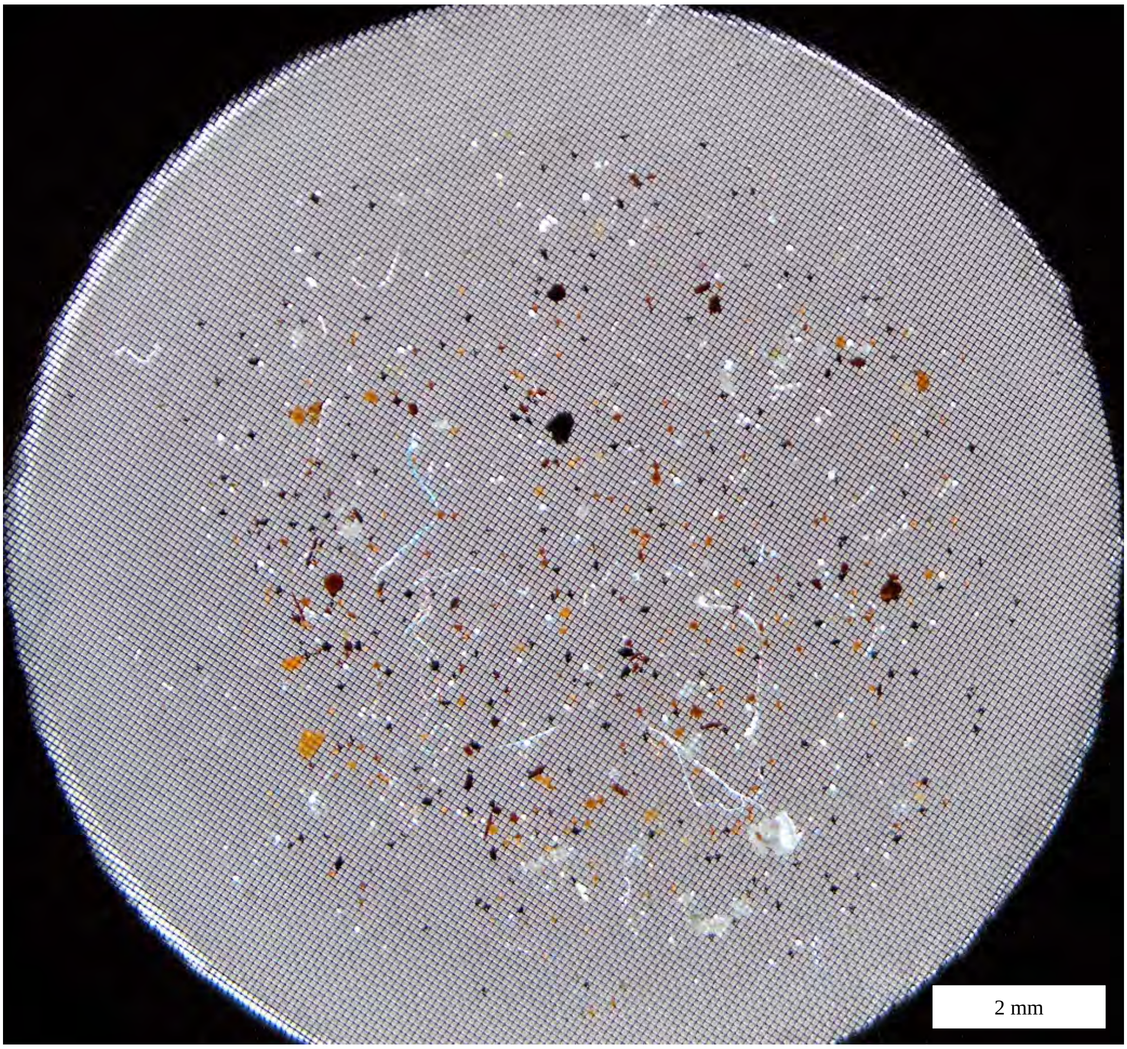

Figure A2.5 Sample S-03 (0-2 cm), filter 1. Mostly PTFE and PE-chlorinated particles, followed by PS, PE:PP, rubber (Resinall) and PE particles.

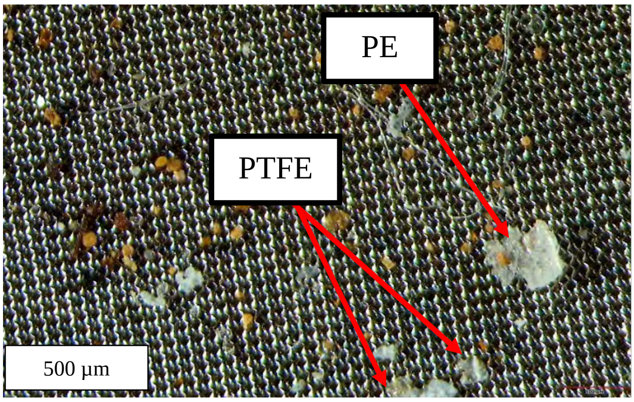

Figure A2.6 Close-up of S-03 (0-2 cm), filter 1, with identified PE and PTFE sheets. Visible mode.

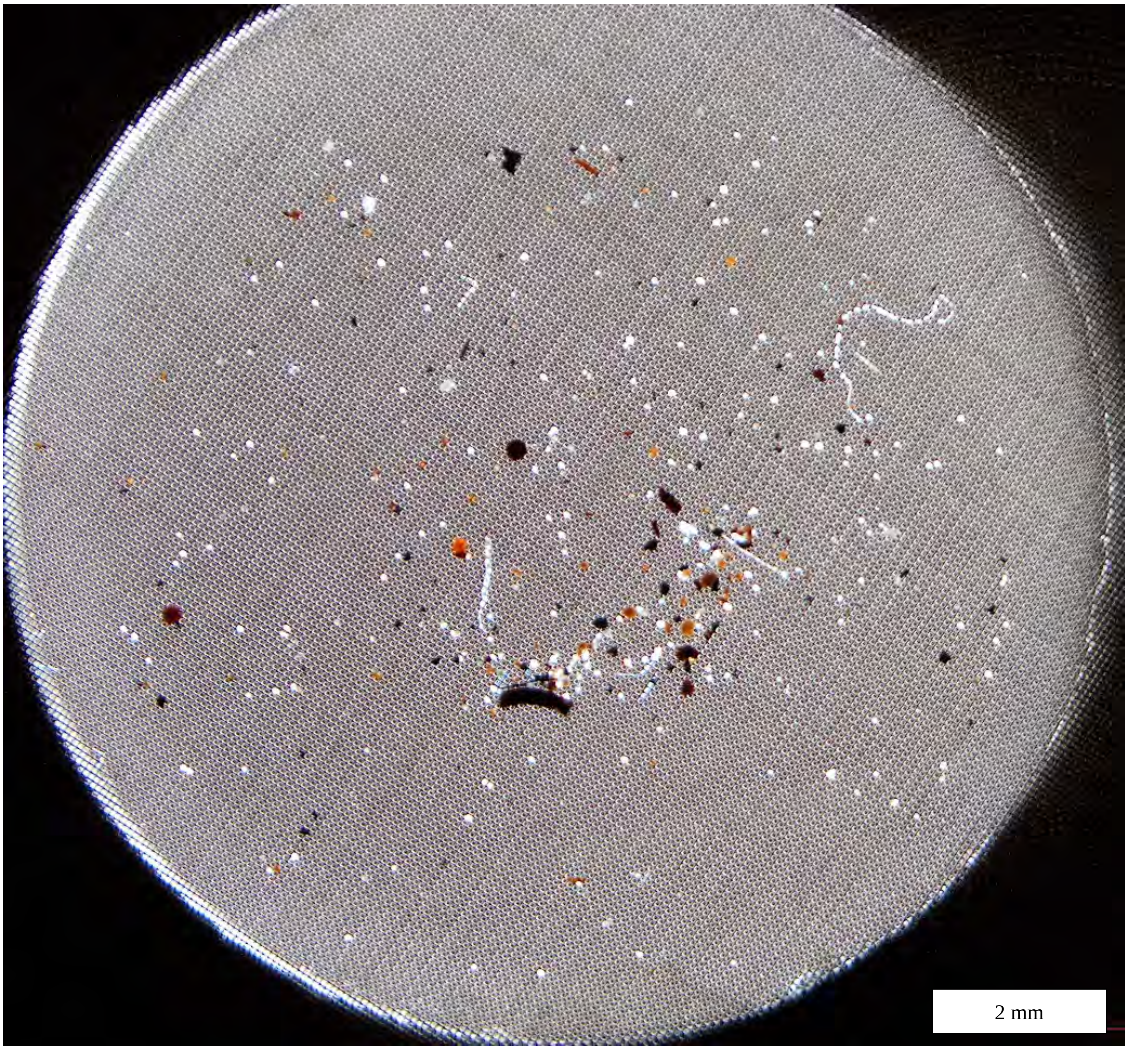

Figure A2.7 Sample S-03 (0-2 cm), filter 2. Some organic (rayon), PE:PP, rubber (Resinall). Photo taken in polarized mode.

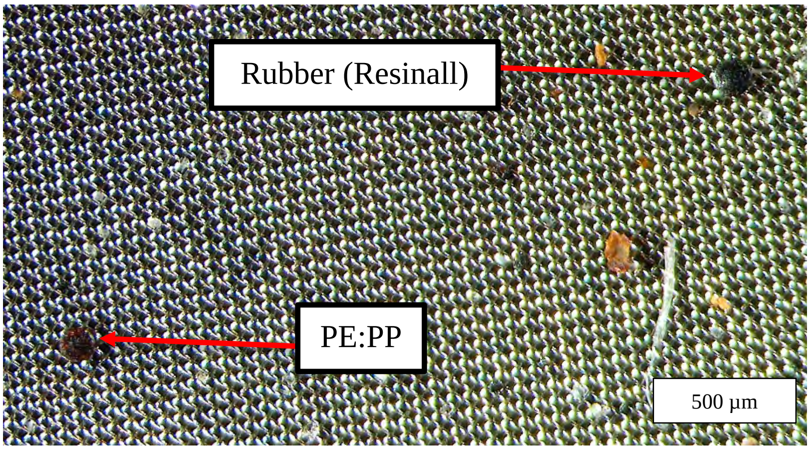

Figure A2.8 Close-up of S-03 (0-2 cm), filter 2, with identified rubber and PE:PP particles. Visible mode.

A2.4 S-04 (0-2 cm)

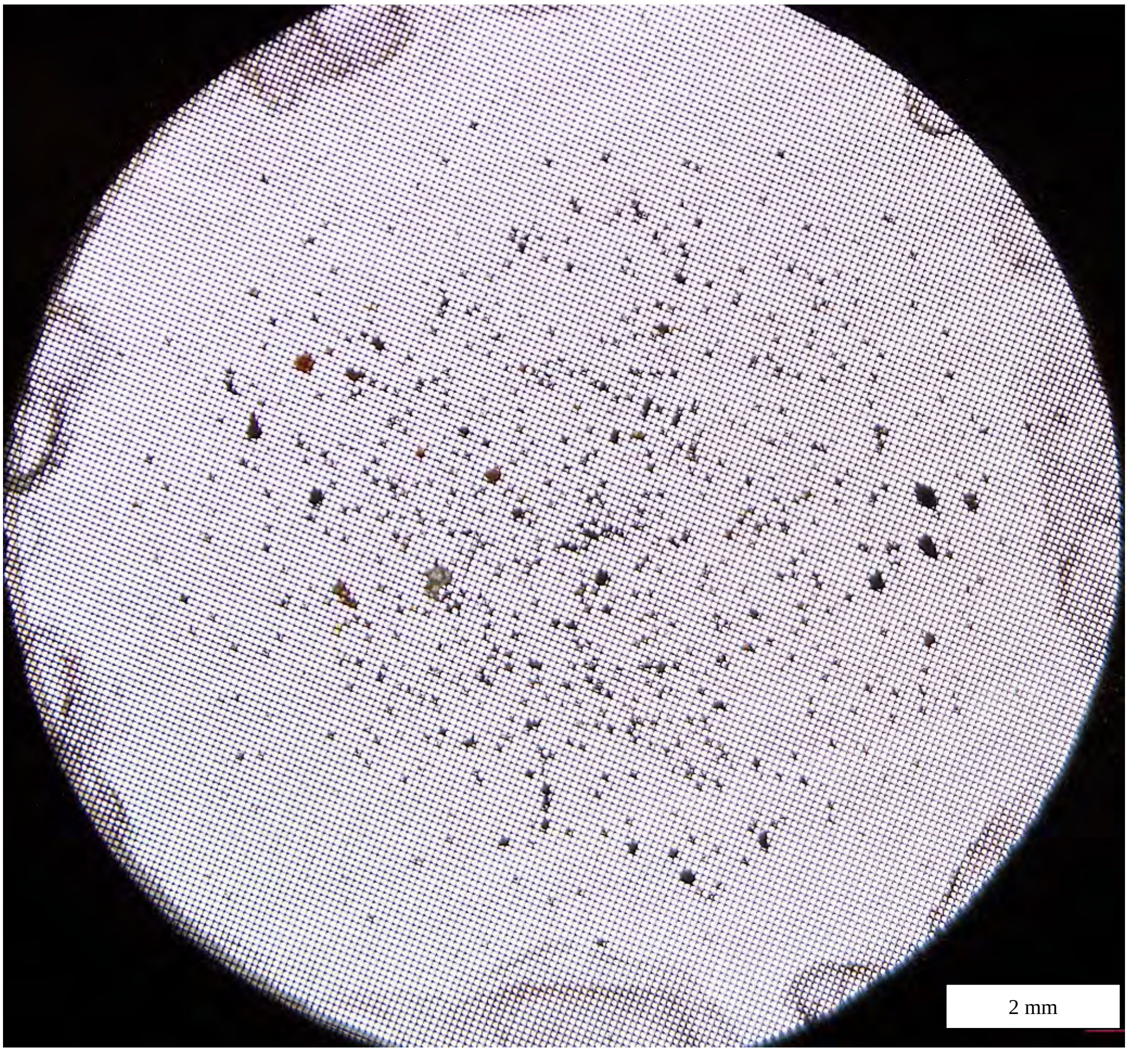

Figure A2.9 Sample S-04 (0-2 cm), filter 1. Mostly PE-oxidized, PP, rubber, organotin. Photo taken in bright field mode.

Figure A2.10 Sample S-04 (0-2 cm), filter 2. Mostly PE and PE-chlorinated, some nylon, PE:PP, melamine particles. Photo taken in bright field mode.

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A2.5 S-05 (0-2 cm)

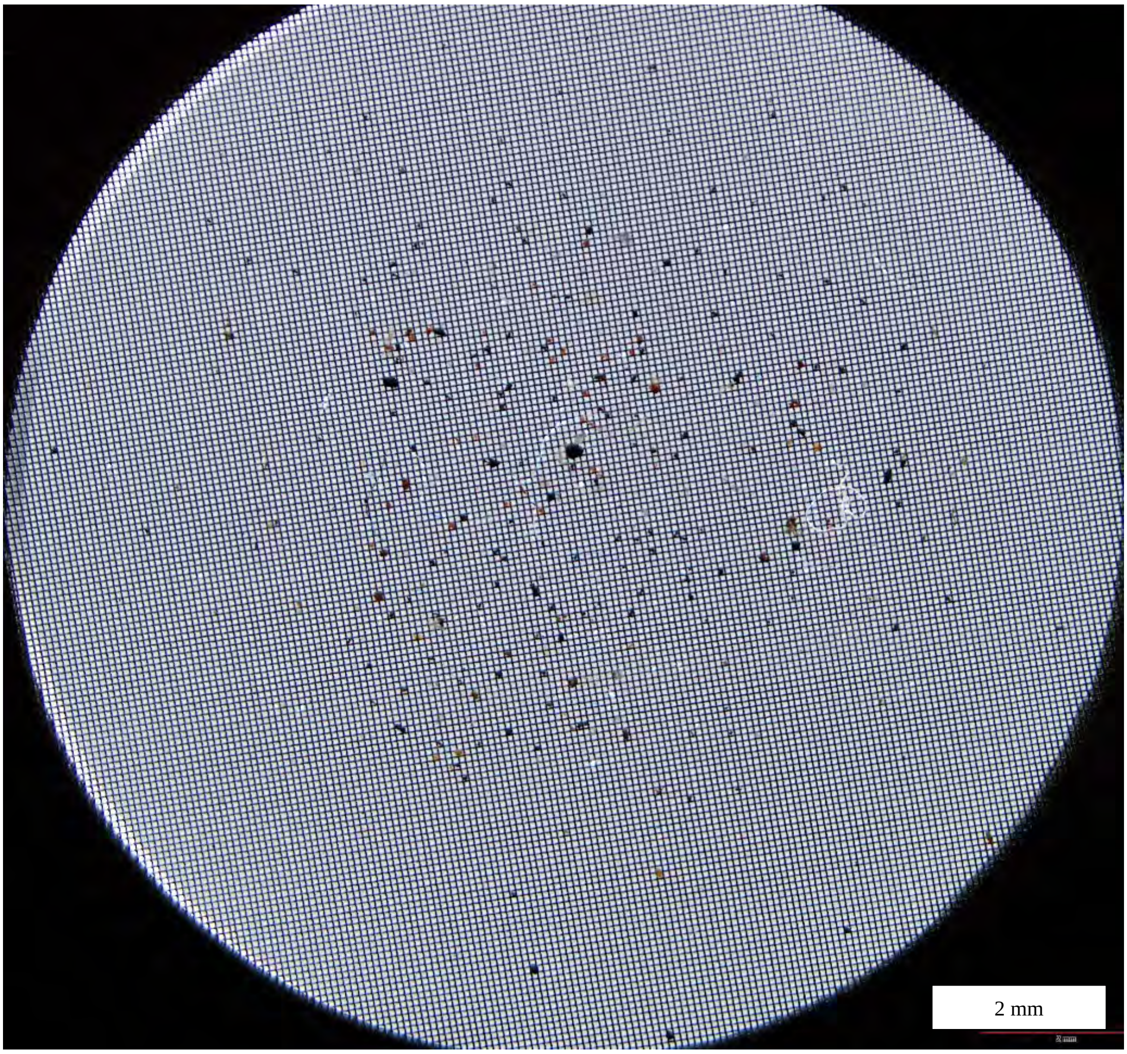

Figure A2.11 Sample S-05 (0-2 cm), filter 1. Mostly PTFE and rubber (Plasthall). Photo taken in polarized mode.

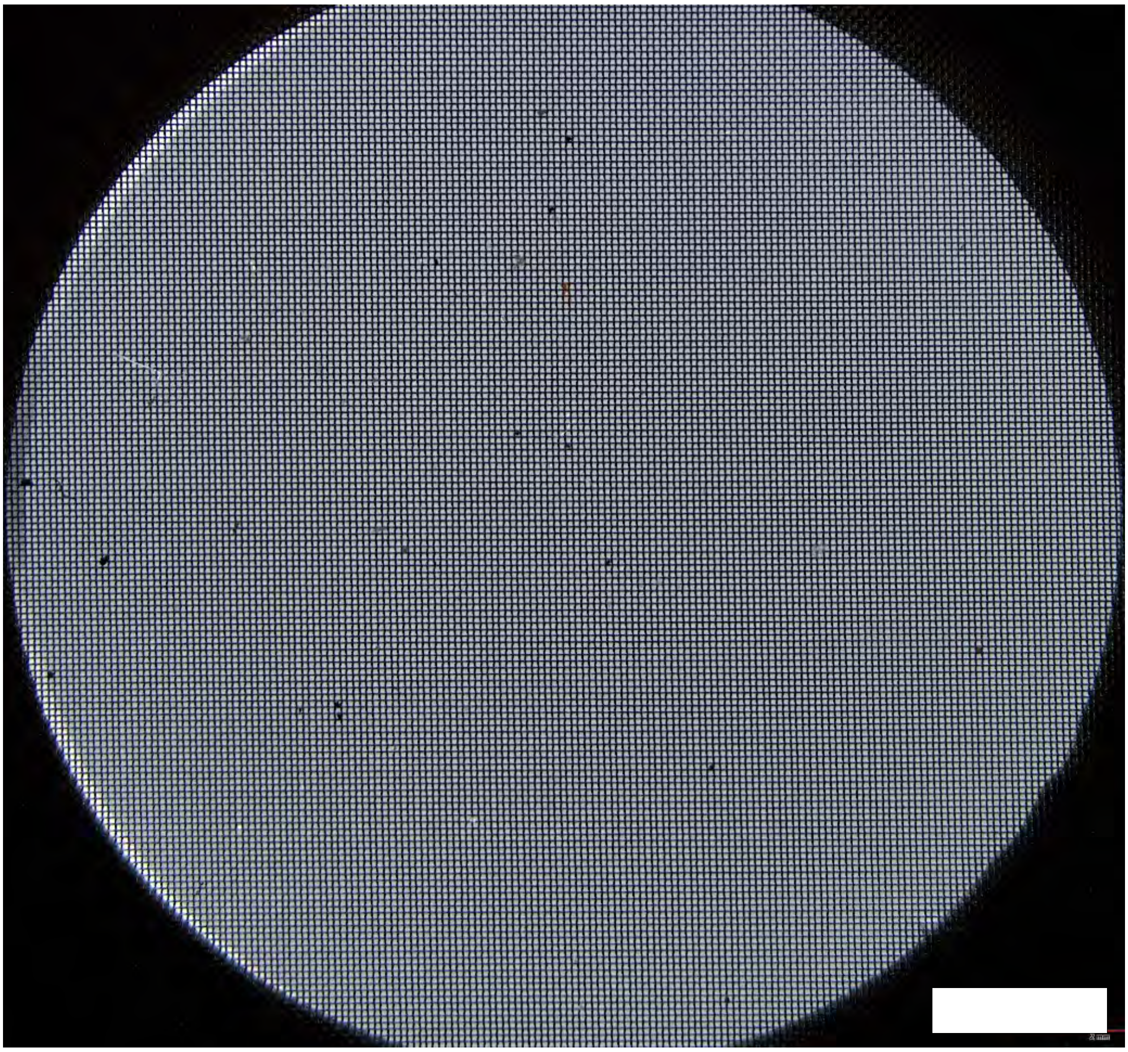

Figure A2.12 Sample S-05 (0-2 cm), filter 2. Mostly PTFE particles. Photo taken in polarized mode.

A2.6 S-06 (0-2 cm)

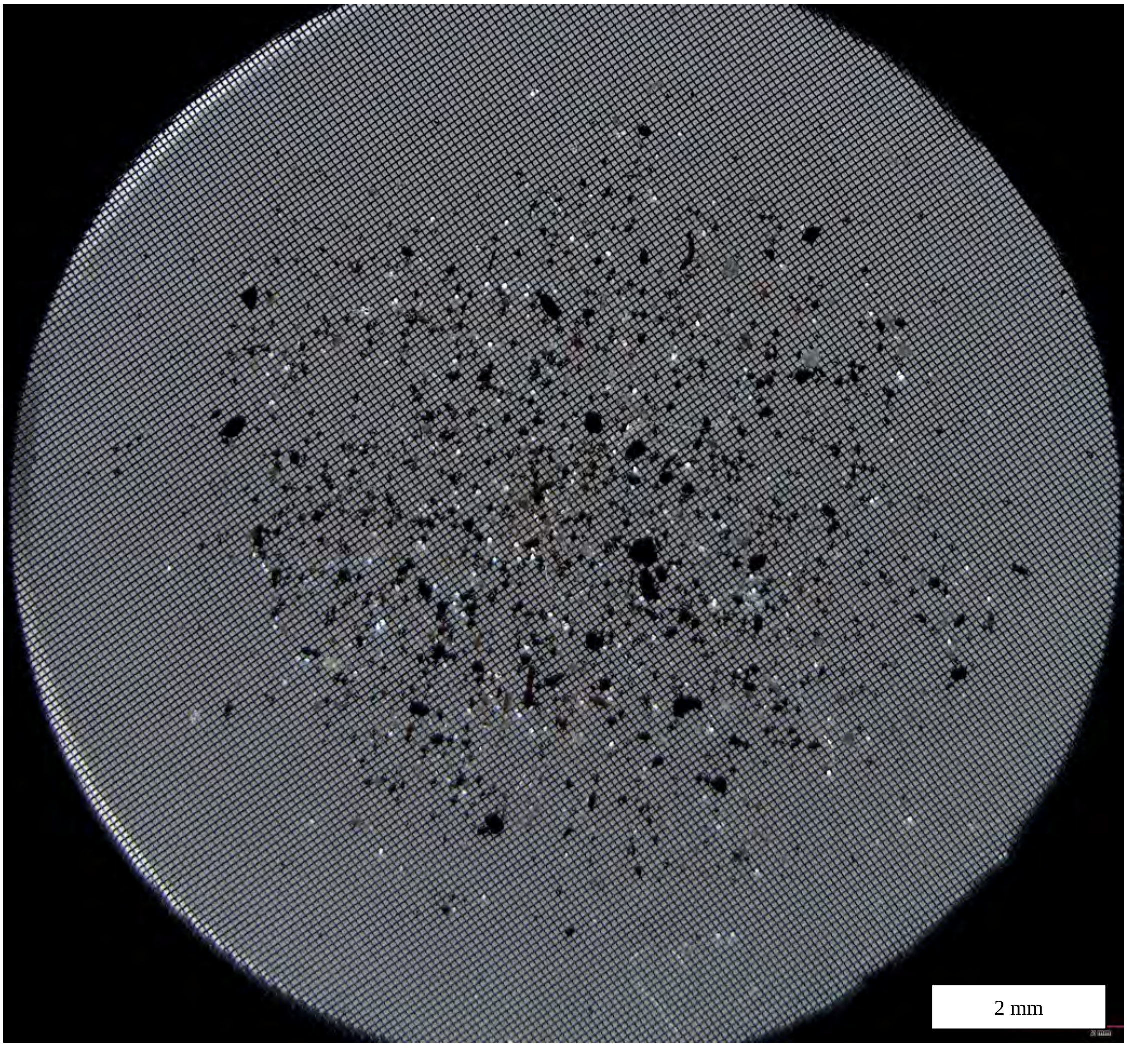

Figure A2.13 Sample S-06 (0-2 cm), filter 1. Mostly PE-chlorinated, rubber (Resinall) and PTFE. Photo taken in polarized mode.

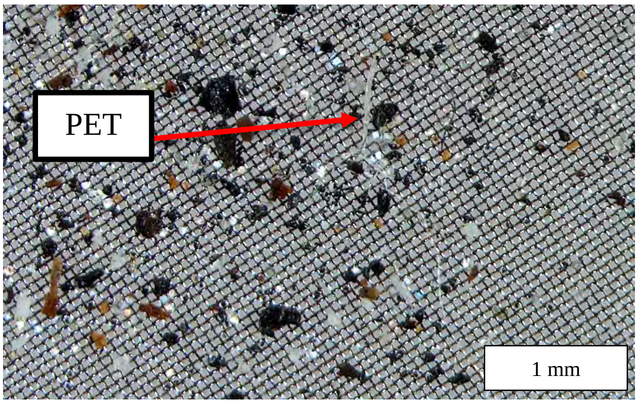

Figure A2.14 Close-up of S-06 (0-2 cm), filter 1, showing identified PET fibre. Visible mode.

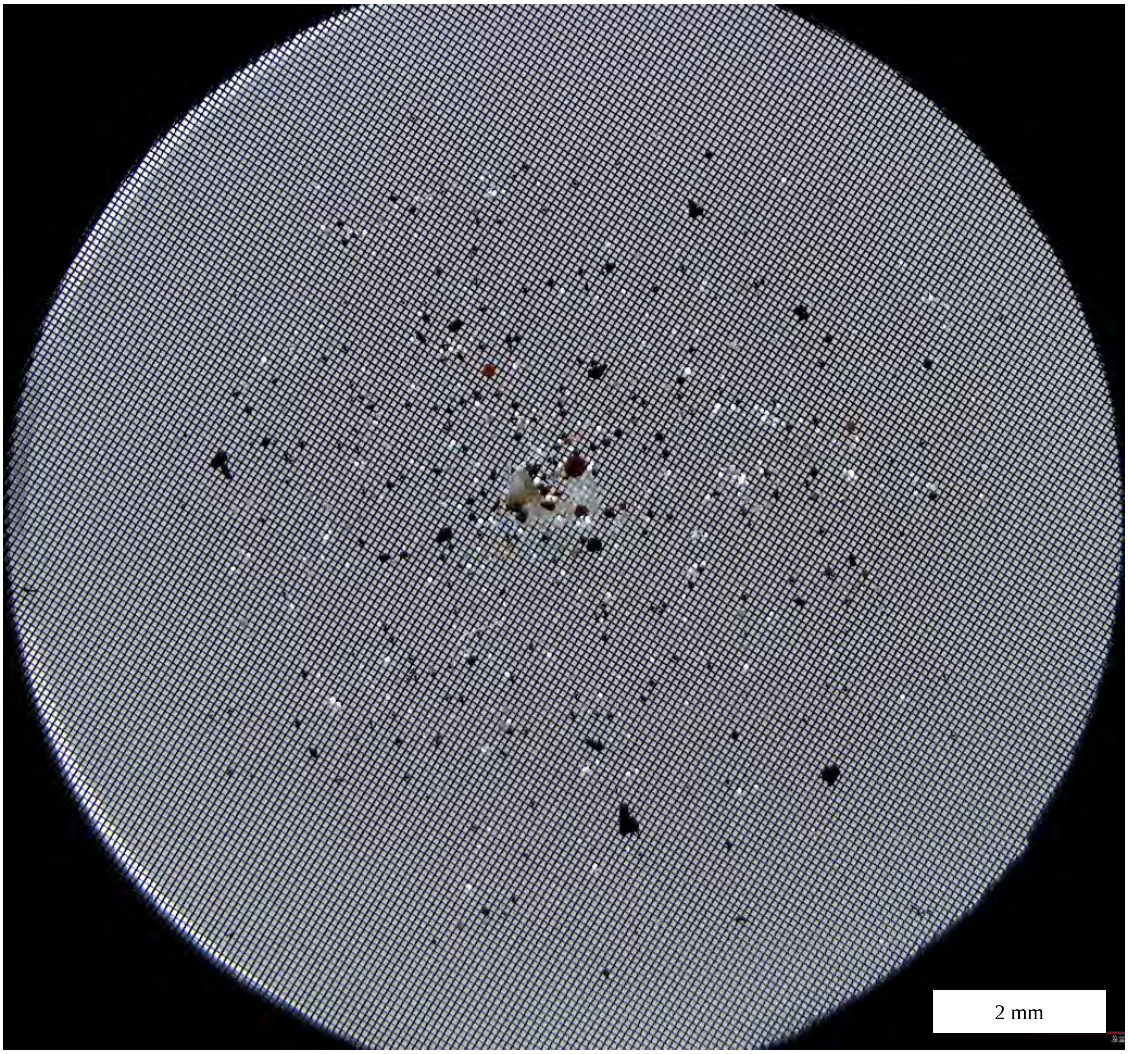

Figure A2.15 Sample S-06 (0-2 cm). filter 2. Mostly PTFE and PE-chlorinated. Photo taken in polarized mode.

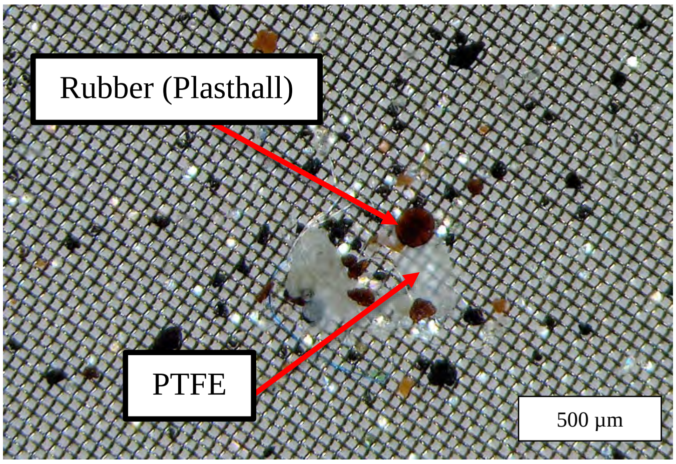

Figure A2.16 Close-up of S-06 (0-2 cm), filter 2, showing PTFE layer and rubber granule. Visible mode.

A2.7 S-06 (2-4 cm)

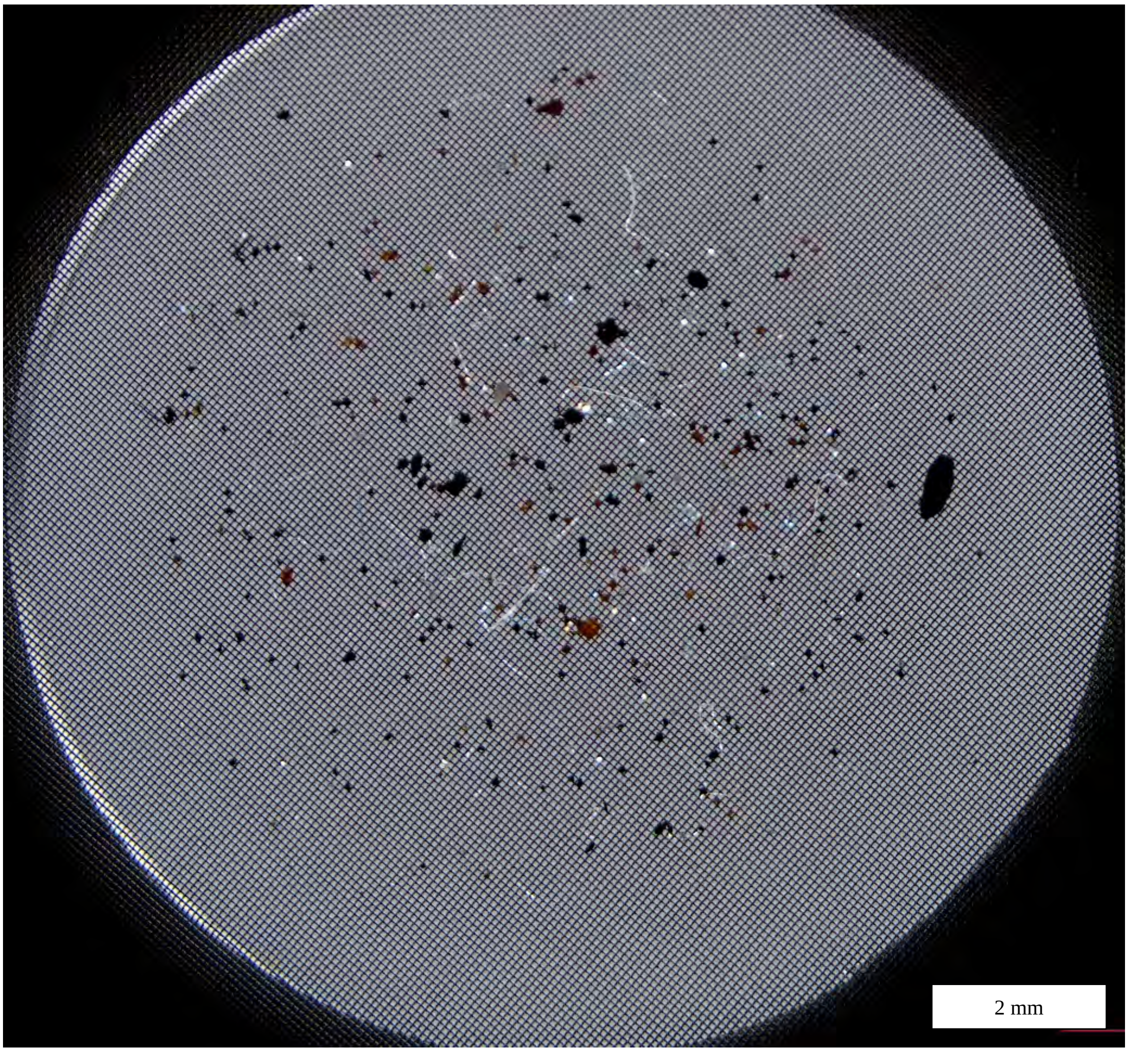

Figure A2.17 Sample S-06 (2-4 cm), filter 1. Mainly PE and PE-chlorinated, some rubber. Photo taken in polarized mode.

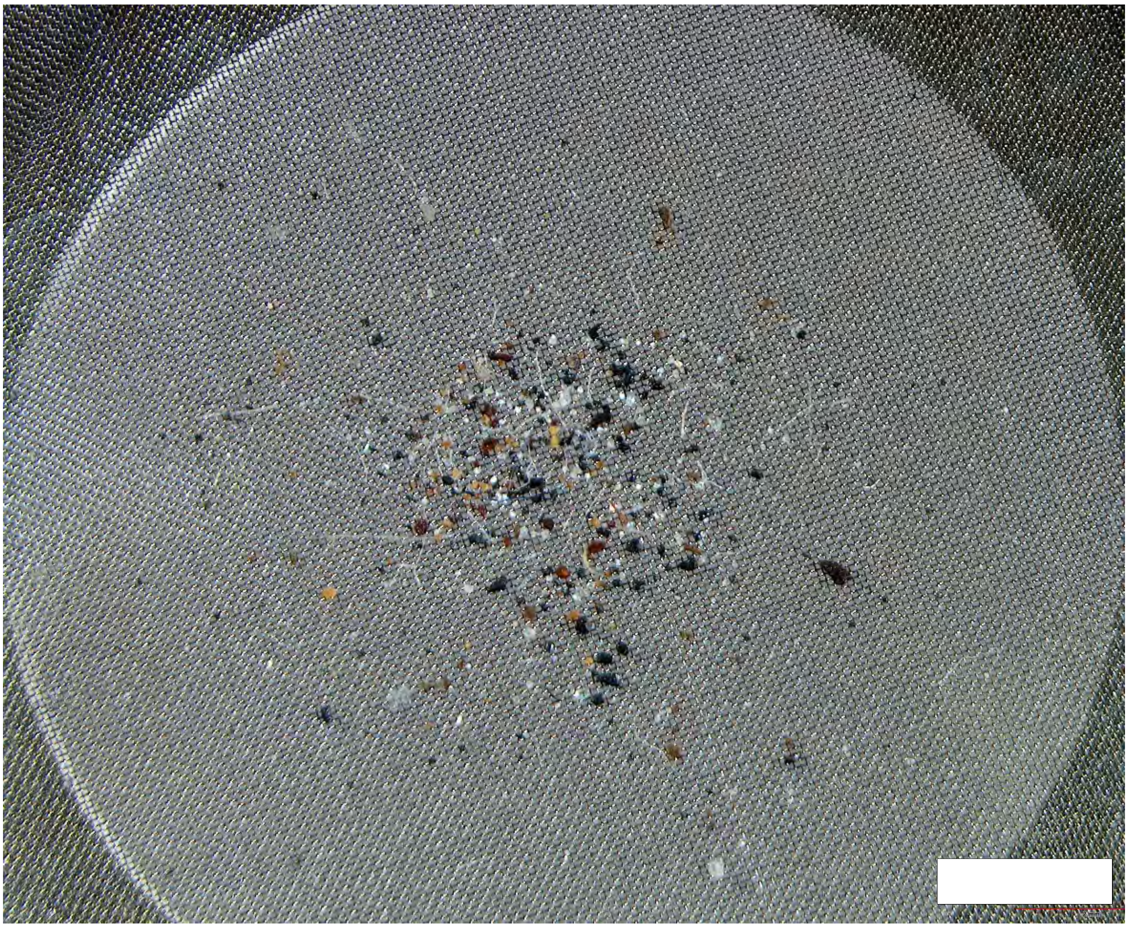

Figure A2.18 Sample S-06 (2-4 cm), filter 2. Mostly PE and melamine. Photo taken in visible mode.

A2.8 S-06 (4-6 cm)

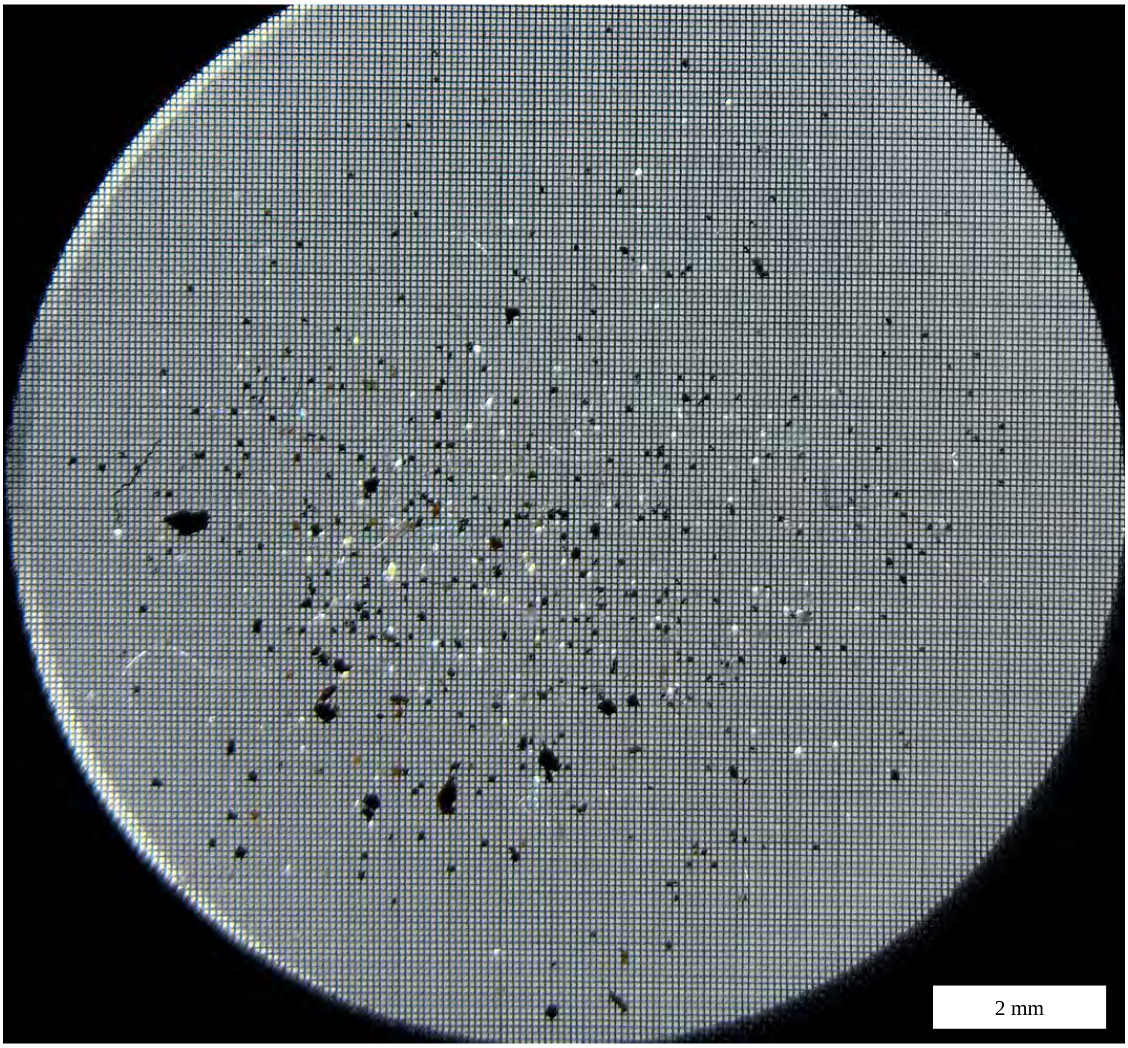

Figure A2.19 Sample S-06 (4-6 cm), filter 1. Mostly PTFE, some PE-chlorinated, PE and rubber (Resinall) particles. Photo taken in polarized mode.

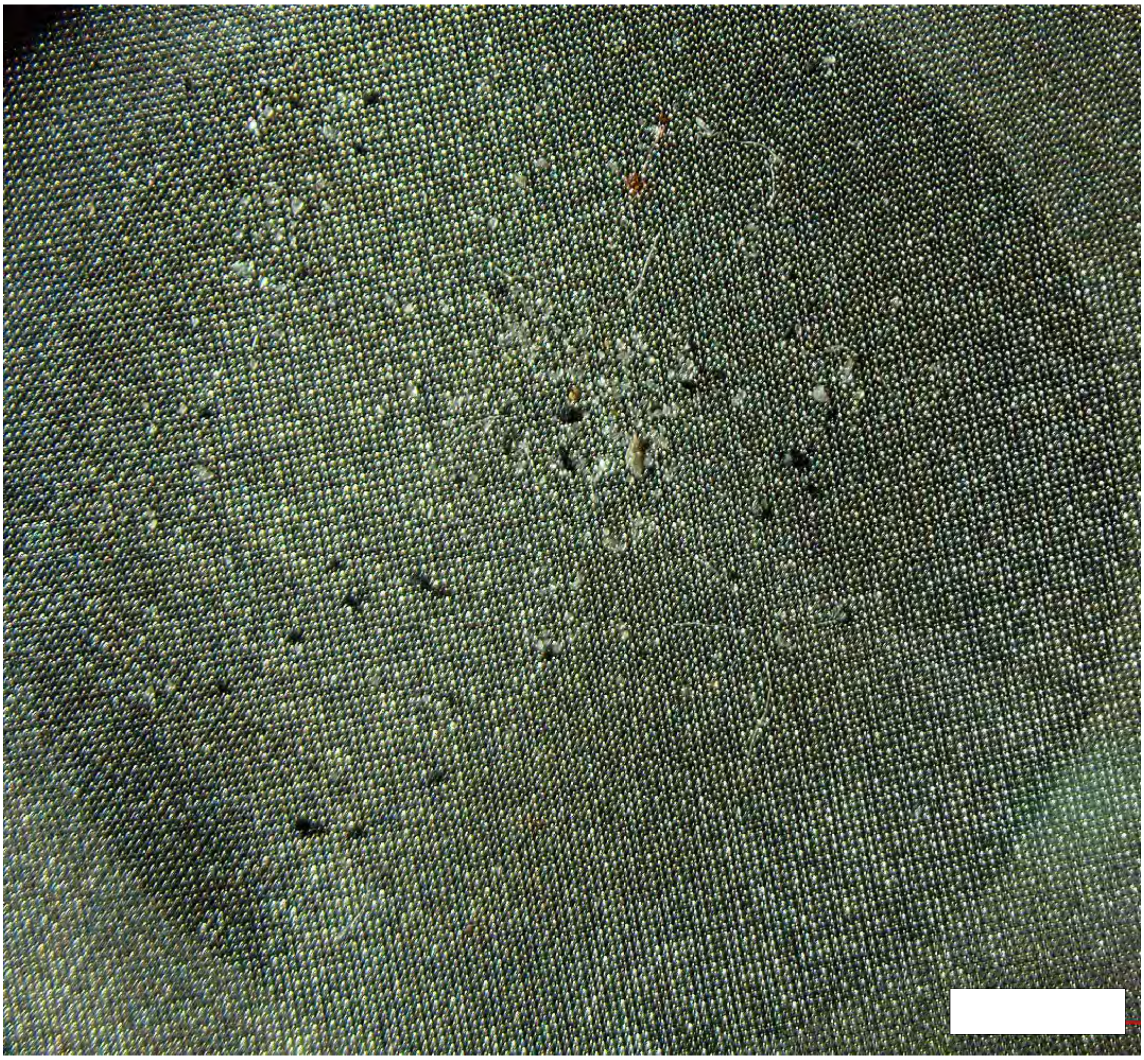

Figure A2.20 Sample S-06 (4-6 cm). filter 2. Mostly PE particles. Photo taken in visible mode.

A2.9 S-06 (6-8 cm)

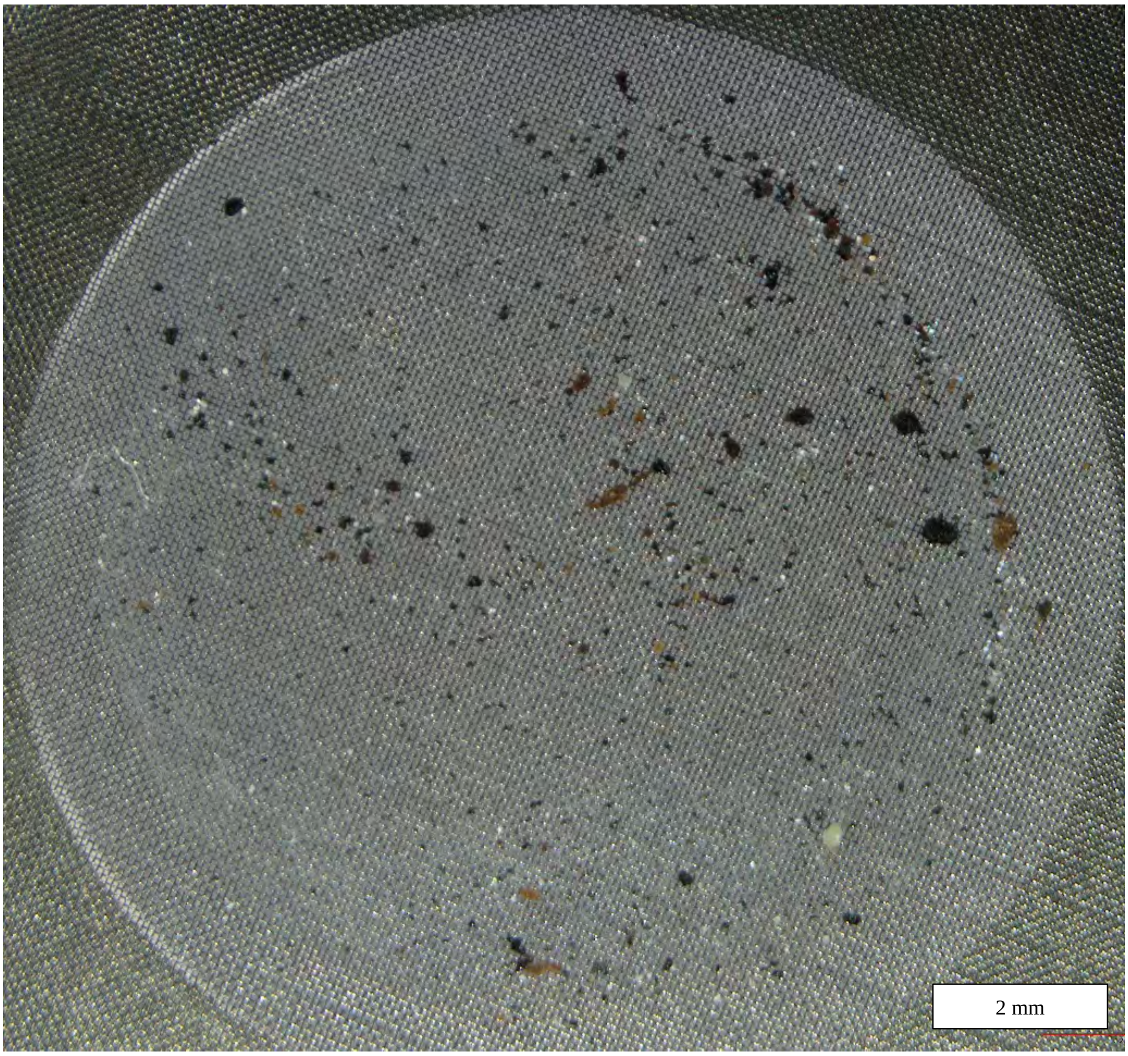

Figure A2.21 Sample S-06 (6-8 cm), filter 1. Mostly PE-chlorinated, some PE PTFE and rubber (Resinall). Photo taken in visible mode.

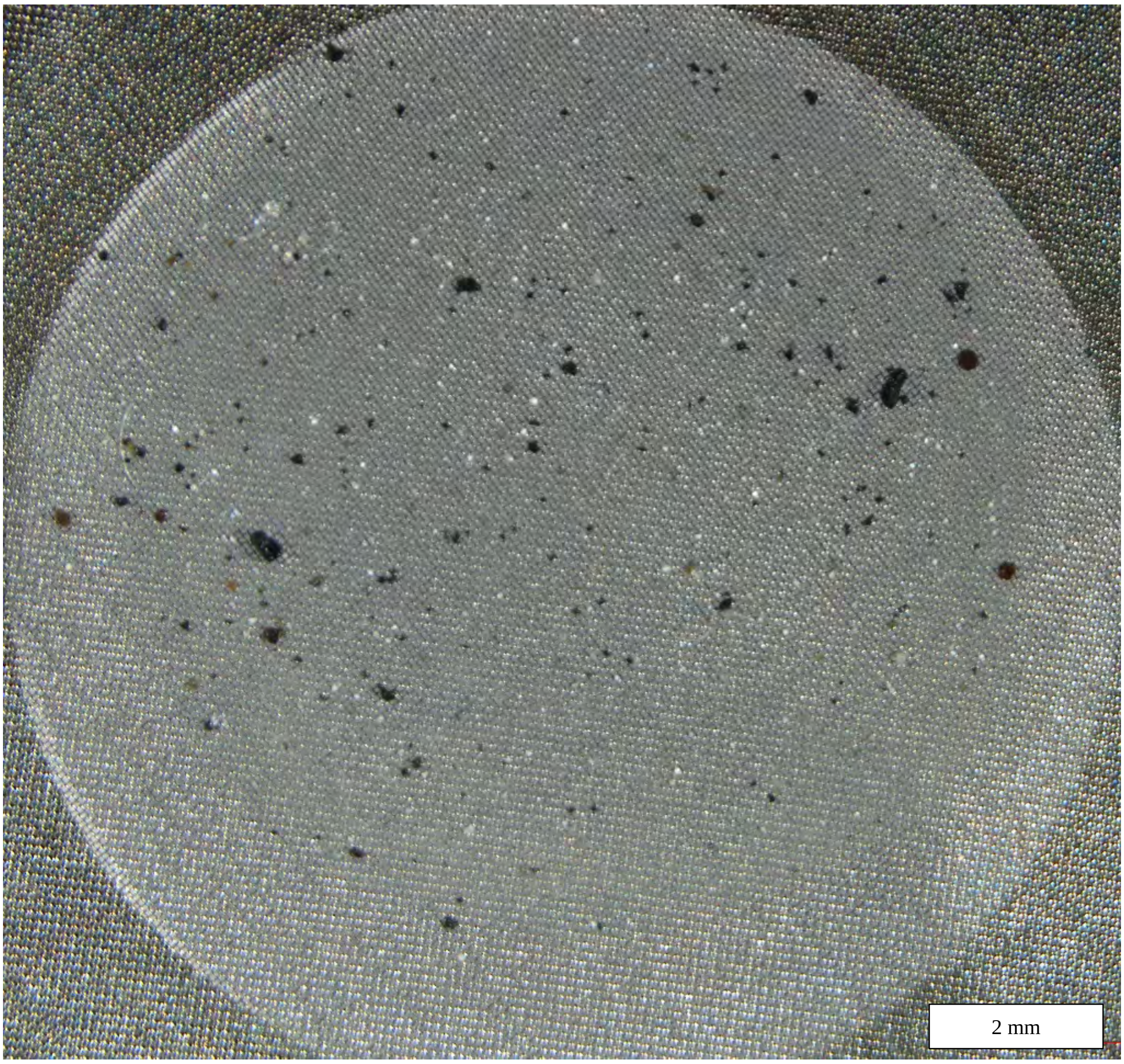

Figure A2.22 Sample S-06 (6-8 cm), filter 2. Mostly PE, PE-chlorinated and PE-oxidized. Photo taken in visible mode.

A2.10 S-06 (8-10 cm)

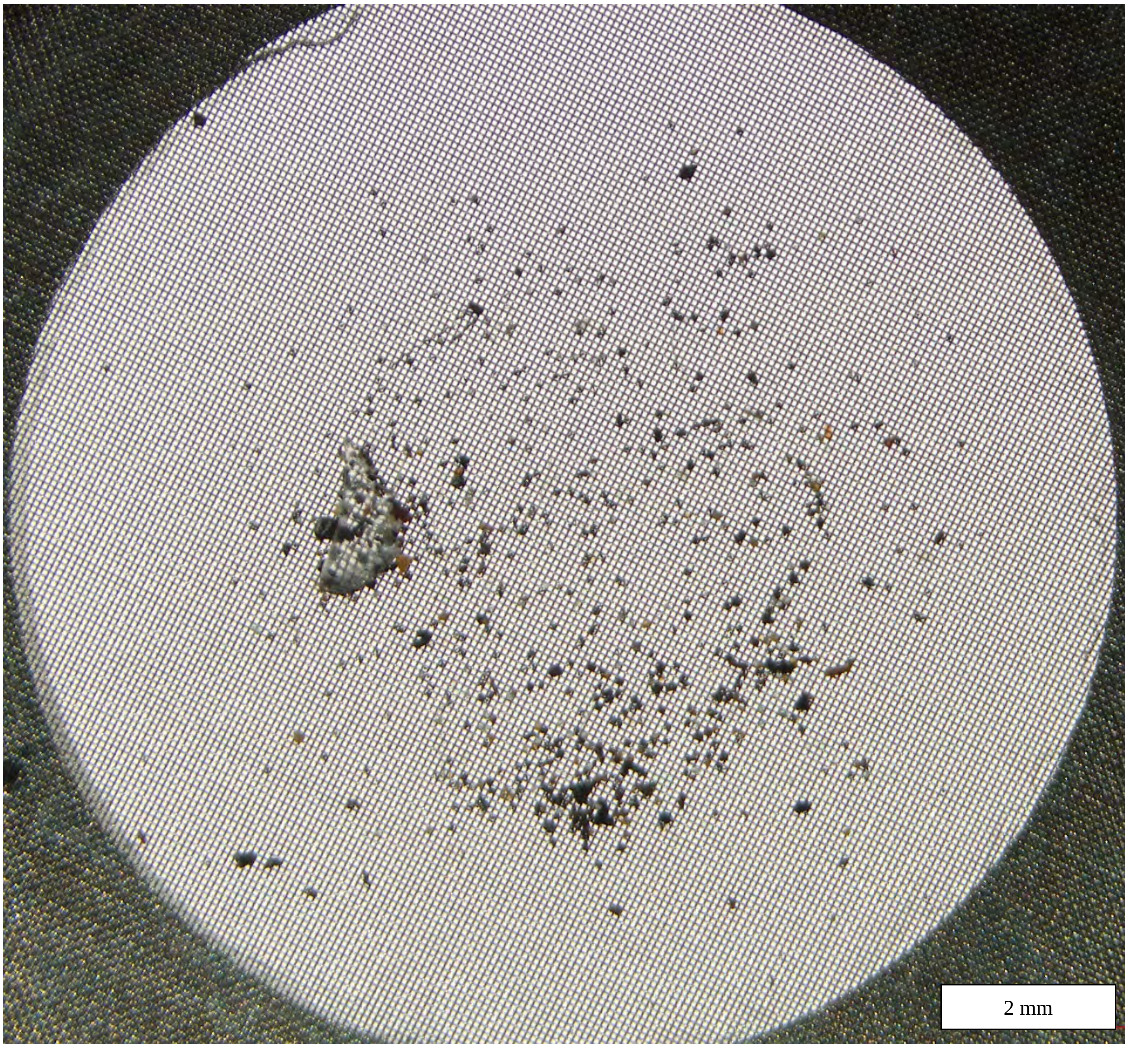

Figure A2.23 Sample S-06 (8-10 cm), filter 1. Mostly PTFE, some PE-chlorinated and PE. Photo taken in bright field mode.

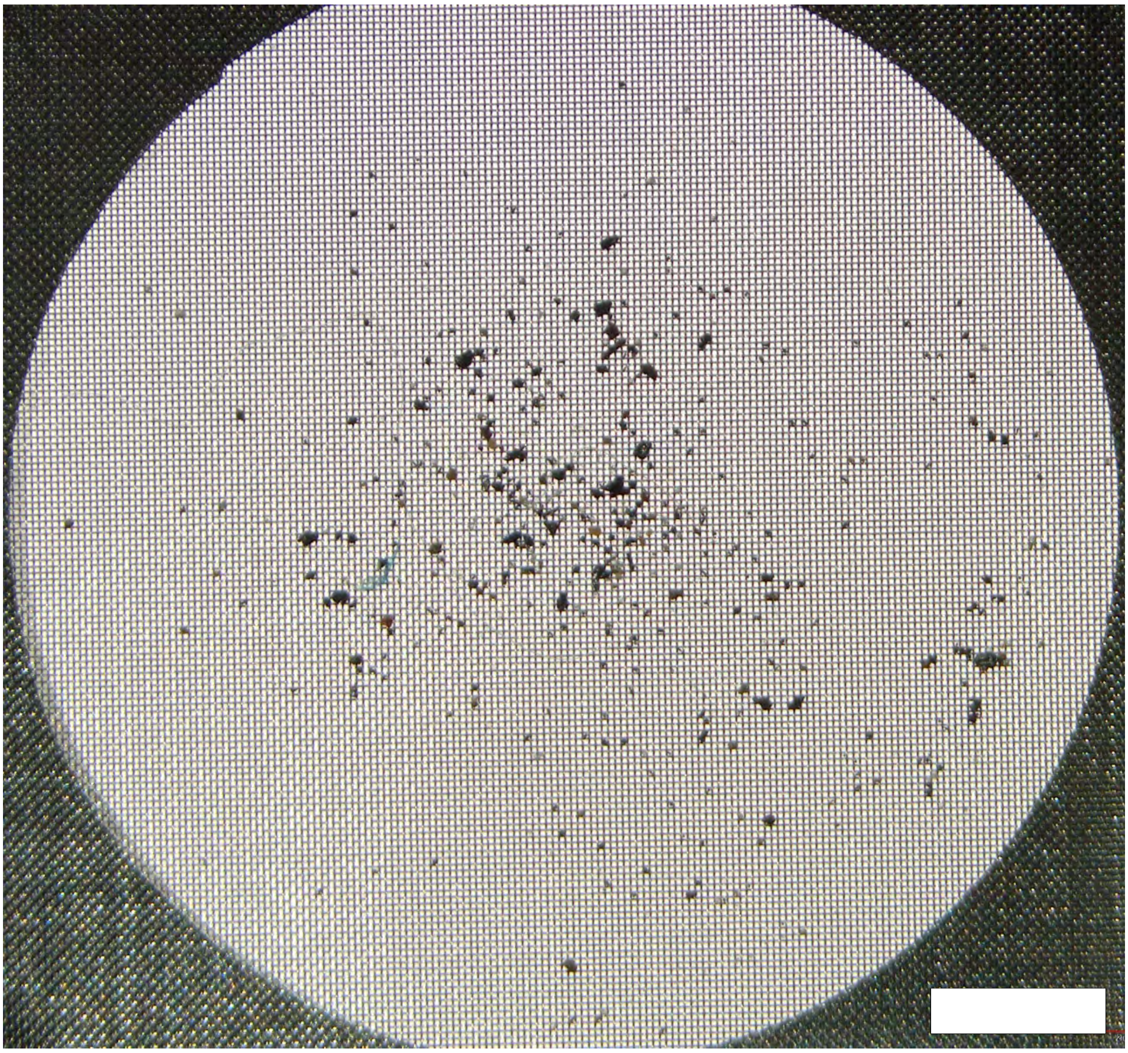

Figure A2.24 Sample S-06 (8-10 cm), filter 2. Some PE and rubber (Resinall). Photo taken in bright field mode.

A2.11 S-07 (0-2 cm)

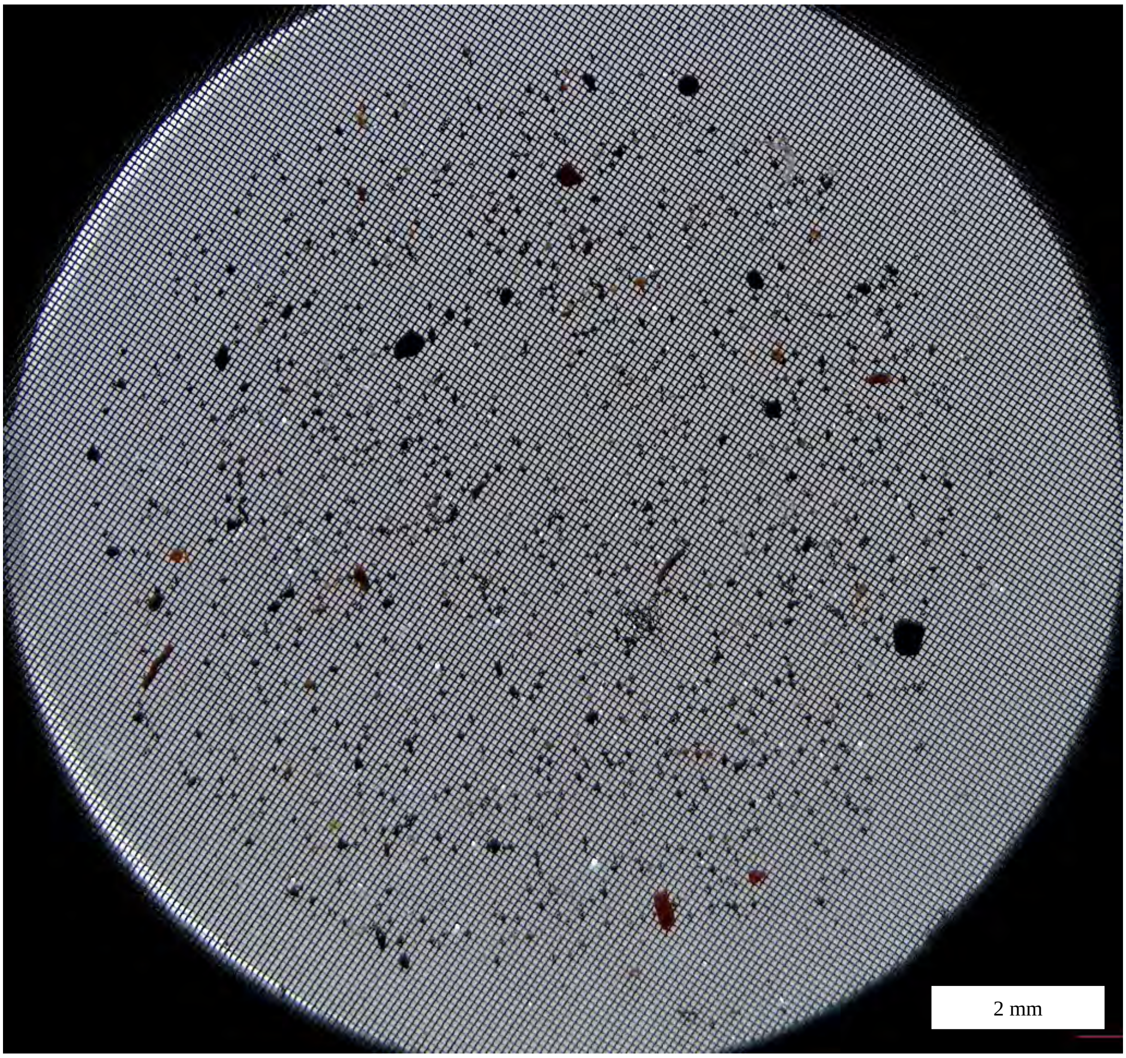

Figure A2.25 Sample S-07 (0-2 cm), filter 1. Mostly PE-chlorinated. Photo taken in polarized mode.

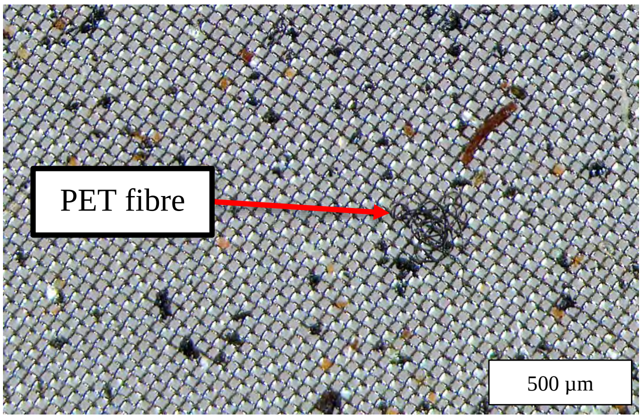

Figure A2.26 Close-up of S-07 (0-2 cm), filter 1, with an identified PET fibre.

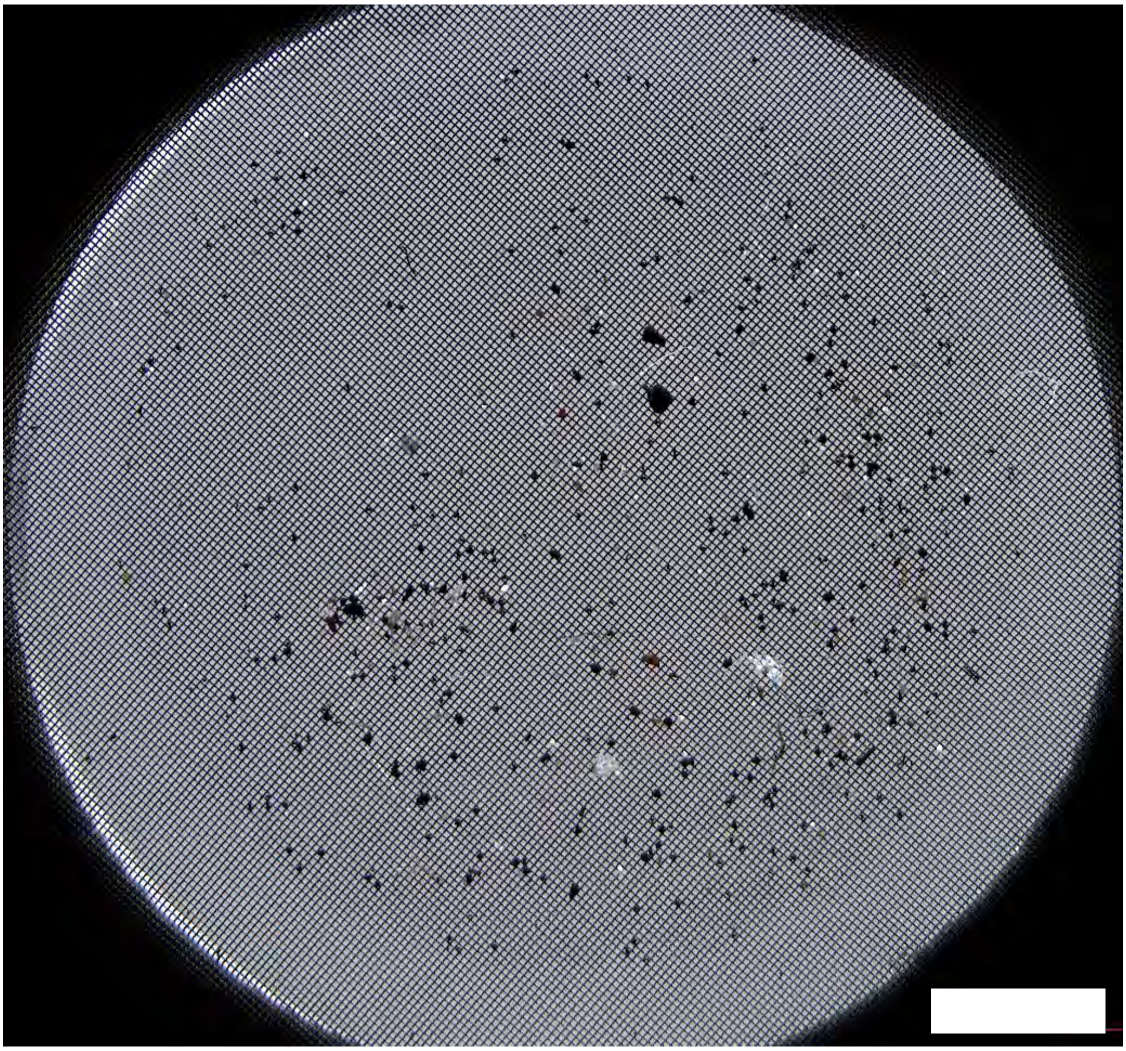

Figure A2.27 Sample S-07 (0-2 cm), filter 2. Mostly PE-chlorinated, PTFE and PE. Photo taken in polarized mode.

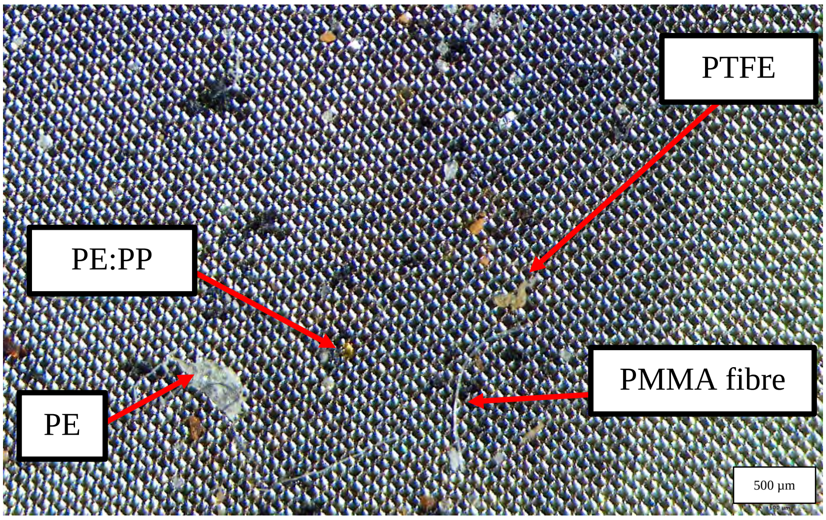

Figure A2.28 Close-up of S-07 (0-2 cm), filter 2. Showing identified particles. Visible mode.

A2.12 S-08 (0-2 cm)

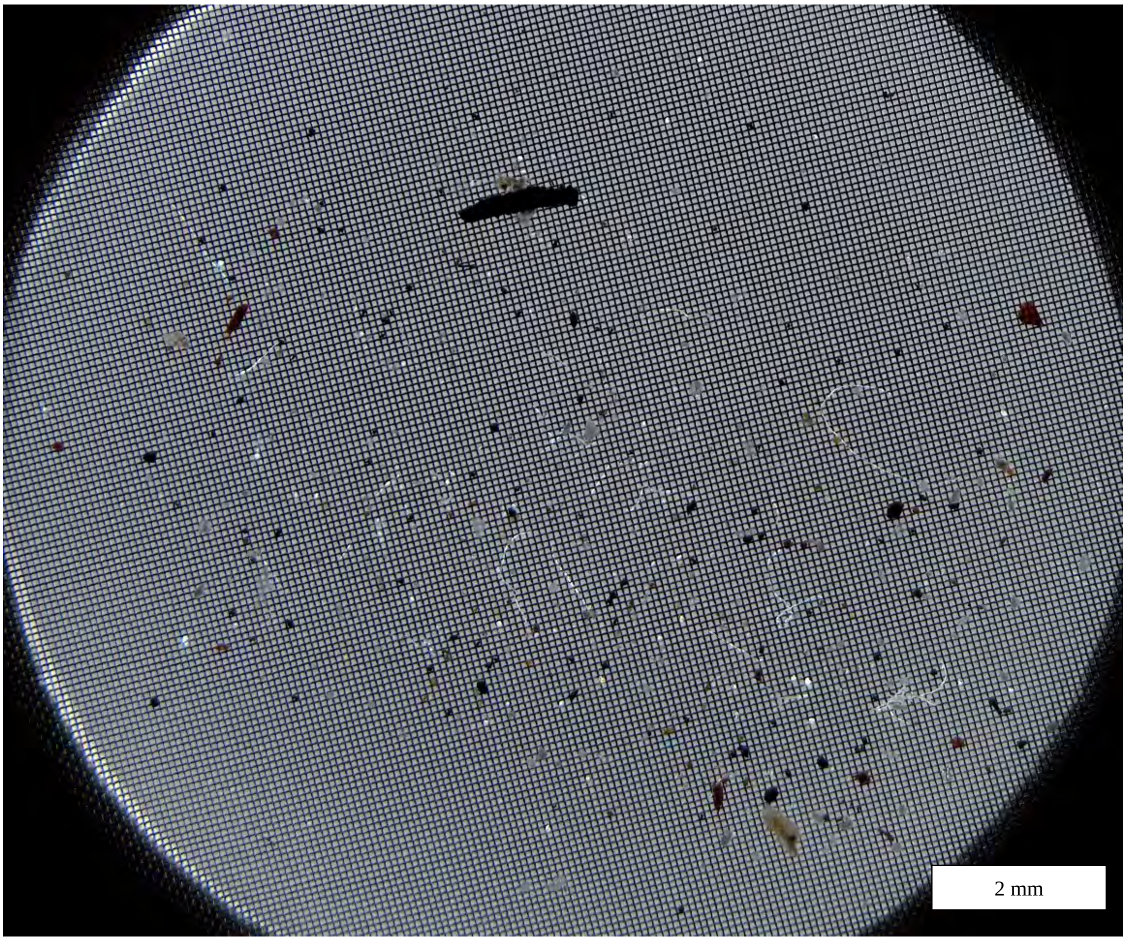

Figure A2.29 Sample S-08 (0-2 cm), filter 1. Mostly PTFE, some PE-chlorinated. Photo taken in polarized mode.

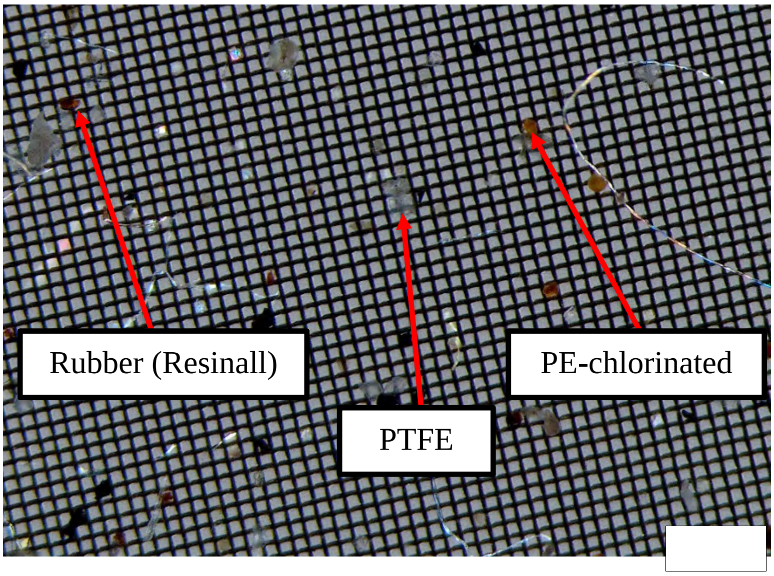

Figure A2.30 Close-up of S-08 (0-2 cm), filter 1, with identified particles. Polarized mode.

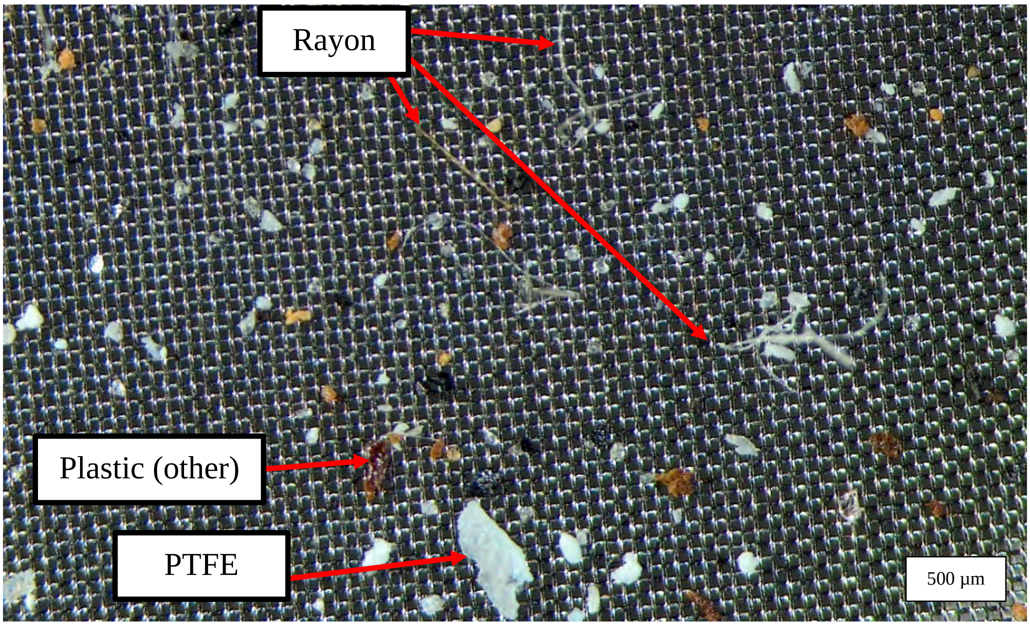

Figure A2.31 Close-up of S-08 (0-2 cm), filter 1, showing some identified microplastics and organic (rayon) fibres. Visible mode.

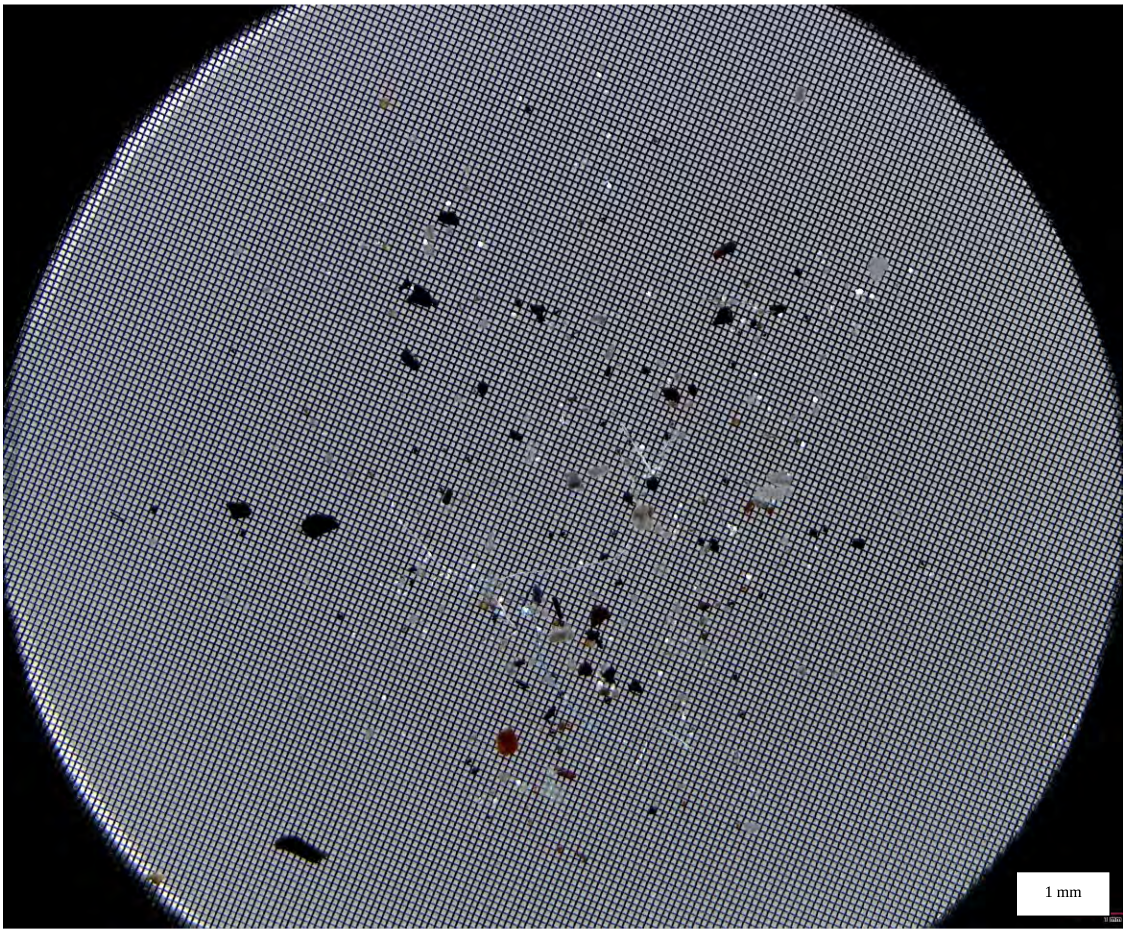

Figure A2.32 Sample S-08 (0-2 cm), filter 2. Mostly PTFE and PE. Polarized mode.

A2.13 S-09 (0-2 cm)

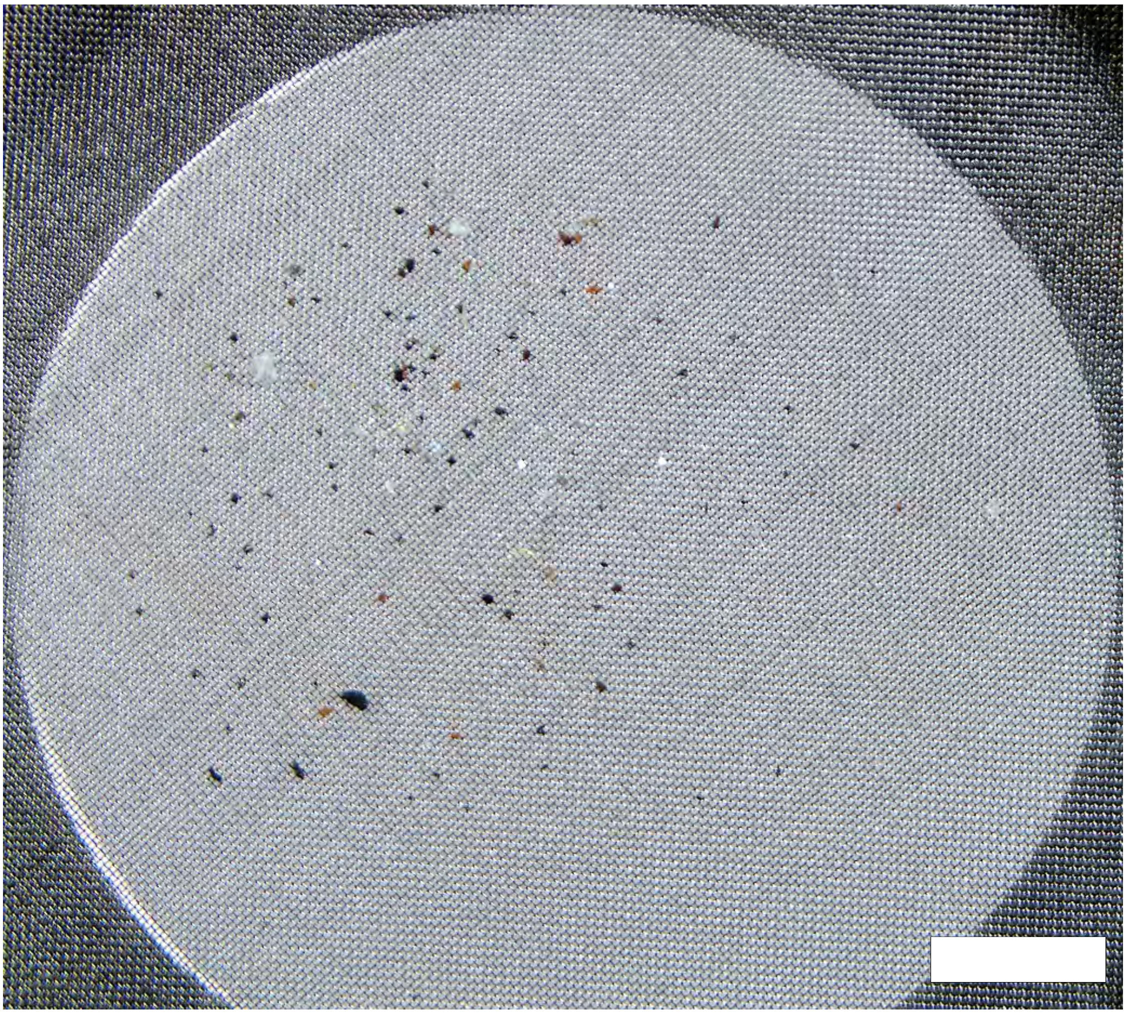

Figure A2.33 Sample S-09 (0-2 cm), filter 1. Mostly PTFE and PE-chlorinated. Polarized mode (with visible light from top).

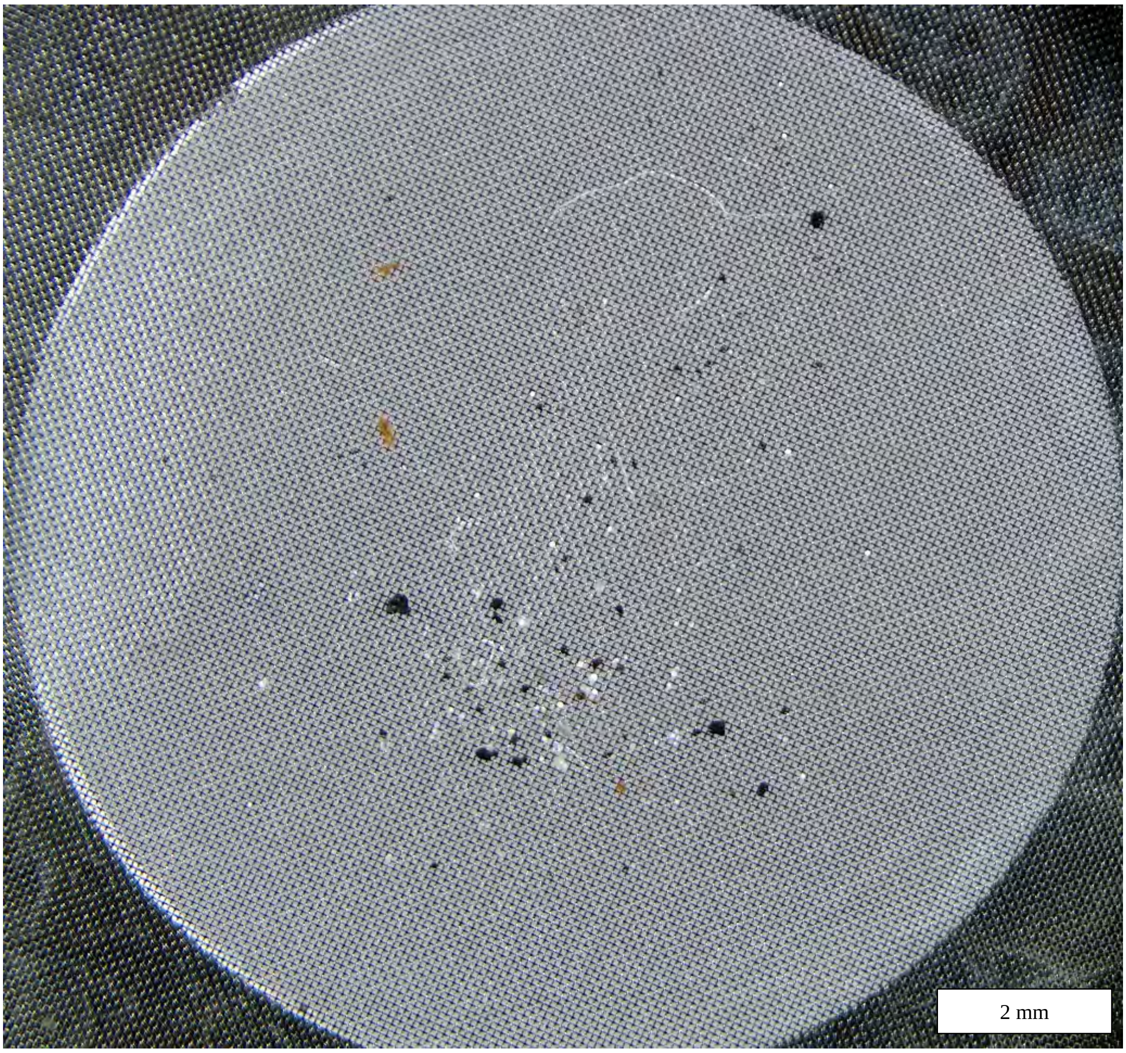

Figure A2.34 Sample S-09 (0-2 cm), filter 2. Mostly PE-chlorinated. Polarized mode (with visible light from top).

A2.14 S-10 (0-2 cm)

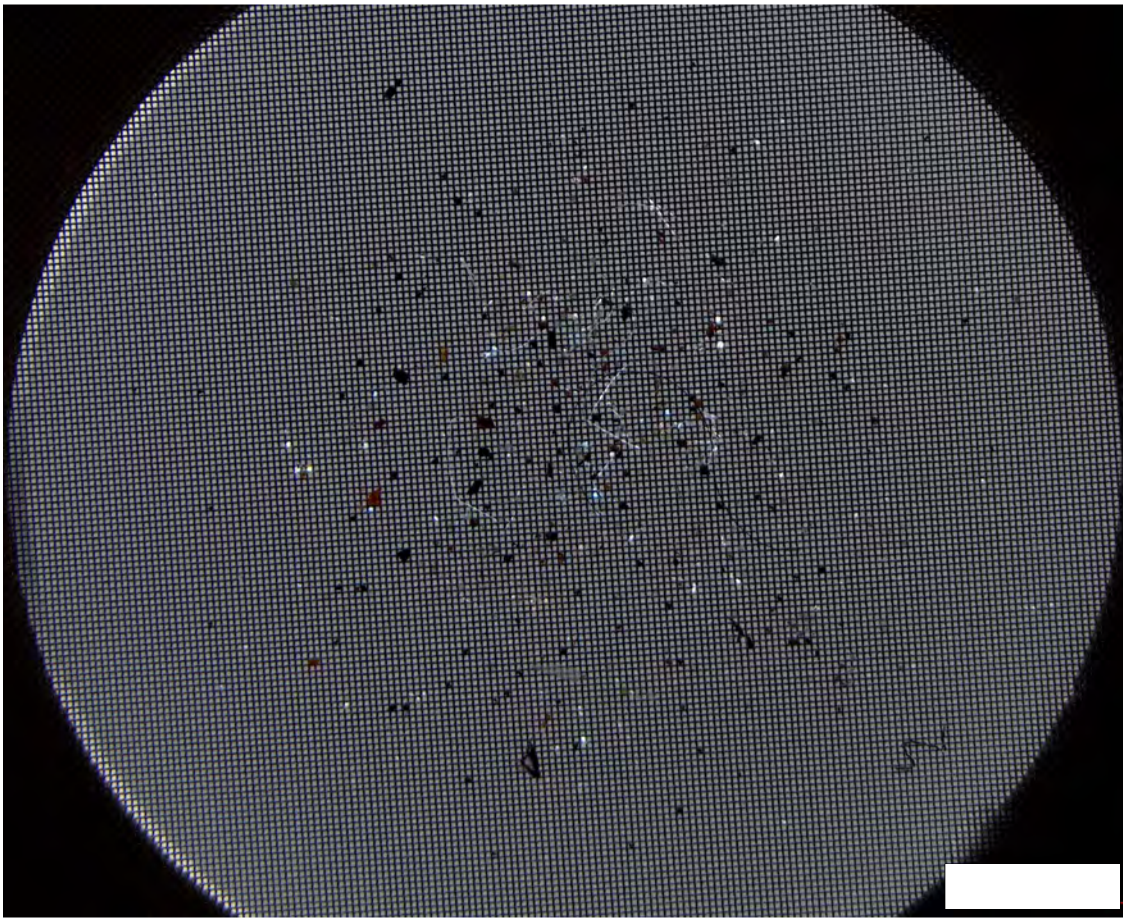

Figure A2.35 Sample S-10 (0-2 cm), filter 1. Mostly PE-chlorinated. Polarized mode.

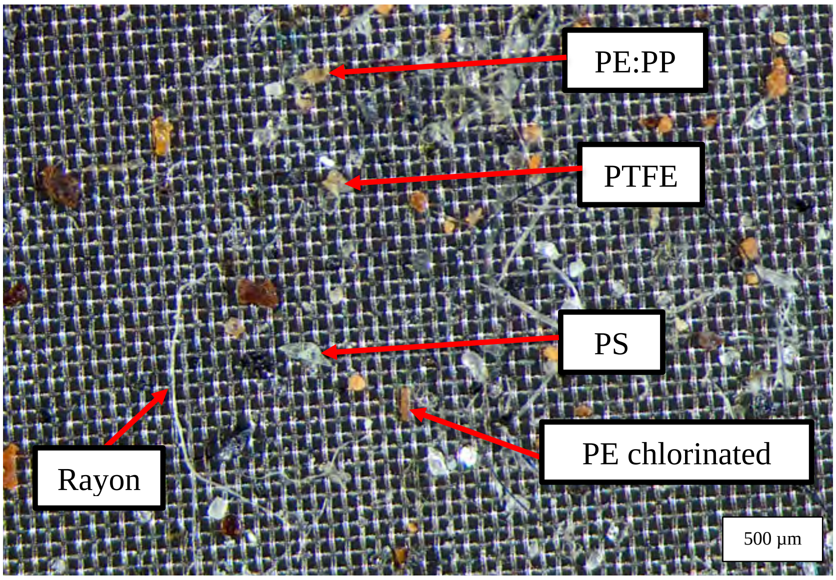

Figure A2.36 Close-up of S-10 (0-2 cm), filter 1, with identified particles. Visible mode.

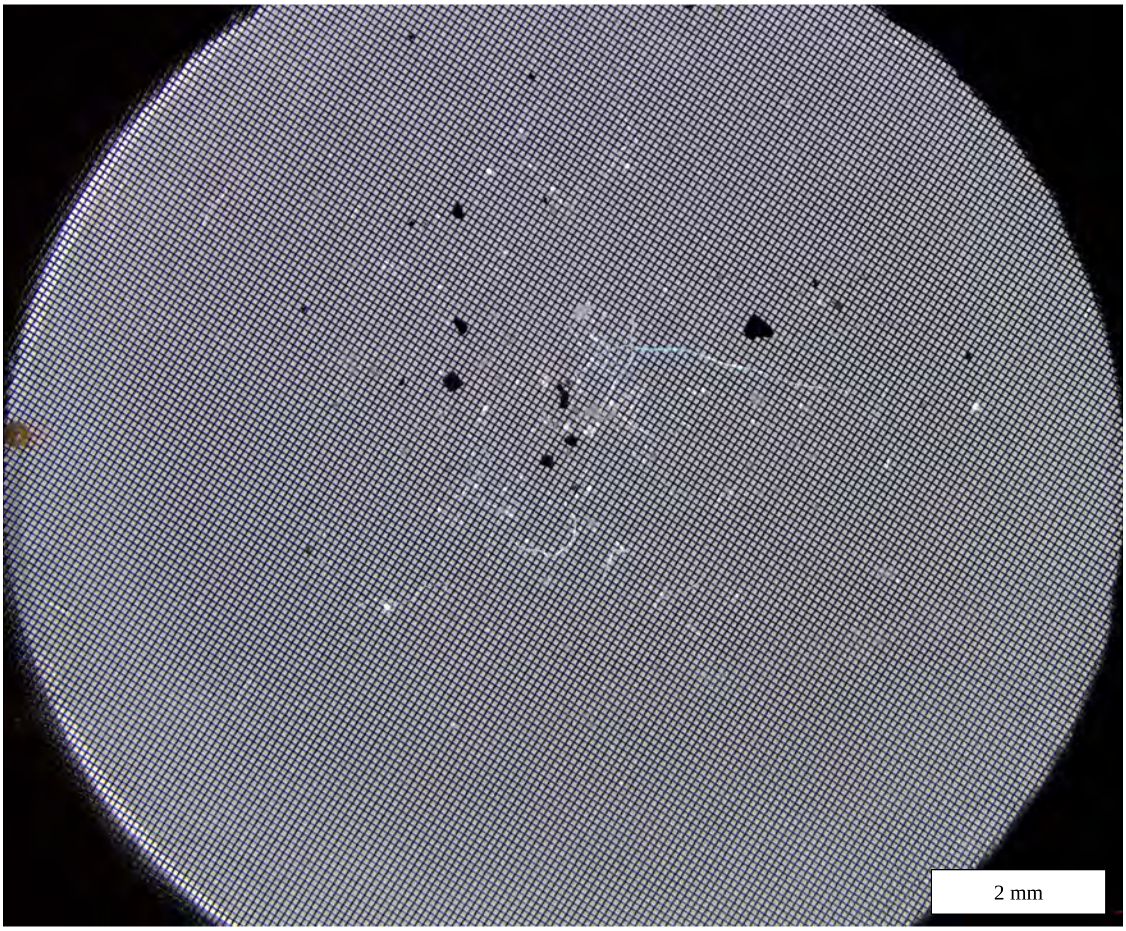

Figure A2.37 Sample S-10 (0-2 cm), filter 2. Mainly PE. Polarized mode.

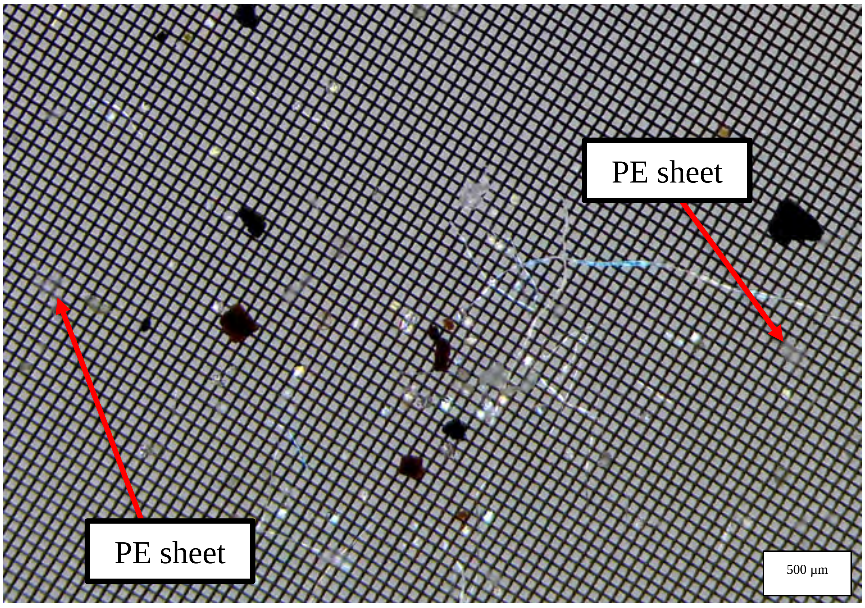

Figure A2.38 Close-up of S-10 (0-2 cm), filter 2, with identified PE particles. Polarized mode.

A2.15 S-10 (2-4 cm)

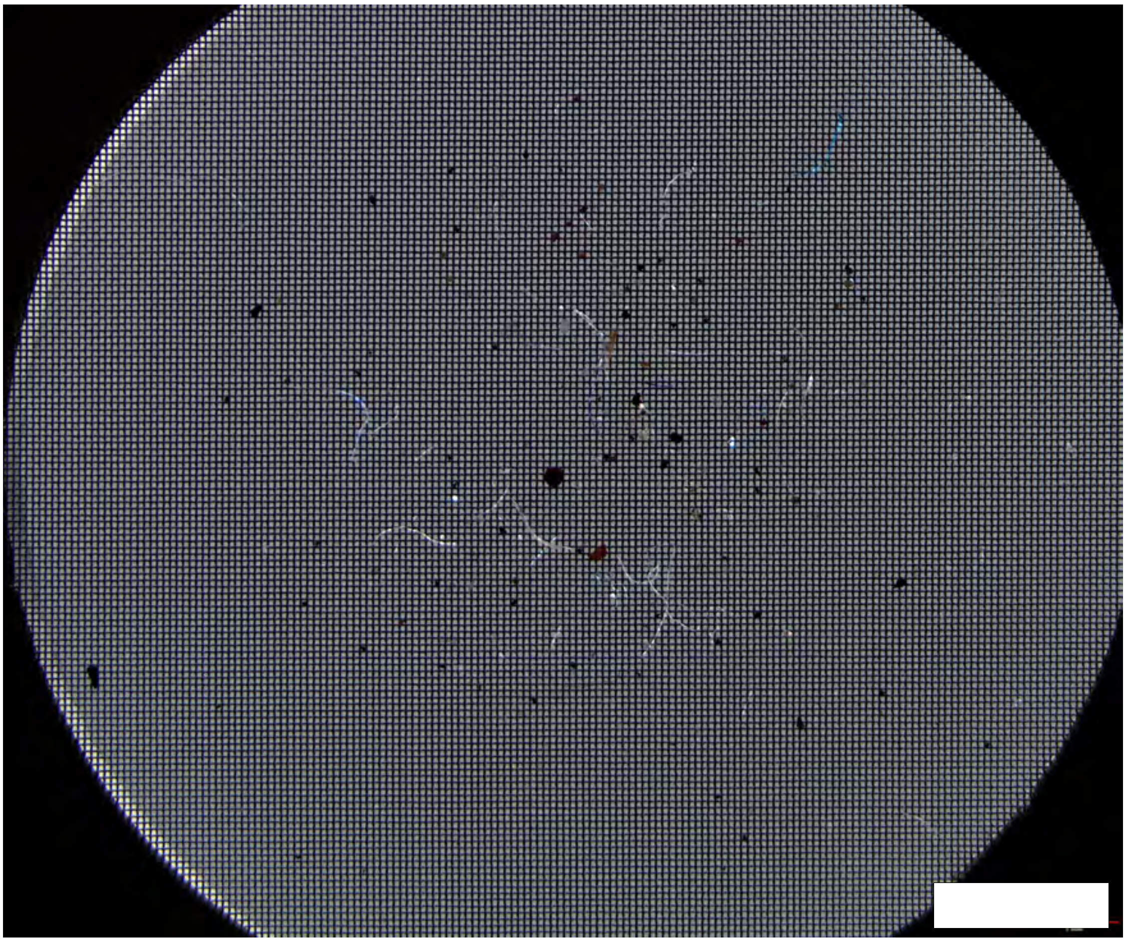

Figure A2.39 Sample S-10 (2-4 cm), filter 1. Mostly PE-chlorinated, PE, melamine and PTFE. Polarized mode.

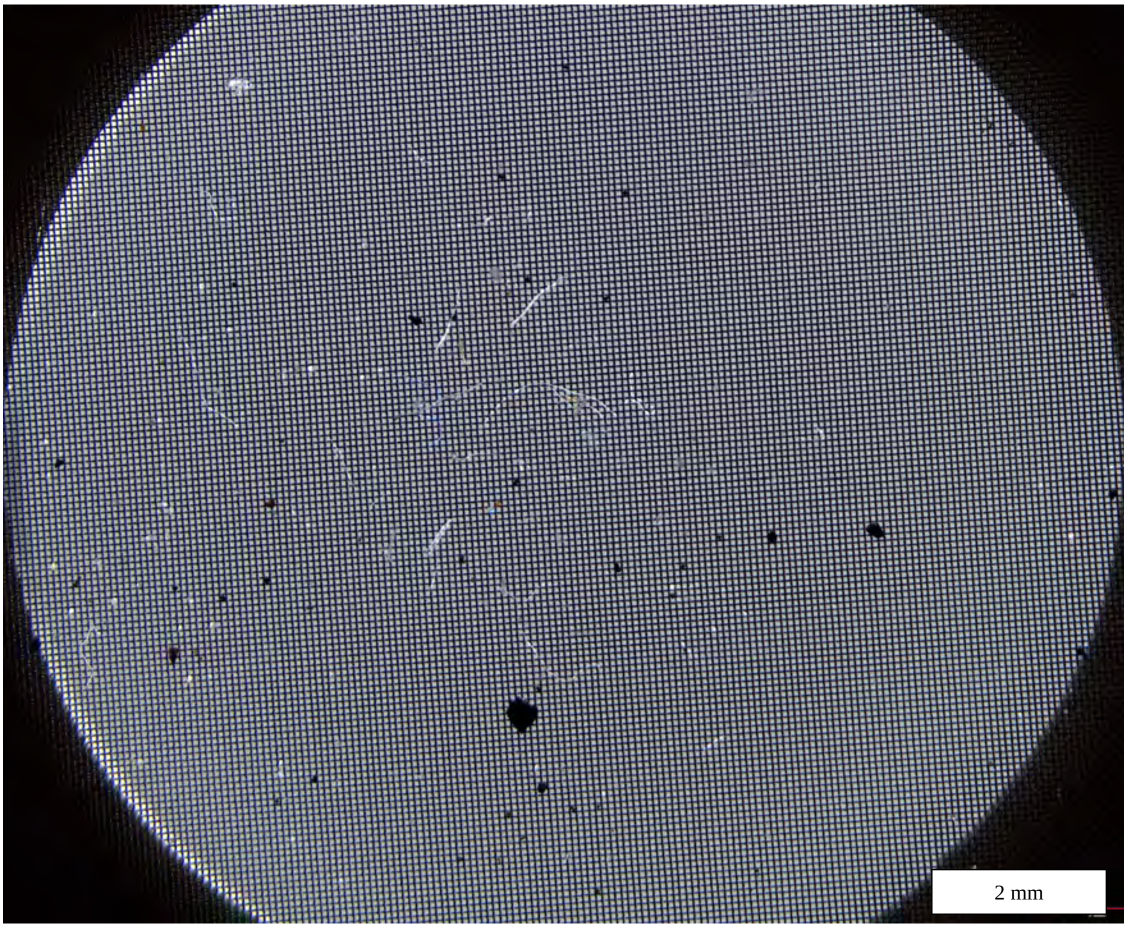

Figure A2.40 Sample S-10 (2-4 cm), filter 2. Mostly PE. Some Melamine and organic (rayon/cotton) fibres. Photo taken in polarized mode.

A2.16 S-10 (4-6 cm)

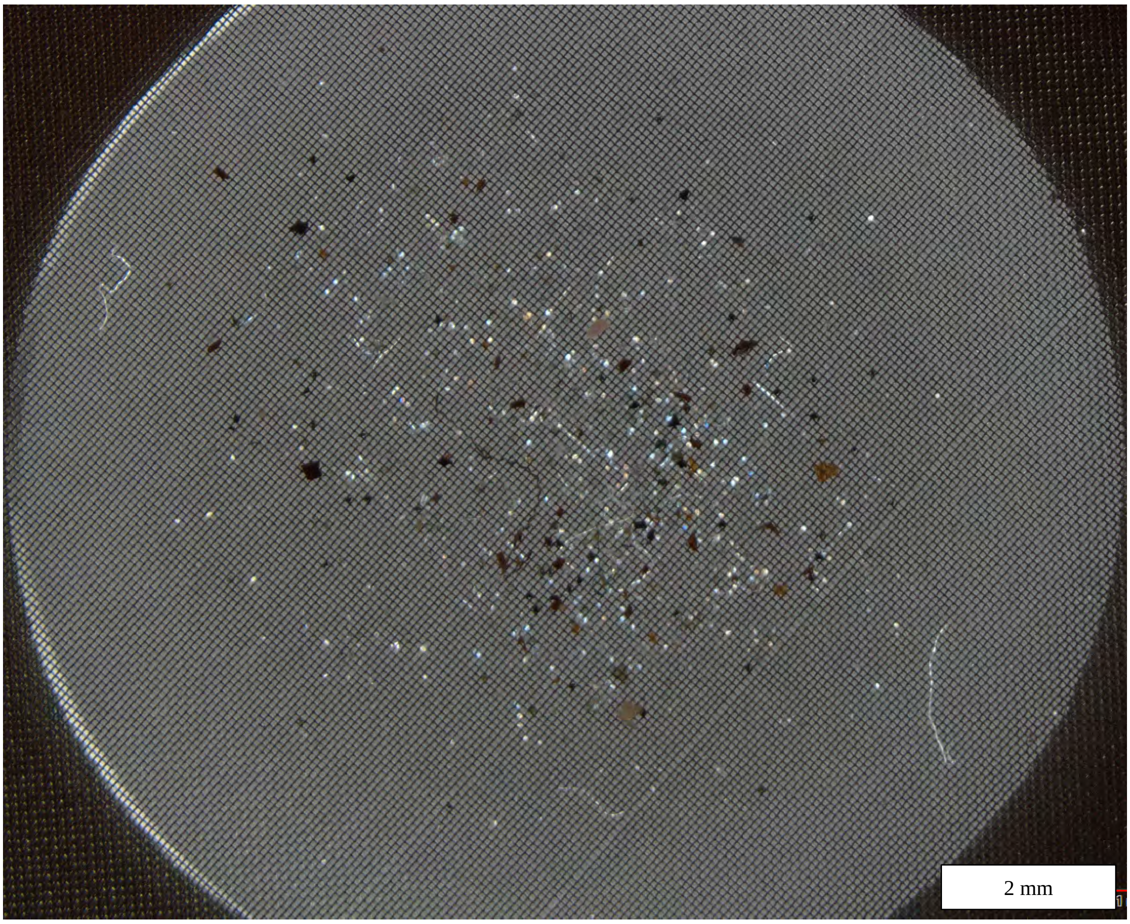

Figure A2.41 Sample S-10 (4-6 cm), filter 1. Mostly plastic additives and PE. Polarized mode.

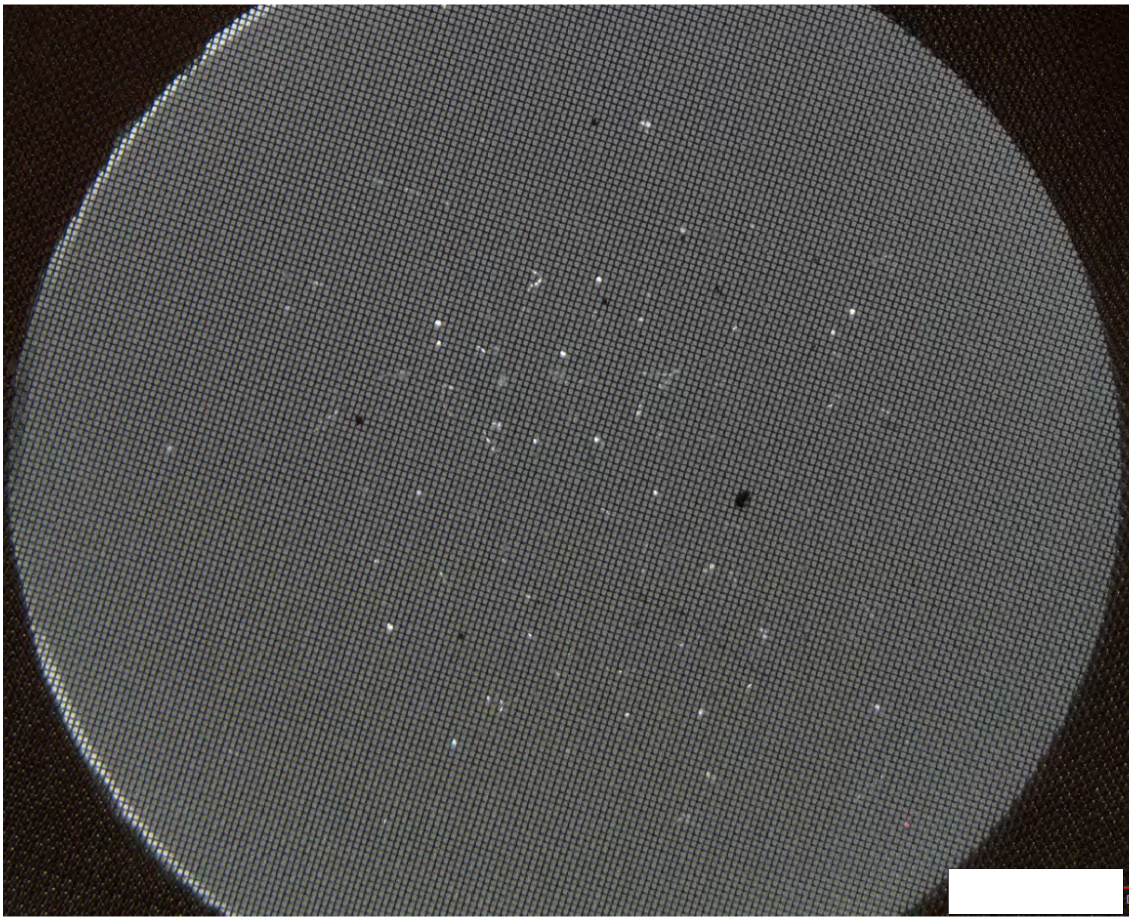

Figure A2.42 Sample S-10 (4-6 cm), filter 2. Mostly PTFE and PS particles. Photo taken in polarized mode.

A2.17 S-10 (6-8 cm)

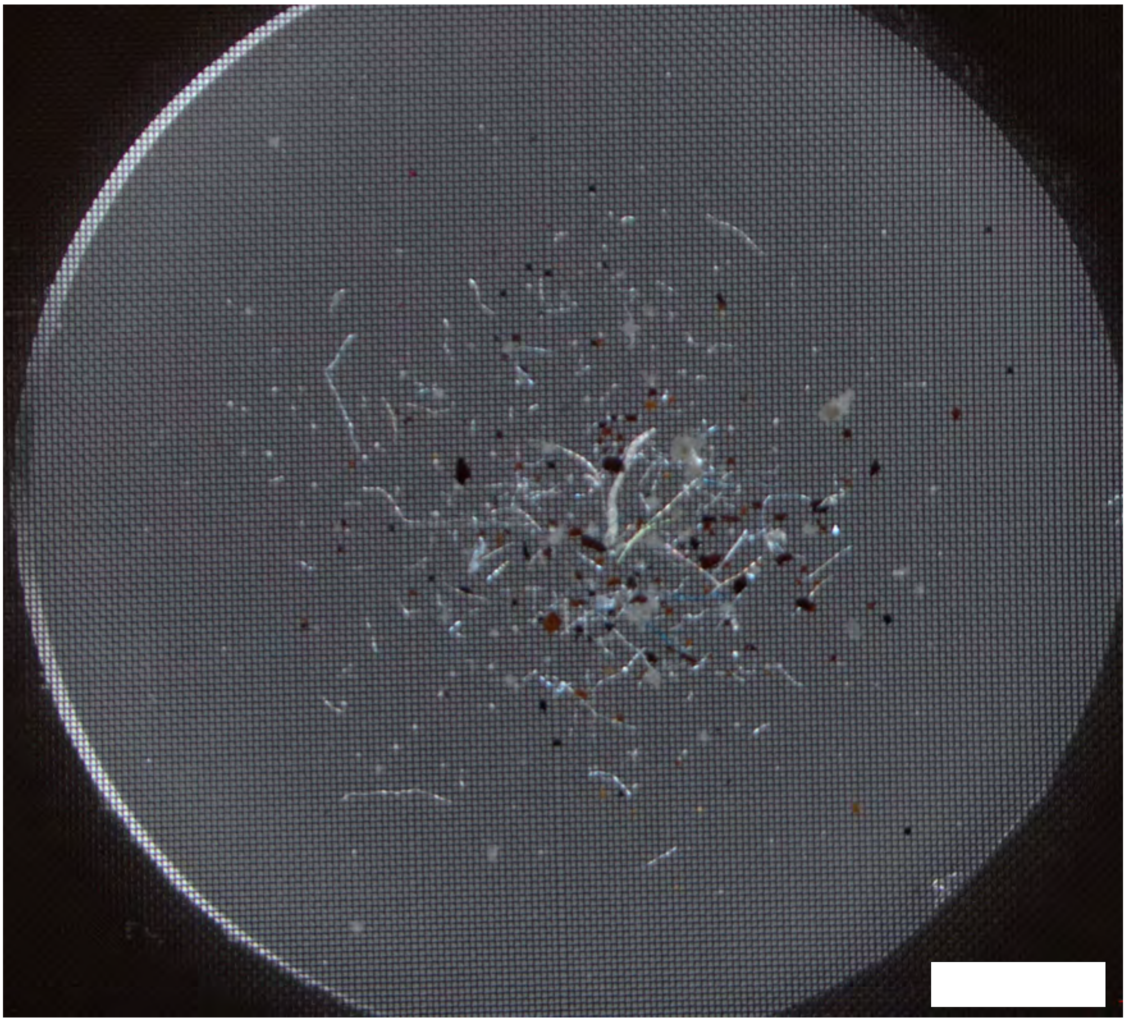

Figure A2.43 Sample S-10 (6-8 cm) filter 1. Mostly PE. Polarized mode.

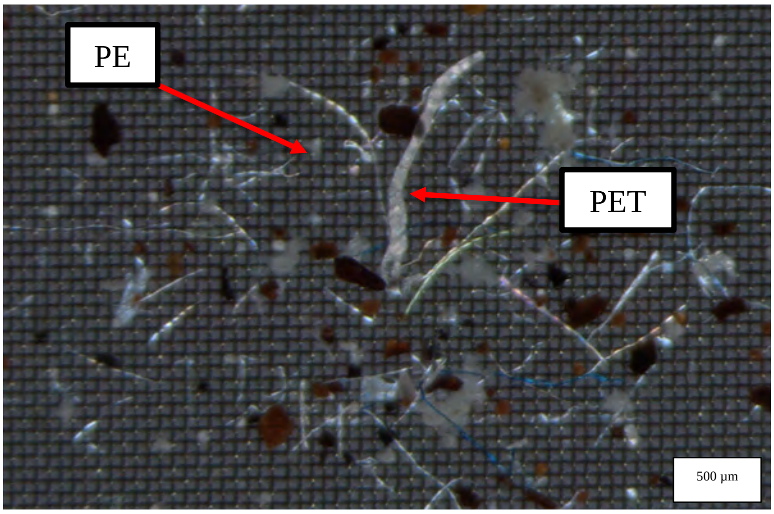

Figure A2.44 Close-up of S-10 (6-8 cm), filter 1, with identified plastics. Polarized mode.

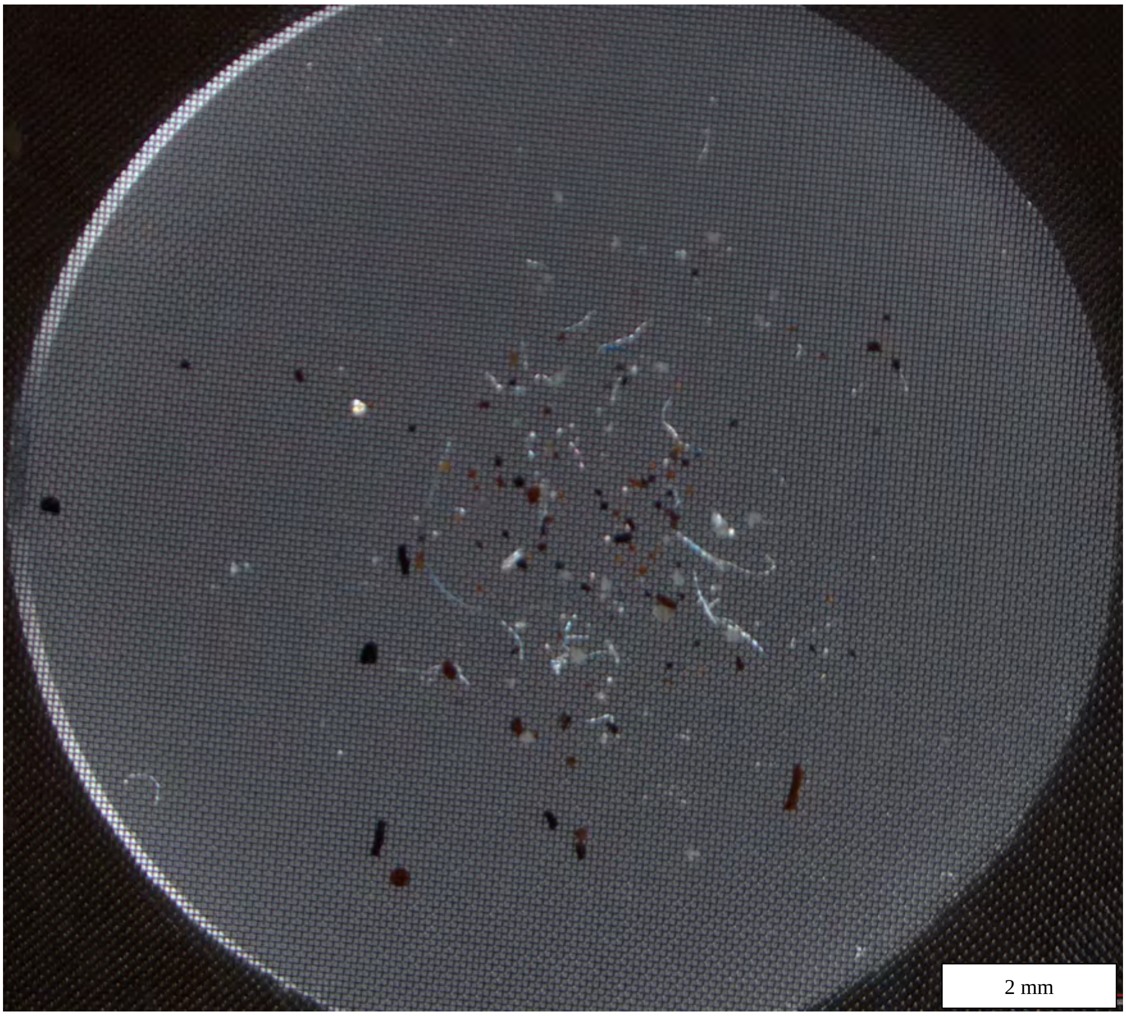

Figure A2.45 Sample S-10 (6-8 cm), filter 2. Mostly PP and PE. Polarized mode.

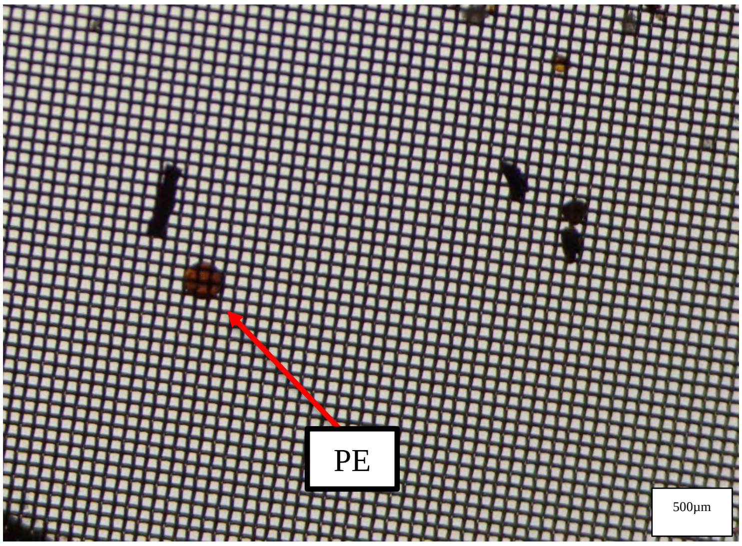

Figure A2.46 Close-up of S-10 (6-8 cm), filter 2, with PE-oxidized granule. Bright field mode.

A2.18 S-10 (8-10 cm)

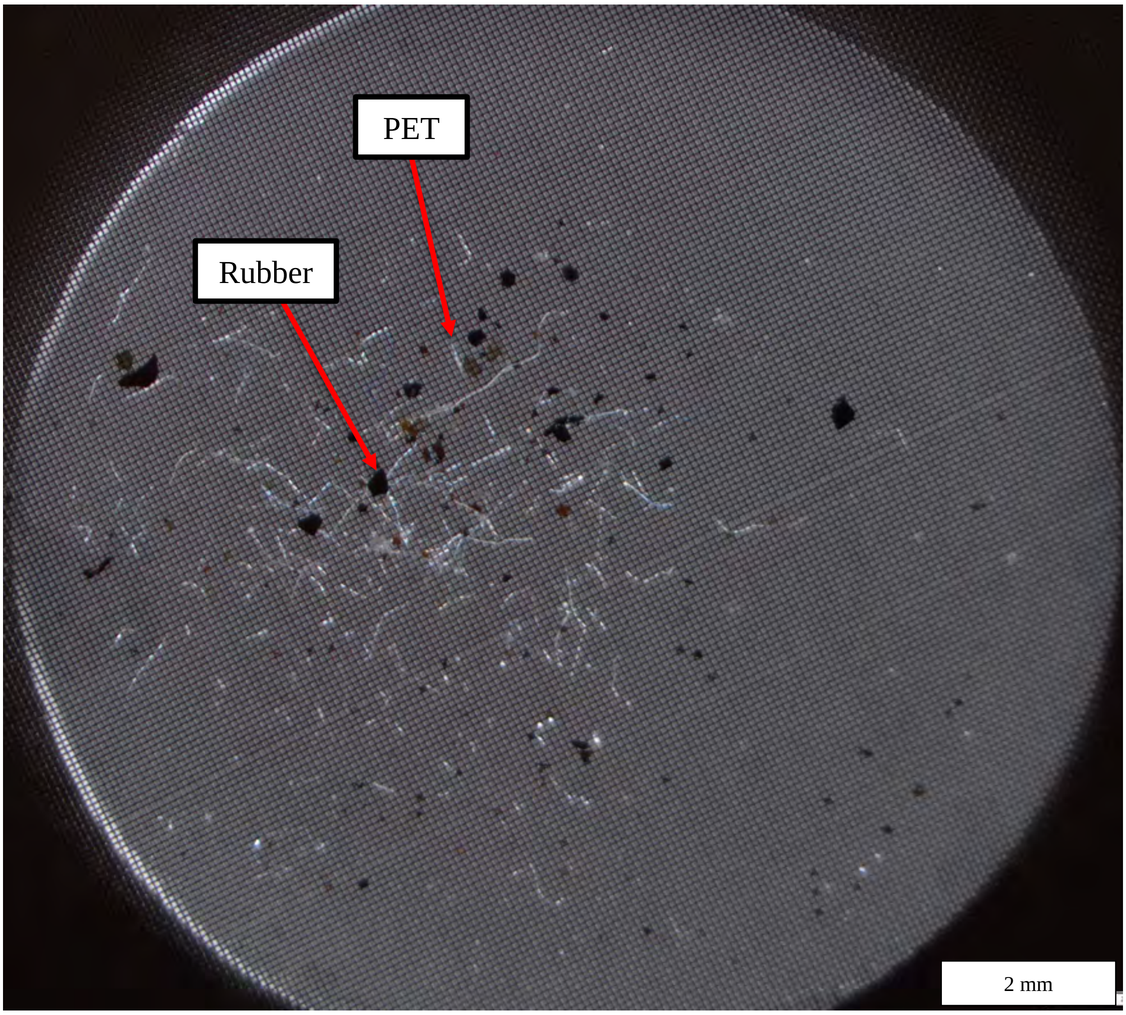

Figure A2.47 Sample S-10 (8-10 cm), filter 1, with some identified particles. Photo taken in polarized mode.

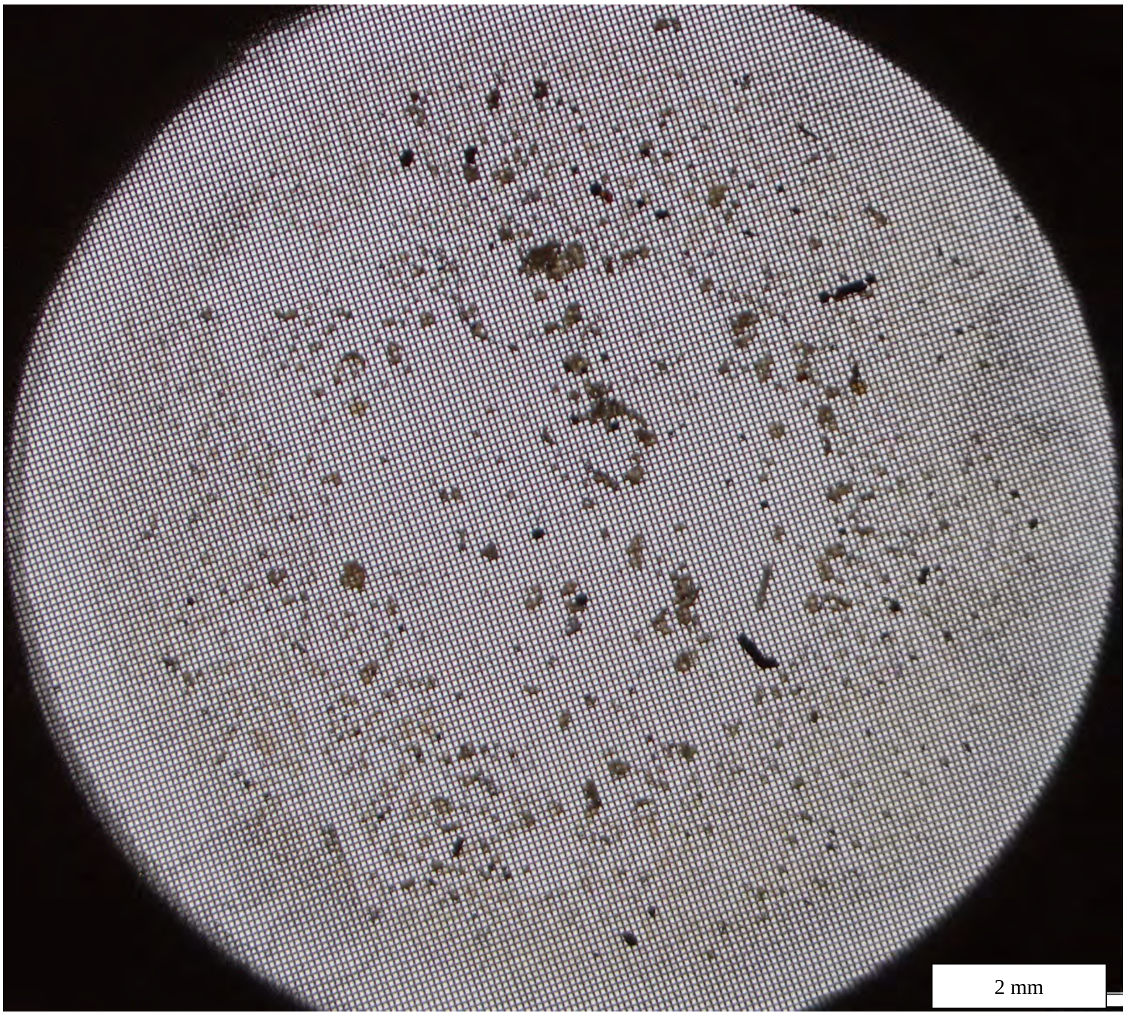

Figure A2.48 Sample S-10 (8-10 cm), filter 2. Mostly PTFE. Lots of small particles that looked like zinc-chloride crystals on the outer parts of the filter (scanned only some of these, classified as "unknown"). Photo taken in bright field mode.

A2.19 S-10 (20-22 cm)

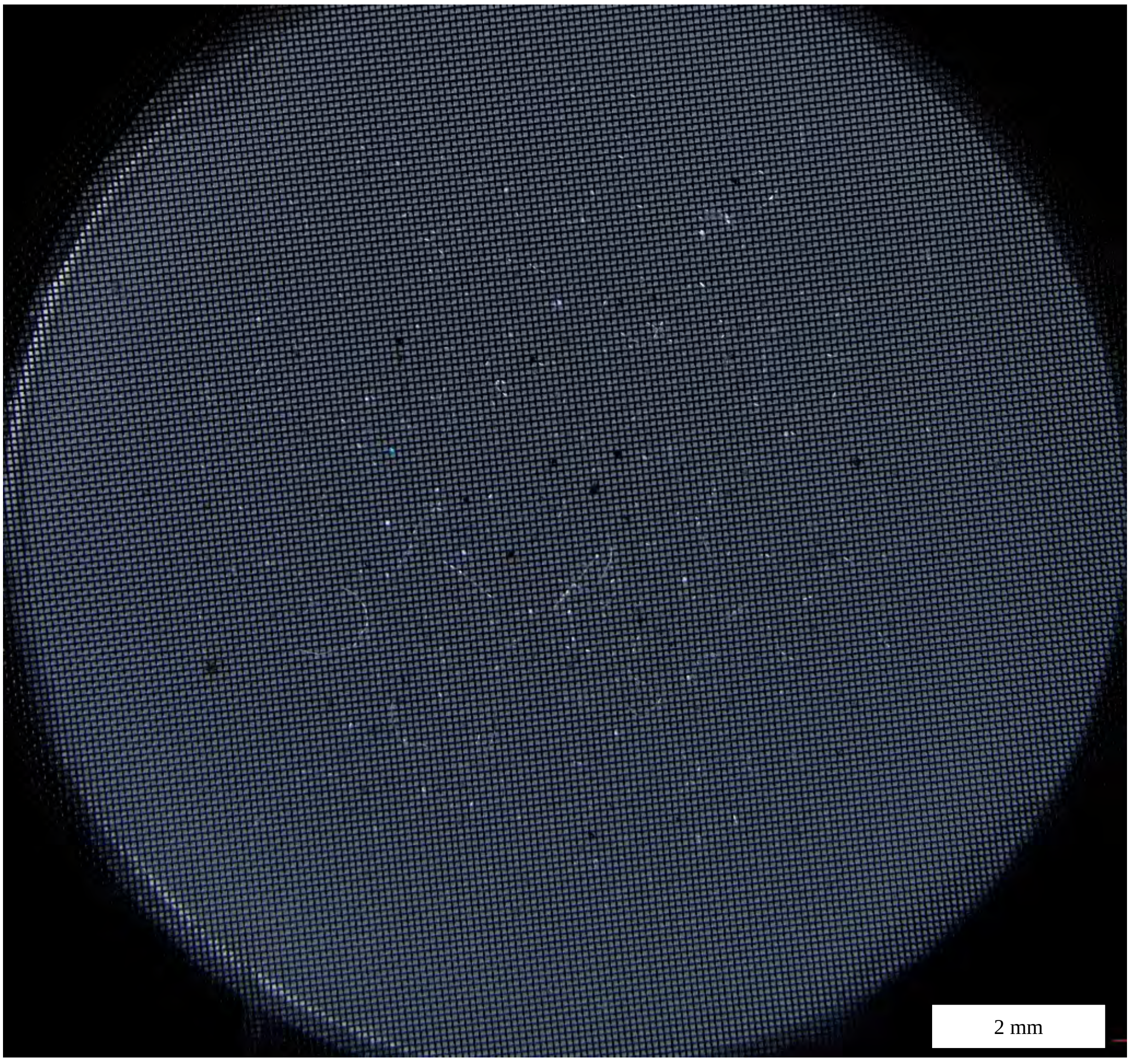

Figure A2.49 Sample S-10 (20-22 cm), filter 1. Mostly PTFE and PE-chlorinated particles. Photo taken in polarized mode.

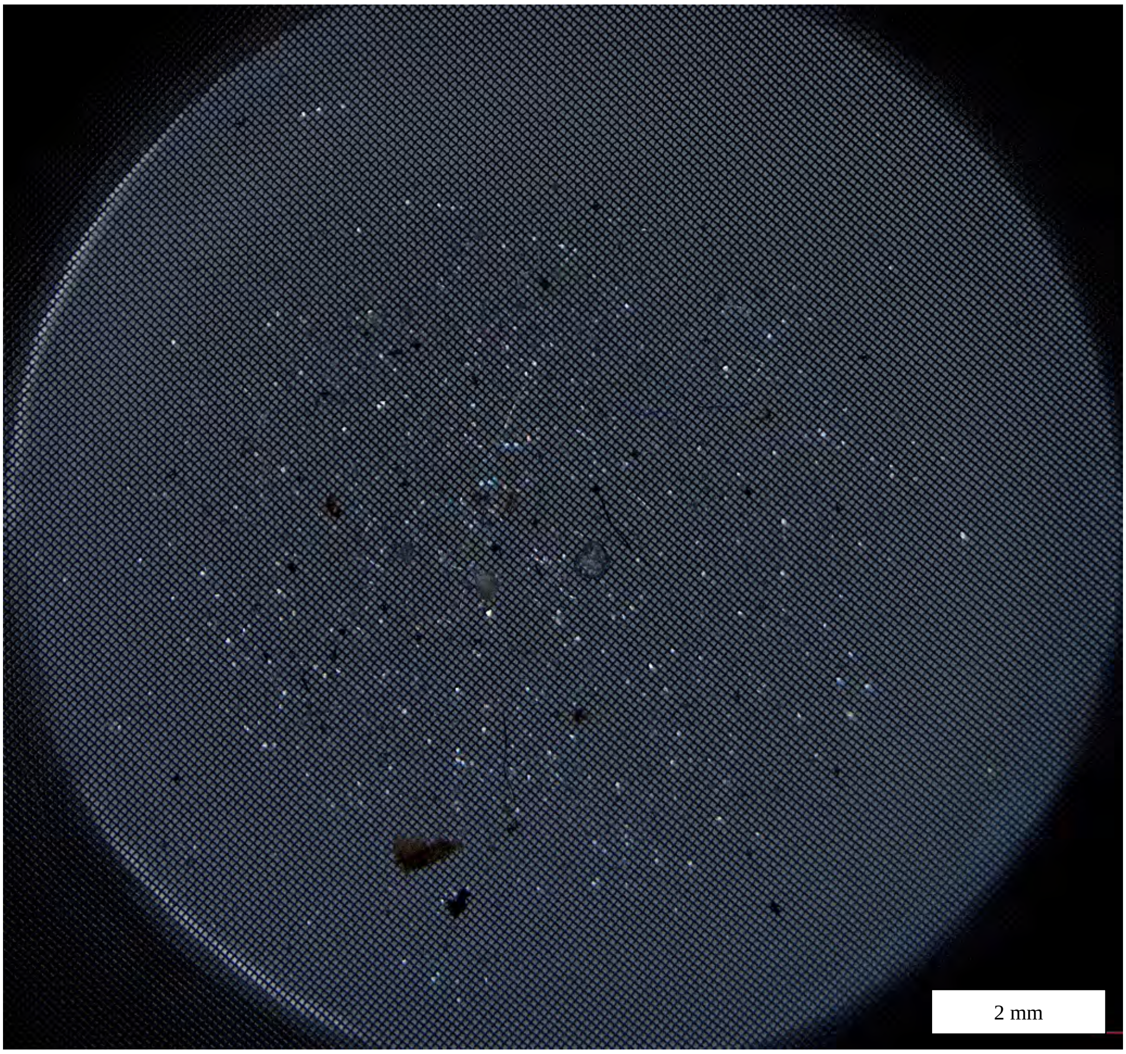

Figure A2.50 Sample S-10 (20-22 cm), filter 2. Mostly PE, PE-chlorinated and PTFE. Photo taken in polarized mode.

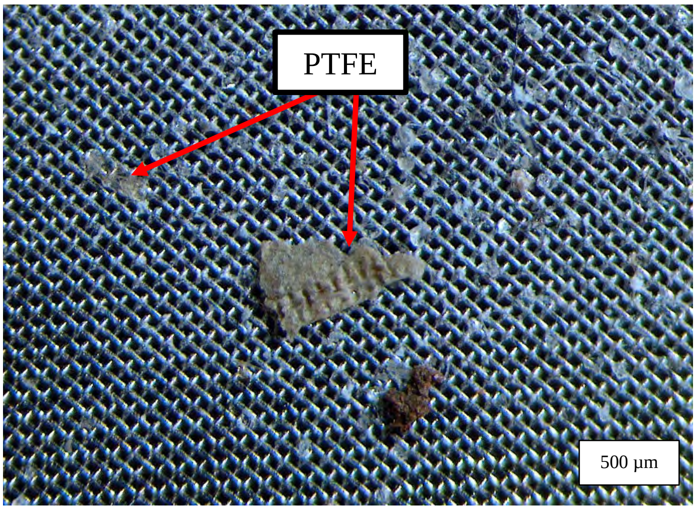

Figure A2.51 Close-up of S-10 (20-22 cm), filter 2, with identified PTFE particles. Visible mode.

A2.20 S-11 (0-2 cm)

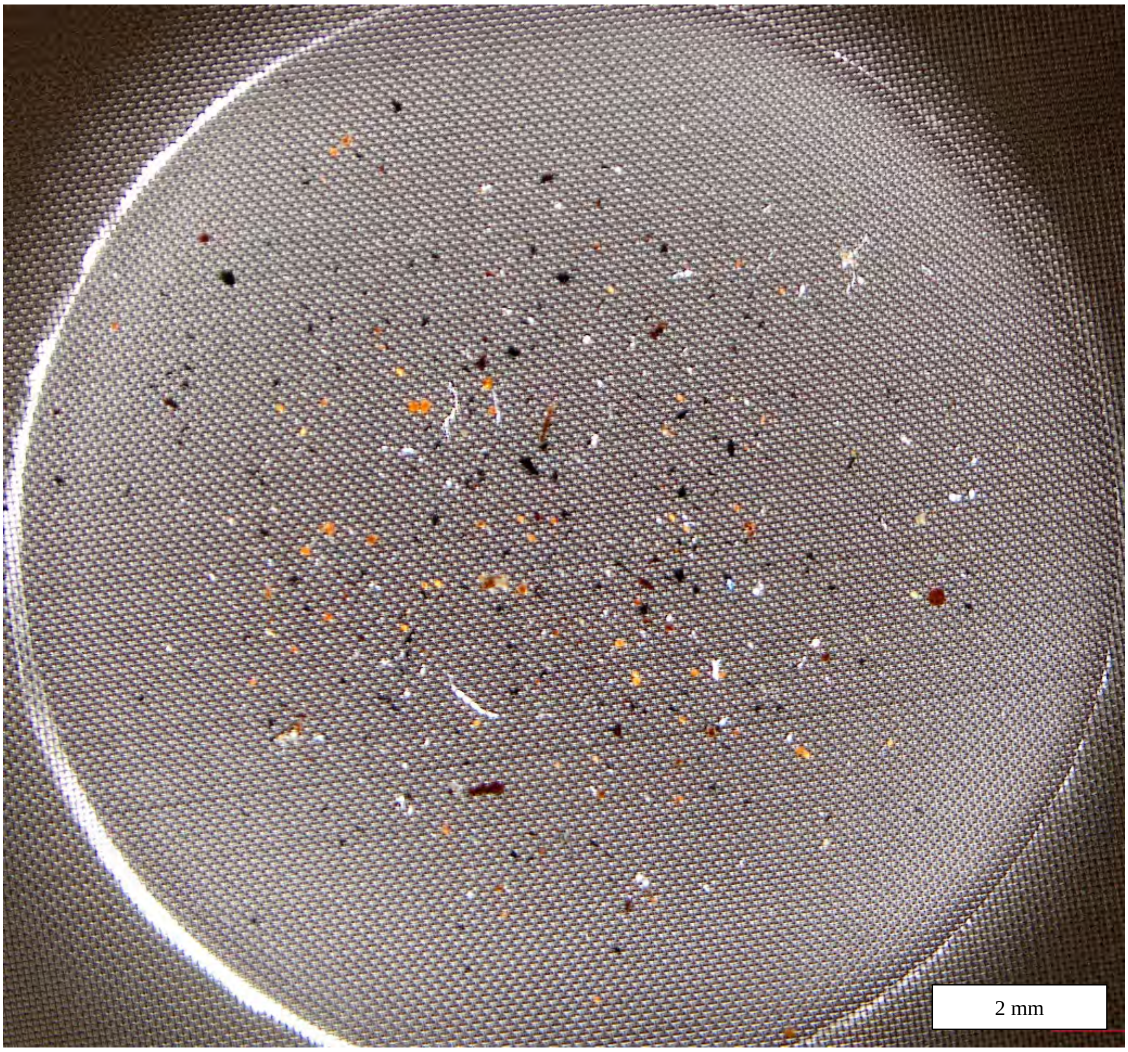

Figure A2.52 Sample S-11(0-2 cm), filter 1. Mostly PTFE, some PE-oxidized, PMMA, PE-chlorinated, PE:PP. Photo taken in polarized mode.

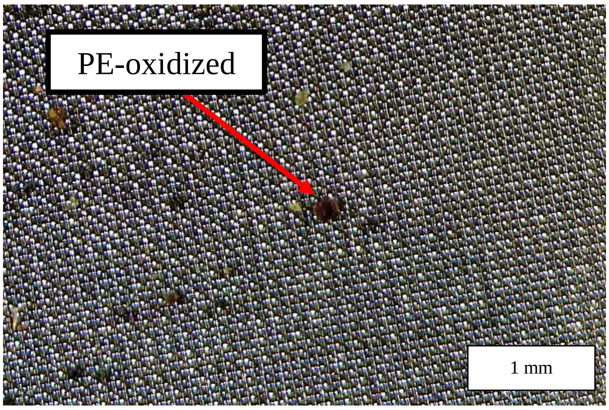

Figure A2.53 Close-up of S-11 (0-2 cm), filter 1, with identified PE-oxidized particle. Visible mode.

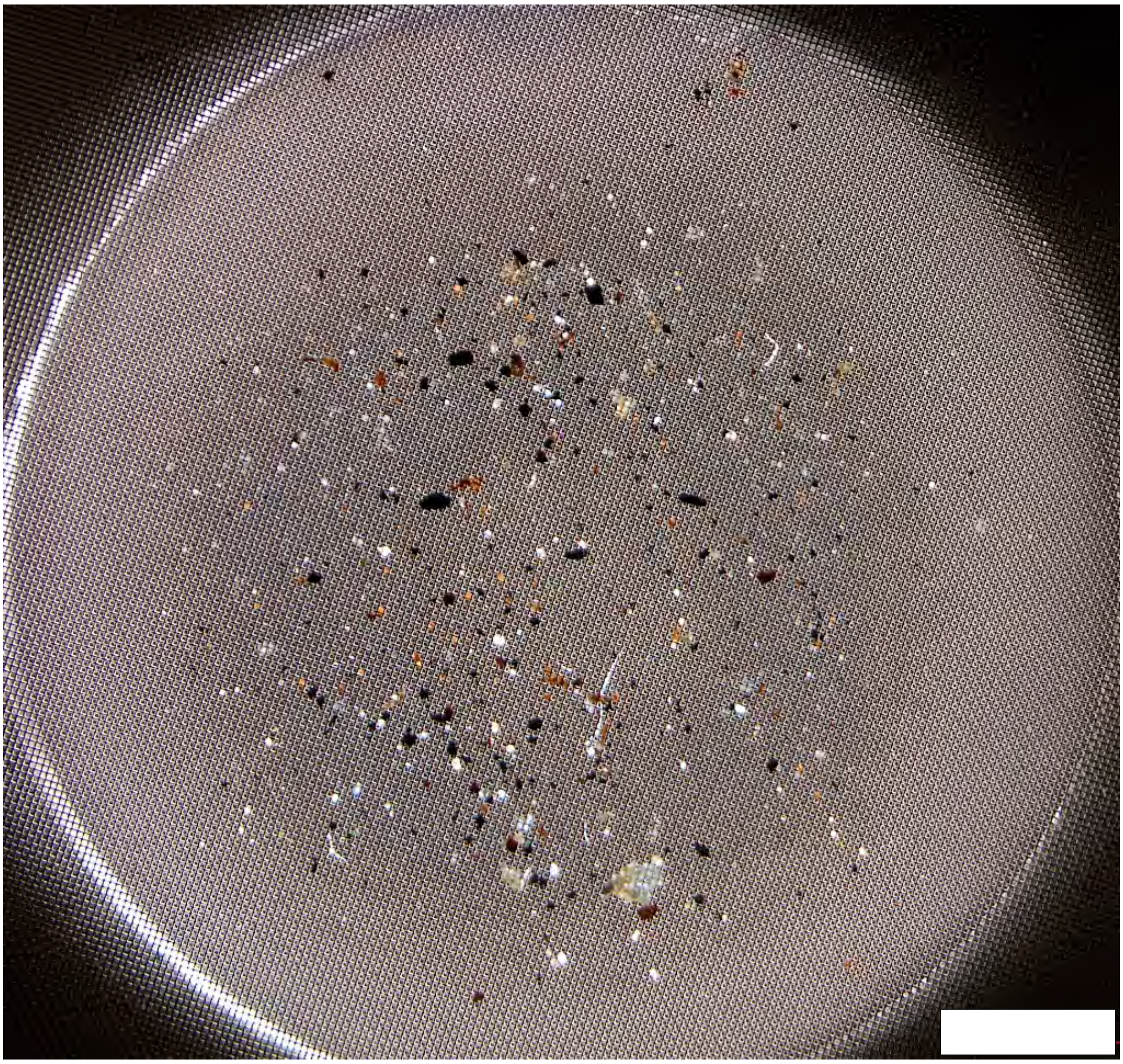

Figure A2. 54 Sample S-11 (0-2 cm), filter 2. Mostly PTFE, then PE and PE:PP. Polarized mode.

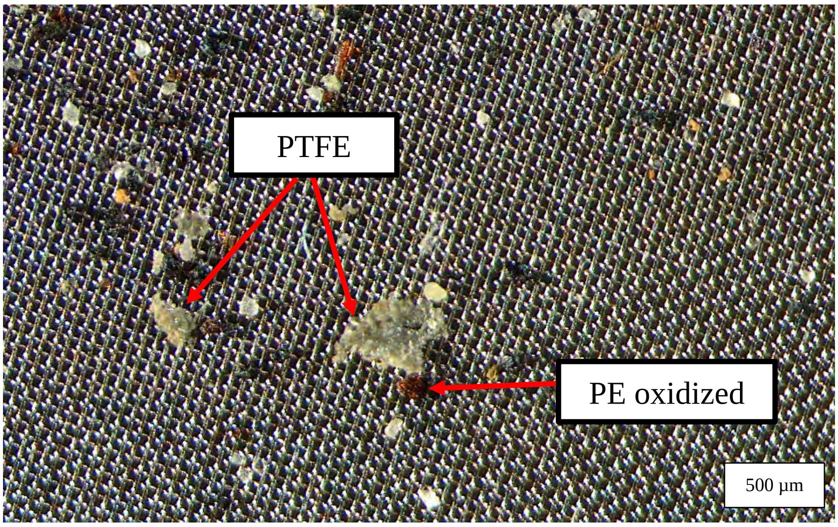

Figure A2.55 Close-up of S-11 (0-2 cm), filter 2, with some identified particles. Visible mode.

A2.21 S-11 (2-4 cm)

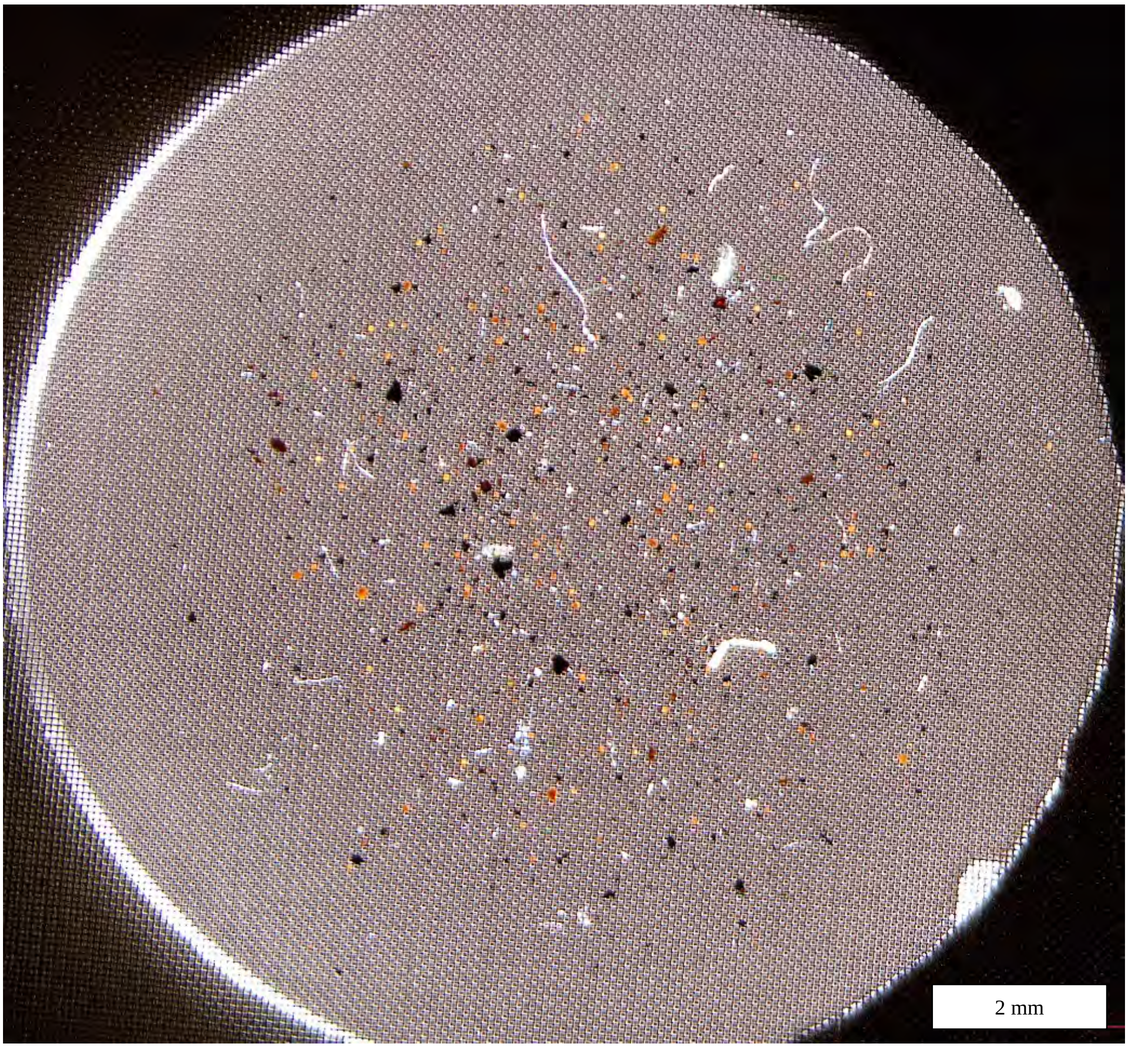

Figure A2.56 Sample S-11 (2-4 cm), filter 1. Mostly rubber (Resinall), PE:PP, PE-chlorinated and organotin. Photo taken in polarized mode.

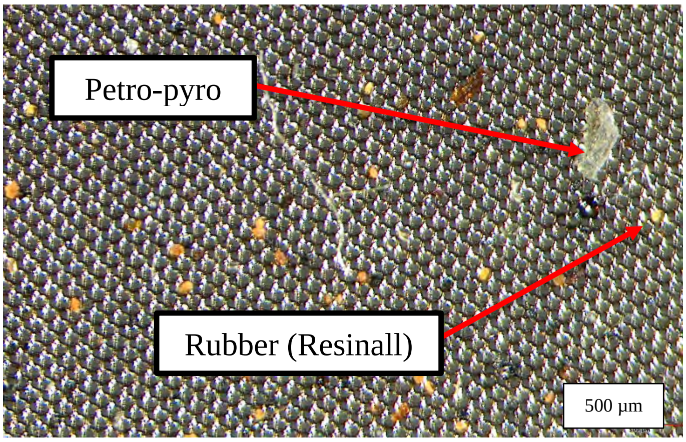

Figure A2.57 Close-up of S-11 (2-4 cm), filter 1, with identified particles. Visible mode.

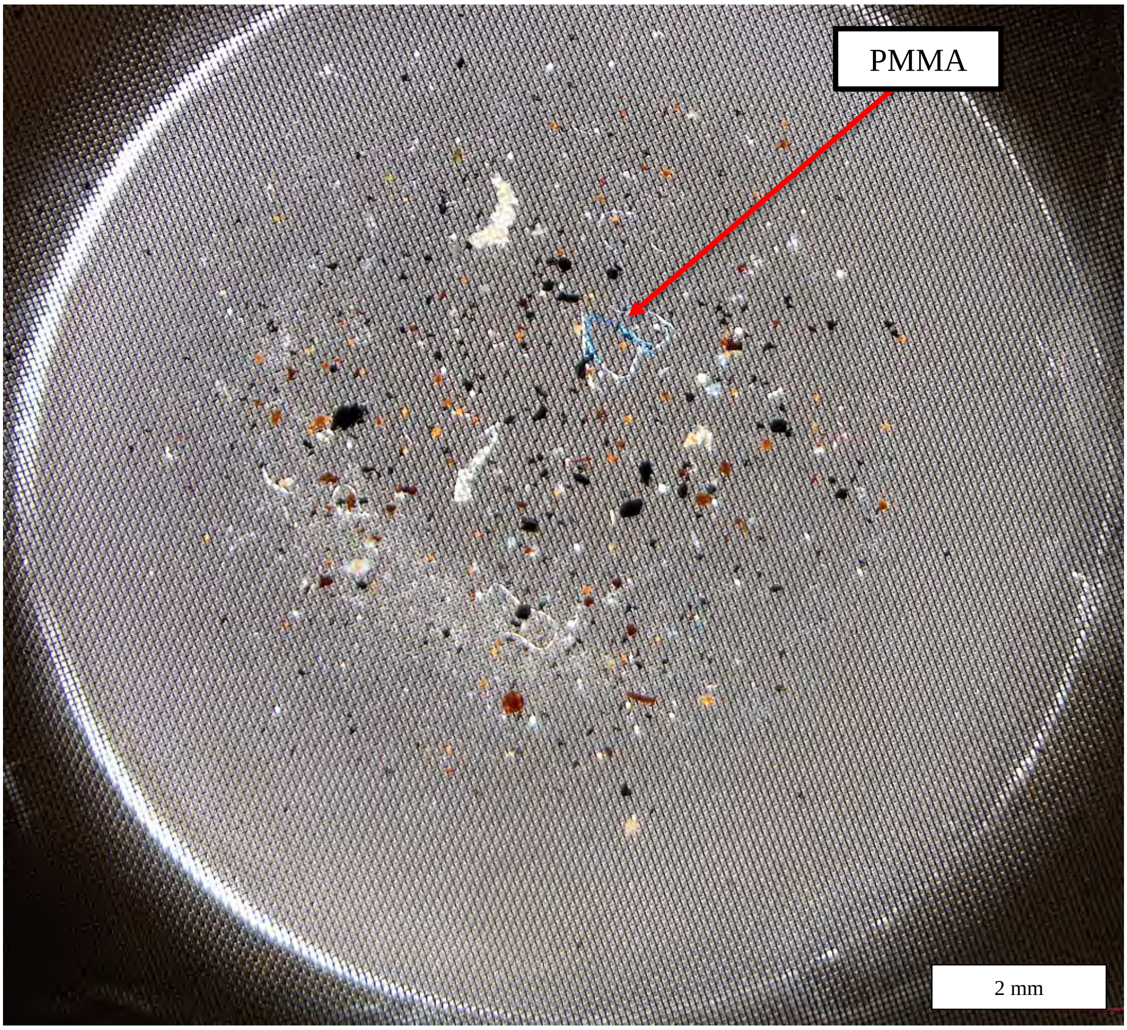

Figure A2.58 Sample S-11 (2-4 cm), filter 2. Mostly PE, PTFE and PE-oxidized. A blue fibre identified as PMMA is shown. Photo taken in polarized mode.

A2.22 S-11 (4-6 cm)

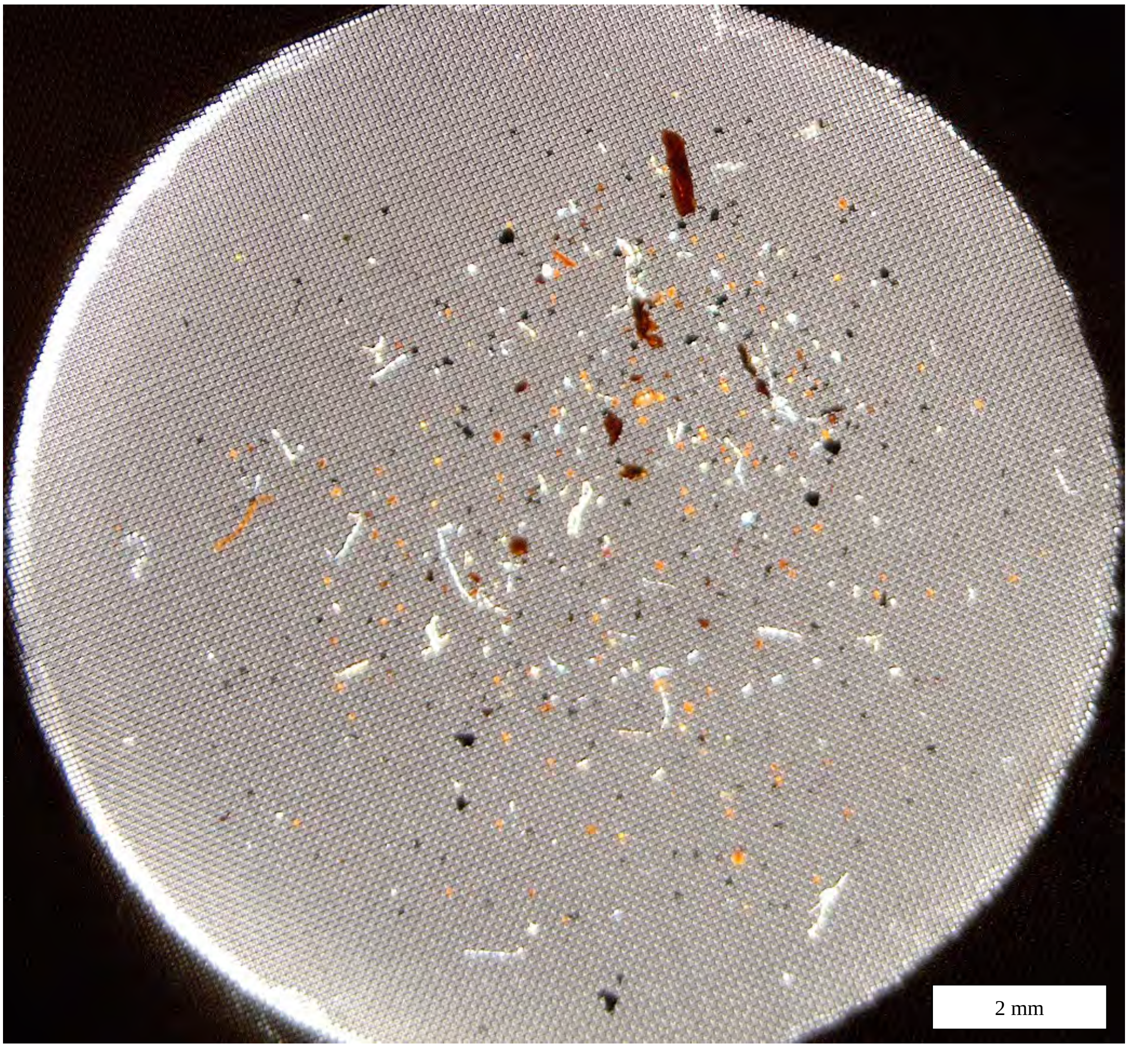

Figure A2.59 Sample S-11 (4-6 cm), filter 1. Mostly PTFE and PE-chlorinated. Polarized mode.

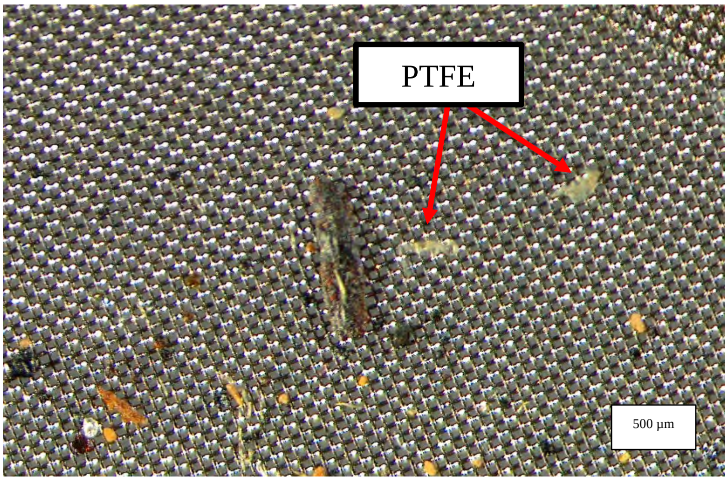

Figure A2.60 Close-up of S-11 (4-6 cm), filter 1, with identified PTFE particles. Visible mode.

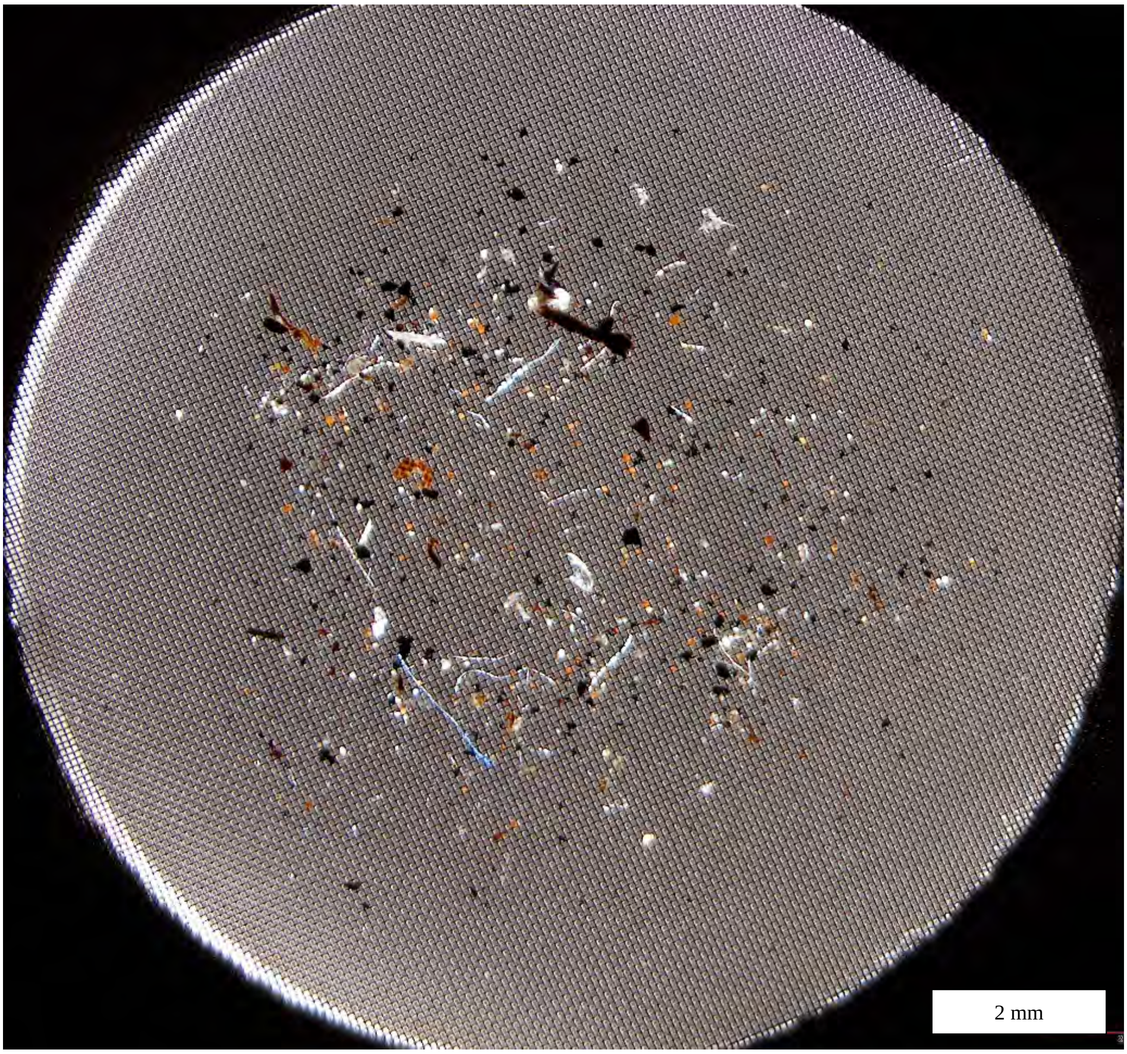

Figure A2.61 Sample S-11 (4-6 cm), filter 2. Mostly PTFE, PE-chlorinated and some PP and PE. Photo taken in polarized mode.

A2.23 S-11 (6-8 cm)

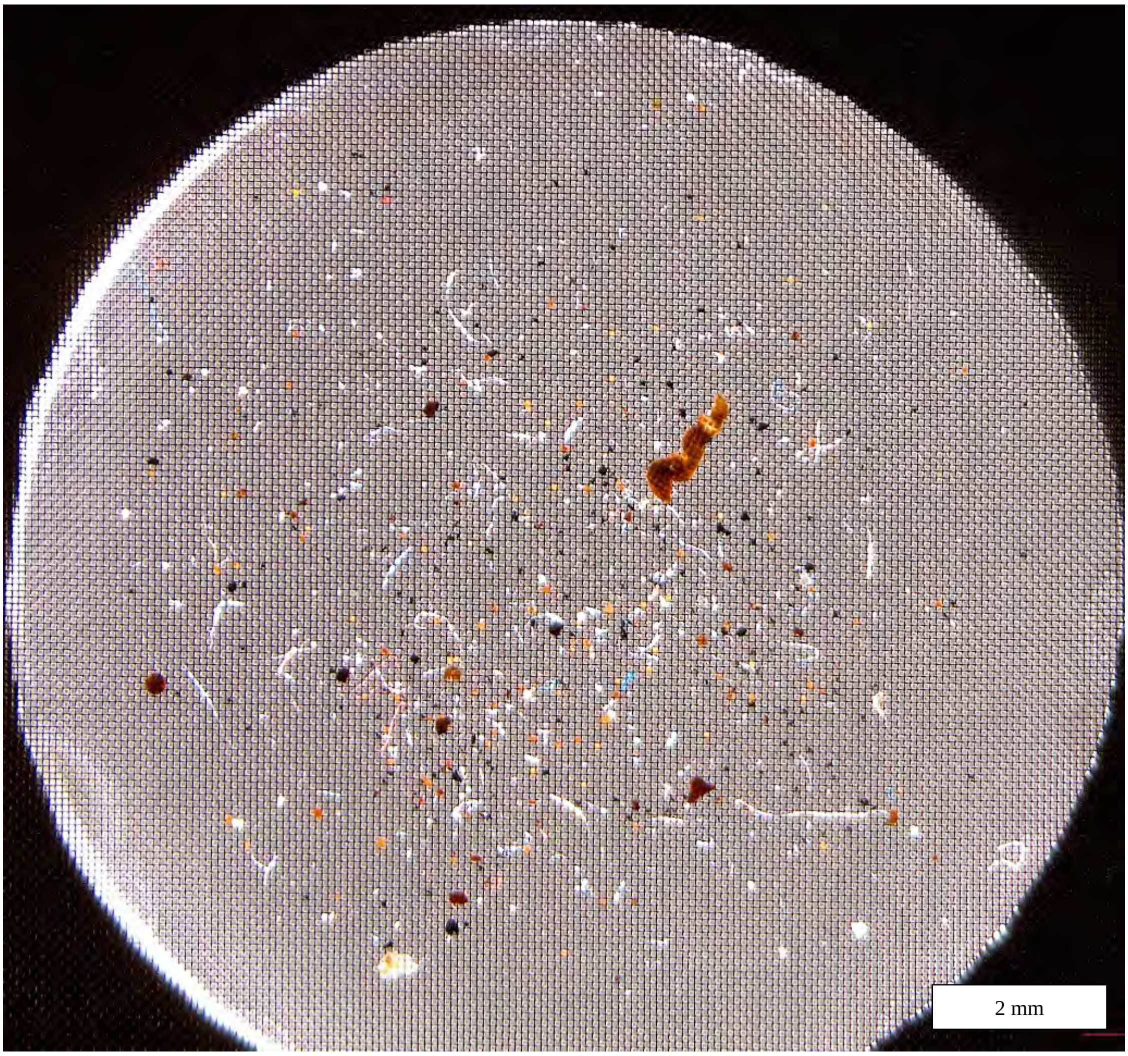

Figure A2.62 Sample S-11 (6-8 cm), filter 1. Mostly rubber (Resinall), organotin, PE-chlorinated and PTFE. Photo taken in polarized mode.

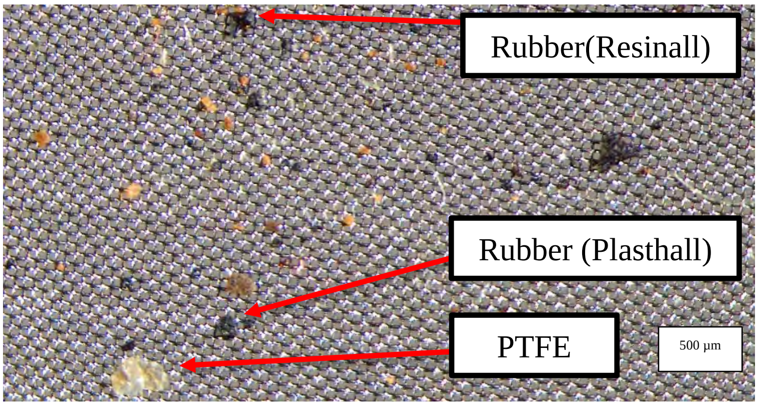

Figure A2.63 Close-up of S-11 (6-8 cm), filter 1, with rubber and PTFE particles. Visible mode.

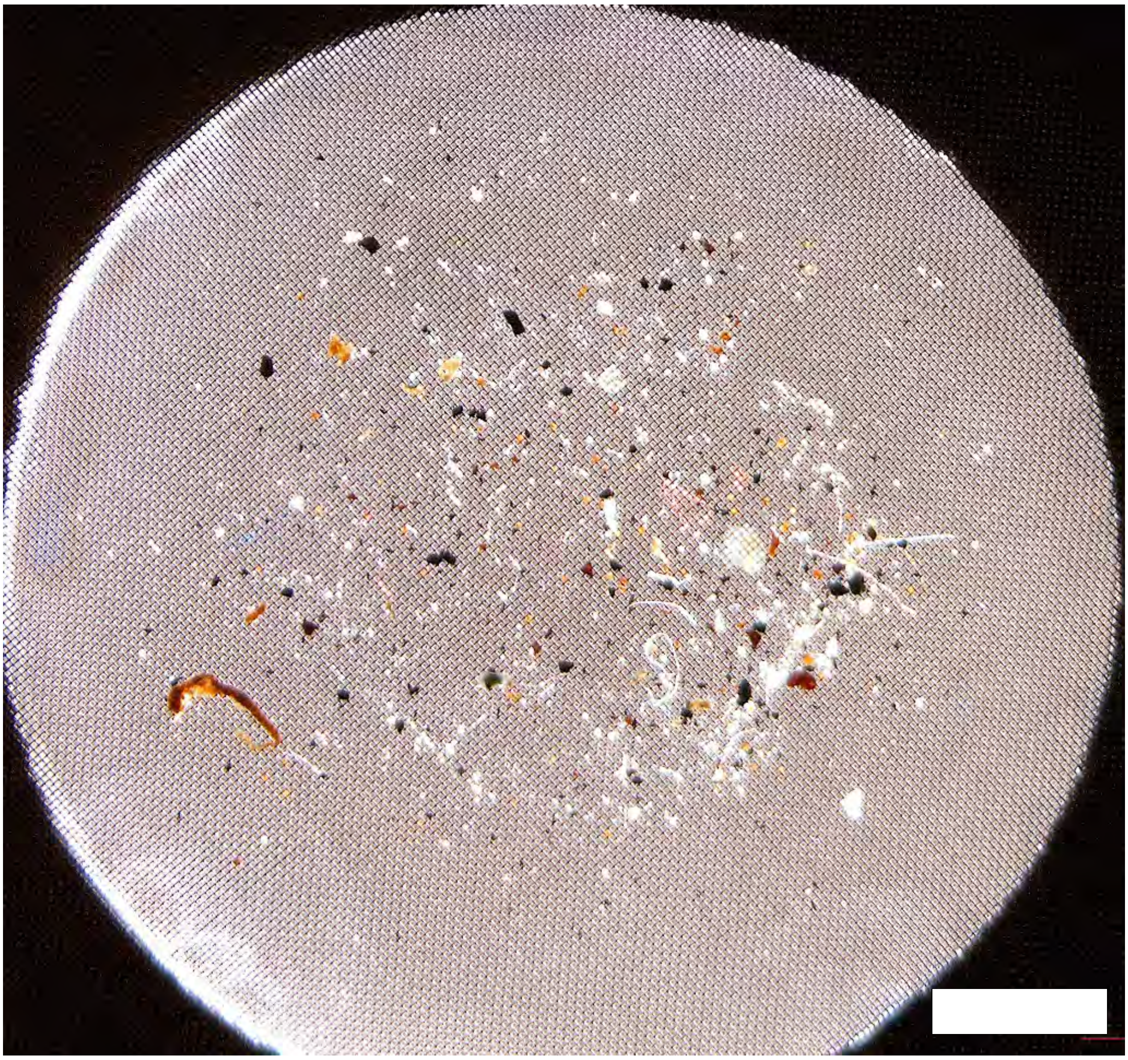

Figure A2.64 Sample S-11 (6-8 cm), filter 2. Mostly PE, PTFE, PE and PET. Polarized mode.

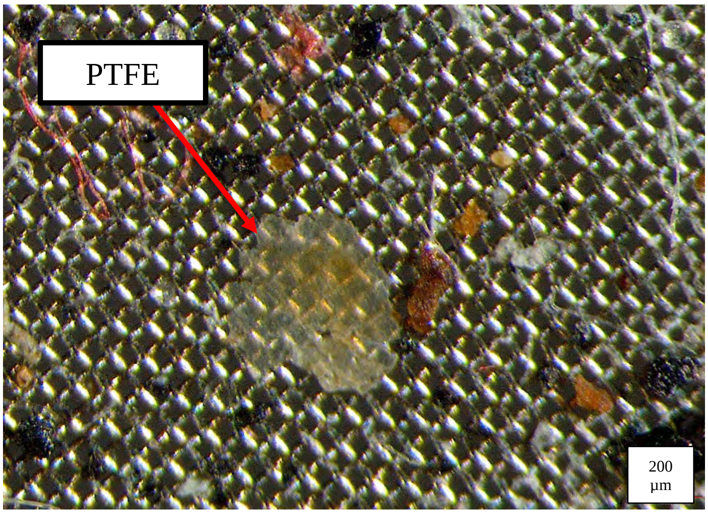

Figure A2.65 Close-up of PTFE particle in S-11 (6-8 cm), filter 2. Visible mode.

A2.24 S-11 (8-10 cm)

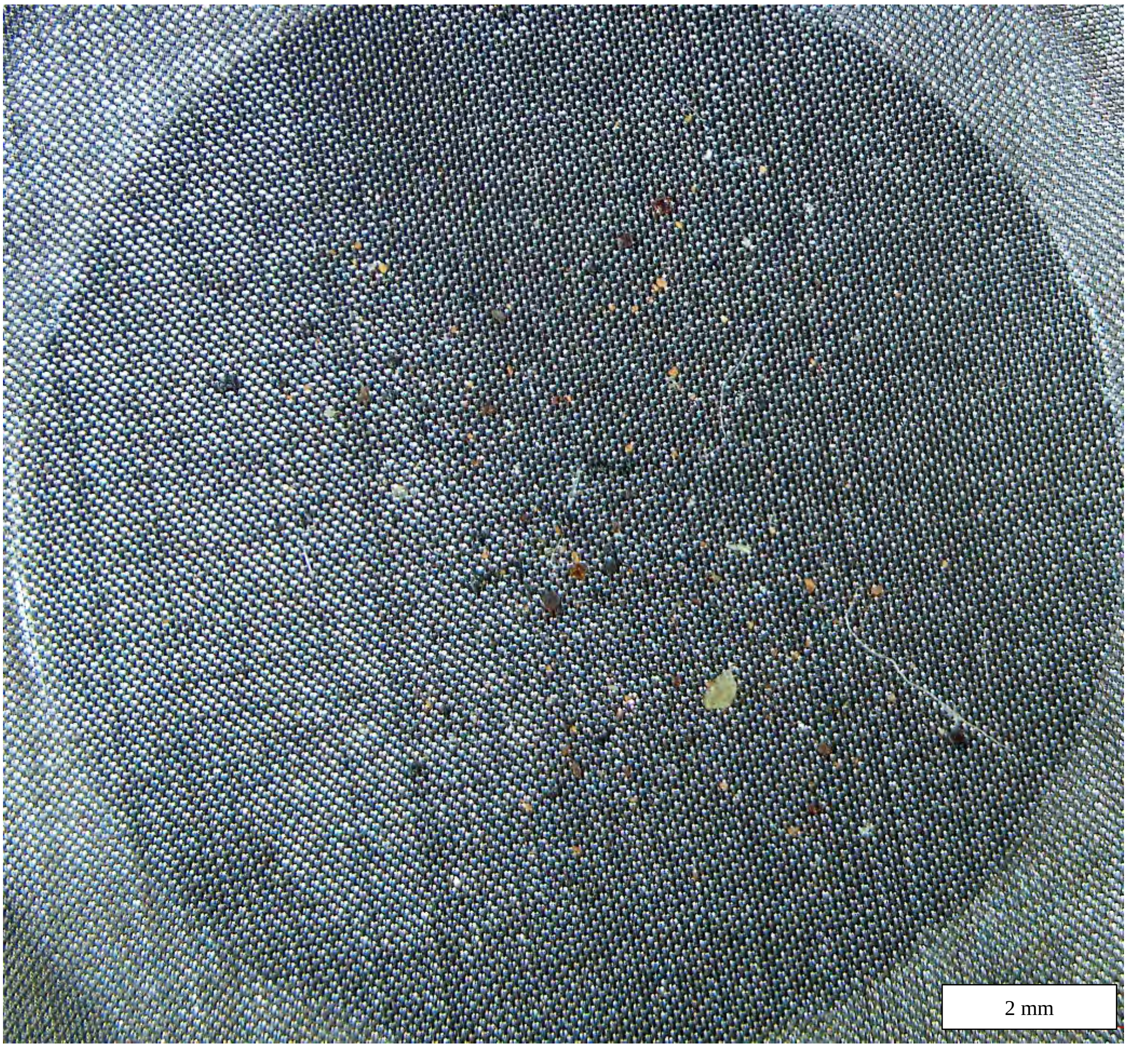

Figure A2.66 Sample S-11 (8-10 cm), filter 1. Mostly rubber (Resinall) and PE:PP. Visible mode.

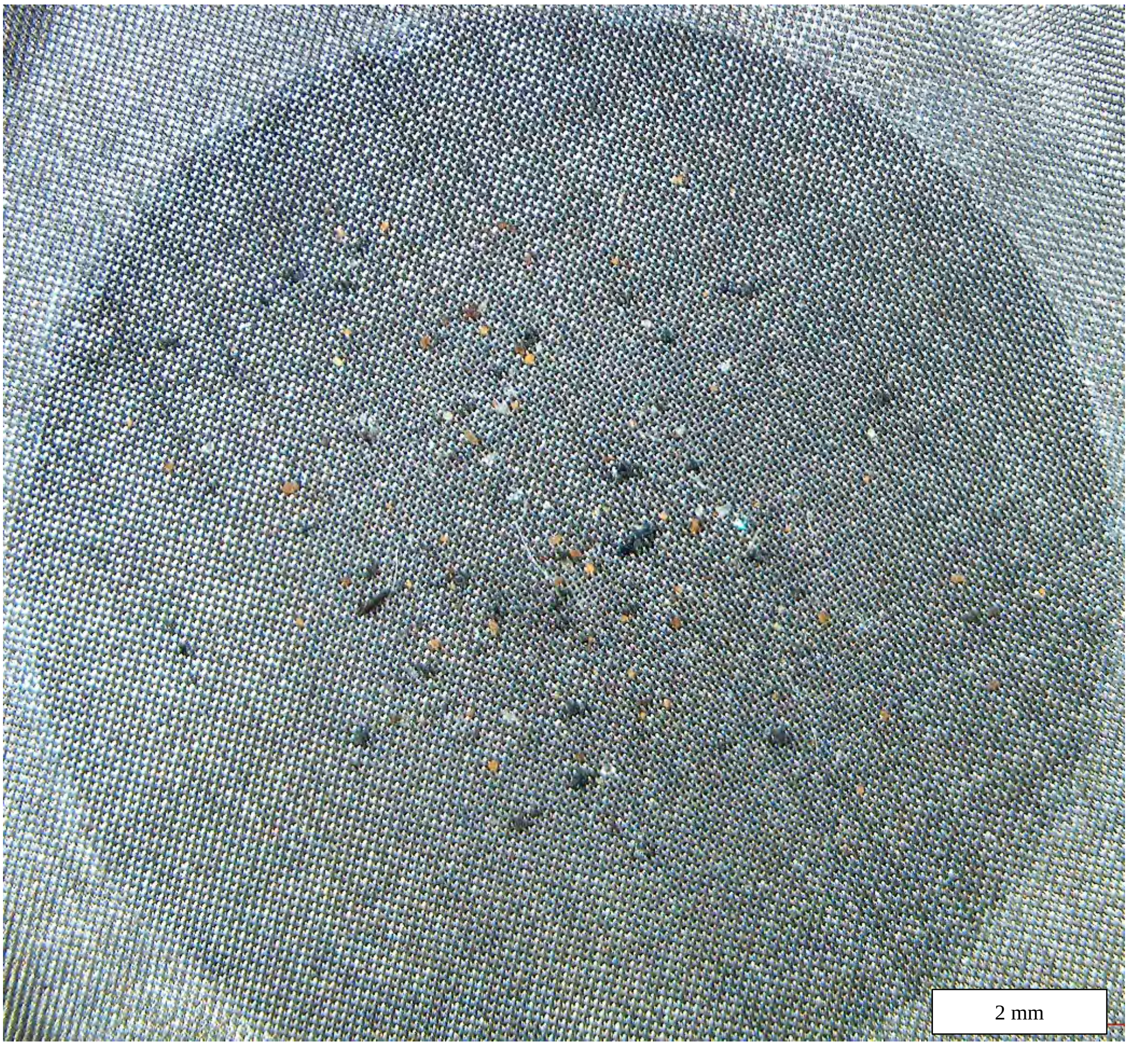

Figure A2.67 Sample S-11 (8-10 cm), filter 2. Mostly PE, PTFE and PE-chlorinated. Visible mode.

A3 Field blanks

A3.1 S-10-FB-01 (30-32 cm)

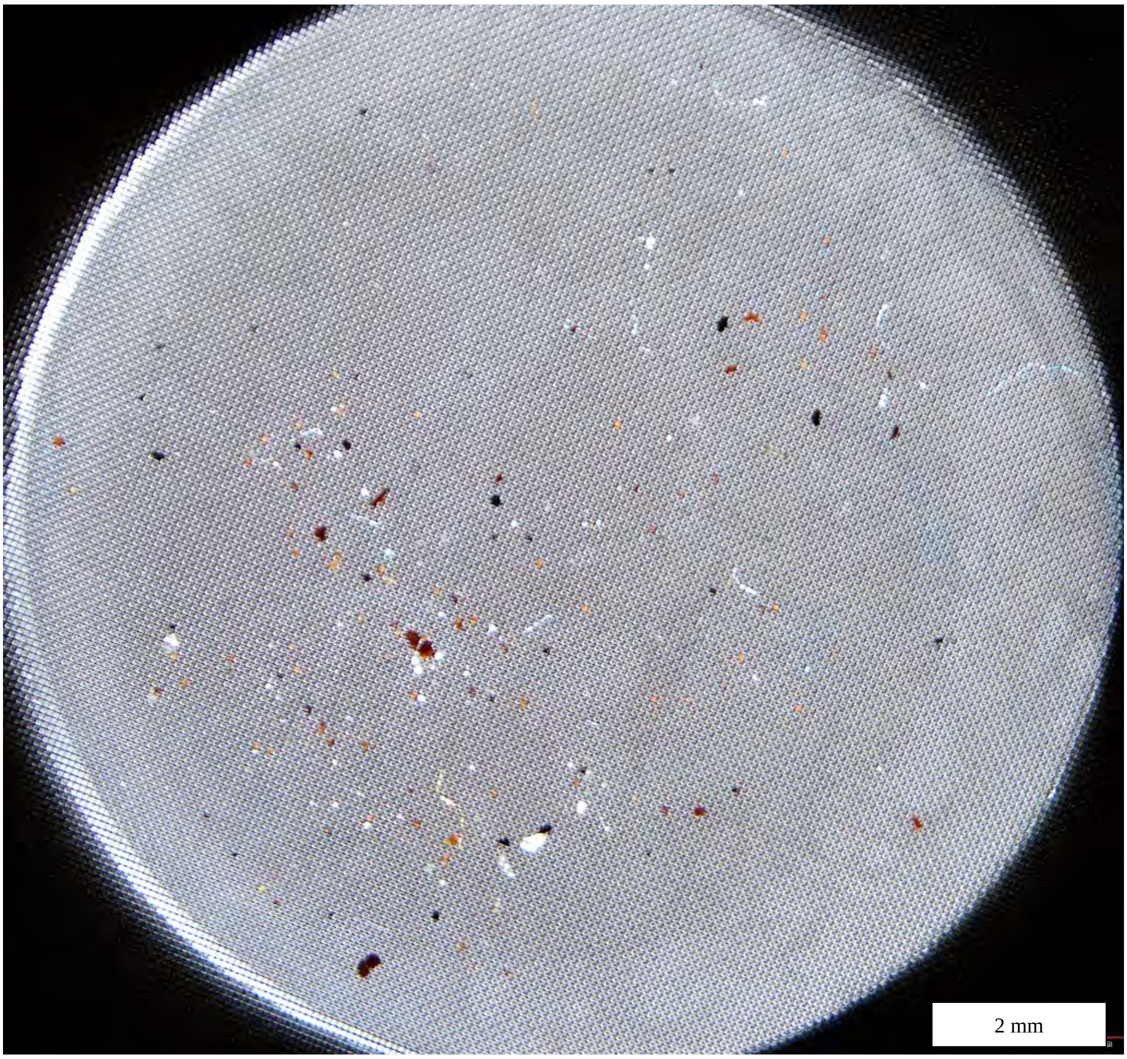

Figure A3.1 Field blank S-10-FB-01 (S-10, 30-32 cm), filter 1. Mostly PTFE. Polarized mode.

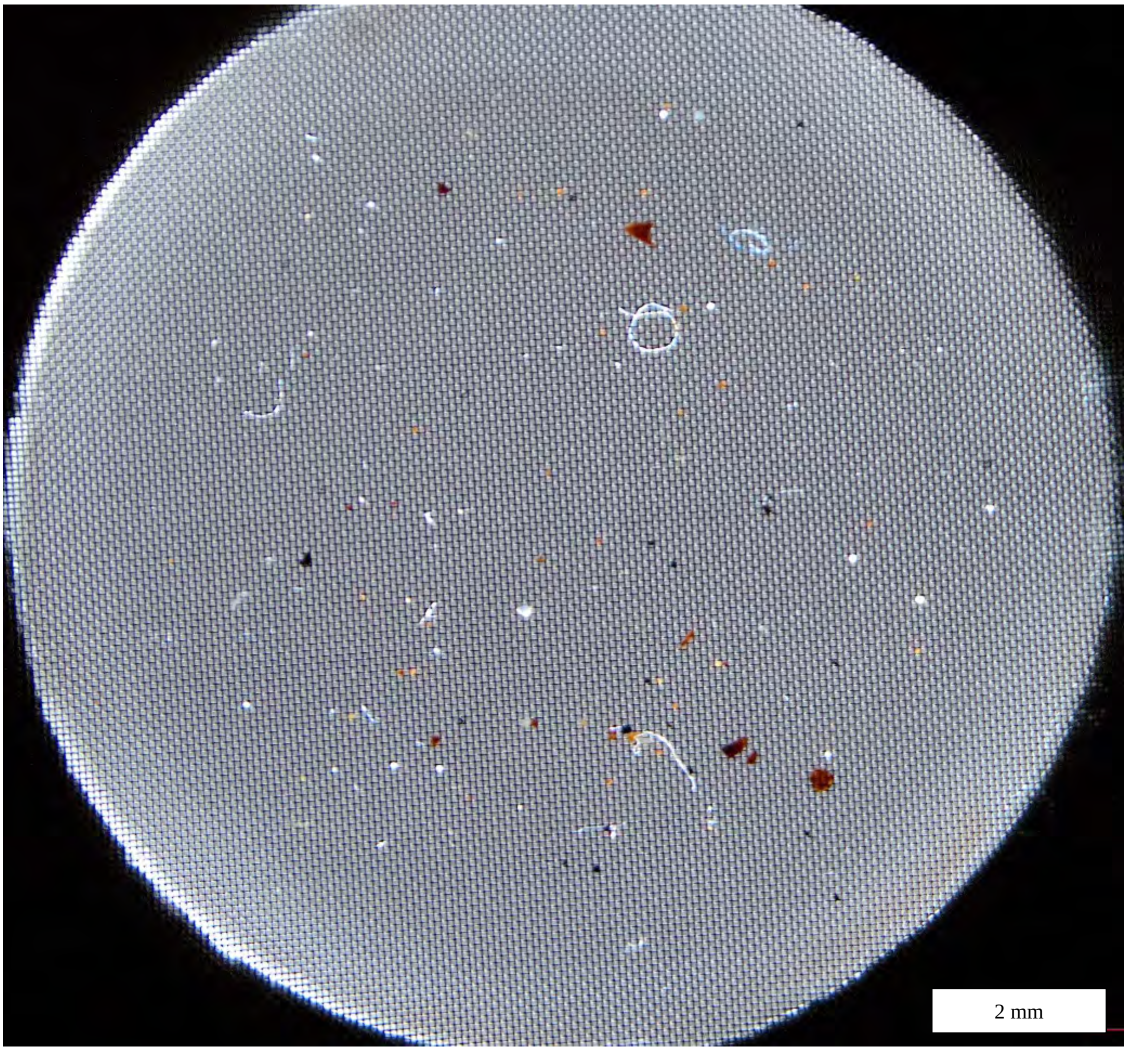

Figure A3.1 Field blank S-10-FB-01 (S-10, 30-32 cm), filter 1. Mostly PTFE. Polarized mode.

A3.2 S-11-FB-02 20-22 cm

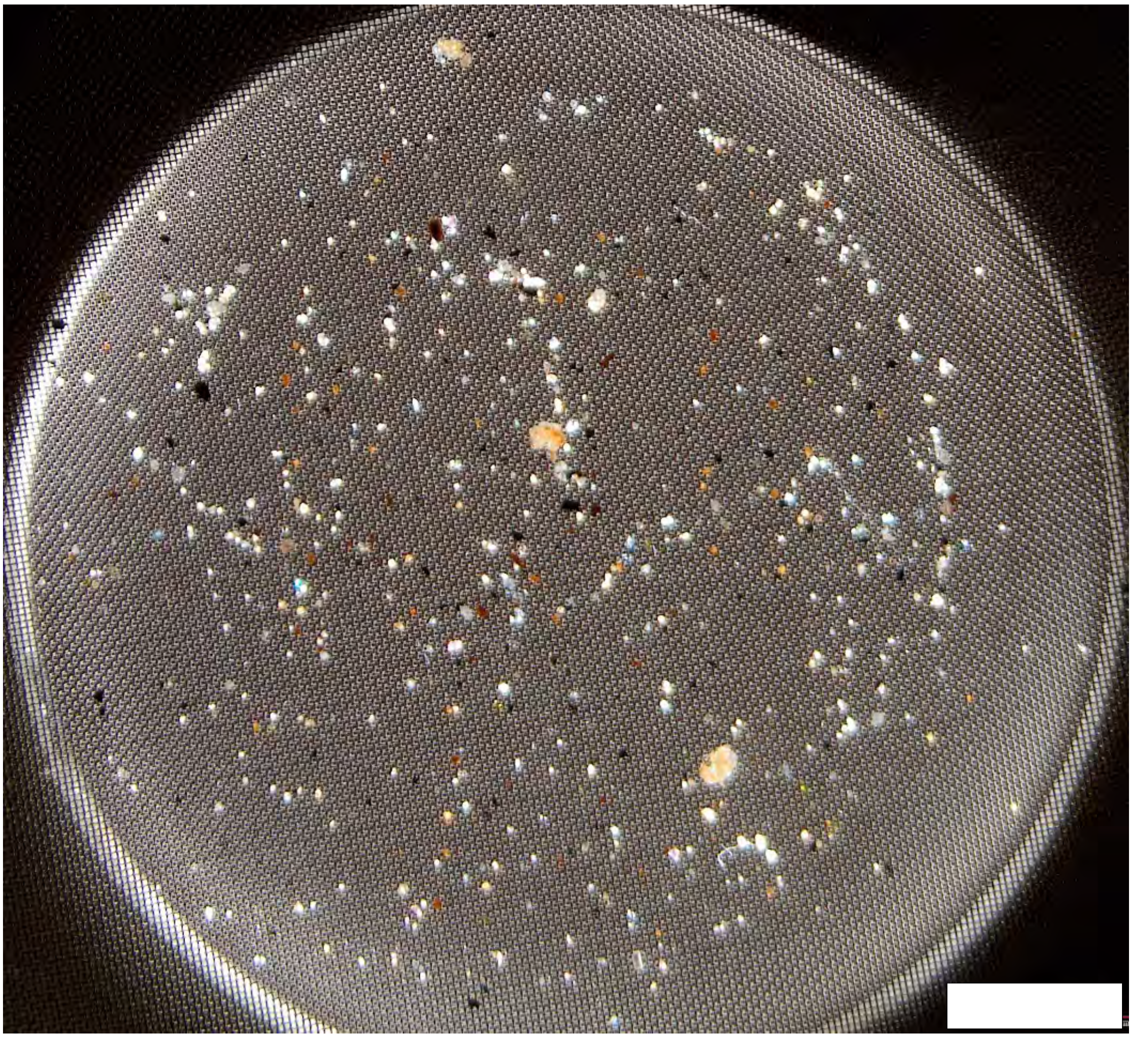

Figure A3.3 Field blank S-11-FB-02 (S-11, 20-22 cm), filter 1. Mostly PTFE, rubber (Resinall) and PE-chlorinated. Many unknown particles. Photo is taken in polarized mode.

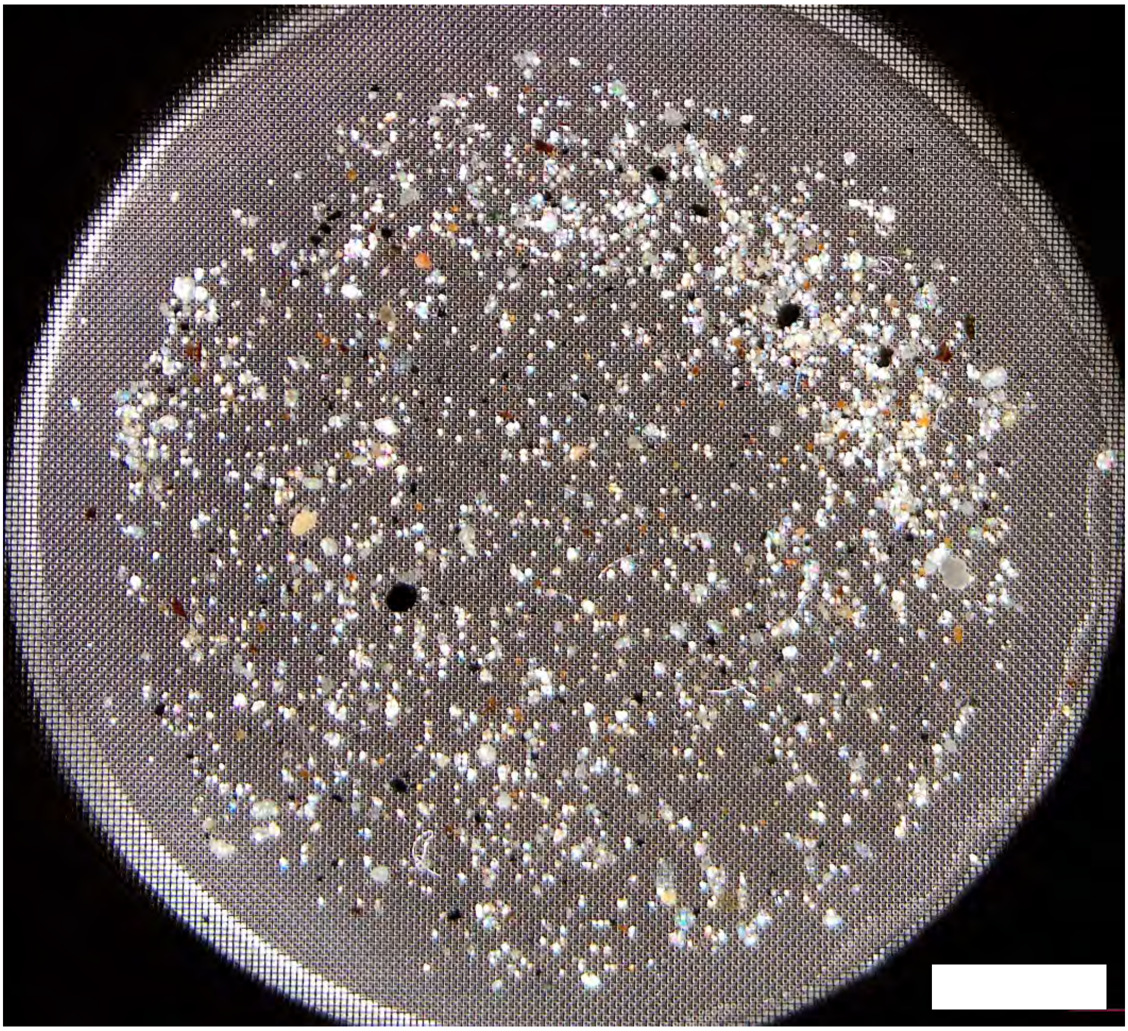

Figure A3.4 Field blank S-11-FB-02 (S-11, 20-22 cm), filter 2. Mostly PE-chlorinated. Many unknown particles. Photo is taken in polarized mode.

Appendix B

RESULTS FOR METHOD BLANKS AND FIELD BLANKS (RAW DATA)

Contents

B1 Method blanks

The number of microplastics and other particles found in analysed method blanks are given in Table B1.1. The abundance of different microplastic types identified in the blanks are given in Table B1.2.

Table B1.1 Number of microplastics and other particles in method blanks. In this report, microplastics are defined as coatings-adhesives, plastic polymers and rubber particles. The stated weeks represents the start of density-separation.

Method blank ID	Week	Unknown	Mineral	Organic	Coatings-adhesives	Petro-pyro	Plastic	Rubber
MB-01	22	156	0	37	0	0	29	0
MB-03	23	108	2	116	2	4	46	0
MB-05	24	214	0	96	0	0	94	2
MB-07	24	128	0	104	0	0	104	2
MB-08	24	76	0	91	0	1	58	0
MB-10	25	148	2	64	0	0	158	0
MB-12	26	84	0	132	0	0	184	0
MB-13	33	166	0	108	0	0	122	0
MB-16	34	134	0	66	0	0	102	0
MB-21	43	100	0	112	0	2	184	0
mean		129	1	92	0	1	114	0
SD		42	1	29	1	1	55	1

Table B1.2 Number of microplastic particles identified in method blanks. The stated weeks represents the start of density-separation.

Method blank ID	Week	Plastic polymer																				Rubber					Coatings-adhesives				
		PE	PP	PET	PS	PTFE	PE-chlorinated	PE-chlorosulfonated	PP-chlorinated	PAM	PMMA	PU	PVF	PE-oxidized	PE:PP	PVC	Melamine	Nylon	EVA	Additive	Other	Resinall	Plasthall	SBR	Silicon	Other	Phenoxy Resin	Epoxy Resin	Organotin	Zonyl	Other
MB-01	22	7	1	4	0	13	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB-03	23	2	10	6	0	12	0	0	0	0	0	0	0	0	4	0	8	0	0	2	2	0	0	0	0	2	0	0	0	0	2
MB-05	24	28	6	0	0	48	2	0	0	0	2	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
MB-07	24	30	2	8	0	54	0	0	0	0	0	0	0	2	0	0	0	4	0	2	2	0	0	0	0	2	0	0	0	0	2
MB-08	24	29	3	2	0	20	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB-10	25	88	4	6	0	20	2	0	0	0	0	2	0	26	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0
MB-12	26	128	10	4	0	8	2	0	0	0	0	0	0	26	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0
MB-13	33	82	0	4	2	26	0	0	0	0	0	0	0	2	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0
MB-16	34	12	2	2	0	80	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0
MB-21	43	38	10	6	0	126	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mean		48	5	4	0	41	1	0	0	0	0	1	0	7	1	0	2	0	0	1	2	0	0	0	0	0	0	0	0	0	0
SD		41	4	2	1	38	1	0	0	0	1	1	0	11	1	1	2	1	1	1	2	0	0	0	0	1	0	0	0	0	1

B2 Field blanks

The number of microplastics and other particles found in analysed method blanks are given in Table B2.1. The abundance of different microplastic types are given in Table B2.2.

Table B2.1 Number of microplastics (coatings-adhesives, plastic polymers and rubber) and other particles in field blank samples. The dry-weight% of the samples and the amount of dry sediment added to the bauta (g) is also given. The stated weeks represents the start of density-separation.

Field blank ID	Week	Dry-weight %	Amount of dry sediment added to bauta (g)	Unknown	Mineral	Organic	Coatings-adhesives	Petro-pyro	Plastic	Rubber
S-10-FB-01	26	50	51	252	2	126	4	1	52	8
S-11-FB-02	43	64	65	2282	2	72	4	10	64	24
mean				1267	2	99	4	6	58	16
SD				1435	0	38	0	6	8	11

Table B1.2 Number of identified microplastic particles in the field bank samples. The stated weeks represents the start of density-separation.

Field blank ID	Week	Plastic polymer																				Rubber					Coatings-adhesives				
		PE	PP	PET	PS	PTFE	PE-chlorinated	PE-chlorosulfonated	PP-chlorinated	PAM	PMMA	PU	PVF	PE-oxidized	PE:PP	PVC	Melamine	Nylon	EVA	Additive	Other	Resinall	Plasthall	SBR	Silicon	Other	Phenoxy Resin	Epoxy Resin	Organotin	Zonyl	Other
S-10-FB-01	22	4	3	6	0	21	8	0	0	1	0	0	0	2	7	0	0	0	0	0	0	8	0	0	0	0	0	0	2	0	2
S-11-FB-02	43	10	0	2	0	12	24	0	0	0	2	0	0	4	10	0	0	0	0	0	0	16	0	0	0	8	0	0	4	0	0
mean		7	2	4	0	17	16	0	0	1	1	0	0	3	9	0	0	0	0	0	0	12	0	0	0	4	0	0	3	0	1
SD		4	2	3	0	6	11	0	0	1	1	0	0	1	2	0	0	0	0	0	0	6	0	0	0	6	0	0	1	0	1

Appendix C

RESULTS FOR SEDIMENT SAMPLES (RAW DATA)

C1 Sediment samples

The number of microplastics and other particles found in sediment samples are given in Table C1.1 (raw data, not blank or recovery corrected). The dry-weight% of the samples and the amount of dry sediment added to the Bauta during density separation is also included as these were used to calculate the MP abundance per kg dry sediment. The abundance of different microplastic types identified in the samples are given in Table C1.2.

Table C1.1 Number of microplastics (coatings-adhesives, plastic polymers and rubber) and other particles in sediment samples. The dry-weight% of the samples and the amount of dry sediment added to the bauta (g) is also given. The stated weeks represents the start of density-separation.

Sediment sample	Week	Dry-weight %	Amount of dry sediment added to bauta (g)	Unknown	Mineral	Organic	Coatings-adhesives	Petro-pyro	Plastic	Rubber
S-01 0-2 cm	34	73	73	440	0	156	10	22	72	6
S-02 0-2 cm	26	35	67	1746	16	186	8	26	190	22
S-03 0-2 cm	25	53	53	1076	0	140	8	16	180	18
S-04 0-2 cm	25	60	62	716	0	206	12	24	120	16
S-05 0-2 cm	25	51	46	263	1	107	0	9	81	16
S-06 0-2 cm	25	47	48	1798	6	142	10	18	128	22
S-06 2-4 cm	25	55	51	782	2	186	2	20	140	10
S-06 4-6 cm	24	59	58	937	7	63	0	9	91	15
S-06 6-8 cm	24	61	62	1060	2	182	6	14	168	16
S-06 8-10 cm	24	64	65	1000	0	114	2	18	62	26
S-07 0-2 cm	25	55	55	1232	0	144	4	130	122	12
S-08 0-2 cm	24	56	56	746	2	112	0	4	102	6
S-09 0-2 cm	24	42	43	380	2	84	2	14	58	2
S-10 0-2 cm	24	54	53	630	4	162	0	6	90	8
S-10 2-4 cm	26	54	54	281	0	142	0	6	73	4
S-10 4-6 cm	23	55	54	560	4	84	0	0	27	4
S-10 6-8 cm	23	54	52	143	1	78	0	0	71	3
S-10 8-10 cm	22	54	52	364	1	91	1	11	33	5
S-10 20-22 cm	22	53	49	276	3	120	8	8	77	16
S-11 0-2 cm	34	61	60	702	2	164	4	20	192	48
S-11 2-4 cm	33	61	58	990	2	215	16	8	196	49
S-11 4-6 cm	33	58	57	886	2	270	6	12	168	42
S-11 6-8 cm	33	60	59	756	4	332	14	4	224	30
S-11 8-10 cm	33	60	59	722	4	144	6	20	104	34

Table C1.2 Number of identified microplastic particles in the sediment samples. The stated weeks represents the start of density-separation.

Sediment sample	Week	Plastic polymer																				Rubber					Coatings-adhesives				
		PE	PP	PET	PS	PTFE	PE-chlorinated	PE-chlorosulfonated	PP-chlorinated	PAM	PMMA	PU	PVF	PE-oxidized	PE:PP	PVC	Melamine	Nylon	EVA	Additive	Other	Resinall	Plasthall	SBR	Silicon	Other	Phenoxy Resin	Epoxy Resin	Organotin	Zonyl	Other
S-01 0-2 cm	34	36	0	0	2	10	2	0	0	0	0	0	0	0	12	0	0	0	0	4	6	6	0	0	0	0	0	0	10	0	0
S-02 0-2 cm	26	2	0	2	4	16	140	0	0	0	0	0	0	10	12	0	0	0	0	2	2	22	0	0	0	0	2	0	2	0	4
S-03 0-2 cm	25	14	10	4	20	48	46	0	0	0	0	0	0	4	24	0	0	2	0	0	8	14	2	0	0	2	0	2	6	0	0
S-04 0-2 cm	25	18	12	6	2	8	14	0	0	0	0	0	0	14	14	2	6	10	0	0	14	12	2	0	0	2	0	0	10	0	2
S-05 0-2 cm	25	11	0	0	0	51	7	0	0	0	2	0	0	4	3	0	0	0	0	2	0	14	2	0	0	0	0	0	0	0	0
S-06 0-2 cm	25	14	0	10	6	40	38	0	2	0	0	0	0	2	8	0	0	0	0	0	8	20	2	0	0	0	4	0	6	0	0
S-06 2-4 cm	25	46	0	0	0	8	24	0	0	2	0	0	2	12	14	0	24	0	0	6	2	4	2	0	0	4	0	0	2	0	0
S-06 4-6 cm	24	27	0	4	0	33	17	0	0	0	1	0	0	5	0	1	1	0	0	0	0	15	0	0	0	0	0	0	0	0	0
S-06 6-8 cm	24	28	2	10	2	14	74	0	0	0	0	0	0	18	8	2	0	4	0	0	6	16	0	0	0	0	0	0	4	0	2
S-06 8-10 cm	24	12	2	4	0	8	10	0	0	0	0	0	0	10	14	0	0	0	0	0	2	16	4	0	0	6	0	0	2	0	0
S-07 0-2 cm	25	18	8	6	2	16	48	0	0	0	2	0	0	4	18	0	0	0	0	0	0	10	0	0	0	2	2	0	2	0	0
S-08 0-2 cm	24	12	0	4	2	52	18	0	0	2	0	0	0	4	4	0	0	0	0	0	4	4	0	0	0	2	0	0	0	0	0
S-09 0-2 cm	24	4	2	6	0	16	18	0	0	0	0	0	0	2	2	0	4	0	0	4	0	2	0	0	0	0	2	0	0	0	0
S-10 0-2 cm	24	32	2	0	4	6	38	0	0	0	0	0	0	0	8	0	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0
S-10 2-4 cm	26	25	0	0	0	8	19	0	0	0	0	0	0	0	2	2	15	0	0	0	2	0	4	0	0	0	0	0	0	0	0
S-10 4-6 cm	23	7	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	11	4	0	4	0	0	0	0	0	0	0	0
S-10 6-8 cm	23	37	17	2	0	1	0	0	0	0	0	0	0	5	5	0	0	2	0	0	2	2	0	0	0	1	0	0	0	0	0
S-10 8-10 cm	22	4	4	9	0	7	5	0	0	0	0	0	0	0	3	1	0	0	0	0	0	5	0	0	0	0	0	0	1	0	0
S-10 20-22 cm	22	17	2	4	0	17	16	0	0	0	0	0	0	3	11	0	4	1	2	0	0	9	7	0	0	0	0	0	8	0	0
S-11 0-2 cm	34	26	2	10	0	88	10	0	0	0	4	0	0	12	20	0	0	6	0	6	8	40	2	0	0	6	0	0	4	0	0
S-11 2-4 cm	33	56	13	0	0	29	20	0	2	0	2	0	0	24	33	0	0	4	0	5	8	39	2	0	0	9	0	0	16	0	0
S-11 4-6 cm	33	14	20	4	0	52	40	0	0	0	2	0	0	12	12	0	2	0	0	2	8	38	0	0	0	4	0	0	6	0	0
S-11 6-8 cm	33	70	18	22	2	60	16	0	0	0	0	0	0	10	12	0	2	8	0	2	2	26	2	0	0	2	0	0	14	0	0
S-11 8-10 cm	33	26	4	0	2	18	18	0	0	0	0	0	0	12	20	0	2	0	0	2	0	32	2	0	0	0	2	4	0	0	0

Appendix D

MATERIAL COMPOSITION

Contents

D1 Surface samples

The composition of microplastics (defined as coatings-adhesives, plastic polymers and rubbers) and other particles in surface samples (0-2 cm) is given in Table D1. Based on blank corrected results (number of microplastics are method blank and field blank corrected, whereas number of unknowns organic and petro-pyro particles are only method blank corrected), as described in the full report.

Table D1 Composition (%) of particles in the surface sediment samples, as classified by FT-IR. Unknown = particles with a match score < 0.7 with the FT-IR library.

Sample ID	Depth (cm)	Unknown	Mineral	Organic	Coatings-adhesives[1]	Petro-pyro	Plastic polymer[1]	Rubber[1]
S-01	0 – 2	82	0.0	11	2.0	3.1	2.3	0.0
S-02	0 – 2	87	0.8	3.6	0.2	0.1	7.6	0.3
S-03	0 – 2	90	0.0	2.0	0.4	1.0	6,6	0.2
S-04	0 – 2	78	0,0	12	0.9	3.3	4.9	0.3
S-05	0 – 2	89	0.0	0.0	0.0	8.4	0.0	2.3
S-06	0 – 2	95	0.3	1.3	0.4	1.1	1.7	0.3
S-07	0 – 2	85	0.0	1.9	0.2	10	2.7	0.0
S-08	0 – 2	99	0.1	0.0	0.0	0.7	0.5	0.0
S-09	0 – 2	92	0.3	0.0	1.0	6.2	0.8	0.0
S-10	0 – 2	87	0.5	7.9	0.0	1.2	3.0	0.0
S-11	0 – 2	81	0.1	6.7	0.0	3.1	4.7	4.3
All stations (mean ± SD)		88 ± 6	0.2 ± 0.3	4.2 ± 4.5	0.5 ± 0.6	3.5 ± 3.4	3.2 ± 2.5	0.7 ± 1.4

[1]Total microplastic concentrations were in this report calculated based on the number of coatings-adhesives, plastic polymers and rubber particles.

D2 Sediment core samples

The composition of microplastics (defined as coatings-adhesives, plastic polymers and rubbers) and other particles in sediment core samples is given in Table D2. Based on blank corrected results (number of microplastics are method blank and field blank corrected, whereas number of unknowns organic and petro-pyro particles are only method blank corrected), as described in the full report.

Table D2 Composition (%) of particles in the sediment core samples, as classified by FT-IR. Unknown = particles with a match score < 0.7 with the FT-IR library.

Sediment core ID	Depth (cm)	Unknown	Organic	Coatings-adhesives[1]	Petro-pyro	Plastic polymer[1]	Rubber[1]
S-06	0-2	95	1.3	0.4	1.1	1.7	0.3
	2-4	83	9.0	0.0	2.7	4.7	0.3
	4-6	98	0.0	0.0	1.2	0.0	0.0
	6-8	86	6.0	0.0	1.4	6.5	0.0
	8-10	97	0.0	0.0	2.1	0.5	0.5
	All (mean ± SD)	92 ± 6.8	3.2 ± 4.0	0.1 ± 0.2	1.7 ± 0.7	2.7 ± 2.8	0.2 ± 0.2
S-10	0-2	87	7.9	0.0	1.2	3.0	0.0
	2-4	70	14	0.0	3.8	9.4	2.7
	4-6	96	0.0	0.0	0.0	2.8	1.0
	6-8	0.0	0.0	0.0	0.0	100	0.0
	8-10	94	0.0	0.0	5.2	1.0	0.0
	20-22	82	0.0	3.3	6.2	1.0	6.4
	All (mean ± SD)	71 ± 36	3.6 ± 5.9	0.5 ± 1.3	2.7 ± 2.7	20 ± 40	1.7 ± 2.5

Sediment core ID	Depth (cm)	Unknown	Organic	Coatings-adhesives[1]	Petro-pyro	Plastic polymer[1]	Rubber[1]
S-11	0-2	81	6.7	0.0	3.1	4.7	4.3
	2-4	82	9.4	1.3	0.8	5.0	2.6
	4-6	76	16	0.2	1.3	3.7	2.5
	6-8	68	25	1.3	0.5	4.5	1.4
	8-10	87	3.7	1.1	3.1	1.9	3.0
	All (mean ± SD)	78 ± 7.1	12 ± 8.3	0.8 ± 0.6	1.8 ± 1.3	4.0 ± 1.2	2.8 ± 1.1

[1]Total microplastic concentrations were in this report calculated based on the number of coatings-adhesives, plastic polymers and rubber particles.

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