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Surface water geochemistry, Oppdal and Rennebu county, South Trøndelag, Norway

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GEOLOGICAL SURVEY OF NORWAY

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Authors:
Clemens Reimann, Manfred Birke, Ola. A. Eggen, Deta Gasser and Jan Sverre Sandstad

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Summary:

A geochemical surface water survey, focused on 2nd and 3rd order streams, was carried out in the Oppdal/Berkåk area. Stream water was collected at about 160 sample sites, covering a 1500 km^2 survey area. The main aim was to test whether today's ICP-MS analyses are sensitive enough to use surface water for gold exploration. A number of methodological tests (acidification with two different acids, filtration and acidification in the evening in the hotel) was carried out in addition. The known gold occurrences in the area are marked by gold anomalies in stream water, though at quite low concentrations. An additional Au anomaly (several samples locations) indicates the general Orkelsjøen area as prospective. Anthropogenic activities in the lowlands are marked by slightly enhanced NO_3 values in the streams, especially in the Berkåk area. An unusual and intriguing As, Mo, Sb, V anomaly marks the main skiing area near Oppdal and it cannot be decided whether this is an anthropogenic or a geogenic signal. Surface water geochemistry in general is quite well reflecting the geology in the area. The methodological tests indicate that it should be sufficient to take unfiltered samples in the field and to acidify these in the evening in the hotel. Such a procedure would greatly increase the productivity for a surface water survey and allow for example to very effectively sample all 1st order streams.

Keywords: geochemistry	surface water	prospecting
mineral resources gold	ICP-MS	

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1. INTRODUCTION

During the last 20 years, inductively coupled plasma mass spectrometry (ICP-MS) has become the method of choice for the analysis of water samples (Allen et al. 1989, 1991, Moens et al. 1994, Giessmann et al. 1994, Hall et al. 1996, Reimann et al. 1996, Riondato et al. 1997, Banks et al. 1999, Gäbler et al. 2002).
Double focusing sector field inductively coupled plasma-mass spectrometry (ICP-SFMS) and quadrupole inductively coupled plasma-mass spectrometry (ICP-QMS) enable direct determination of elements of interest with no pre-concentration or separation required (Riondato et al. 1997). In addition to analyze many elements within the same sequence, ICP-QMS also offers high sensitivity over a wide linear range and low detection limits.

Today it is thus possible to routinely analyse more than 60 chemical elements in a water sample with sufficiently low detection limits (for many elements in the ppt-range) to obtain informative results.

Recently a large gold nugget (17.2 g) was panned in a river in the Oppdal area in central Norway (Kalseth-Iversen, 2015). This sparked renewed mineral exploration interest in the area. The Geological Survey of Norway was already conducting a geological mapping program in the surroundings of Oppdal. Thus it was decided to carry out an additional geochemical mapping program. The main project was based on soil sampling at a density of 1 site per 2.5 km^2 during the summer of 2015. Figure 1 provides a topographical overview of the area. All locations mentioned in the text are shown here in addition to the known metal occurrences.

As an orientation survey to test whether detection limits are low enough to use water samples for gold exploration an additional orientation geochemical mapping program based on stream water samples collected at a density of 1 site per approximately 10 km^2 (150-200 samples) from the same area where soil samples were taken was added on. Within the project two different methods of sample conservation, (a) field acidification with conc. HNO_3 and (b) field acidification with conc. HCl, were also tested and thus all samples were taken in duplicate. Method (b) was expected to better stabilize Au in solution while method (a) is the standard procedure for water-based geochemical surveys. In Norway with its long coastline it is often a general problem for surface water surveys that for several elements the results are swamped by the input of marine aerosols to a distance of well over 100 km from coast (e.g., Banks et al., 2001). The Oppdal area is well over 100 km from the nearest coast, so it was assumed that this will not be a problem in the survey area.

Filtering and acidifying the samples in the field takes a considerable time at each sample site. Thus it was also tested whether it would be possible to take a large unfiltered and unacidfied sample in the field and carry out filtration and acidification in the evening in the hotel. Given the often adverse weather conditions in Norway and

many remote sample locations productivity of such a surface water based survey could be considerably increased following such an approach.

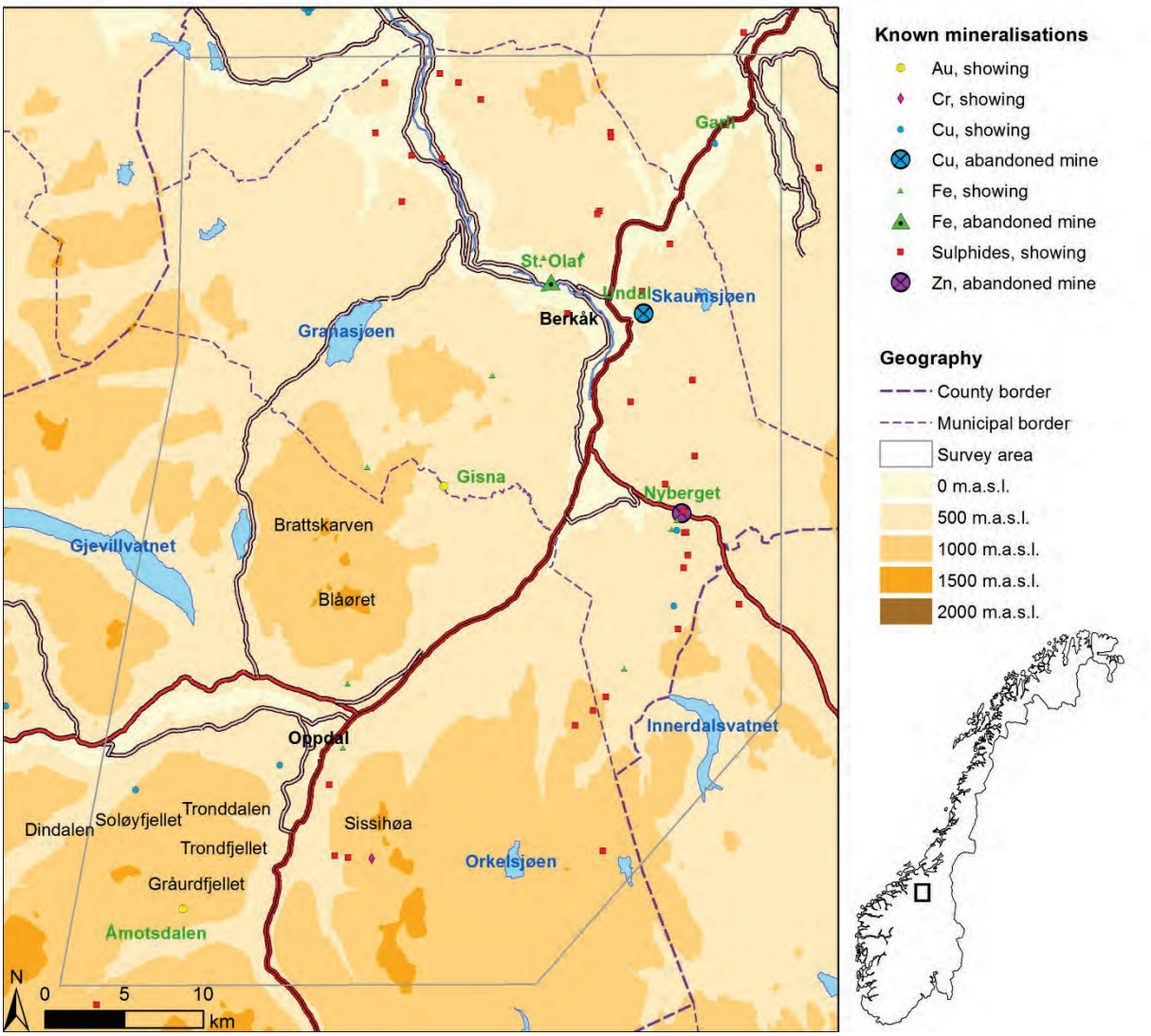


Figure 1: Topographical overview of the survey area with known metal occurrences added from NGU's ore deposit database (www.ngu.no).

This report will thus answer several questions:
(a) is it possible to use stream water samples for routine Au exploration in Norway?
(b) is it necessary to use an own field conservation procedure to obtain reliable Au results?
(c) is it possible to sample more efficiently by doing sample preparation under controlled conditions in the hotel?
(d) how far inland do we detect an impact of the input of marine aerosols on stream water geochemistry?

1.1 Geology

Figure 2 shows a simplified geological map of the area. The bedrock geology within the investigated area is dominated by Caledonian nappes belonging to several tectonostratigraphic levels. The area can be divided into three roughly north-south-trending units.

(1) West of a series of NNW-SSE-trending late- to post-Caledonian normal faults, several nappes consisting of Proterozoic acidic magmatic rocks, Neoproterozoic quartzitic rocks and Cambro-Ordovician volcanoclastic rocks are metamorphosed in amphibolite facies and folded into recumbent isoclinal folds, resulting in a complex map pattern (Fig. 2; Krill, 1980; Robinson et al., 2014). They are interpreted to represent remnants of the continental margin of Baltica telescoped during the Caledonian orogeny (Gee et al., 1985).

(2) The central area east of the prominent normal faults is occupied by a higher tectonic level consisting of Cambro-Ordovician metabasalts, felsic volcanites, metacherts and volcanoclastic rocks, which are partly inverted and intruded by a series of Ordovician to Silurian mafic to acidic plutons (Fig. 2; Rohr-Torp, 1972; Krill, 1980; Nilsen et al., 2003). These rocks probably developed in marginal oceanic basins and island-arcs during the closure of the Iapetus ocean (Gee et al., 1985).

(3) The easternmost area consists of probably Proterozoic to Cambrian clastic metasedimentary rocks (in places calcareous), intercalated with ribbon chert, graphitic schist and metabasalts. The succession is intruded by Ordovician to Silurian mafic to acidic plutons (Nilsen 1978; Nilsen and Wolff, 1989; Nilsen et al. 2007). These rocks represent a fragment of a mainly continentally-derived Proterozoic to Paleozoic terrane, which is overprinted by island-arc and back-arc magmatism and was accreted to the Baltican margin during the Caledonian orogeny (Gee et al., 1985; McClellan, 1995; Nilsen et al., 2007).

1.2 Metal occurrences

VMS-type deposits, some with elevated gold values, e.g., the Garli/Gullvåg mineralization (with up to 0.6-0.9 ppm Au) occur in various greenstone units in the general area (Fig. 2). The correlation of these greenstone units is not well understood. Gold prospecting was carried out in the south-westernmost part of the area in the early 1990'ies, and gold mineralization in bedrock and gold anomalies in soil samples were detected in the Gråurdfjellet area (Livgard 1993, 1994a, 1994b) – see Figure 1 for location. The recent discovery of gold nuggets (up to 17.2 g) during gold panning in Gisna river, NE of Oppdal (Kalseth-Iversen 2015 – see Fig. 1) has further increased the interest in the area.

A number of small sulfide occurrences are documented in NGUs ore deposit database (see www.ngu.no) throughout the area. Many are bound to the volcano-sedimentary formation (compare Fig. 1 and 2). Three metal occurrences in the region have actually been mined in the past, though on a small scale. These are the Nyberget Zn deposit near Innset, the Undal Cu deposit right to the south of Berkåk and the St. Olaf Fe deposit right to the west of Berkåk (Fig. 1). All three are positioned such that they could not be found by this test survey focusing on smaller streams and trying to avoid the roads.

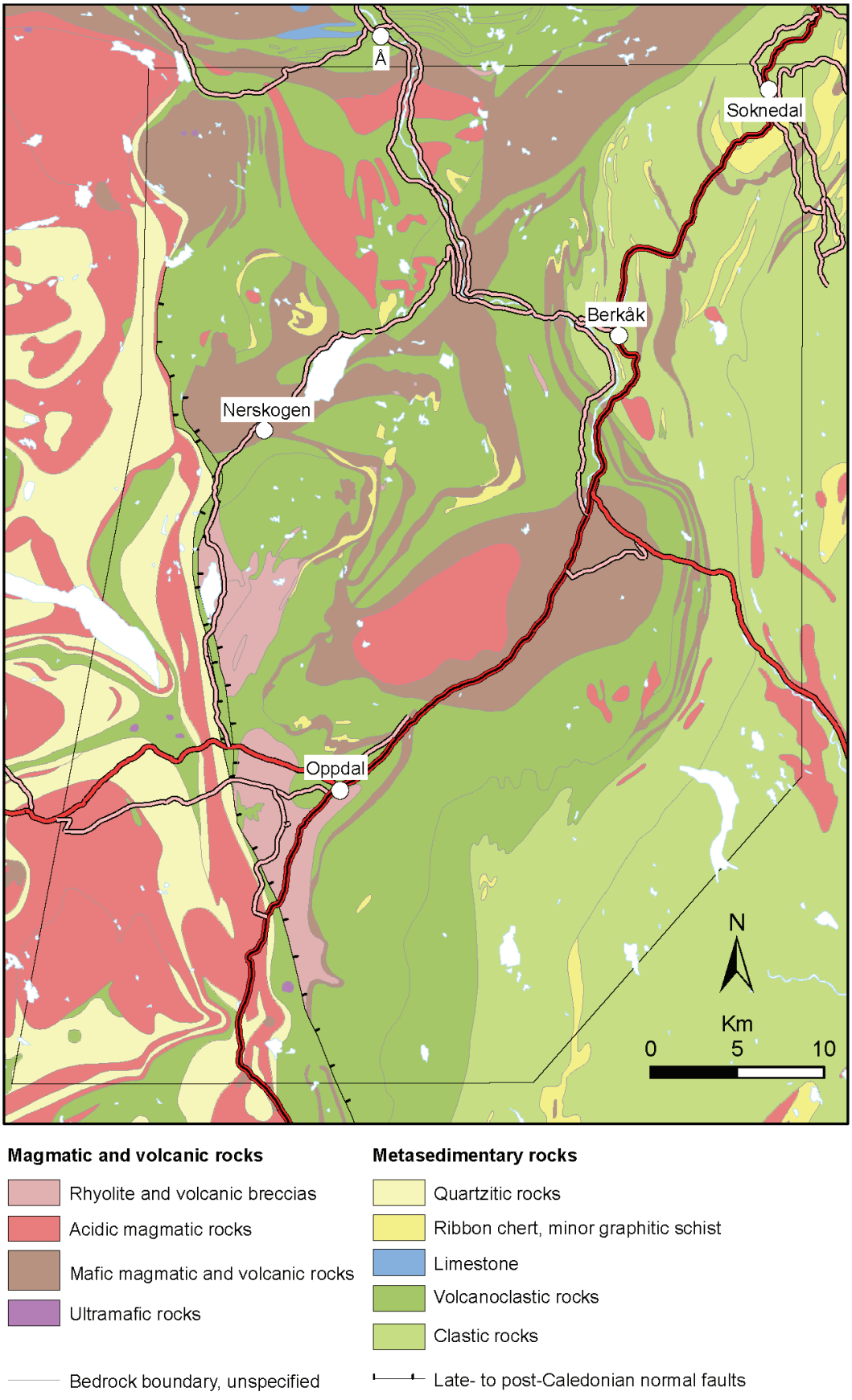


Figure 2: Geological map of the survey area.

2. METHODOLOGY

2.1 Sampling

Given the limitation that not more than max. 200 samples could be taken and analysed for this orientation survey, it was decided to focus on 2nd and 3rd order streams for the sampling campaign (see Fig. 3 for a typical 3rd order stream in the survey area). Originally it had been assumed that the focus on relatively large streams would guarantee easy and fast access to the sample locations. It turned out, however, that parts of the area are so remote that still a lot of walking was needed to reach some of the pre-planned sample locations. On average for one person it was possible to take 7 water samples/day.

The field equipment consisted of:

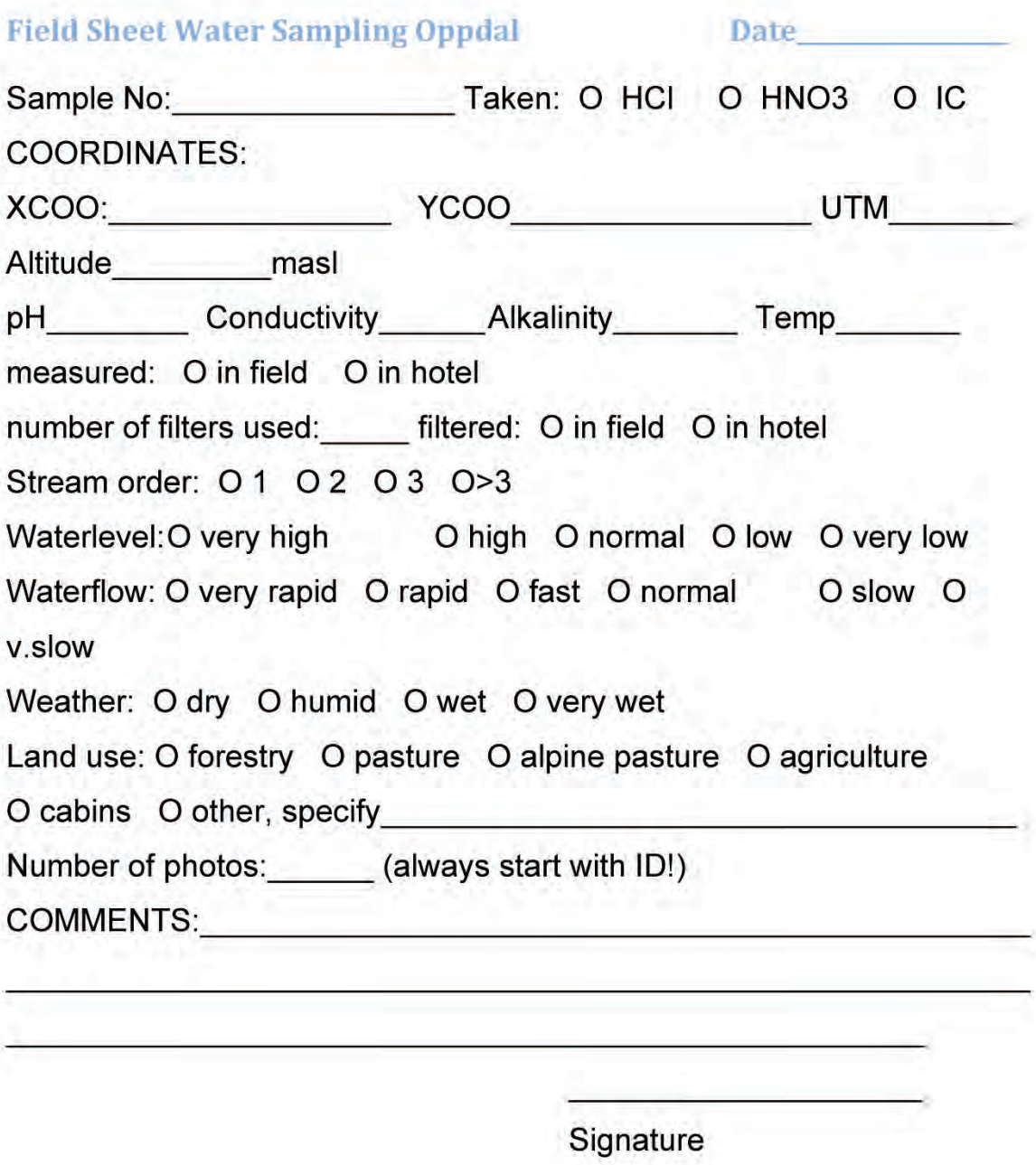
- A large 500 ml factory new clear PE-bottle
- Two small 125 ml factory new clear PE bottles (Thermo scientific HDPE with PP cap)
- A BD PlastipakTM 50 ml syringe
- Sartorius NML Minisart cellulose acetat syringe filters 0.45 micron
- Granberg soft nitrile powder free magic touch examination gloves
- Merck nitric acid (HNO_3) Rotipuran ultra quality 69% in a Teflon drip bottle
- Merck hydrochloric acid (HCl) Rotipuran ultra quality 34% in a second Teflon drip bottle
- A GARMIN® Oregon 650 GPS
- Camera
- pH meter (IQ scientific instruments Model IQ 125 pH meter with silicon chip sensor)
- Conductivity meter (WTW LF 92)
- Merck Mcolortest alkalinity field test
- Field sheet
- A 1:50.000 map with the pre-planned sample locations
- Pre-numbered adhesive plastic sample labels, indicating the treatment of the sample (untreated -marked IC, acidified with HNO_3, acidified with HCl)

At each site the large 500 ml PE bottle was three times thoroughly rinsed with stream water and then filled to the top with unfiltered and unacidified stream water for the IC measurements (+ pH and EC) in NGU's laboratory.

The syringe (a new syringe each day) was then also thoroughly rinsed with stream water for three times. Then the filter was fitted to the syringe and the first 10 ml of filtered water were discarded. Afterwards the small 125 ml bottles were thoroughly rinsed three times with stream water and subsequently 3 times with 20 ml of filtered stream water. Afterwards the small bottles were almost filled with filtered stream water, then acidified with the respective number of drops of conc. HNO_3 (first sample) and conc. HCl (second sample) according to the sample label on the bottle (see Fig. 4), filled to the top with filtered water and closed. In case the filter had to be shifted, the first 10 ml of filtered water were discarded again.

Figure 3: The river Gisna (3rd order stream) at sample site 4547. A 17.2 g gold nugget was found a few hundred m upstream from this site.

Figure 4: The three bottles filled at each sample site providing information on site number and sample treatment.


Field Sheet Water Sampling Oppdal Date_____

Sample No:_____ Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH_____ Conductivity_____Alkalinity_____ Temp_____

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel:O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

Signature

Figure 5: Field sheet used for the Oppdal/Rennebu survey

There have been long discussions in the literature about the type of sample bottles best used for such water surveys (high density polyethene (HDPE), polypropene (PP), fluorinated ethene propene copolymer (FEP) and perfluoroalkoxy polymer (PFA)) and the correct pre-treatment of these bottles prior to sampling (e.g., very elaborate acid washing procedures in the laboratory vs. “simple” washing of factory new bottles with water right in the field). Some of these bottles (e.g., FEP, PFA) are so expensive that they have to be re-used, others (e.g. HDPE) so cheap that they can be discarded after the samples have been analysed. Hall (1998) and Reimann et al. (1999) came independently to the conclusion that for water surveys with hundreds of samples to be taken cheap, factory new HDPE bottles, which are thoroughly rinsed in the field with the water to be sampled are quite sufficient if they have been

checked for possible contamination issues (elements like Ba, Sb, Zn may be an issue – see Reimann et al., 2007) before use or are controlled via a sufficient number of blind samples to detect any contamination issue during the survey. The “acid washing of sample bottles” debate must also be seen in connection with the fact that neither the syringes nor the filters can be acid-washed anyway.

Electrical conductivity and pH were then measured in the field and recorded in the field sheet. Alkalinity was also measured and noted down in the field sheet. Figure 5 shows the field sheet that had to be filled in at each location.

At approximately every 20th site a duplicate sample was collected following the above described procedure. Furthermore 7 sites collected at the beginning of the survey were re-visited and re-sampled at the end of the sampling period 6 weeks later.

At about 25 locations chosen at random instead of one three of the 500 ml bottles were filled with stream water. Two of these bottles were then used in the evening in the hotel to filter and acidify the small samples for the ICP-MS analyses. Using this procedure sampling in the field could be carried out considerably faster, which would be a great advantage especially under the frequent bad weather conditions in Norway.

To test the whole procedure for blind values originating from either leaching from the bottles, syringe, filters or introduced via the acid a blind sample was prepared about twice a week and at latest when the drip bottles for the acid had to be re-filled. For this purpose the whole above procedure was carried out using de-ionized water (18.2 MΩ) brought to the field in large (500 ml) bottles from NGU’s laboratory.

In the evening all sample bottles filled during the day were stored in the hotels cold storage room at 4 °C. Once a week the samples were transported to NGU, stored in NGU’s cold storage room and analysed within a few days after arrival.

2.2 Analysis

Alkalinity was titrated in the field using the Merck Mcolortest alkalinity field test. Electrical conductivity and pH were measured in the field using a WTW LF 92 and an IQ scientific instruments Model IQ 125 pH meter with silicon chip sensor. In addition both parameters were once more measured in the laboratory of NGU using a CDM 80 Conductivity Meter of Radiometer Copenhagen and a Seven Easy pH Meter S20 from Mettler Toledo.

Anions were analysed by ion-chromatography (IC) using an Ion Chromatography System Thermo Scientific Dionex ICS-1100 in NGU’s laboratory within 1-2 weeks after sampling.

Analyses of the cations were carried out on an Agilent ICP-QMS in the laboratory of Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) in Hannover, Germany. The analytical program, isotopes measured and detection limits reached are summarized in Table 1. Major elements were also measured on an ICP-AES, results are, however, not used here because these results were so severely rounded (see below) that it was decided to rather use the values as received from the ICP-MS.

Table 1: Analytical methods and detection limits, ICP-QMS and ICP-AES analyses, pH, EC and alkalinity measurements

Parameter	Unit	Analytical method	Isotop	Used gases	Instrument detection limit (IDL)	Reported detection limit (RDL)
pH		potentiometric				
EC	µs/cm	conductometric				
Alkalinity	mmol/L	titration			0.1	0.1
Ag	µg/L	ICP-QMS	Min: 107-109	He GM[1)]	0.001	0.001
Al	µg/L	ICP-QMS	27	NGM[2)]	0.05	0.1
As	µg/L	ICP-QMS	75	He GM[1)]	0.01	0.01
Au	µg/L	ICP-QMS	197	He GM[1)]	0.0005	0.001
B	µg/L	ICP-QMS	11	NGM[2)]	0.1	0.1
Ba	µg/L	ICP-QMS	137	NGM[2)]	0.005	0.01
Be	µg/L	ICP-QMS	9	NGM[2)]	0.001	0.001
Bi	µg/L	ICP-QMS	209	NGM[2)]	0.0005	0.001
Br	µg/L	ICP-QMS	79	NGM[2)]	0.1	1
Ca	mg/L	ICP-AES		-	0.01	0.01
Ca	µg/L	ICP-QMS	43	He GM[1)]	0.1	1
Cd	µg/L	ICP-QMS	114_cor	NGM[2)]	0.001	0.001
Ce	µg/L	ICP-QMS	140	NGM[2)]	0.0005	0.001
Co	µg/L	ICP-QMS	59	He GM[1)]	0.002	0.01
Cr	µg/L	ICP-QMS	52	He GM[1)]	0.01	0.01
Cs	µg/L	ICP-QMS	133	NGM[2)]	0.0005	0.001
Cu	µg/L	ICP-QMS	Min: 63-65	He GM[1)]	0.001	0.01
Dy	µg/L	ICP-QMS	163	NGM[2)]	0.0005	0.001
Er	µg/L	ICP-QMS	166	NGM[2)]	0.0005	0.001
Eu	µg/L	ICP-QMS	151_kor	NGM[2)]	0.0005	0.001
Fe	µg/L	ICP-QMS	56	He GM[1)]	0.01	0.1
Ga	µg/L	ICP-QMS	71	He GM[1)]	0.0005	0.001
Gd	µg/L	ICP-QMS	157	NGM[2)]	0.0005	0.001
Ge	µg/L	ICP-QMS	72	He GM[1)]	0.005	0.01
Hf	µg/L	ICP-QMS	178	NGM[2)]	0.0005	0.001
Hg	µg/L	ICP-QMS	201	NGM[2)]	0.005	0.01
Ho	µg/L	ICP-QMS	165	NGM[2)]	0.0005	0.001
I	µg/L	ICP-QMS	127	NGM[2)]	0.01	0.1
In	µg/L	ICP-QMS	115	NGM[2)]	0.0001	0.001

Parameter	Unit	Analytical method	Isotop	Used gases	Instrument detection limit (IDL)	Reported detection limit (RDL)
K	µg/L	ICP-QMS	39	He GM[1)]	0.1	1
K	mg/L	ICP-AES		-	0.1	0.1
La	µg/L	ICP-QMS	139	NGM[2)]	0.0005	0.001
Li	µg/L	ICP-QMS	7	NGM[2)]	0.01	0.01
Lu	µg/L	ICP-QMS	175	NGM[2)]	0.0005	0.001
Mg	µg/L	ICP-QMS	25	He GM[1)]	0.1	1
Mg	mg/L	ICP-AES		-	0.001	0.001
Mn	µg/L	ICP-QMS	55	NGM[2)]	0.005	0.01
Mo	µg/L	ICP-QMS	95	He GM[1)]	0.001	0.001
Na	µg/L	ICP-QMS	23	He GM[1)]	0.1	1
Na	mg/L	ICP-AES		-	0.1	0.1
Nb	µg/L	ICP-QMS	93	NGM[2)]	0.001	0.001
Nd	µg/L	ICP-QMS	146	NGM[2)]	0.0005	0.001
Ni	µg/L	ICP-QMS	60	He GM[1)]	0.005	0.01
Pb	µg/L	ICP-QMS	Sum: 206+207+208	NGM[2)]	0.001	0.001
Pr	µg/L	ICP-QMS	141	NGM[2)]	0.0005	0.001
Rb	µg/L	ICP-QMS	85	NGM[2)]	0.001	0.001
Sb	µg/L	ICP-QMS	121	NGM[2)]	0.001	0.001
Sc	µg/L	ICP-QMS	45	He GM[1)]	0.001	0.01
Se	µg/L	ICP-QMS	78	H_2 GM[3)]	0.005	0.01
Sm	µg/L	ICP-QMS	147	NGM[2)]	0.0005	0.001
Sn	µg/L	ICP-QMS	118	NGM[2)]	0.001	0.001
Sr	µg/L	ICP-QMS	86	NGM[2)]	0.01	0.1
Sr	mg/L	ICP-AES		NGM[2)]	0.001	0.001
Ta	µg/L	ICP-QMS	181	NGM[2)]	0.0005	0.001
Tb	µg/L	ICP-QMS	159	NGM[2)]	0.0005	0.001
Te	µg/L	ICP-QMS	126	NGM[2)]	0.001	0.001
Th	µg/L	ICP-QMS	232	NGM[2)]	0.0001	0.001
Ti	µg/L	ICP-QMS	Min: 47-49	He GM[1)]	0.005	0.01
Tl	µg/L	ICP-QMS	205	NGM[2)]	0.0005	0.001
Tm	µg/L	ICP-QMS	169	NGM[2)]	0.0005	0.001
U	µg/L	ICP-QMS	238	NGM[2)]	0.0001	0.001
V	µg/L	ICP-QMS	51	NGM[2)]	0.01	0.01
W	µg/L	ICP-QMS	182	NGM[2)]	0.001	0.001
Y	µg/L	ICP-QMS	89	NGM[2)]	0.0005	0.001
Yb	µg/L	ICP-QMS	172	NGM[2)]	0.0005	0.001
Zn	µg/L	ICP-QMS	Min: 66-68	He GM[1)]	0.01	0.1
Zr	µg/L	ICP-QMS	90	NGM[2)]	0.0005	0.001
SiO_2	mg/L	ICP-AES		-	0.05	0.05

[1)] He gas mode, [2)] no gas mode, [3)] H_2 gas mode

2.3 Quality control

Quality control consisted of taking duplicate samples in the field (N=8), the analysis of a number of analytical duplicates (N=10), the production and insertion of blind samples during field work (N=9), and the insertion and frequent analysis of three international reference materials during analysis of the samples.

2.3.1 Blind samples

Table 2 compares the results obtained for the blind samples with the statistics (minimum, median, maximum value observed) obtained for the true samples. For Br, F, NO_2 and PO_4 all results were below the detection limit. The elements Bi, Cd, Hg, In, Pb, Sc, Se, Te and Zn show some high values among the blind samples and should thus probably not be mapped. The elements Ag, Au, B, Ge, Hf, Li, Nb, NO_3, Sn, Ta and Tl can probably be used with care. All other elements (Al, As, Ba, Be, Br, Ca, Ce, Cl, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ho, I, K, La, Lu, Mg, Mn, Mo, Na, Nd, Ni, Pr, Rb, Sb, Si, Sm, SO_4, Sr, Tb, Th, Ti, Tm, U, V, W, Y, Yb, Zr) show no indications of procedural problems.

Table 2: Analytical results for the blind samples in relation to the concentration range of the elements reported here. Highlight red: all results below detection, highlight orange: analytical results in the same range as the blind samples, the map cannot be trusted, highlight yellow: the maps should be treated with care, no highlight: the results are not affected by the values and variation observed for the blind samples.

		BLIND SAMPLES (N=9)			TRUE SAMPLES				
ELEMENT	DL	MIN	MED	**MAX**	MIN	**MED**	MAX		Remarks
Ag	0.001	<0.001	<0.001	**0.001**	<0.001	**0.001**	0.0028	?	map is OK
Al	0.1	0.4	0.8	**1.2**	3	**22**	228	OK	
Al_AES	3	<3	<3	**3**	3	**27**	282	OK	
As	0.01	<0.01	0.01	**0.02**	0.018	**0.056**	1.34	OK	
Au	0.001	0.001	0.003	**0.006**	<0.001	**<0.001**	0.0060	?	map is OK
B	0.1	<0.1	1.8	**2.1**	0.47	**0.98**	2.9	?	map is OK
Ba	0.01	<0.01	0.07	**0.80**	0.73	**3.6**	19	OK	
Ba_AES	1	<1	<1	**1**	1	**4**	21	OK	
Be	0.001	0.001	0.002	**0.004**	<0.001	**0.0055**	0.014	OK	
Bi	0.001	<0.001	<0.001	**0.002**	<0.001	**0.0010**	0.0021	??	map noisy
Br_IC	100	<100	<100	**<100**	<100	**<100**	<100	DL	all <DL
Br	1	<1	1.3	**1.6**	4.0	**8.3**	31	OK	
Ca	1	1.0	2.4	**8.7**	255	**4125**	30433	OK	
Ca_AES	10	<10	10	**10**	300	**4610**	31700	OK	
Cd	0.001	<0.001	0.002	**0.006**	<0.001	**0.0027**	0.0070	??	map noisy
Ce	0.001	<0.001	0.002	**0.004**	0.0079	**0.076**	1.5	OK	
Cl	100	<100	<100	**<100**	247	**1050**	4880	OK	
Cl_AES	100	<100	<100	**100**	300	**1200**	5200	OK	
Co	0.01	<0.01	<0.01	**<0.01**	<0.01	**0.024**	0.11	OK	
Cr	0.01	<0.01	<0.01	**0.06**	0.013	**0.12**	0.70	OK	

Cs	0.001	<0.001	<0.001	**0.001**	<0.001	**0.019**	0.12	OK	
Cu	0.01	<0.01	0.01	**0.05**	0.12	**0.45**	2.1	OK	
Dy	0.001	<0.001	0.002	**0.003**	0.0024	**0.014**	0.11	OK	
Er	0.001	<0.001	0.001	**0.002**	0.0016	**0.0090**	0.054	OK	
Eu	0.001	<0.001	<0.001	**0.001**	<0.001	**0.0043**	0.038	OK	
F	500	<500	<500	**<500**	<500	**<500**	<500	DL	all <DL
Fe	0.1	0.3	1.3	**2.0**	0.96	**13**	436	OK	
Fe_AES	3	<3	<3	**3**	<3	**14**	467	OK	
Ga	0.001	<0.001	0.001	**0.003**	<0.001	**0.0045**	0.020	OK	
Gd	0.001	0.001	0.002	**0.003**	0.0032	**0.019**	0.16	OK	
Ge	0.01	0.01	0.02	**0.04**	<0.01	**0.027**	0.078	?	map noisy
Hf	0.001	<0.001	0.001	**0.002**	<0.001	**0.0024**	0.0099	?	map noisy
Hg	0.01	<0.01	0.01	**0.01**	<0.01	**0.01**	0.033	?	map very noisy
Ho	0.001	<0.001	<0.001	**<0.001**	<0.001	**0.0027**	0.018	OK	
I	0.1	<0.1	<0.1	**0.1**	0.17	**0.53**	1.43	OK	
In	0.001	<0.001	<0.001	**<0.001**	<0.001	**<0.001**	0.0013	??	map very noisy
K	1	9	13	**22**	49	**319**	1689	OK	
K_AES	100	<100	<100	**<100**	<100	**350**	1900	OK	
La	0.001	<0.001	0.002	**0.002**	0.0076	**0.100**	1.5	OK	
Li	0.01	<0.01	<0.01	**<0.01**	0.014	**0.11**	0.60	OK	map noisy
Lu	0.001	<0.001	<0.001	**0.001**	<0.001	**0.0017**	0.0074	OK	
Mg	1	<1	<1	**1**	52	**415**	2341	OK	
Mg_AES	1	<1	<1	**2**	53	**447**	2620	OK	
Mn	0.01	<0.01	0.03	**0.09**	0.036	**0.48**	8.6	OK	
Mo	0.001	<0.001	0.002	**0.005**	0.0013	**0.058**	0.88	OK	
Na	1	<1	2.2	**4.0**	327	**1116**	2983	OK	
Na_AES	100	<100	<100	**<100**	400	**1200**	3100	OK	
Nb	0.001	<0.001	<0.001	**0.003**	<0.001	**0.0025**	0.010	?	map OK
Nd	0.001	0.002	0.003	**0.004**	0.0082	**0.10**	1.2	OK	
Ni	0.01	<0.01	0.01	**0.05**	0.022	**0.25**	2.5	OK	
NO_2	100	<100	<100	**<100**	<100	**<100**	<100	DL	all <DL
NO_3	250	<250	<250	**346**	<250	**310**	340	???	map OK
Pb	0.001	0.004	0.011	**0.036**	<0.001	**0.018**	0.088	??	map very noisy
PO_4	500	<500	<500	**<500**	<400	**<400**	<400	DL	all <DL
Pr	0.001	<0.001	<0.001	**0.001**	0.0019	**0.026**	0.34	OK	
Rb	0.001	0.004	0.011	**0.021**	0.18	**1.1**	6.1	OK	
Sb	0.001	<0.001	0.002	**0.005**	0.0016	**0.0075**	0.072	OK	
Sc	0.01	<0.01	0.01	**0.02**	<0.01	**0.028**	0.081	?	map very noisy
Se	0.01	<0.01	<0.01	**0.01**	0.010	**0.040**	0.15	?	map noisy
Si_AES	50	<50	<50	**<50**	<50	**1262**	3085	OK	
Sm	0.001	<0.001	<0.001	**0.003**	0.0023	**0.020**	0.22	OK	
Sn	0.001	0.002	0.009	**0.016**	<0.001	**0.0051**	0.018	???	map OK
SO_4	200	<200	<200	**<200**	<200	**1145**	23200	OK	
SO_4_AES	50	<50	<50	**<50**	340	**1420**	24300	OK	
Sr	0.1	<0.1	<0.1	**<0.1**	1.7	**13**	71	OK	
Sr_AES	1	<1	<1	**<1**	2	**15**	78	OK	
Ta	0.001	<0.001	0.001	**0.002**	<0.001	**0.0015**	0.0050	??	map OK?

Tb	0.001	<0.001	<0.001	**<0.001**	<0.001	**0.0028**	0.022	?	
Te	0.001	0.003	0.015	**0.021**	<0.001	**0.015**	0.031	???	map noisy
Th	0.001	<0.001	<0.001	**0.001**	<0.001	**0.012**	0.12	OK	
Ti	0.01	<0.01	<0.01	**0.08**	<0.01	**0.14**	1.5	OK	map very noisy
Tl	0.001	0.004	0.008	**0.024**	0.0024	**0.012**	0.029	???	map quite OK
Tm	0.001	<0.001	<0.001	**<0.001**	<0.001	**0.0014**	0.0065	OK	
U	0.001	<0.001	<0.001	**<0.001**	0.0066	**0.035**	0.69	OK	
V	0.01	<0.01	0.02	**0.03**	0.031	**0.086**	0.30	OK	
W	0.001	0.001	0.005	**0.016**	<0.001	**0.011**	0.051	??	map quite OK
Y	0.001	<0.001	<0.001	**0.001**	0.012	**0.080**	0.55	OK	
Yb	0.001	<0.001	0.001	**0.002**	0.0011	**0.0092**	0.047	OK	
Zn	0.1	<0.1	3	**6**	0.49	**1.90**	17	???	map very noisy
Zr	0.001	<0.001	<0.001	**0.004**	0.0020	**0.024**	0.15	OK	

2.3.2 Field duplicates

At 8 sample sites true field duplicates were taken (a second sample collected, filtered and acidified following the collection of the first sample). The results were plotted in XY-diagrams (XY diagrams for all parameters/elements can be found in Appendix VI and allow the following conclusions:

General detection limit problem (all values below DL): Br_IC, F_IC, NO2_IC, PO4_IC

Not reproducible: Cd

Most results below DL: Ag, Bi

Poor to very poor reproducibility: Au, Co, Ge, Hg, Ga, In, NO3, Pb, Sc, Se, Te, Ti, W, Zn (in addition 1 outlier)

Problems with single samples: Cl_AES, Cu, Na_AES, Sn, Ta

OK to good reproducibility: alkalinity, pH, pH_lab, Be, Br, Gd, Hf, Lu, Mn, Nb, Tl, Tm, V

Excellent reproducibility: conductivity, conductivity_lab, Al, Al_AES, As, B, Ba, Ba_AES, Ce, Cl, Ca, Ca_AES, Cr, Cs, Dy, Er, Eu, Fe, Fe_AES, Ho, I, K, K_AES, La, Li, Mg, Mg_AES, Mo, Na, Nd, Ni, Pr, Rb, Sb, SO4_IC, SO4_AES, Sr, Sr_AES, Si_AES, Sm, Tb, Th, U, Y, Yb, Zr.

2.3.3 Analytical duplicates

Table 3 shows the results of a precision calculation based on 10 analytical duplicates as measured on the ICP-MS. For the majority of elements precision is quite good. Two thirds of the elements show a precision that is better than +/- 20%. The very poor precision for Ti is due to the low concentrations of the element in the Oppdal samples. Results for the international reference materials (presented below) show that Ti at higher concentrations is reported within the expected range.

Table 3: Precision as calculated for the 10 analytical duplicates that were measured on the ICP-MS.

Precision < +/- 5%		Precision +/- 5-10%		Precision +/- 10-20%	
Element	Precision +/- %	Element	Precision +/- %	Element	Precision +/- %
Ba	1.4	I	5.5	Mn	10.4
Rb	1.4	U	5.7	Sm	10.5
Ca	1.5	Zn	5.8	Zr	10.5
Al	1.7	Gd	7	Er	10.9
Sr	1.7	Cs	7.1	Mo	11
La	1.9	Nd	7.6	Eu	11.8
K	2	Ni	7.7	Tb	12.9
Pr	2.1	Br	7.9	Dy	14.4
Na	2.5	Th	7.9	Ho	15.5
Y	2.5	Cr	8.5	Yb	16.7
Ce	2.6	V	8.9	Sb	17.2
Mg	3.5			Au	17.4
Fe	3.6			Co	17.6
B	4			As	18.2
Li	4.2			Lu	18.3
Cu	4.7			Tm	18.3
				W	19.3
				Se	19.4

Precision +/- 20-30%		Precision > +/- 30%	
Element	Precision +/- %	Element	Precision +/- %
Hg	22.6	In	34.2
Nb	23.5	Pb	34.6
Hf	25.1	Bi	35.5
Ta	25.2	Ge	53.2
Ga	25.9	Ag	57.6
Sn	26.8	Te	57.7
Be	27.1	Cd	58.8
Sc	27.2	Tl	77.6
		Ti	104.1

2.3.4 Standards

A problem with the multi-element analysis of water samples is the fact that there are no international reference materials with published and accepted values for all the elements that can be analysed. Table 4 summarizes the analytical results for four international reference materials that were measured while the Oppdal samples were analysed. With few exceptions at low concentrations (e.g., Cd, Tl) the results obtained are very well in agreement with the published reference values.

Table 4:Analytical results for four international reference samples analysed repeatedly together with the samples in relation to the certified values.

Standard		SLSR-5 (N=212)				TM-23.4 (N=115)				TMDA-51.4 (N=69)				TMDA-52.3 (N=113)			
Element	unit	certified	MW	SDEV	%	certified	MW	SDEV	%	certified	MW	SDEV	%	certified	MW	SDEV	%
Ag	**µg/L**		0.00070	0.000635		4.77	4.81	0.376	101	12.3	11.9	1.119	97	20.6	18.3	1.45	89
Al	**µg/l**	49.5	50.7	3.372	102	94.5	93.9	10.36	99	95.1	91.7	10.33	96	310	305	20.8	98
As	**µg/L**	0.413	0.391	0.0302		8.15	8.01	0.626	98	16.4	15.2	1.5005	93	25.4	24.2	1.67	95
B	**µg/L**		7.6	1.39		18.1	20.3	7.39	112	47.7	48.2	5.16	101	10.7	12.0	1.32	113
Ba	**µg/L**	14	15	0.679	109	14.3	14.7	0.972	103	73.1	74.6	6.59	102	148	152	8.59	103
Be	**µg/L**	0.005	0.0056	0.00178	112	2.02	2.03	0.157	100	10	9.4	1.13	94	17.6	16.8	1.43	95
Bi	**µg/L**		0.0019	0.00311		3.4	3.6	0.349	107	11	12.7	1.27	115	12.3	14.7	1.24	119
(Br)	**µg/L**		18	5.77			29.5	8.16			27.7	3.23			15.7	2.95	
(Ca)	**µg/l**	10500	10440	616	99		21543	1653			20537	1974			13802	924	
Cd	**µg/L**	0.006	0.0079	0.00115	131	2.9	2.97	0.202	102	25.7	25.2	2.193	98	90.9	90.5	5.14	100
Ce	**µg/L**		0.265	0.0156			0.00211	0.00184			0.00323	0.00461			0.00242	0.00178	
Co	**µg/L**	0.05	0.05	0.00538	108	7.09	7.28	0.519	103	70.6	71.9	6.69	102	136	137	8.41	101
Cr	**µg/L**	0.208	0.232	0.0303	111	6.8	6.7	0.487	98	66.2	64.8	6.24	98	165	163	10.7	99
Cs	**µg/L**		0.0050	0.000941			0.016	0.00462			0.00783	0.00122			0.00439	0.00184	
Cu	**µg/L**	17.4	18.5	1.101	106	8.52	8.76	0.6412	103	80.7	83.1	8.23	103	197	199	12.6	101
Dy	**µg/L**		0.0197	0.00174			0.00075	0.000460			0.000730	0.000518			0.00071	0.00044	
Er	**µg/L**		0.0113	0.00128			0.000621	0.000284			0.00068	0.00031			0.00060	0.00026	
Eu	**µg/L**		0.0062	0.000792			0.00042	0.000281			0.00120	0.00111			0.00161	0.00357	
(Fe)	**µg/l**	91.2	93.6	6.38	103	14.5	15.3	1.323	105	118	128	14.4	108	412	409	32.6	99
Ga	**µg/L**		0.0148	0.00248		2.1	2.1	0.152	102	9.3	8.9	0.863	96	13.6	13.2	0.880	97
Gd	**µg/L**		0.0276	0.00567			0.00118	0.000545			0.00194	0.00080			0.00234	0.00090	
(Ge)	**µg/L**		0.0128	0.01004			0.0114	0.03303			0.00638	0.00575			0.02876	0.05749	
Hf	**µg/L**		0.0017	0.00148			0.00151	0.00191			0.00200	0.00198			0.00249	0.00282	
(Hg)	**µg/L**		0.0059	0.00383			0.00607	0.00631			0.00331	0.00569			0.00472	0.00761	
Ho	**µg/L**		0.0039	0.000439			0.00019	1E-04			0.00021	0.00015			0.00019	0.00011	
(I)	**µg/L**		1.27	0.372			1.31	0.2434			1.57	0.357			0.749	0.2869	
(K)	**µg/l**	839	763	74	91		990	89.1			932	115			573	52.8	
La	**µg/L**		0.2154	0.0111			0.0018	0.000575			0.00383	0.00234			0.0057	0.00118	
Li	**µg/L**		0.5123	0.1144		2.04	2.12	0.1989	104	18	19	2.10	103	13.9	14.2	1.10	102
Lu	**µg/L**		0.0018	0.000475			0.00027	0.000198			0.00031	0.00028			0.00026	0.00016	
(Mg)	**µg/l**	2540	2462	171	97		5208	403			5095	530			3266	224	
Mn	**µg/L**	4.33	4.30	0.317	99	8.74	8.81	0.559	101	84.3	86.0	9.3	102	198	197	13.7	99
Mo	**µg/L**	0.27	0.23	0.0678	85	4.24	4.09	0.326	96	57.6	53.6	5.139	93	207	199	16.3	96
(Na)	**µg/l**	5380	5104	379	95		9726	786			8826	959			5934	433	
Nb	**µg/L**		0.00341	0.000846			0.00266	0.00549			0.00361	0.00890			0.00315	0.00267	
Nd	**µg/L**		0.198	0.0128			0.00163	0.000916			0.00225	0.00270			0.00196	0.00112	

Standard		SLSR-5 (N=212)				TM-23.4 (N=115)				TMDA-51.4 (N=69)				TMDA-52.3 (N=113)			
Element	unit	certified	MW	SDEV	%	certified	MW	SDEV	%	certified	MW	SDEV	%	certified	MW	SDEV	%
Ni	**µg/L**	0.476	0.466	0.0351	98	4.95	5.05	0.365	102	65.7	66.4	6.133	101	274	275	17.6	100
Pb	**µg/L**	0.081	0.088	0.0151	108	2.97	3.26	0.276	110	69.3	71.9	4.42	104	358	367	20.9	102
Pr	**µg/L**		0.0511	0.00291			0.00036	0.000158			0.00050	0.00064			0.00044	0.00028	
Rb	**µg/L**		1.27	0.0737		0.75	0.79	0.106	106	15.5	15.2	1.52	98	15.6	15.5	1.02	99
Sb	**µg/L**	0.3	0.30	0.0195	100	3.27	3.19	0.279	98	15	14.4	1.38	96	16.4	15.6	1.38	95
Sc	**µg/L**		0.020	0.0112			0.0153	0.0102			0.0138	0.0178			0.01528	0.0200	
(Se)	**µg/L**		0.083	0.0112		4.6	4.6	0.3486	99	13.8	13.0	1.123	94	21.4	20.2	1.42	94
Sm	**µg/L**		0.035	0.00306			0.00113	0.000686			0.00190	0.00114			0.00227	0.00089	
Sn	**µg/L**		0.020	0.0302		2.81	2.67	0.276	95	16.5	16	1.39	97	19.8	18.4	1.72	93
Sr	**µg/L**	53.6	54.9	2.83	102	111	115	8.45	103	116	118	10.6	102	286	287	17.5	100
Ta	**µg/L**		0.0005	0.000625			0.000839	0.00111			0.00109	0.00134			0.00097	0.00153	
Tb	**µg/L**		0.0036	0.000437			0.00017	0.000126			0.00021	0.00027			0.000180148	0.00013	
Te	**µg/L**		0.0077	0.0195			0.00549	0.0130			0.00533	0.00842			0.00674	0.0056	
Th	**µg/L**		0.0092	0.00347			0.00148	0.00401			0.00403	0.00544			0.00379	0.00535	
(Ti)	**µg/l**		1.69	0.1720		3.18	2.90	0.392	91	14.2	13.0	1.29	91	120	110	10.8	92
Tl	**µg/L**		0.0078	0.00574		3.98	4.81	0.593	121	20.4	24.0	4.03	118	18.3	21.5	3.071	117
Tm	**µg/L**		0.0016	0.00037			0.000166	9.785E-05			0.00019	0.00013			0.00016	0.00009	
U	**µg/L**	0.093	0.096	0.00756	103	5.01	5.25	0.395	105	29.1	30.1	2.30	103	22.7	23.5	1.72	104
V	**µg/L**	0.317	0.329	0.0351	104	1.93	1.94	0.315	100	48	47.2	4.88	98	145	140	9.8	97
W	**µg/L**		0.045	0.0239		4.8	5.1	0.768	107		13.2	3.30		9.9	9.98	0.822	101
Y	**µg/L**		0.114	0.00621			0.00326	0.000948			0.00438	0.00200			0.00541	0.00130	
Yb	**µg/L**		0.011	0.00130			0.00109	0.000799			0.00117	0.00050			0.00108	0.00057	
Zn	**µg/L**	0.845	0.910	0.1233	108	2.46	3.76	0.935	153	140	141	13.8	100	263	265	17.8	101
Zr	**µg/L**		0.023	0.00755			0.0120	0.0377			0.0120	0.0126			0.0394	0.0105	

3. RESULTS

Table 4 summarises the results of the Oppdal survey and compares the results with those obtained from some other surface water and ground water surveys in Norway. For a few elements (Br, F, NO_2, PO_4 – all measured by IC) all values were reported as below detection. For Br the results from the ICP-MS are available. For two further elements (Au, In) even the median value is "below detection". Table 5 shows the "relative abundance" of the elements in the dataset.

Table 5: Statistical summary of the Oppdal surface water samples and comparison with the median values observed for three other surface water sets (Oslo: Reimann et al., 2009; NTR: Nord-Trøndelag: Banks et al.., 2001 and Europe: FOREGS atlas: Salminen et al., 2005).

				OPPDAL			OSLO	NTR	EUROPE
Parameter	Unit	Method	DL	MIN	**MED**	MAX	MED		MED
pH				5.4	**6.7**	7.8	7.5	6.4	7.7
pH_lab				5.2	**7.2**	7.9			
COND	µS/cm			5	**35**	183			
COND_lab	µS/cm			5	**34**	175	16.7	34	30
ALK	mmol/L			0.05	**0.3**	1.4	1.05	0.11	na
TEMP	^{o}C			5.8	**10.9**	16.9			
Ag	µg/L	ICP-MS	0.001	<0.001	**0.001**	0.0028	na		na
Al	µg/L	ICP-MS	0.1	3	**22**	228	28	110	17.7
Al_AES	µg/L	ICP-AES	3	3	**27**	282			
As	µg/L	ICP-MS	0.01	0.018	**0.056**	1.34	<0.5		0.6
Au	µg/L	ICP-MS	0.001	<0.001	**<0.001**	0.0065	na		na
B	µg/L	ICP-MS	0.1	0.47	**0.98**	2.9	<20		15.6
Ba	µg/L	ICP-MS	0.01	0.73	**3.6**	19			
Ba_AES	µg/L	ICP-AES	1	1	**4**	21		<25	
Be	µg/L	ICP-MS	0.001	<0.001	**0.0055**	0.014	<0.05	<1	0.009
Bi	µg/L	ICP-MS	0.001	<0.001	**0.0010**	0.0021	<0.05		0.002
Br	µg/L	IC	100	<100	**<100**	<100			
Br	µg/L	ICP-MS	1	4.0	**8.3**	31	25		<10
Ca	µg/L	ICP-MS	1	255	**4125**	30433			
Ca_AES	µg/L	ICP-AES	10	300	**4610**	31700	26200	1900	40200
Cd	µg/L	ICP-MS	0.001	<0.001	**0.0027**	0.0070	<0.05	<6	0.01
Ce	µg/L	ICP-MS	0.001	0.0079	**0.076**	1.5	0.13		0.06
Cl	µg/L	IC	100	247	**1050**	4880	7830		8800
Cl_AES	µg/L	ICP-AES	100	300	**1200**	5200			
Co	µg/L	ICP-MS	0.01	<0.01	**0.024**	0.11	0.08	<20	0.16
Cr	µg/L	ICP-MS	0.01	0.013	**0.12**	0.70	<0.5		0.4
Cs	µg/L	ICP-MS	0.001	<0.001	**0.019**	0.12	0.01		0.006
Cu	µg/L	ICP-MS	0.01	0.12	**0.45**	2.1	0.9	<1	0.88
Dy	µg/L	ICP-MS	0.001	0.0024	**0.014**	0.11	0.02		0.008
Er	µg/L	ICP-MS	0.001	0.0016	**0.0090**	0.054	0.01		0.006
Eu	µg/L	ICP-MS	0.001	<0.001	**0.0043**	0.038	0.02		0.005
F	µg/L	IC	500	<500	**<500**	<500	150		100

				OPPDAL			OSLO	NTR	EUROPE
Parameter	Unit	Method	DL	MIN	**MED**	MAX	MED		MED
Fe	µg/L	ICP-MS	0.1	0.96	**13**	436			
Fe_AES	µg/L	ICP-AES	3	<3	**14**	467	40	130	70
Ga	µg/L	ICP-MS	0.001	<0.001	**0.0045**	0.020	<0.05		na
Gd	µg/L	ICP-MS	0.001	0.0032	**0.019**	0.16	0.04		0.01
Ge	µg/L	ICP-MS	0.01	<0.01	**0.027**	0.078	<0.05		0.009
Hf	µg/L	ICP-MS	0.001	<0.001	**0.0024**	0.0099	<0.02		0.004
Hg	µg/L	ICP-MS	0.01	<0.01	**0.01**	0.033	na		na
Ho	µg/L	ICP-MS	0.001	<0.001	**0.0027**	0.018	<0.01		0.002
I	µg/L	ICP-MS	0.1	0.17	**0.53**	1.43	na		na
In	µg/L	ICP-MS	0.001	<0.001	**<0.001**	0.0013	<0.01		na
K	µg/L	ICP-MS	1	49	**319**	1689			
K_AES	µg/L	ICP-AES	100	<100	**350**	1900	1240	<500	1600
La	µg/L	ICP-MS	0.001	0.0076	**0.100**	1.5	0.15		0.034
Li	µg/L	ICP-MS	0.01	0.014	**0.11**	0.60	0.6	<5	2.1
Lu	µg/L	ICP-MS	0.001	<0.001	**0.0017**	0.0074	<0.01		<0.002
Mg	µg/L	ICP-MS	1	52	**415**	2341			
Mg_AES	µg/L	ICP-AES	1	53	**447**	2620	2770	550	6020
Mn	µg/L	ICP-MS	0.01	0.036	**0.48**	8.6	27.6	<50	15.9
Mo	µg/L	ICP-MS	0.001	0.0013	**0.058**	0.88	0.9	<10	0.22
Na	µg/L	ICP-MS	1	327	**1116**	2983			
Na_AES	µg/L	ICP-AES	100	400	**1200**	3100	4600	2600	6600
Nb	µg/L	ICP-MS	0.001	<0.001	**0.0025**	0.010	0.02		0.004
Nd	µg/L	ICP-MS	0.001	0.0082	**0.10**	1.2	0.15		0.04
Ni	µg/L	ICP-MS	0.01	0.022	**0.25**	2.5	<0.2	<40	1.91
NO_2	µg/L	IC	100	<100	**<100**	<100	<50		na
NO_3	µg/L	IC	250	<250	**310**	340	2540	200	2800
Pb	µg/L	ICP-MS	0.001	<0.001	**0.018**	0.088	<0.1	<90	0.093
PO_4	µg/L	IC	499	<400	**<400**	<400	<200		na
Pr	µg/L	ICP-MS	0.001	0.0019	**0.026**	0.34	0.03		0.009
Rb	µg/L	ICP-MS	0.001	0.18	**1.1**	6.1	1.62		1.3
Sb	µg/L	ICP-MS	0.001	0.0016	**0.0075**	0.072	0.07		0.07
Sc	µg/L	ICP-MS	0.01	<0.01	**0.028**	0.081	<1		na
Se	µg/L	ICP-MS	0.01	0.010	**0.040**	0.15	<0.5		0.34
Si_AES	µg/L	ICP-AES	50	<50	**1262**	3085	2200	530	8030
Sm	µg/L	ICP-MS	0.001	0.0023	**0.020**	0.22	0.03		0.009
Sn	µg/L	ICP-MS	0.001	<0.001	**0.0051**	0.018	<0.05		na
SO4	µg/L	IC	200	<200	**1145**	23200	12800		16100
SO4_AES	µg/L	ICP-AES	50	340	**1420**	24300		1600	
Sr	µg/L	ICP-MS	0.1	1.7	**13**	71	106		110
Sr_AES	µg/L	ICP-AES	1	2	**15**	78		8.3	
Ta	µg/L	ICP-MS	0.001	<0.001	**0.0015**	0.0050	<0.02		na
Tb	µg/L	ICP-MS	0.001	<0.001	**0.0028**	0.022	<0.01		0.002
Te	µg/L	ICP-MS	0.001	<0.001	**0.015**	0.031	<0.05		na
Th	µg/L	ICP-MS	0.001	<0.001	**0.012**	0.12	<0.05		0.009
Ti	µg/L	ICP-MS	0.01	<0.01	**0.14**	1.5	<10	<4	na

Parameter	Unit	Method	DL	OPPDAL MIN	OPPDAL **MED**	OPPDAL MAX	OSLO MED	NTR	EUROPE MED
Tl	µg/L	ICP-MS	0.001	0.0024	**0.012**	0.029	0.01		0.005
Tm	µg/L	ICP-MS	0.001	<0.001	**0.0014**	0.0065	<0.01		<0.002
U	µg/L	ICP-MS	0.001	0.0066	**0.035**	0.69	0.59		0.32
V	µg/L	ICP-MS	0.01	0.031	**0.086**	0.30	0.7	<7	0.46
W	µg/L	ICP-MS	0.001	<0.001	**0.011**	0.051	<0.02		0.007
Y	µg/L	ICP-MS	0.001	0.012	**0.080**	0.55	0.13		0.064
Yb	µg/L	ICP-MS	0.001	0.0011	**0.0092**	0.047	0.01		0.006
Zn	µg/L	ICP-MS	0.1	0.49	**1.90**	17		<6	
Zr	µg/L	ICP-MS	0.001	0.0020	**0.024**	0.15	0.08		0.053

Table 6: Relative abundance (median value) of elements in the Oppdal surface water samples in decreasing order.

µg/L	**Elements**
>1000	Ca, SO_4, Si, Cl, Na
>100-1000	Mg, K, NO_3
>1-100	Al, Sr, Fe, Br, Ba, Zn, Rb
>0.1 - 1	B, I, Mn, Cu, Ni, Ti, Cr, Li
>0.01 - 0.1	Nd, La, V, Y, Ce, Mo, As, Se, U, Sc, Ge, Pr, Co, Zr, Sm, Cs, Gd, Pb, Te, Dy, Tl, Th, W
>0.001 - 0.01	Hg, Yb, Er, Sb, Be, Sn, Ga, Eu, Tb, Ho, Cd, Nb, Hf, Lu, Ta, Tm
0.001	Bi, Ag
<0.001	Au, In
<DL	F, PO_4, NO_2

Compared to the other datasets (see Tab. 4) the following elements/parameters fall into the expected range: EC, pH, alkalinity, Al, Bi, Ca, Ce, Cr, Cu, Dy, Er, Eu, Gd, Hf, Ho, La, Lu, Mg, Nb, Nd, Ni, NO_3, Pr, Rb, Si, Sm, SO_4, Tb, Th, Tl, W, Y, Yb, Zr. Unusually high concentrations are reported for Cs and Ge. The two elements show a different regional distribution, a joint source (e.g., enhanced weathering, presence of clay in the catchments) can thus be excluded – see maps below and in the attachments). The elements As, B, Br, Cd, Cl, Co, Fe, K, Li, Mn, Mo, Na, Pb, Sb, Se, U, V, Zn show in contrast all very low concentrations in the Oppdal samples.

3.1 Methodological tests

3.1.1 Field vs. laboratory measurements, pH and electrical conductivity (EC)

Figure 6 compares the results of the EC and pH measurements in the field and in the laboratory. The EC measurements show a perfect comparability. The pH values are in general comparable, however there exists quite a deviation between field and laboratory measurements with a tendency towards higher pH values for the laboratory results. The instrument used in the laboratory is far superior to the simple field instrument thus the laboratory values should rather be used here though the

generally higher pH values measured in the lab may point towards a degassing effect during sample storage, which indicates that pH should really be measured right in the field.

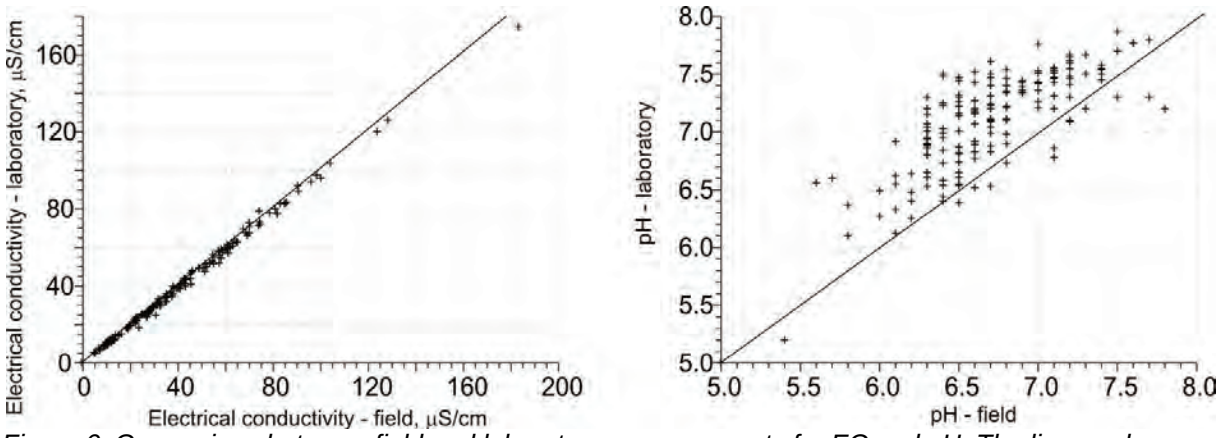


Figure 6: Comparison between field and laboratory measurements for EC and pH. The line marks a 1:1 relation.

3.1.2 ICP-QMS vs. ICP-AES, major elements

A total of 27 elements (Al, As, Ba, Be, B, Ca, Cd, Cl, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, PO_4, Sc, Si, SO_4, Sr, Ti, V and Zn) were also measured on an ICP-AES, which has principally considerably higher detection limits than the ICP-MS. However, a few elements can either not be determined by ICP-MS or have so high concentrations that the measurements on the ICP-AES become more reliable. In addition these results can again be used as an independent quality control of the ICP-MS results. Figure 7 shows as an example XY plots for two elements as analysed with the two different techniques.

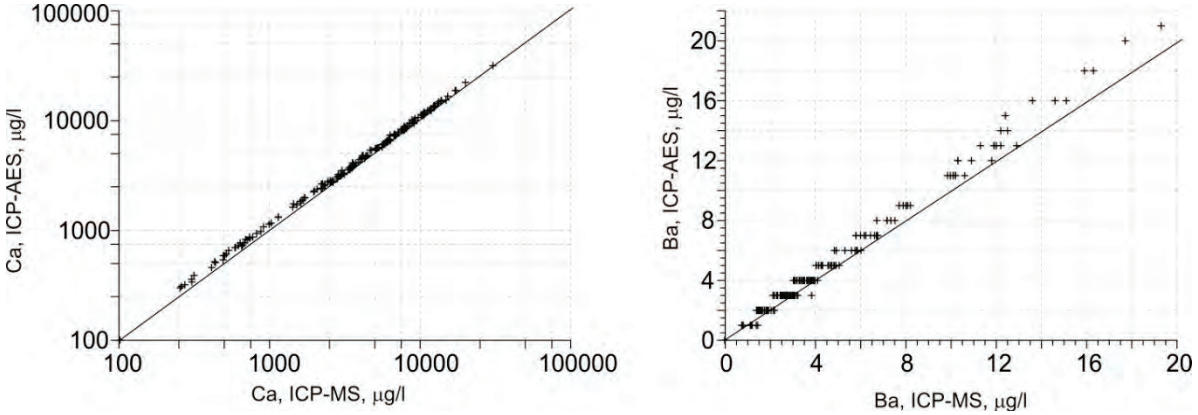


Figure 7: Comparison of analytical results for two elements (Ca, Ba) as received from the ICP-AES and the ICP-MS. The line indicates a 1:1 relation. Results for Ca are excellent. The Ba results are plagued by discretisation of the ICP-AES results.

Figure 7 indicated some problems with the results for Ba from the ICP-AES. This was investigated in more detail by plotting the data distribution for the Ba results from the two techniques in CP diagrams (Fig. 8). Here the discretisation of the Ba results from the ICP-AES becomes more clearly visible. When looking at the other elements in

the form of such CP diagrams it turned out that such a discretisation of the values could be observed for most of the analytical results reported from the ICP-AES. The reason is that the results from the ICP-AES were originally reported in mg/l, while all results from the ICP-MS were reported in µg/l. Reporting in mg/l led to an excessive rounding of all ICP-AES values. The dataset was practically destroyed via the rounding, good data were sacrificed for good looking numbers.

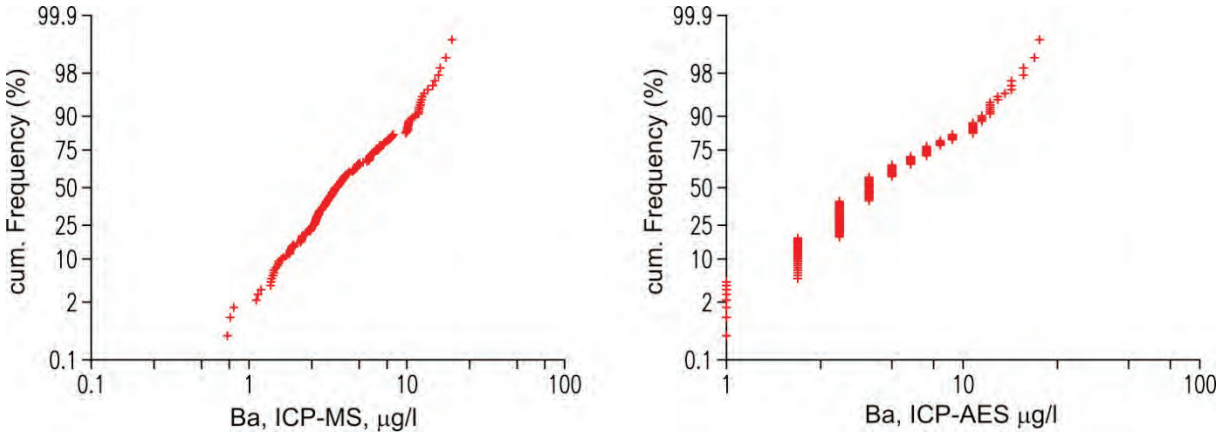


Figure 8: CP diagrams for Ba as reported from the ICP-MS (left) and the ICP-AES (right). The strong dicretisation of values that becomes visible in the right hand diagram is due to the fact that Ba from the ICP-AES was originally reported in mg/l and that the values were excessively rounded.

The original instrument readings from the ICP-AES were unfortunately no longer available when the problem was detected. Thus it was decided to rather us the ICP-MS values even for those elements where one would usually rather tend to use the ICP-AES results.

3.1.3 Hotel duplicates

At 24 sites a second untreated sample was taken in three 0.5 litre PE bottles in the field. These samples were filtered and acidified in the evening in the hotel. If unacidifed and unfiltered samples could be taken in the field and prepared under controlled conditions in the evening it would become possible to take more samples per day in addition to being able to avoid carrying splits of the ultrapure acids along in the field. Especially on rainy days this would minimize the danger of contamination of the samples during field work. It would also be easier to have several sample teams in parallel in the field. The risk is that adsorption/desorption processes might occur on the walls of the large preliminary sample bottles or that elements might form or bind to colloids during transport to the hotel. A further risk is leaching of elements (e.g. Ba, Sb, Zn) from the bottle material into the water. The results of the two samples were again plotted in XY diagrams (Fig. 9 shows four examples all results are available in Appendix IV and the conclusions are as follows:

General detection limit problem (all values below DL): Br_IC, F_IC, NO2_IC, PO4_IC

Leaching from bottle material: Zn

Not reproducible: Cd, Ge, Pb

Poor to very poor reproducibility: pH, Ag (DL!), Hg, In, NO3, Sb, Sc, Sn, Ta, Te, Zn

Problems with single samples: Cl_AES

OK to good reproducibility: alkalinity, Au, B, Be, Bi, Co, Ga, Hf, Nb, Se, Th, Ti, Tl, Tm, V, W, Yb

Excellent reproducibility: pH_lab, conductivity, conductivity_lab, Al, Al_AES, As, Ba, Ba_AES, Br, Ca, Ca_AES, Ce, Cl, Cr, Cs, Cu, Dy, Er, Eu, Fe, Fe_AES, Gd, Ho, I, K, K_AES, La, Li, Lu, Mg, Mg_AES, Mn, Mo, Na, Na_AES, Nd, Ni, Pr, Rb, Si_AES, Sm, SO4_IC, SO4_AES, Tb, U, Y, Zr.

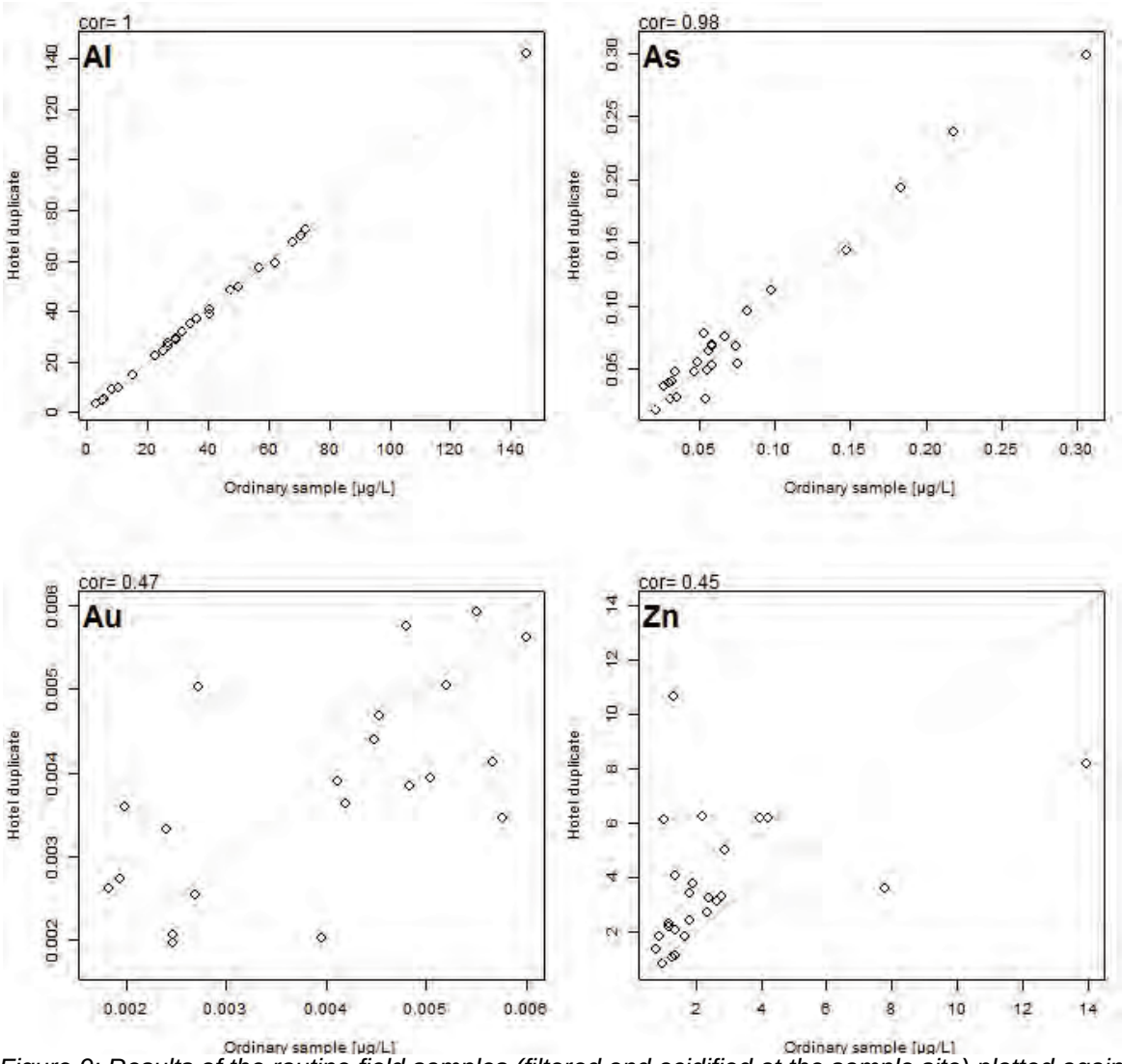


Figure 9: Results of the routine field samples (filtered and acidified at the sample site) plotted against the results of the "hotelduplicates" (filtered and acidified in the evening in the hotel).

In general it can be concluded that taking unfiltered and unacidified samples in the field and to filter and acidify them the same evening in the hotel is a viable approach under Norwegian field conditions. Even for gold at extremely low concentrations and thus plagued with a high variation the diagram indicates that there are no additional artefacts from the procedure; no trend towards higher or lower values in one of the

two samples is discernible (Fig. 9, lower left). For Zn, however, as the only element a bottle related effect is visible (Fig. 9, lower right), the analytical results of the samples that were first stored in the large bottles are all (with the exception of 2 samples) higher than the results for the field filtered and acidified samples. This points at a certain amount of Zn leaching from the large bottles into the samples, even given less than one full day of storage in these bottles. Whether the results for Ge, Pb, Sb and Sn are really an effect of differences in sampling procedure can not be assessed due to the very low concentration levels near the detection limits of these elements.

3.1.4 Acidification: HNO_3 vs. HCl

In order to hold all elements in solution water samples usually are field acidified to a pH of about 2 by adding a defined number of drops of ultrapure HNO_3 to the sample containers. Gold is known for its tendency to adsorb to the bottle walls. To keep gold in solution a number of special techniques are suggested in the literature. A simple and easy procedure appeared to be to acidify the samples with ultrapure HCl instead of HNO_3. Because Au was the main element for which the survey was carried out it was decided to take 2 samples at each location, one according to the standard procedure (filtered and acidified with HNO_3) and a second one which was also filtered but acidified with ultrapure HCl instead of HNO_3. This meant that two bottles of ultrapure concentrated acid had to be carried around in the field. To compare results XY plots were produced for all elements analysed on the ICP-MS. The following results were obtained.
Well to very well comparable: Al, As, B (in general somewhat higher in HCl), Ba, Br (clearly higher in HCl), Co, Cr, Cs (somewhat higher values in HCl),Ca, Ce, Gd, Dy, Er, Eu, Fe, K, Ho, I, La, Li, Lu, Nd, Ni, Mg, Mn, Mo, Na, Pr, Rb, Sb, Sm, Sr, Tb, Th, Tm, U, V (but generally higher in HCl), Y, Yb, Zr.
Poor, but still comparable: Ag, Be, Cu, Hf (higher in HNO3), Se, Ti, W.
Incomparable: Au (in general higher in HNO_3), Bi (in general higher in HNO_3), Cd, Ga (much higher in HCl), Ge, Hg, In (higher in HCl), Nb (in general higher in HCl), Pb (much higher in HNO_3), Sn, Sc, Tl (much higher in HNO_3), Ta, Te (higher in HNO_3), Zn (in general higher in HNO_3).

Figure 10 shows a few examples: As with a good reproducibility for both samples, Au with the clearly higher results for the HNO_3-acidified samples, Pb, where almost all results for the HNO_3 acidified samples are higher and a correlation between the two results is not even indicated and V where all results are clearly higher for the HCL-acidified samples but a general correlation between the two results still exists. Plots for all elements are shown in the attachments.

In conclusion it did not pay to acidify the samples with HCl. Gold results were actually slightly higher and, according to the resulting map and the duplicate analyses, more reliable in the HNO_3-acidified samples. Probably it would have been more interesting to compare filtered to unfiltered samples than to test the two different acids.

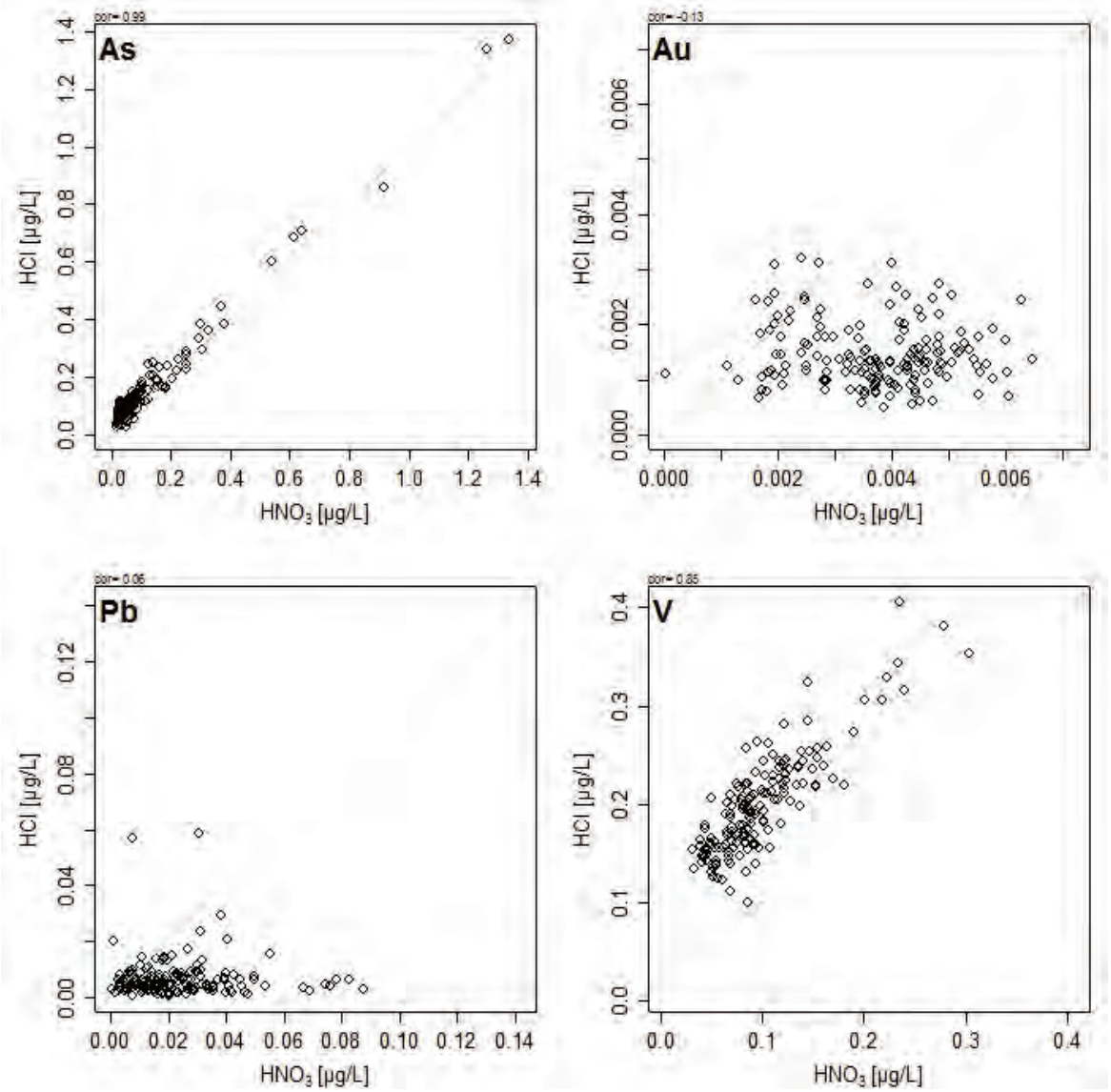


Figure 10: XY plots showing the analytical results of the duplicate samples acidified with HNO_3 and HCl

3.2 Regional distribution – geochemical maps

Figure 11 shows maps for nine selected elements, all maps are available in the Appendix. When studying the maps in the appendix the overall quality of the results for each element should be considered, e.g., the blind values as presented in Table 2, the precision shown in Table 3 and the results obtained for the international reference materials in Table 4.

3.2.1 Indications for mineralisation

Although the gold values are very low (see Table 5) the map (Fig. 11, Au) shows an interpretable regional distribution. Both, the river Gisna (for location see Fig. 1), where the gold nugget was found, and the occurrence at Kells Creek (Gråurdfjellet – for location see Fig. 1) are indicated by Au anomalies. Furthermore a quite substantial region in the south eastern corner of the survey area (Sissihøa/ Orkelsjøen) is indicated by no less than five streams with enhanced Au values. Along the same geological unit but further to the north quite a number of small mineral

occurrences (not all verified) are reported in NGU's ore occurrences database (see Fig. 1) – the area is clearly indicated in the SO_4 map. The Garli showing is not visible on the Au map, the reason is that it occurs close to a larger river that was not sampled.

A distinct Ag, Cu, REE, (Te, Th, V) marks the general area of Gråurdfjellet / Trondfjellet / Soløyfjellet between Dinsdalen and Åmotdalen in the south of the survey area (see Cu-map in Fig. 11). The Au anomaly in the upper reaches of Tronddalen lies in the centre of the indicated area. The Au showing at Gråurdfjellet has associated Cu, Ag and locally Te mineralisation (Livgard, 1993).

The Blåøret area directly to the north of Oppdal is marked by a distinct As, Mo, Sb and V anomaly (see As and Mo-maps in Fig. 11, the maps for the other elements are available in the appendix). This is an unusual element association for any geogenic source of these elements and one could speculate whether the values are related to the extensive use of the area for skiing. Some further investigations appear justified. Elevated As, Mo and Sb values do also mark the adjacent Innset massif directly to the north of Oppdal (compare Fig. 2 and Fig. 11). Here As, Mo and Sb are accompanied by numerous high values of Al, Cr, REEs, Li, Mn, Ta, Th, U and Zr. A further As and Sb anomaly occurs to the north of Berkåk (see Fig. 11). All other anomalies rather indicate geology than possible mineralisation.

3.2.2 Geology

High SO_4-values mark the rock units at the eastern border of the survey area (see Fig. 11 – Orkelsjøen - Innerdalsvatnet – Skaumsjøen, see Fig. 1 for locations). In contrast the area around Gråurdfjellet / Trondfjellet / Soløyfjellet between Dinsdalen and Åmotsdalen is marked by exceptionally low SO_4-concentrations. Further elements that show low concentrations in this area are As, Ca, Cs, Mg, Mo, Na, Ni, Sn, and Sr. In contrast all REEs (see Fig. 11, Ce as an example) show high concentrations in this area.

A sizable anomaly of Ca, K, Rb and Sr (see Fig. 11, Ca) marks the area from Orkelsjøen to Innerdalsvatnet (in part coinciding with the Au anomalies – see above) and in general the eastern border of the survey area. This is an area where both, calcareous micaschists as well as black schists are known to occur.

In general the maps for many elements reflect geological features as visible in Figure 2 surprisingly well. A high density surface water map could definitely aid geological mapping. Interesting for geological mapping and interpretation may be the difference in concentration levels for many elements (see, for example, Ca in Fig. 11) in the middle part of the north-south running units of volcanoclastic and clastic rocks at the eastern survey border.

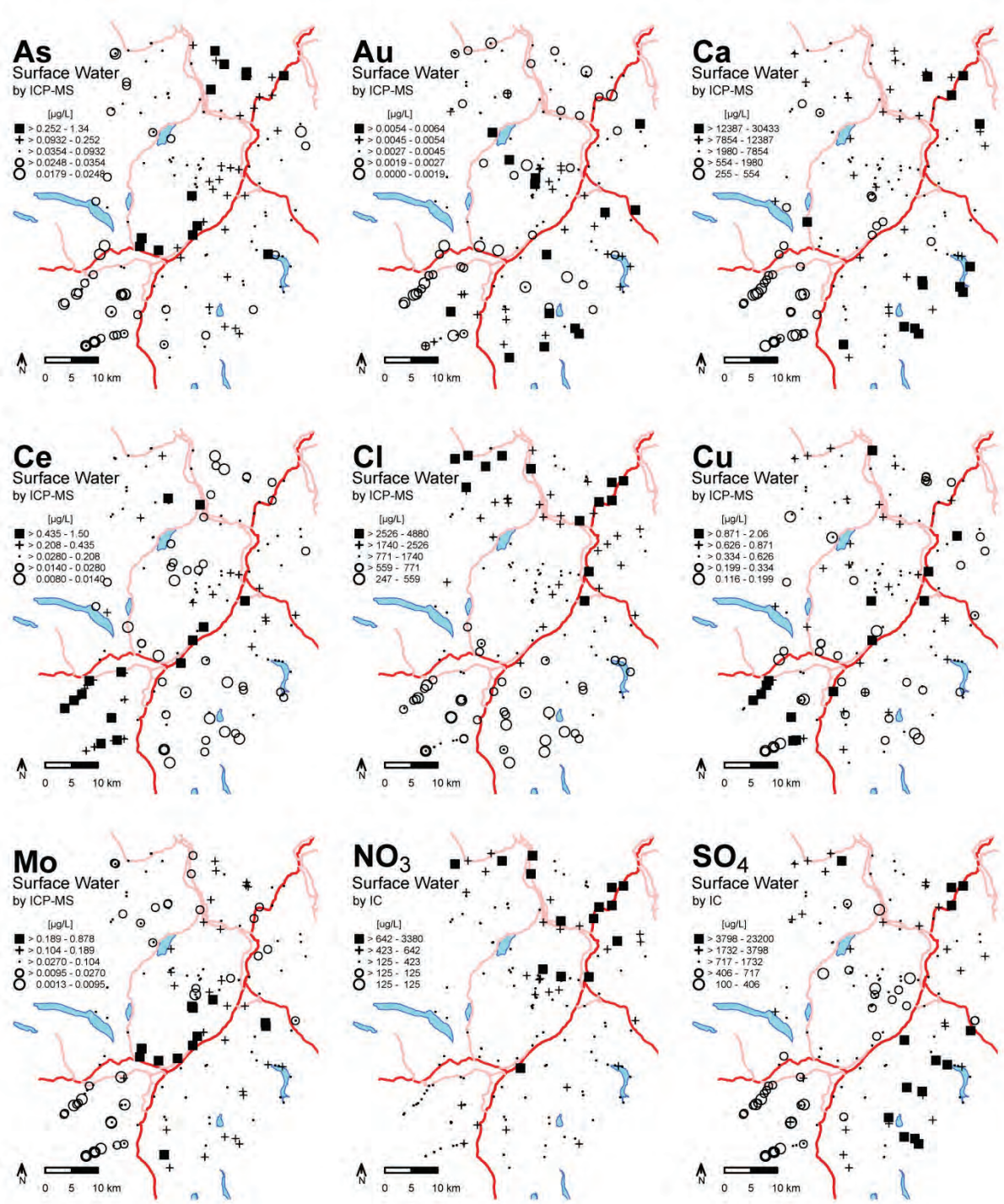


Figure 11: Geochemical maps for 9 selected elements (As, Au, Ca, Ce, Cu, and Mo as analysed by ICP-MS and Cl, NO_3 and SO_4 as analysed by IC), for all maps see Appendix.

3.2.3 Seaspray

The Oppdal area is far inland from the North-Atlantic ocean. With an average distance of over 100 km from the coast it was not expected that marine aerosols will still dominated the surface water geochemistry. In the North-Trøndelag data (Banks et al., 2001) the input of marine aerosol was the dominating factor for several elements and a very strong coast-inland gradient was observed for the first 100 km from coast. However, even in the Oppdal area the regional distribution of a number of elements is still visibly influenced by the input of marine aerosols: B, Br, Cl, I, Na (see

Fig. 11 for Cl and all other elements the maps in the Appendix) are all strongly affected.

The elements Mg and Sr are only slightly (still detectable in an XY diagram of Mg or Sr against Cl), the element Se is not affected. When comparing the concentrations in the Oppdal stream waters to the Nord-Trøndelag surface water results (Banks et al., 2001- see Table 5) the median values for Cl and Na in Nord-Trøndelag, with its long coast line, are by a factor of 2-4 higher than those in the Oppdal area.

3.2.4 Human impact

The map for NO_3 looks almost like one of the "seaspray" maps (Cl, B, Br, Na): low values in the southern half of the area, high values in the northern half (see Figure 11). However, here the high values of NO_3 are an "artefact" of altitude – at lower altitudes there are more human activities (farming, cows instead of sheep) and this is what becomes visible on the map – an increased impact of agriculture and grazing animals at the low altitudes.

The distinct As, Mo, Sb marking the streams draining the main skiing area near Oppdal (see Fig. 11 the maps for As and Mo, Sb map in the Appendix) is puzzling, there is no obvious geological explanation and the anomalies cut several established geological boundaries. It is thus a question whether these anomalies might be related to the land use (skiing arena) in the area. Further investigations appear justified.

4. CONCLUSIONS

A number of important conclusions can be drawn from this test survey using predominantly water samples collected from 2nd and 3rd order streams:
(1) Water is a well suited sample material for geochemical mapping and mineral exploration in Norway provided that very low detection limits for the most interesting elements are reached and blind values can be kept low. Geology (lithology) is very well reflected in surface water geochemistry.
(2) Under Norwegian field conditions and given the very low values of electrical conductivity in the collected surface waters it would probably have been possible to collect unfiltered water samples. This would allow for a much more effective sample collection program. The test with the hotel duplicates also indicates that it should be sufficient if the samples are acidified each evening in the hotel.
(3) The use of factory new HDPE bottles did not result in any obvious contamination or adsorption/desorption problems for most elements. This reduces the cost for such a survey considerably. The large 0.5 l bottles used for the hotel duplicates did leach some Zn. A leaching test of any new brand of bottles before use is advisable.
(4) Acidification with HCl (in addition to the traditional HNO_3) did not provide any advantages (e.g., the expected superior stabilisation of Au).

In general the Oppdal water samples show very low background values for most elements. Several interesting anomalies (Orkelsjøen area,

Trondfjell/Gråurdfjell/Soløyfjell area) were found and the areas with known gold mineralisation (Gisnadal, Gråurdfjell) were reliably detected.

Slightly higher NO_3 concentrations in the streams at an altitude < 500 m indicate the impact of farming and human activities. An As, Mo, Sb, V anomaly is found directly to the north of Oppdal in streams draining the main skiing areas. Here it can not be decided whether this may be an indication of the anthropogenic activities in the area or whether this is a mineralisation related anomaly.

A higher density water survey, collecting samples from all first order streams and taking unfiltered and hotel-acidified samples appears justified. Collecting unfiltered samples that are acidified in the evening in the hotel would allow for fast and effective sampling.

ACKNOWLEDGEMENTS

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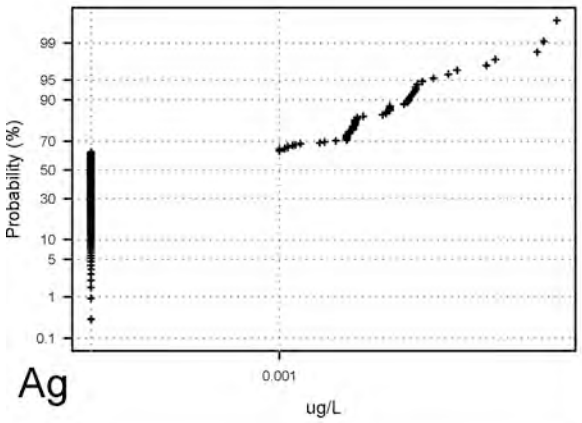
Appendix I: CP diagram for all elements (HNO_3, ICP-MS)



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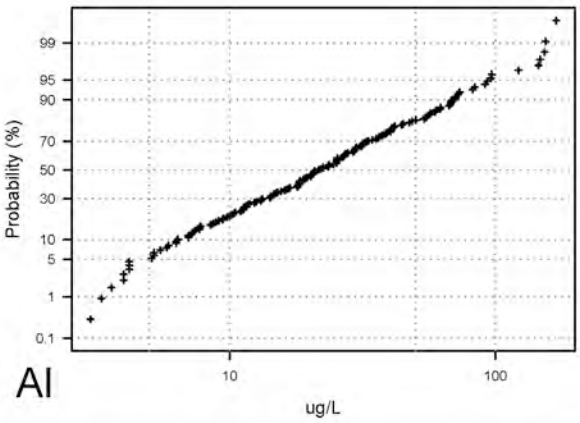

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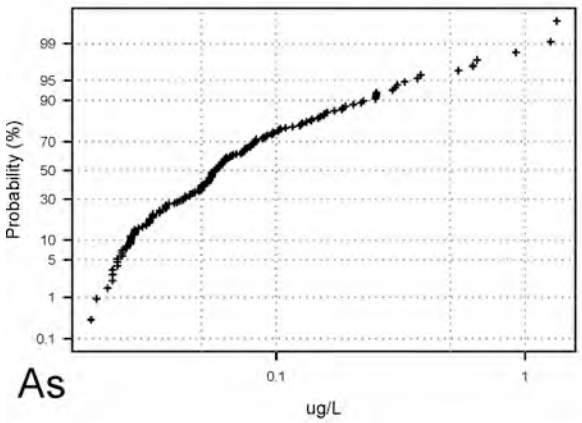

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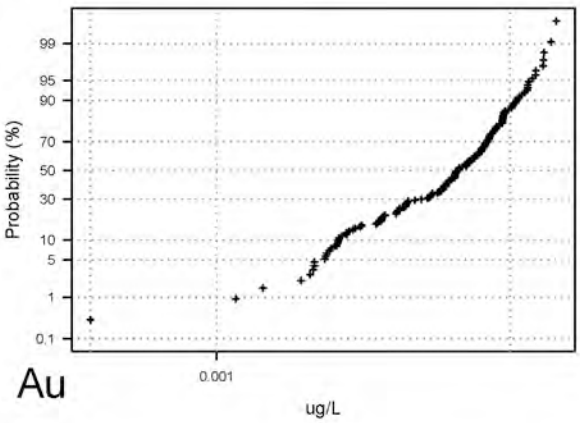

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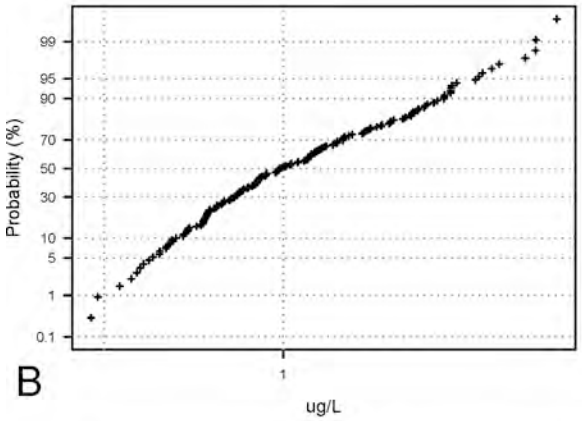

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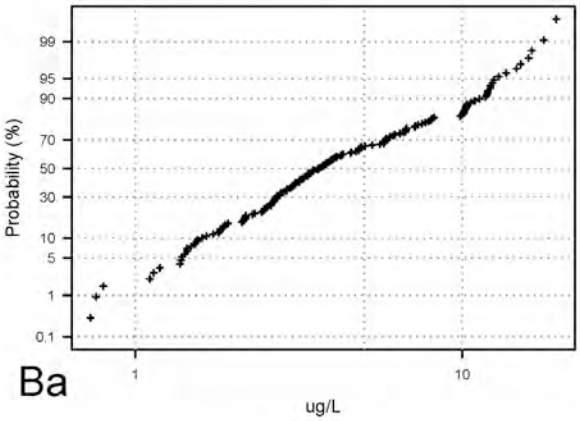

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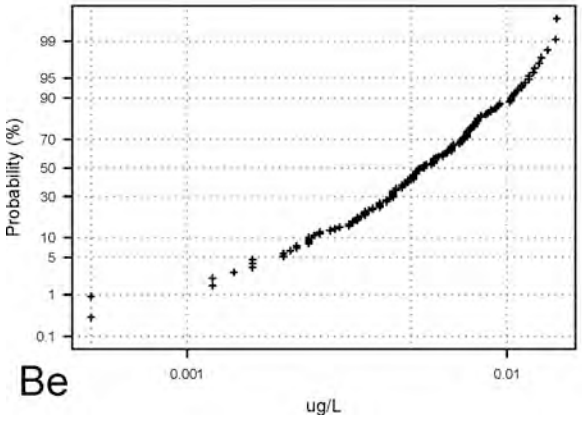

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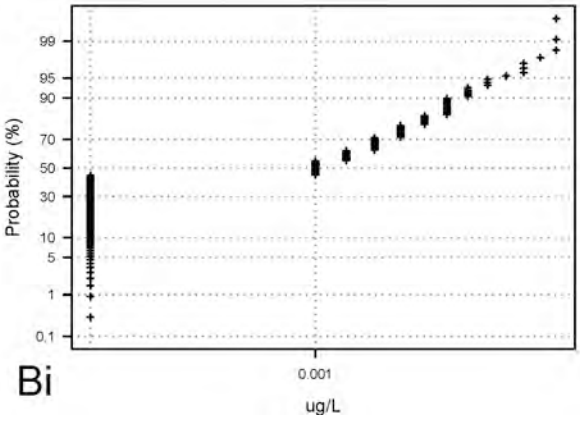

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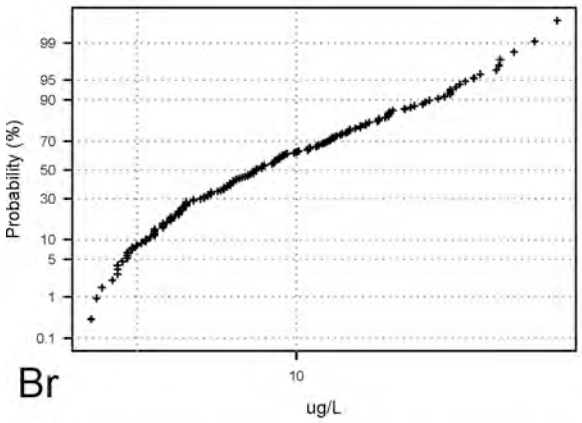

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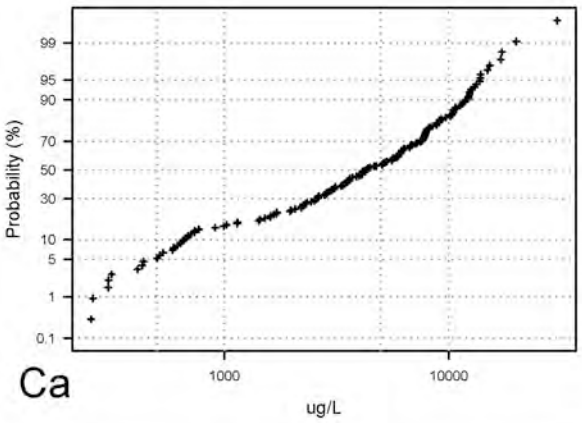

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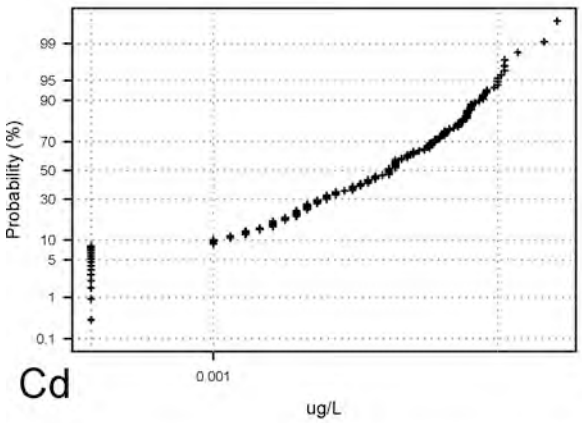

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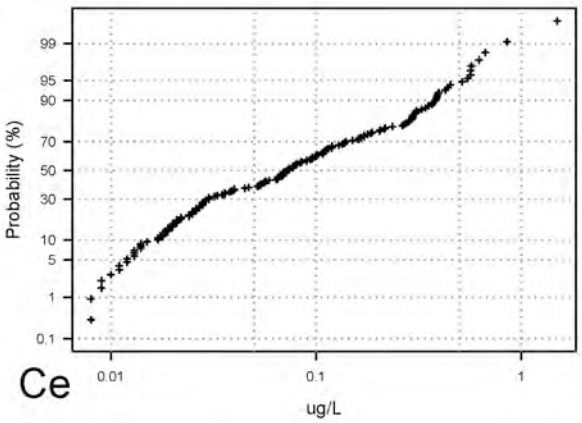

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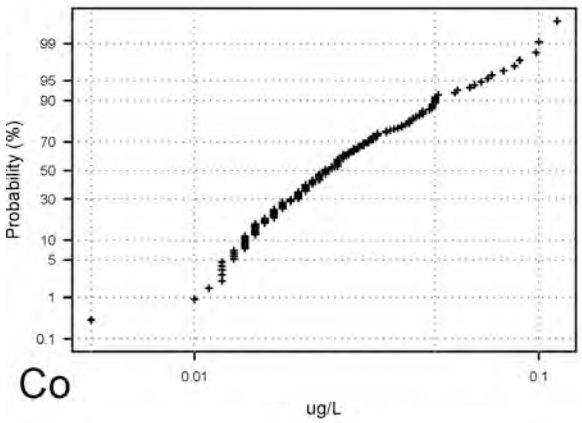

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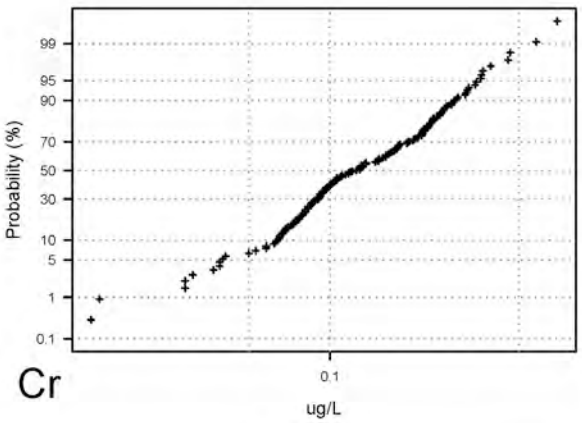

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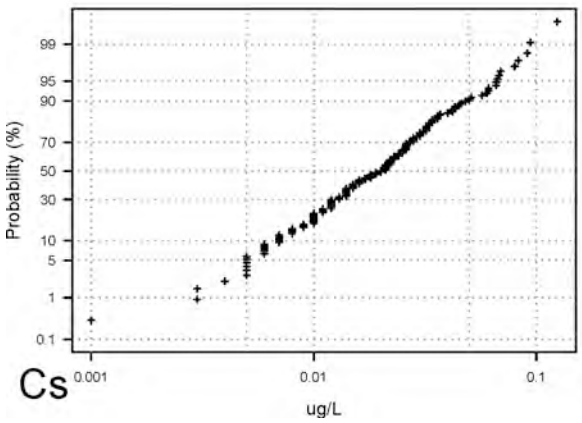

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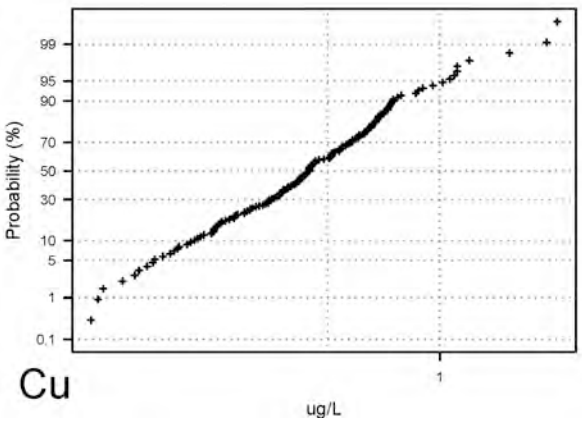

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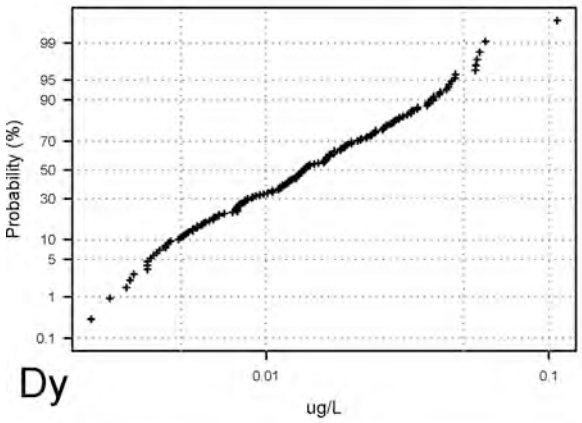

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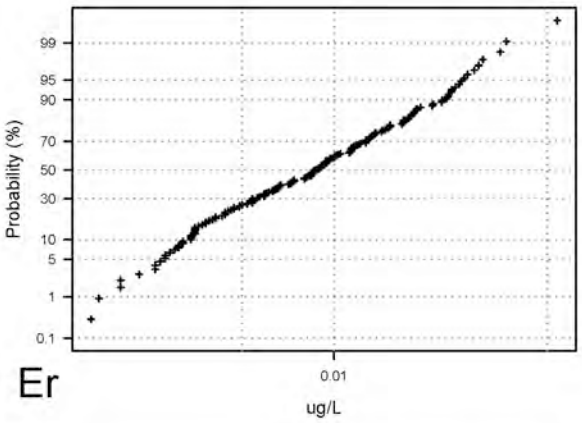

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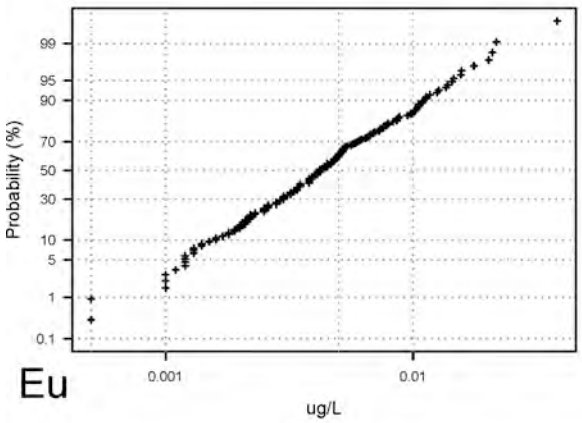

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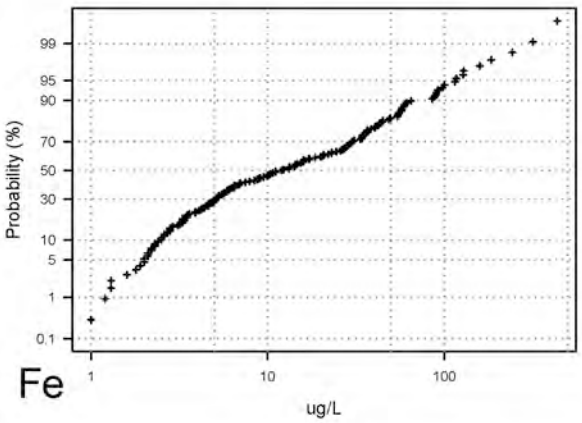

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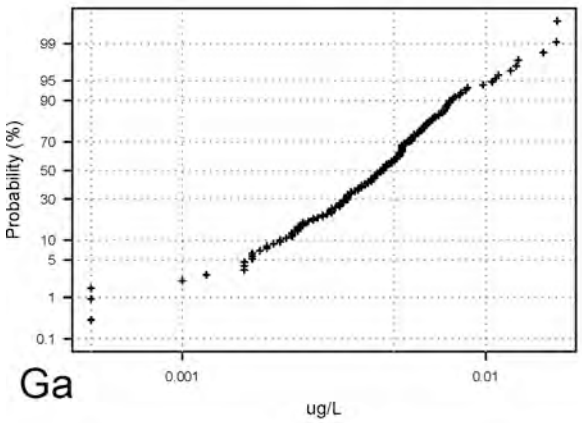

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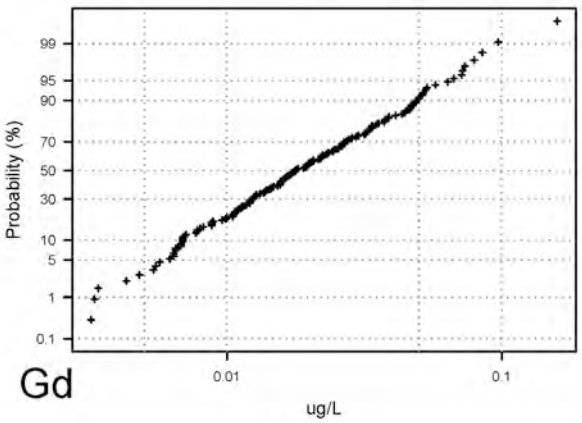

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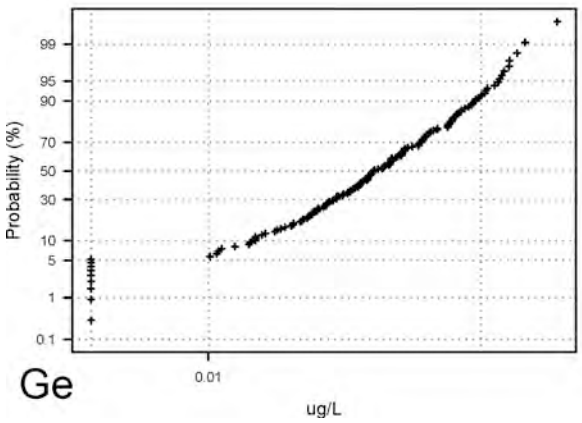

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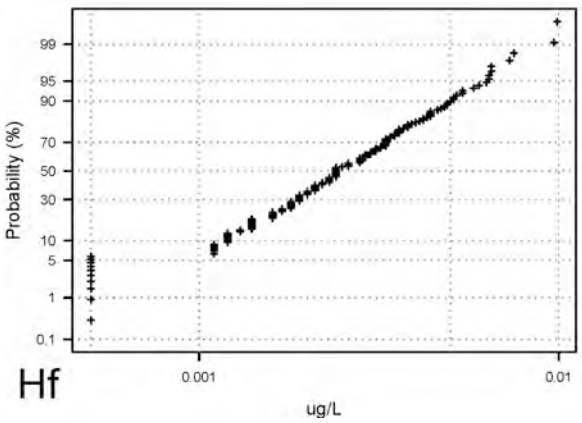

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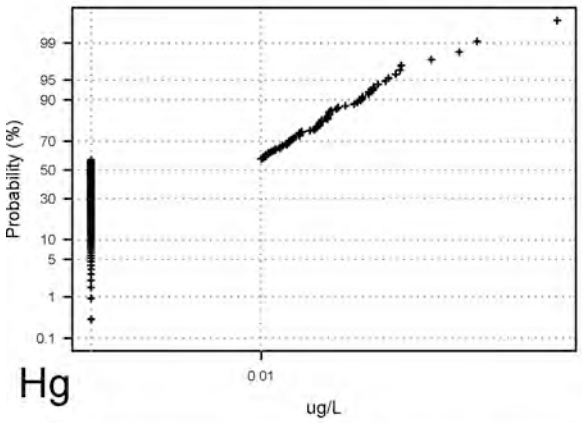

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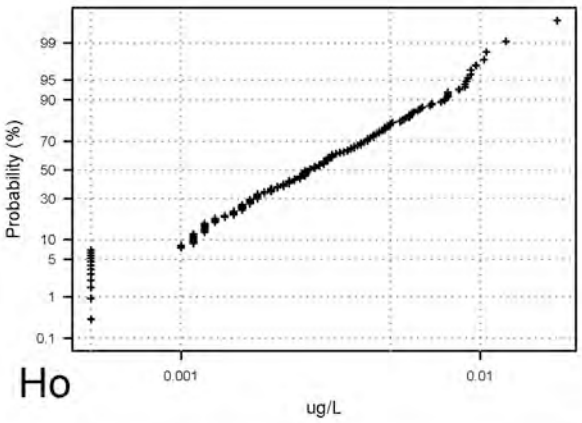

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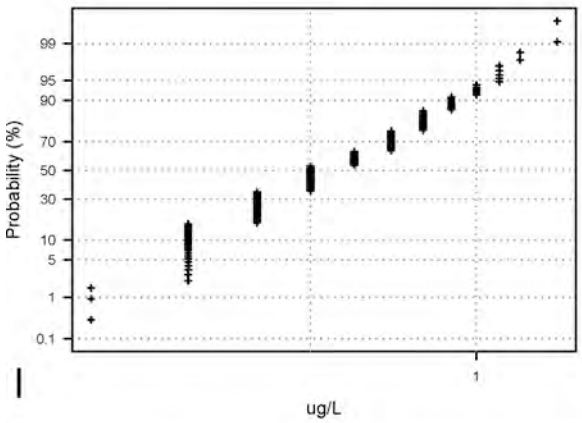

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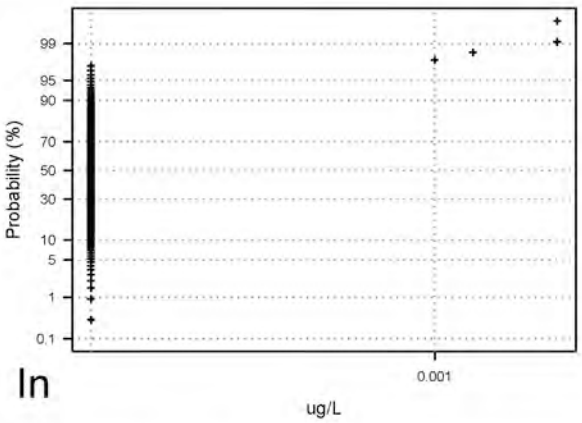

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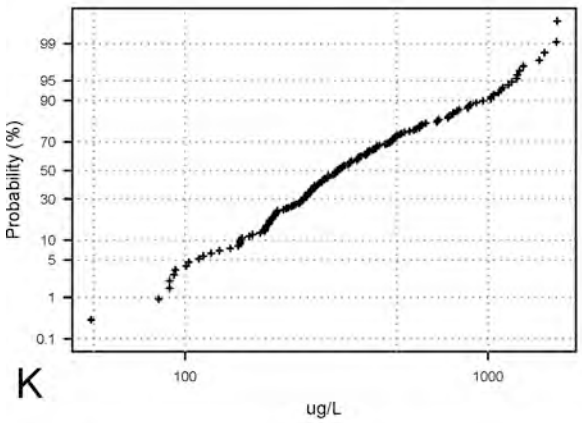

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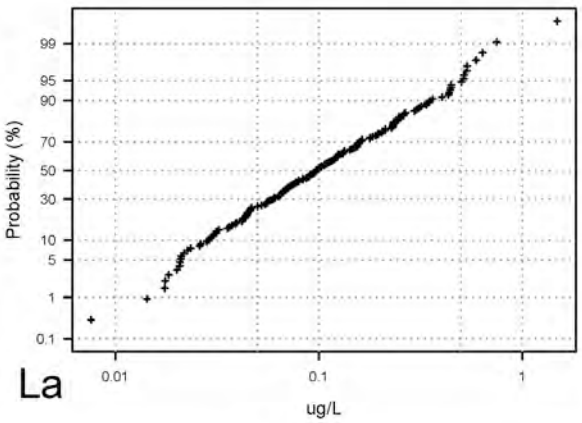

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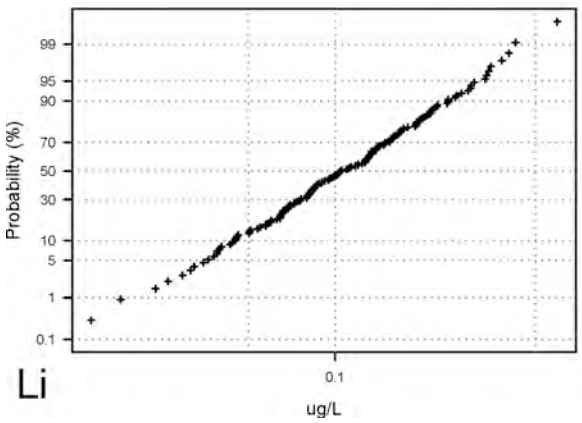

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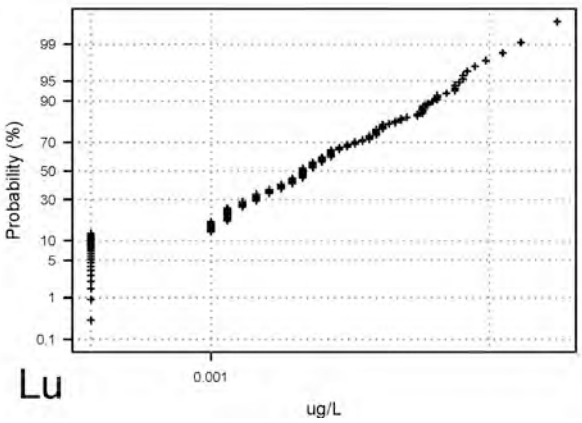

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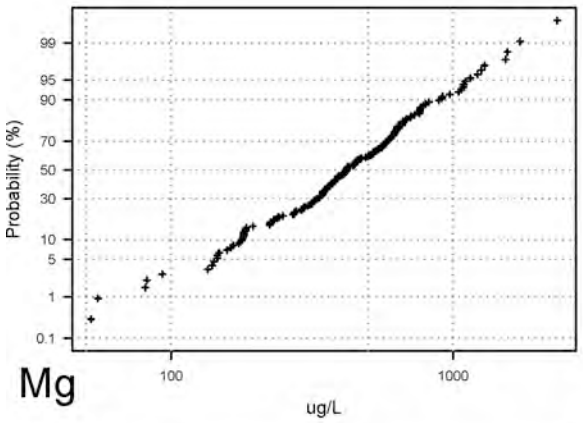

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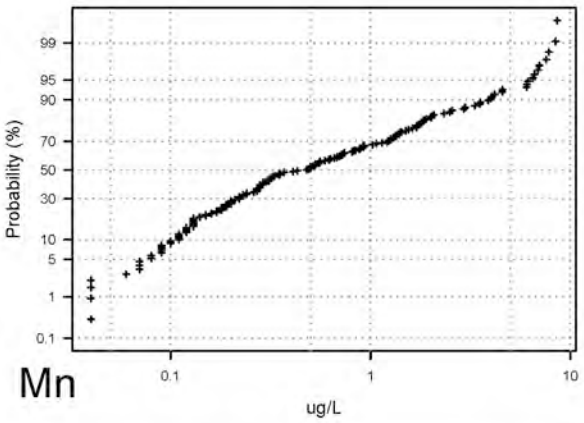

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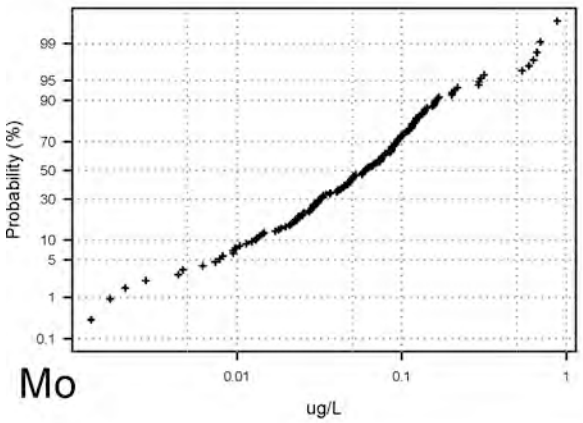

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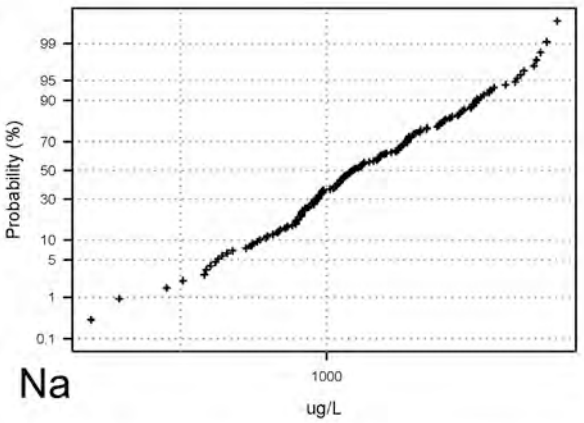

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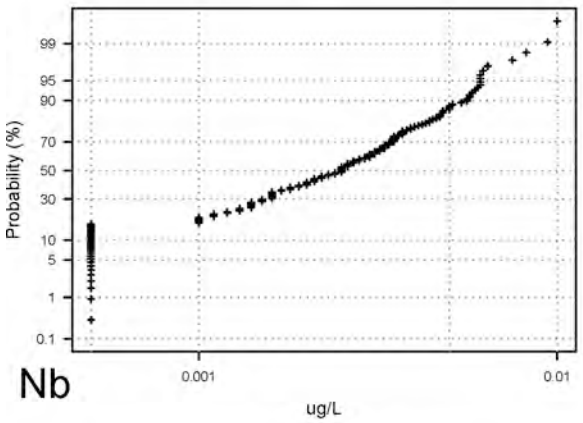

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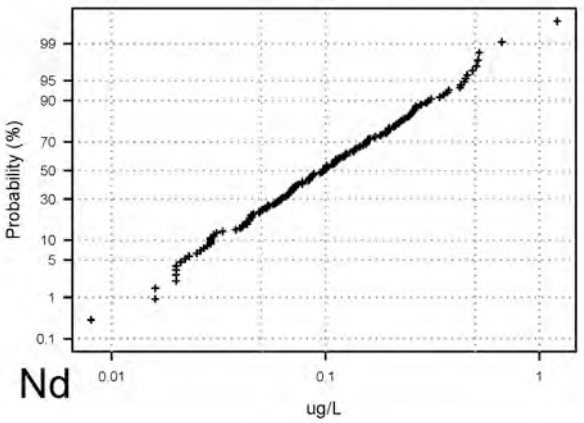

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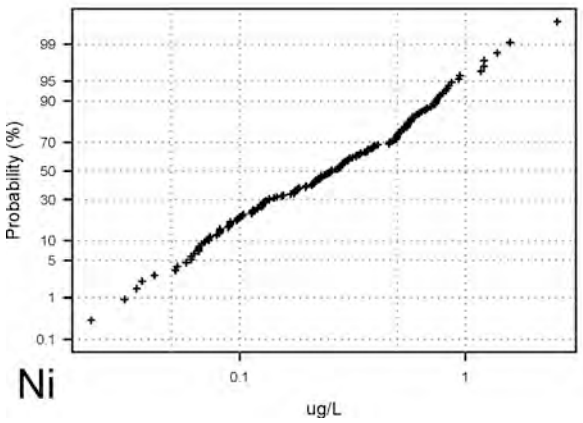

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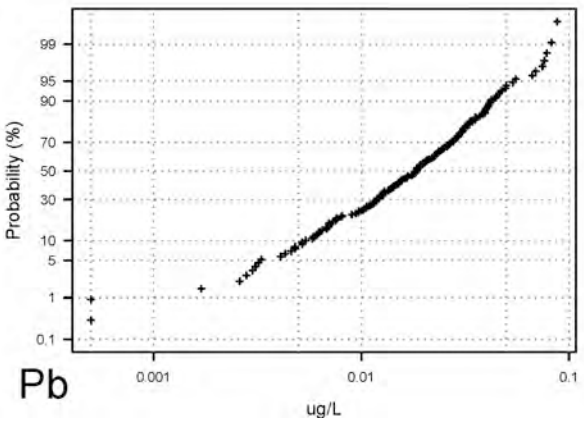

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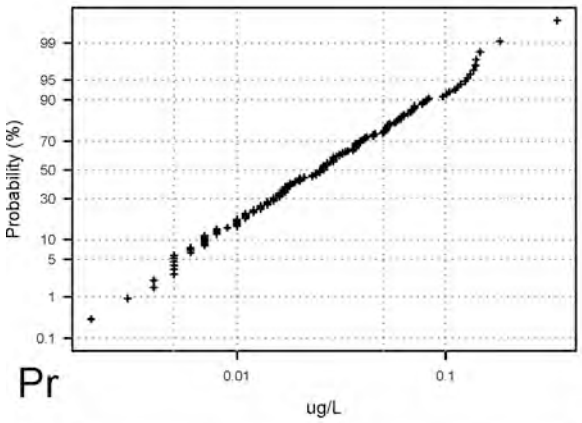
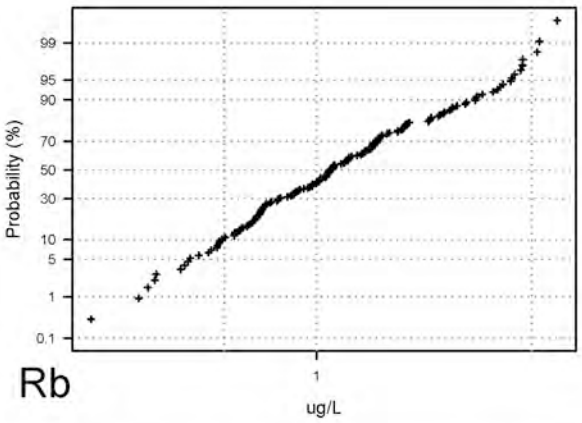
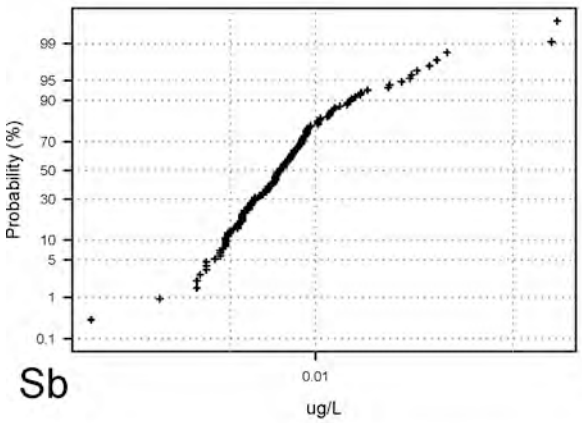


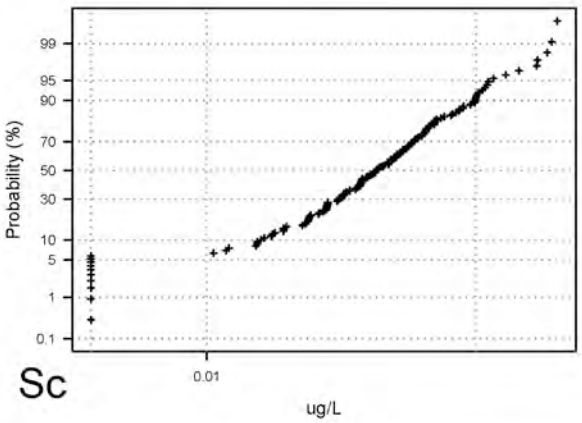
Pr



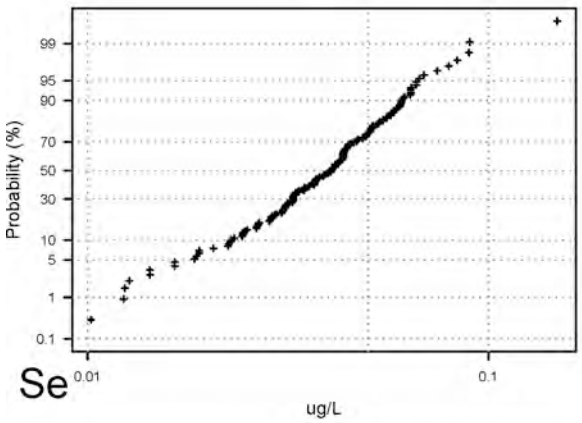
Rb



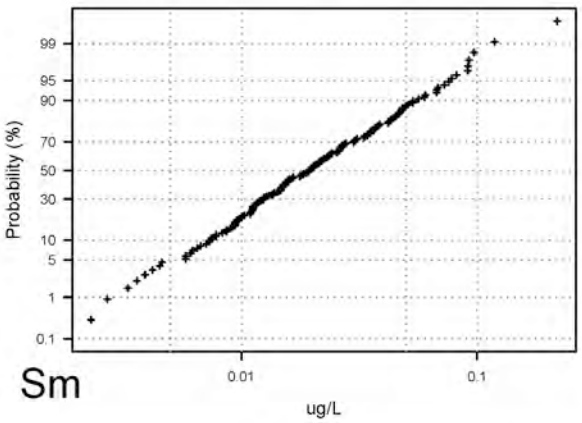
Sb



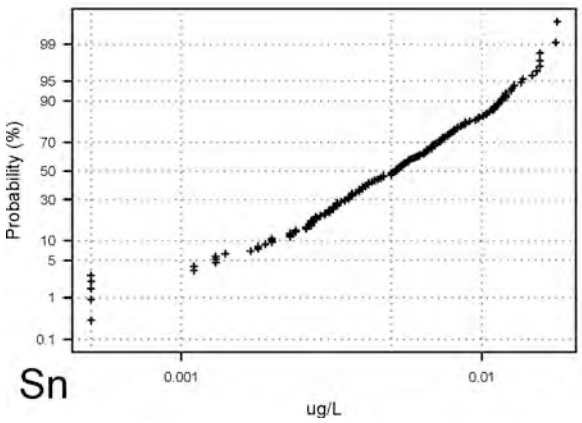
Sc



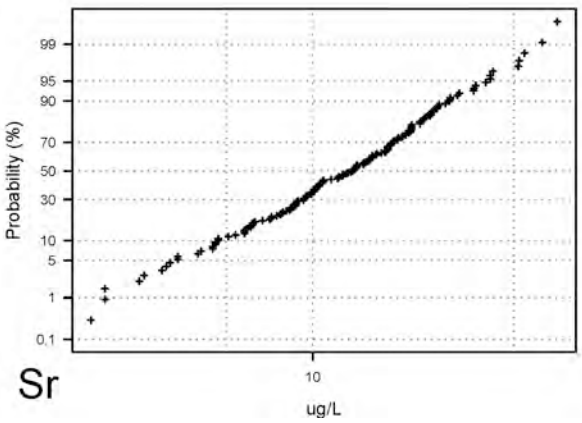
Se



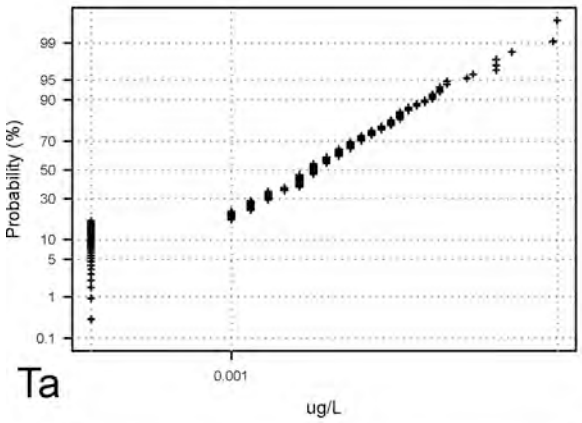
Sm



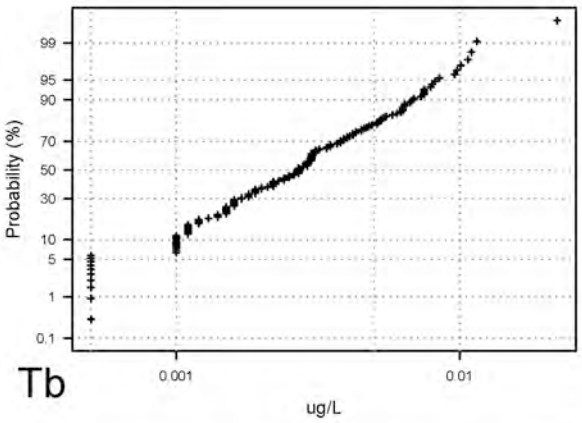
Sn



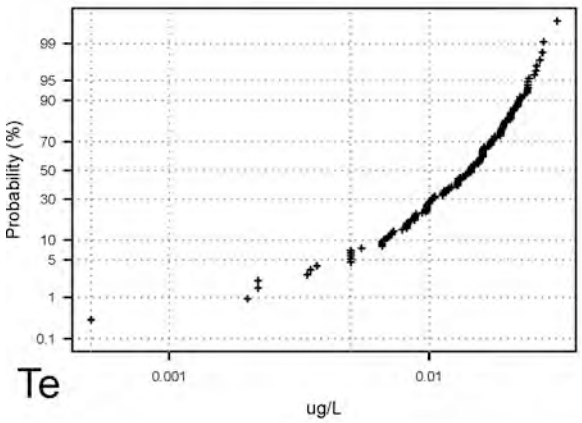
Sr



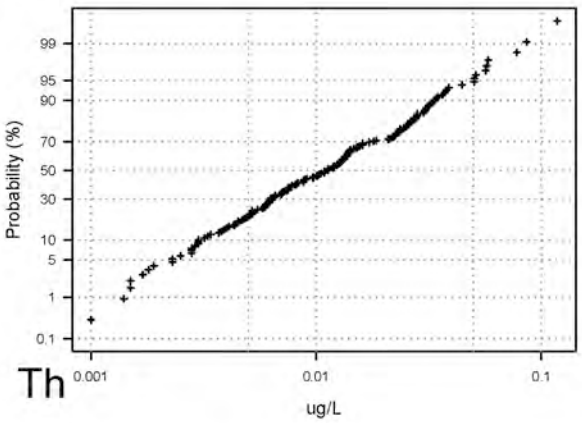
Ta



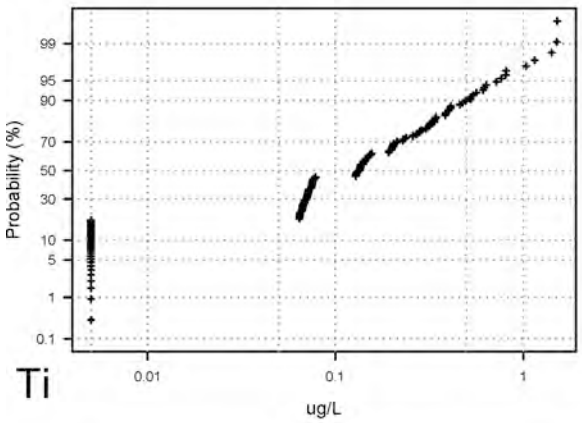
Tb



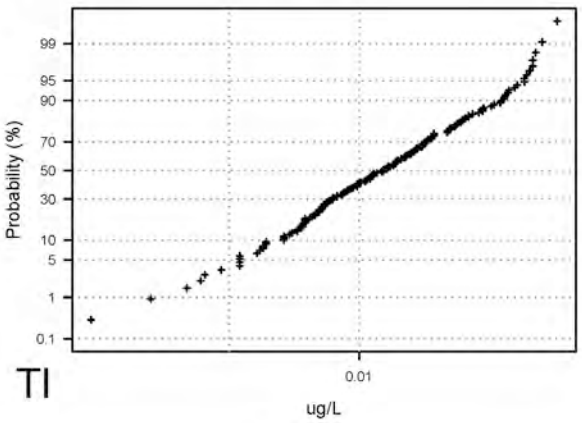
Te



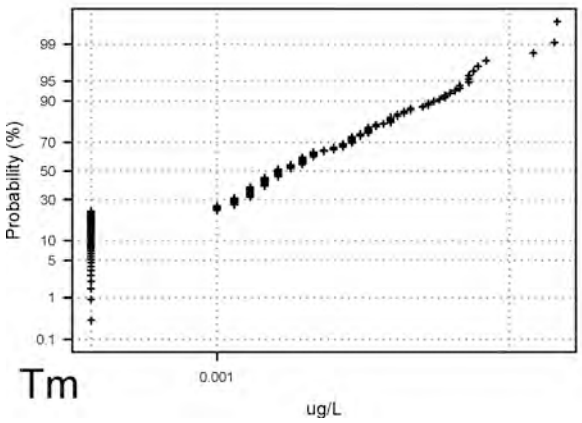
Th



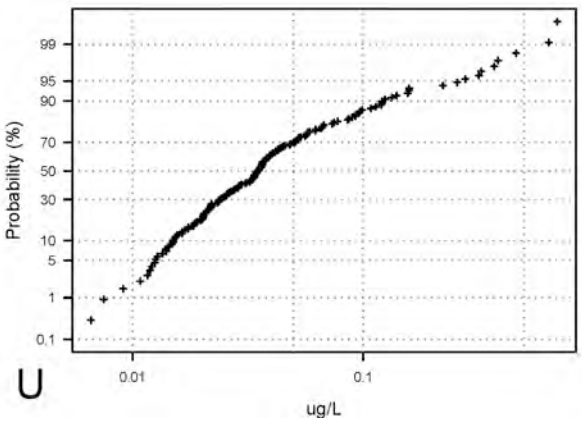
Ti



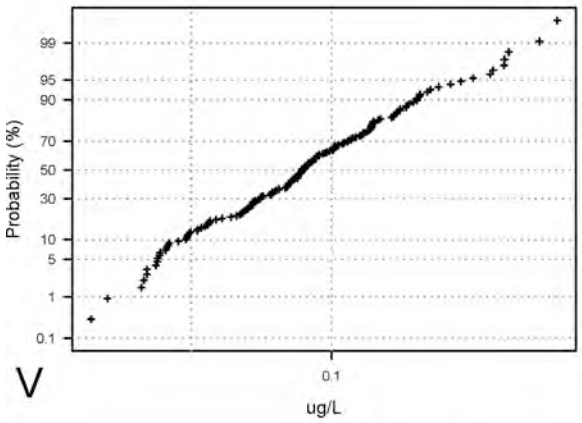
Tl



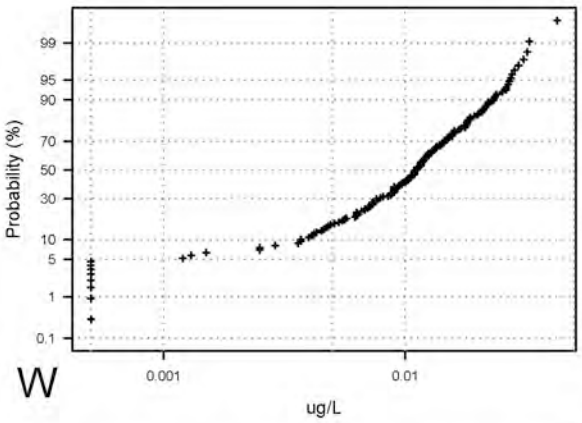
Tm



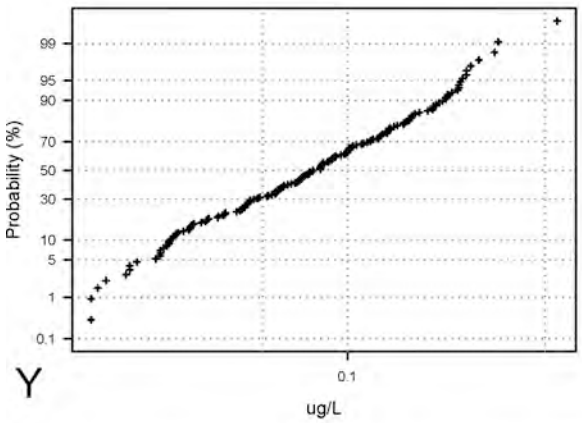
U


Probability (%)
99
95
90
70
50
30
10
5
1
0.1
0.1
ug/L

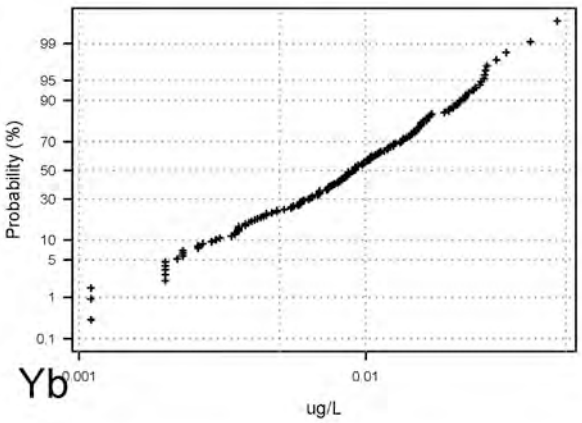
V


Probability (%)
99
95
90
70
50
30
10
5
1
0.1
0.001
0.01
ug/L

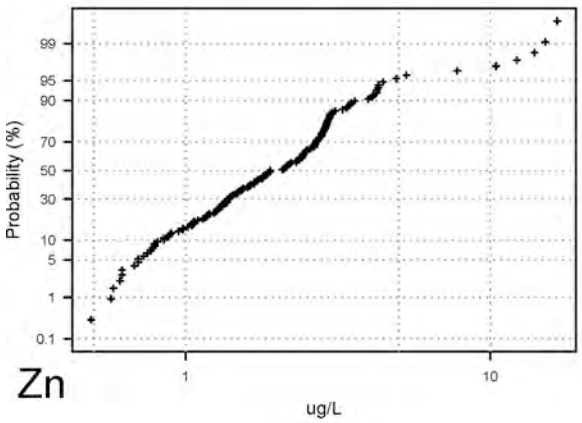
W


Probability (%)
99
95
90
70
50
30
10
5
1
0.1
0.1
ug/L

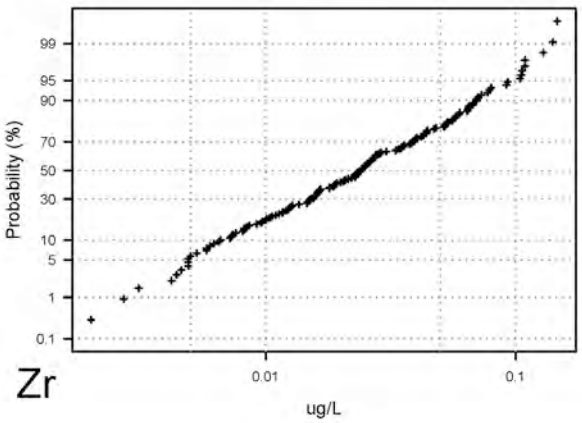
Y


Probability (%)
99
95
90
70
50
30
10
5
1
0.1
0.001
0.01
ug/L

Yb


Probability (%)
99
95
90
70
50
30
10
5
1
0.1
1
10
ug/L

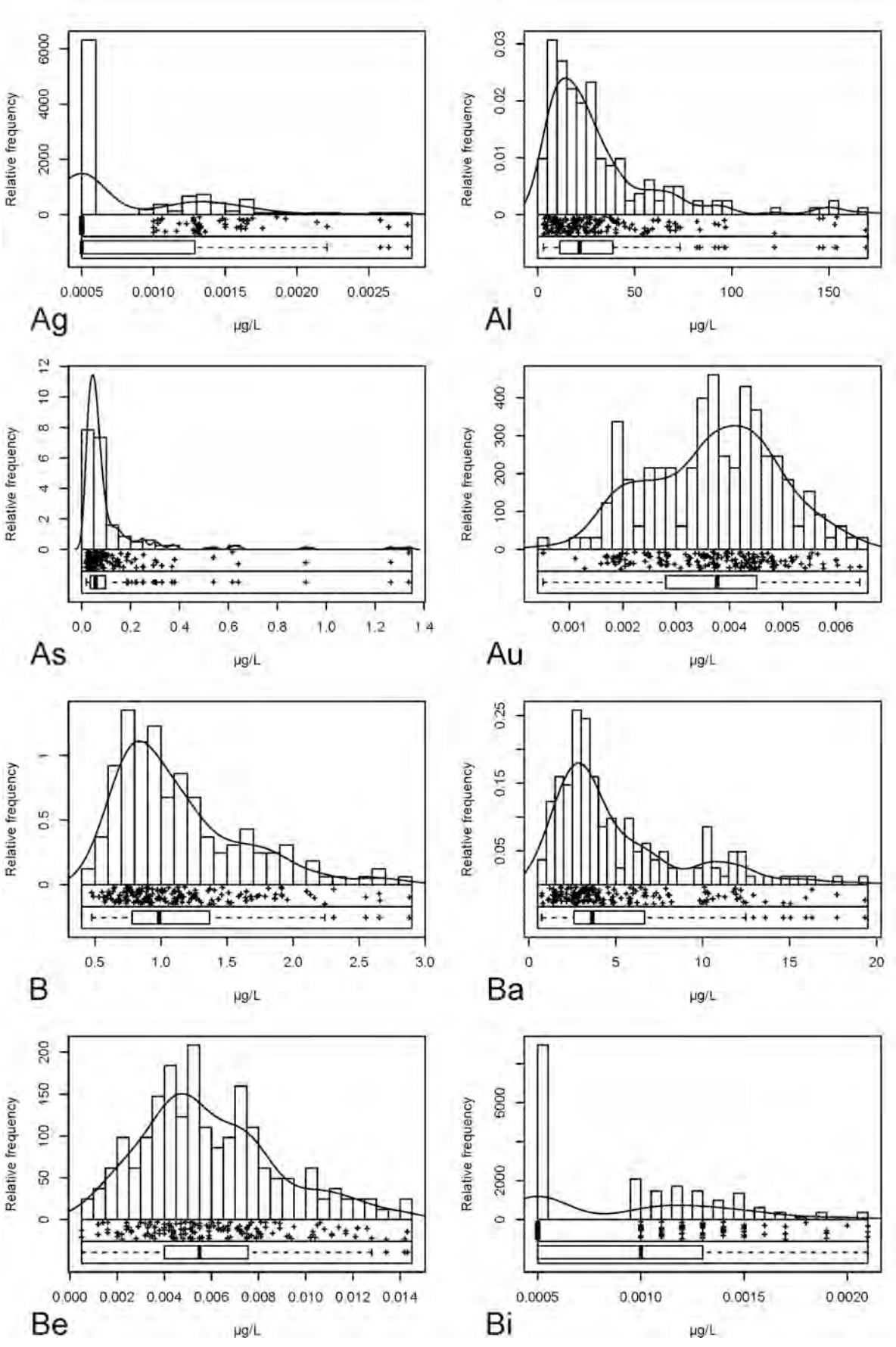
Zn

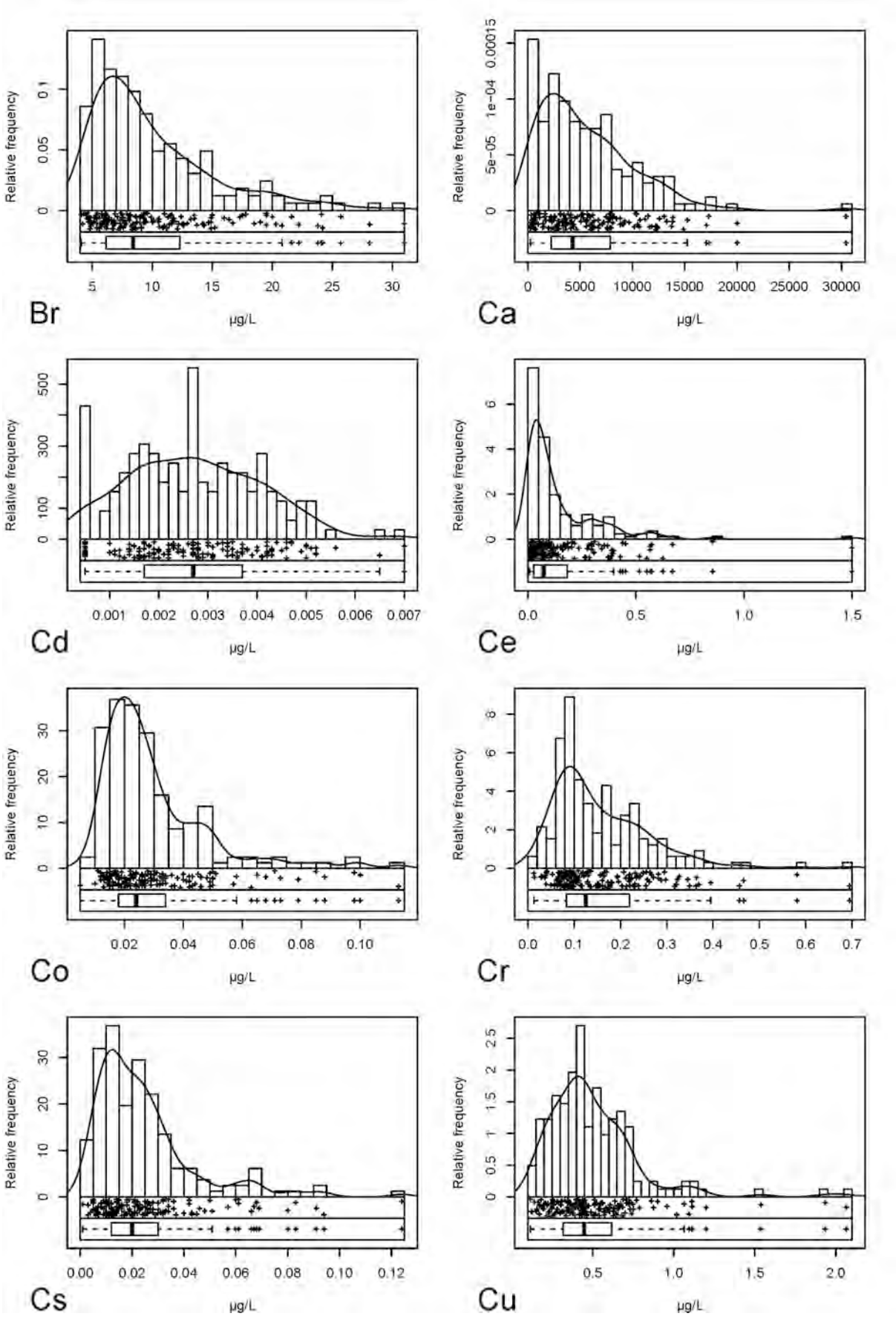

Probability (%)
99
95
90
70
50
30
10
5
1
0.1
0.01
0.1
ug/L

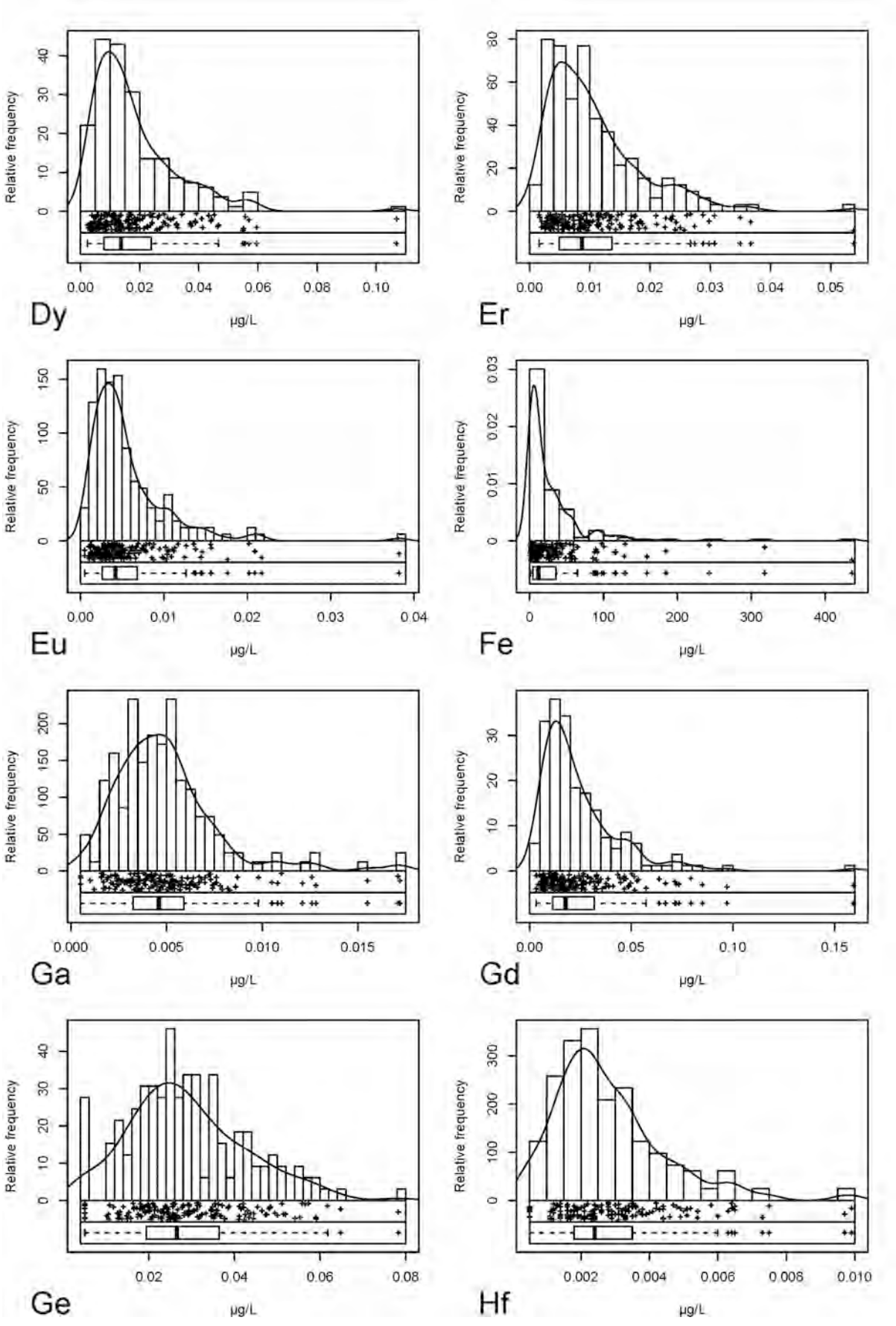
Zr

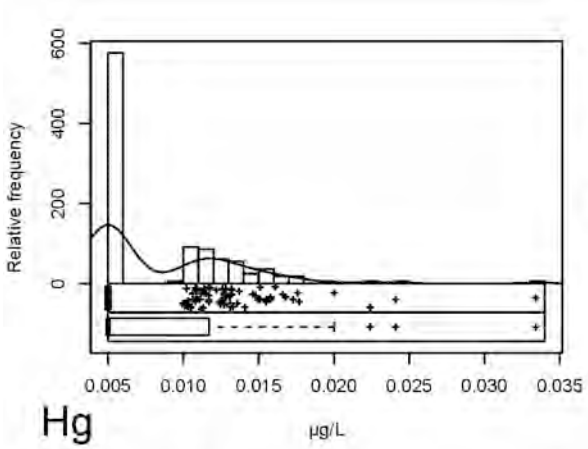
Appendix II: EDA-plots for all elements

Combination of density trace, histogram, one-dimensional scattergram and boxplot for all elements.

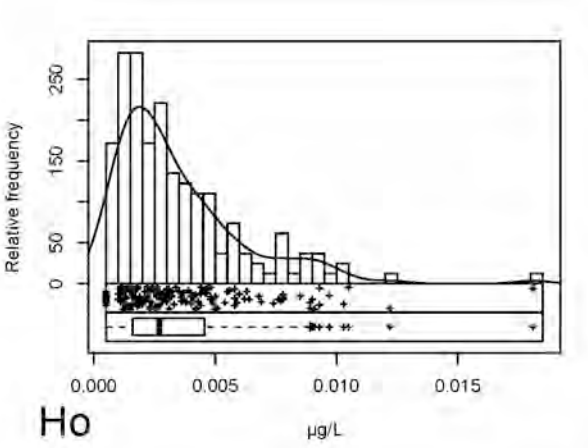

Relative frequency
µg/L
Ag
Al
As
Au
B
Ba
Be
Bi


Relative frequency
0
0.05
0.1
5
10
15
20
25
30
Br
µg/L
Relative frequency
0
5e-05
1e-04
0.00015
0
5000
10000
15000
20000
25000
30000
Ca
µg/L
Relative frequency
0
100
300
500
0.001
0.002
0.003
0.004
0.005
0.006
0.007
Cd
µg/L
Relative frequency
0
2
4
6
0.0
0.5
1.0
1.5
Ce
µg/L
Relative frequency
0
10
20
30
0.02
0.04
0.06
0.08
0.10
Co
µg/L
Relative frequency
0
2
4
6
8
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Cr
µg/L
Relative frequency
0
10
20
30
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Cs
µg/L
Relative frequency
0
0.5
1
1.5
2
2.5
0.5
1.0
1.5
2.0
Cu
µg/L

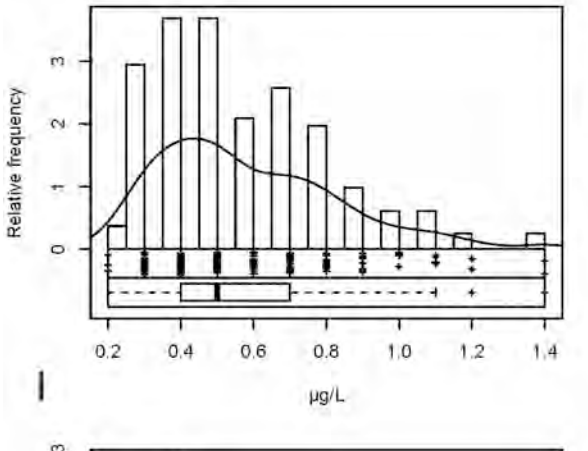

Relative frequency
µg/L
Dy
Er
Eu
Fe
Ga
Gd
Ge
Hf



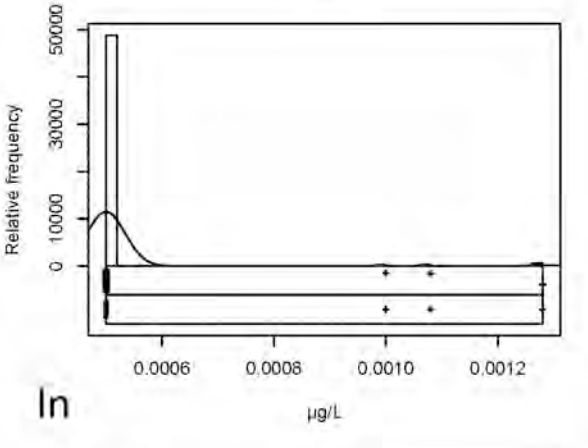
Hg



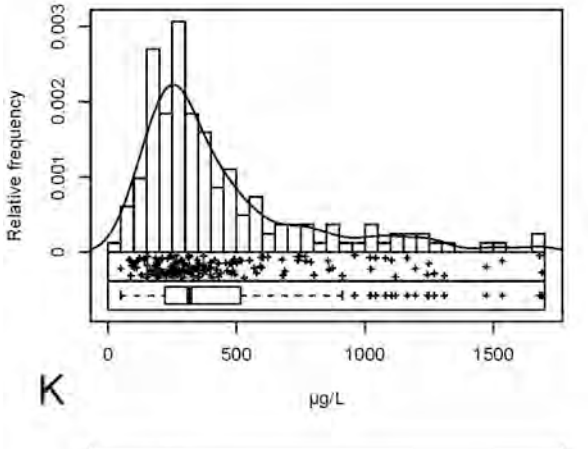
Ho



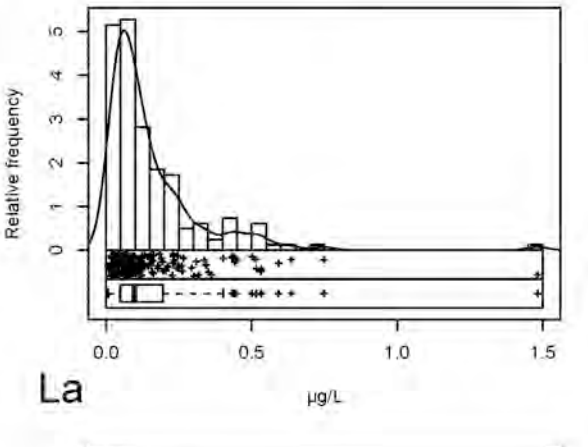
I



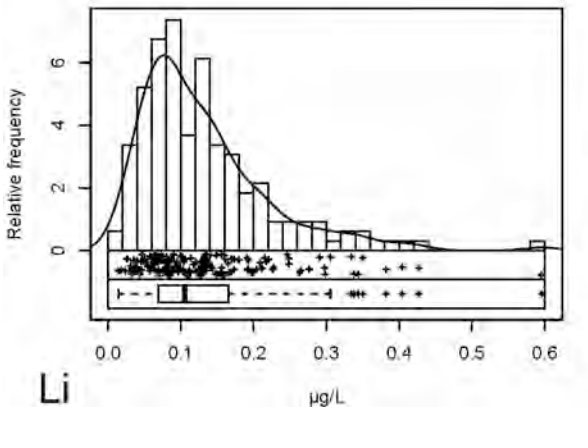
In



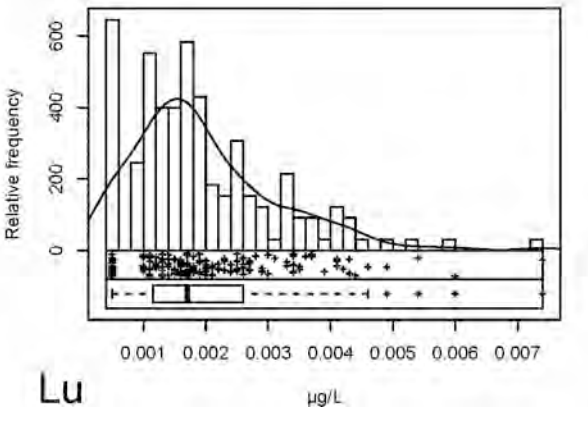
K



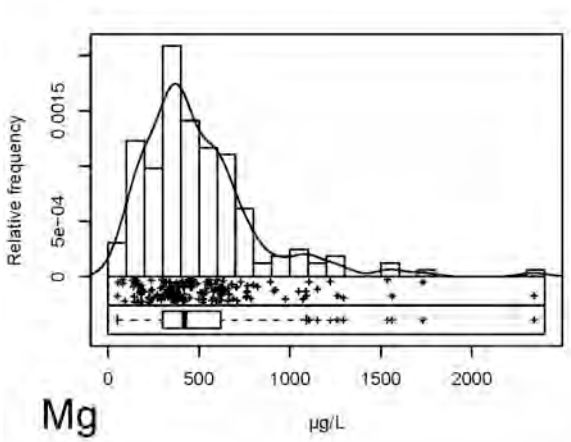
La



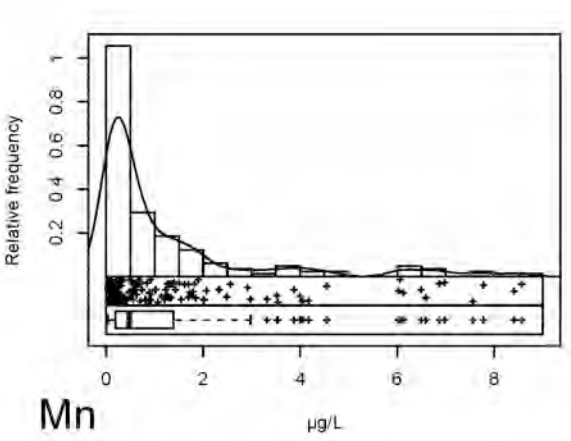
Li



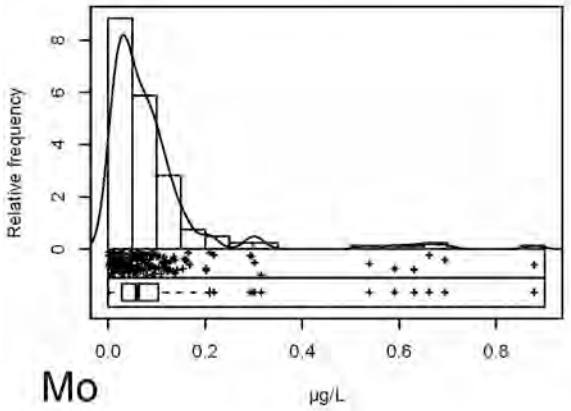
Lu



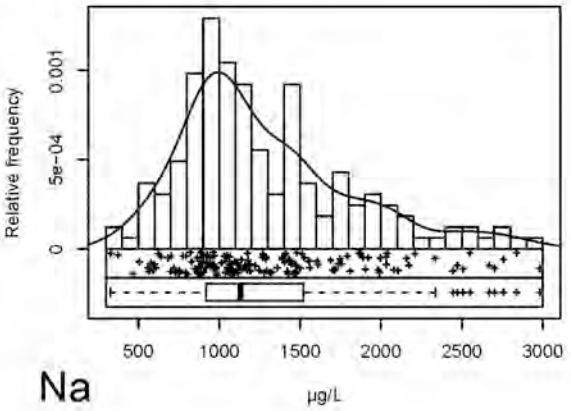
Mg



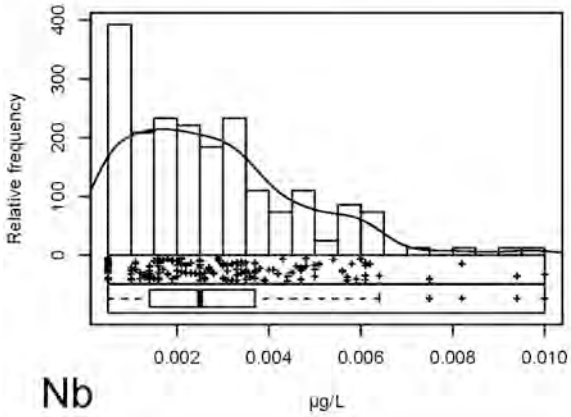
Mn



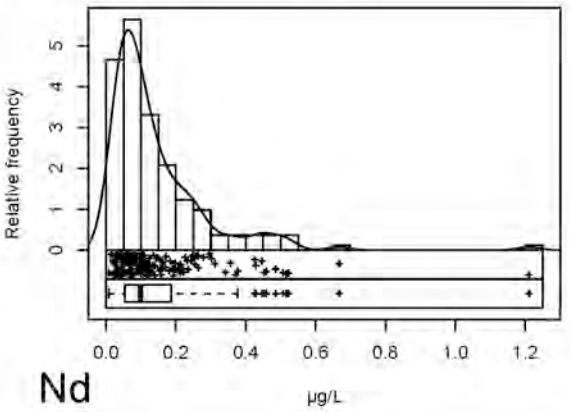
Mo



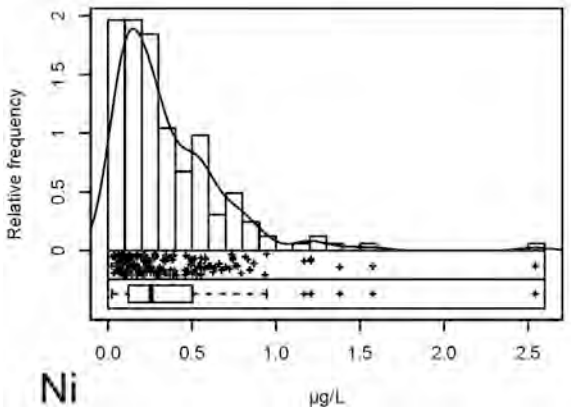
Na



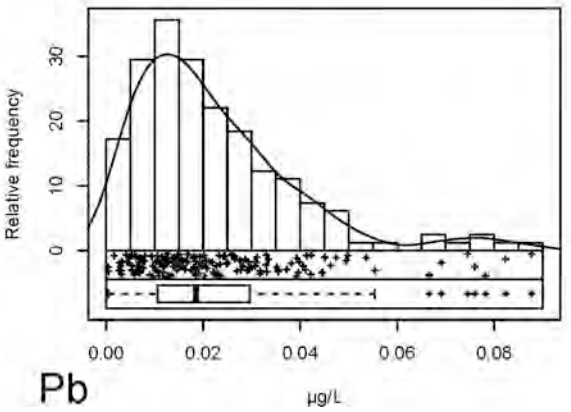
Nb



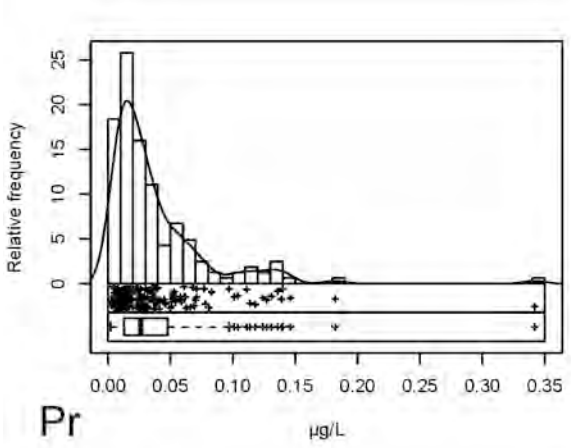
Nd



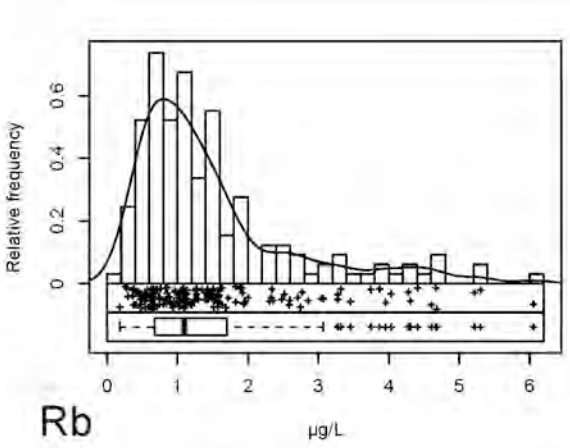
Ni



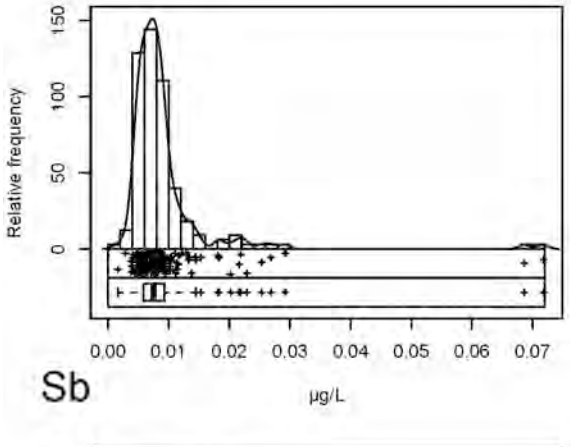
Pb



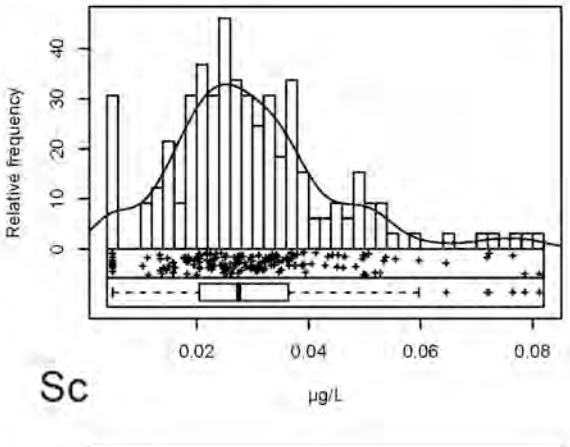
Pr



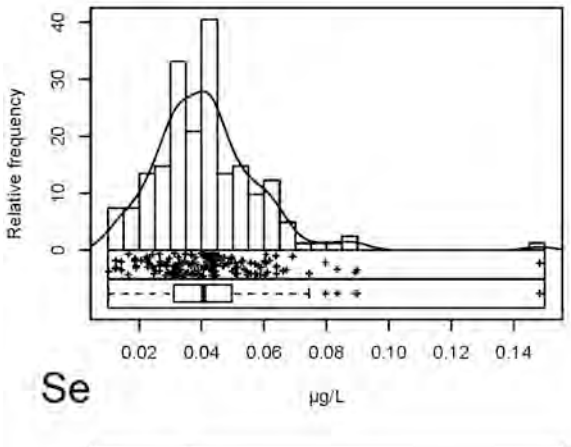
Rb



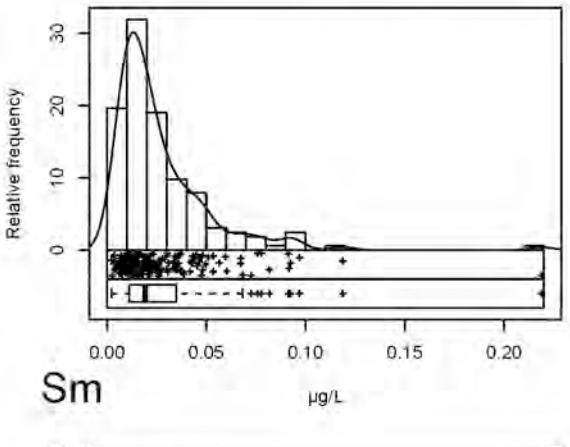
Sb



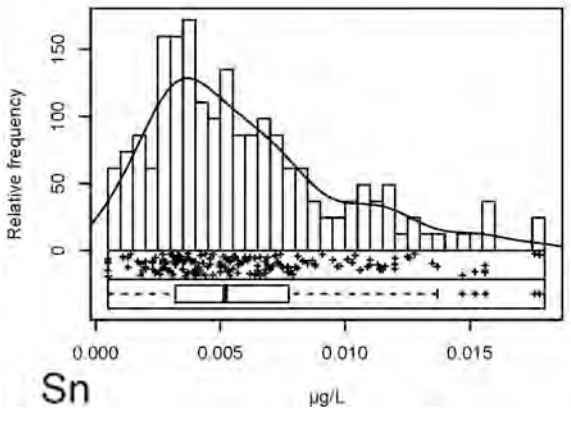
Sc



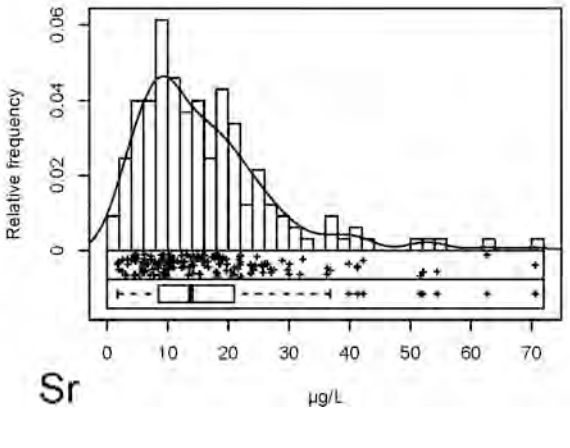
Se



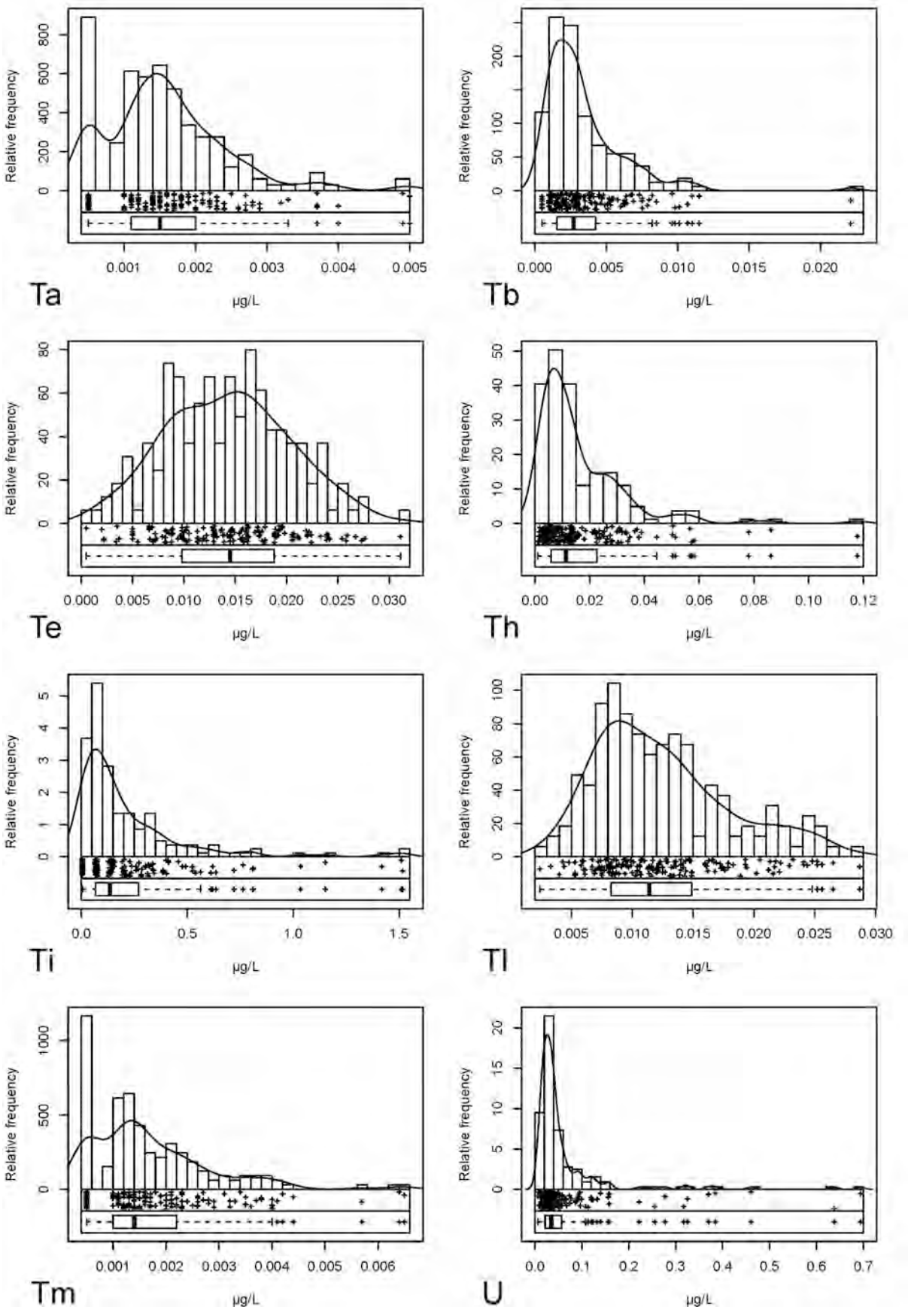
Sm

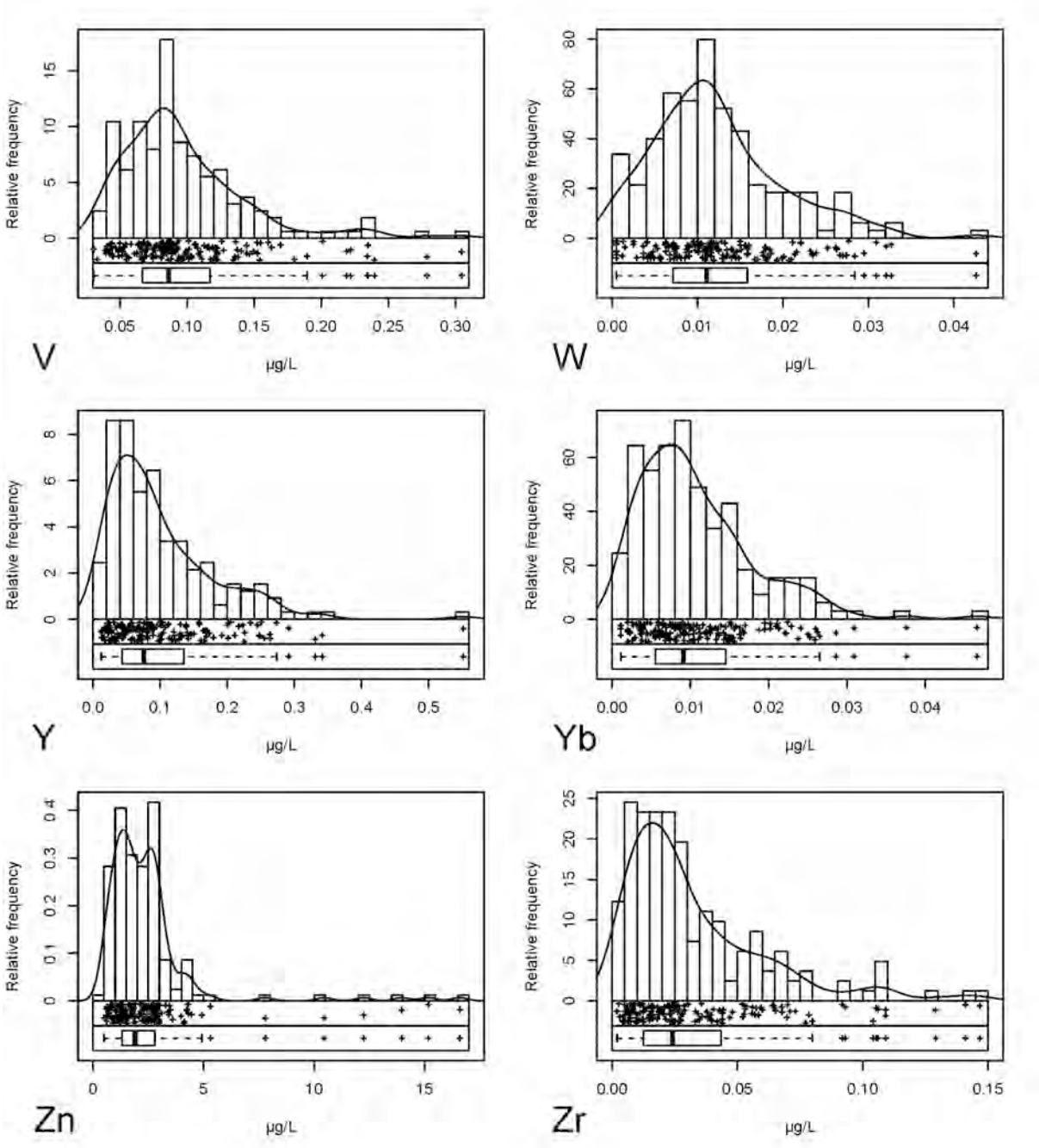


Sn



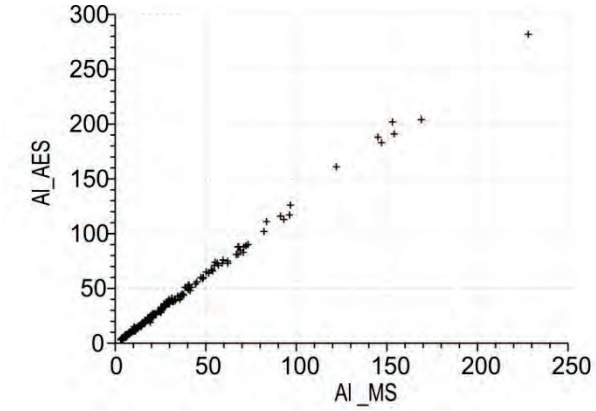
Sr

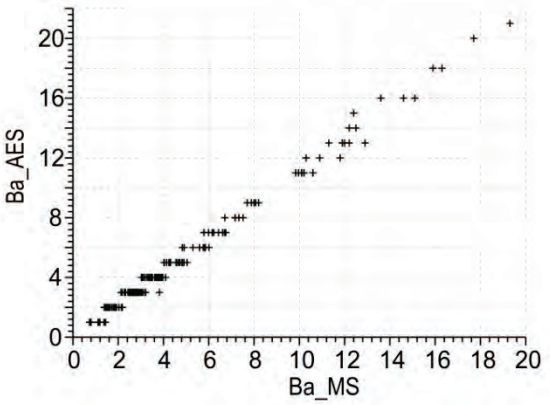

Relative frequency
µg/L
Ta
Tb
Te
Th
Ti
Tl
Tm
U

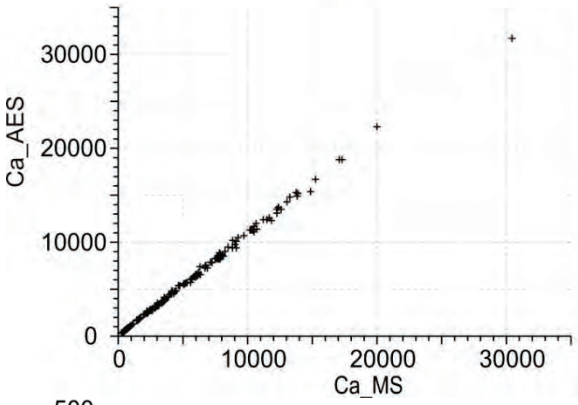

Relative frequency
µg/L
V
W
Y
Yb
Zn
Zr

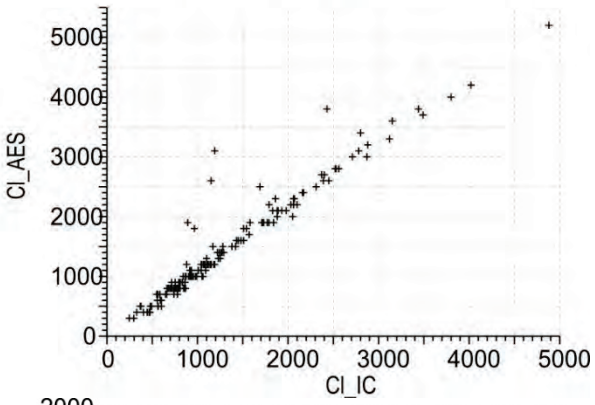
Appendix III: ICP-AES vs. ICP-MS/IC

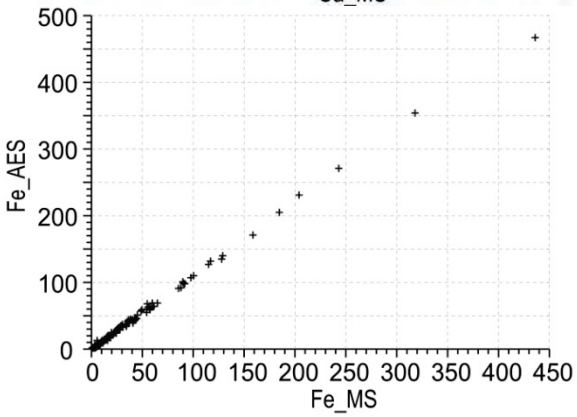
Comparison of analytical results as received from the ICP-AES and the ICP-MS/IC. The line indicates a 1:1 relation.

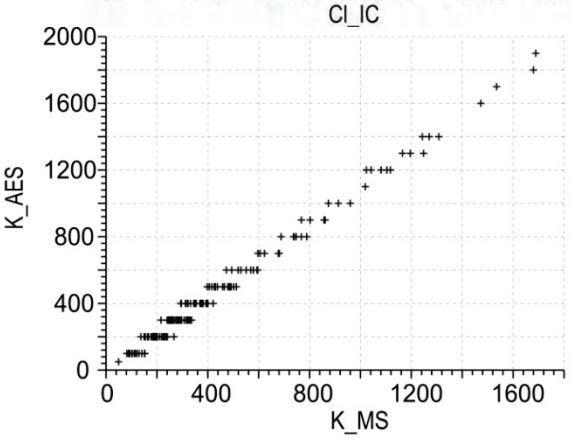

Al_AES
Al_MS
0
50
100
150
200
250
300

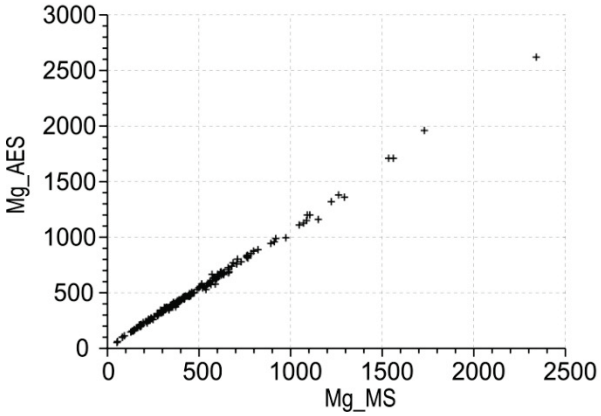

Ba_AES
Ba_MS
0
2
4
6
8
10
12
14
16
18
20

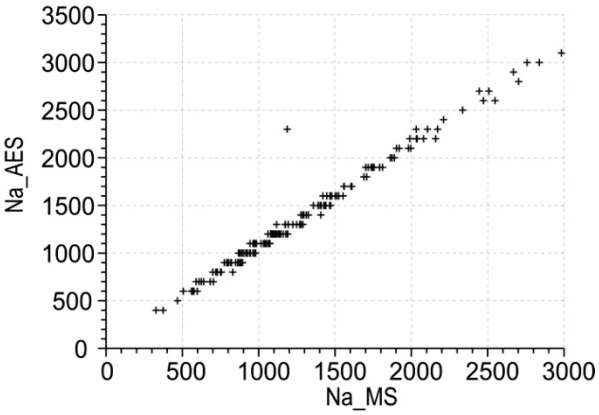

Ca_AES
Ca_MS
0
10000
20000
30000

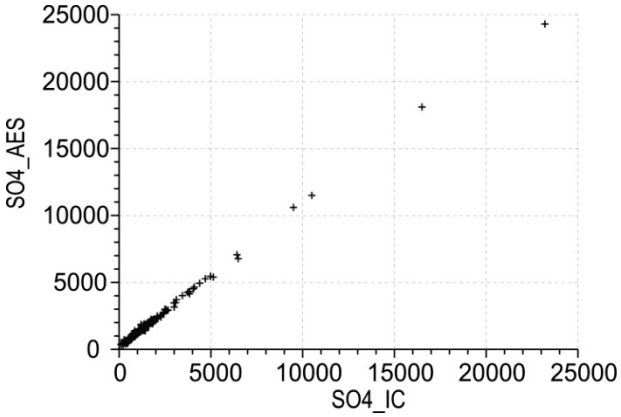

Cl_AES
Cl_IC
0
1000
2000
3000
4000
5000

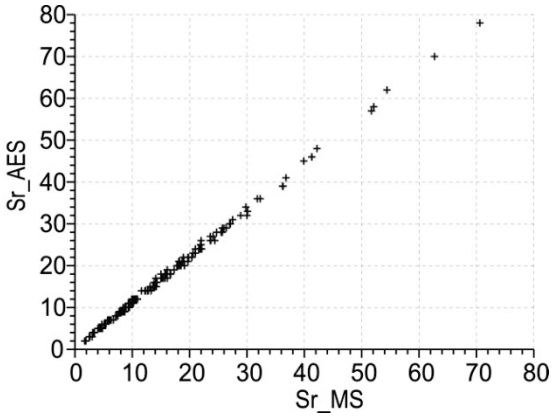

Fe_AES
Fe_MS
0
50
100
150
200
250
300
350
400
450
500


K_AES
K_MS
0
400
800
1200
1600
2000


Mg_AES
Mg_MS
0
500
1000
1500
2000
2500
3000

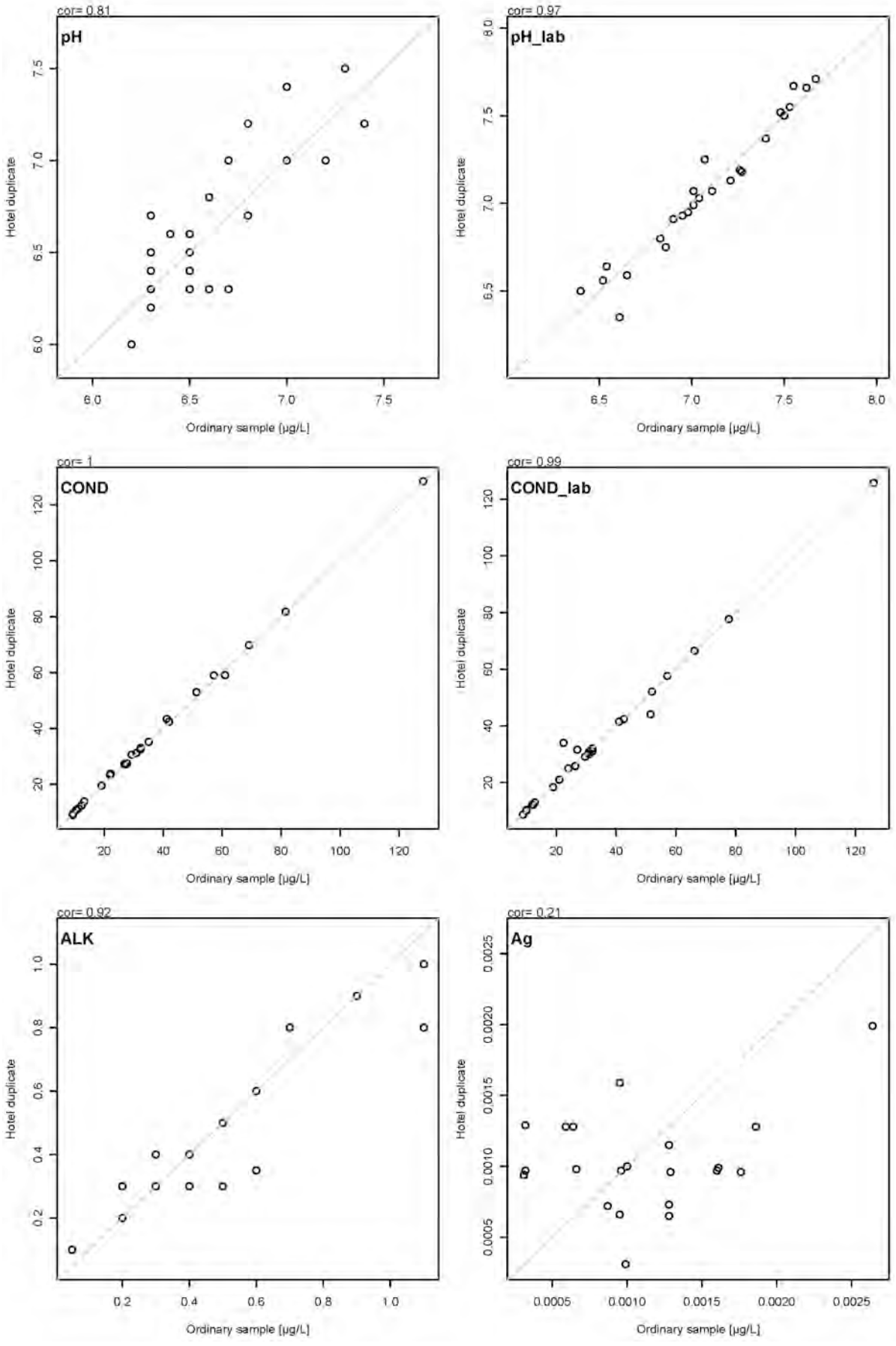

Na_AES
Na_MS
0
500
1000
1500
2000
2500
3000
3500

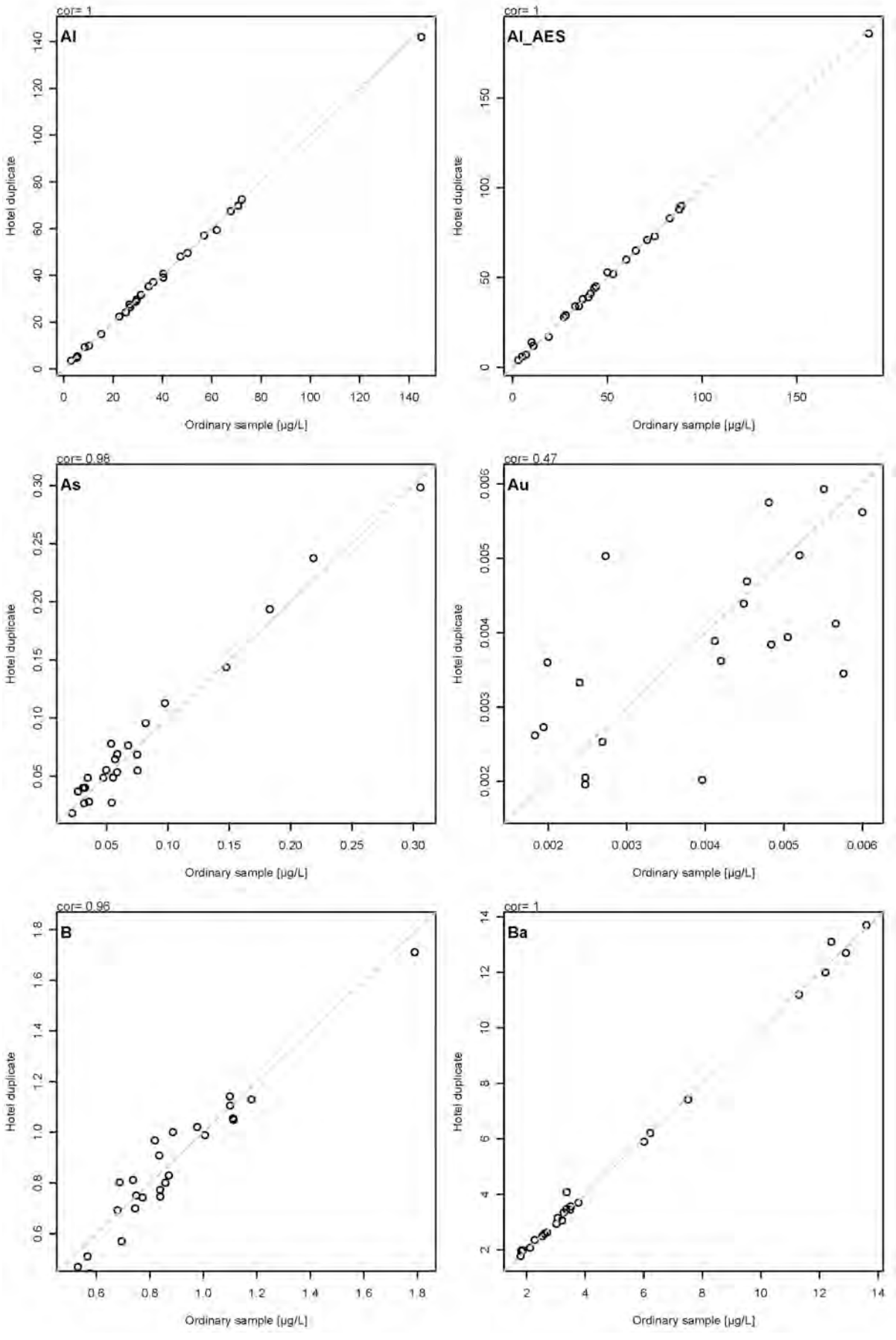

SO4_AES
SO4_IC
0
5000
10000
15000
20000
25000

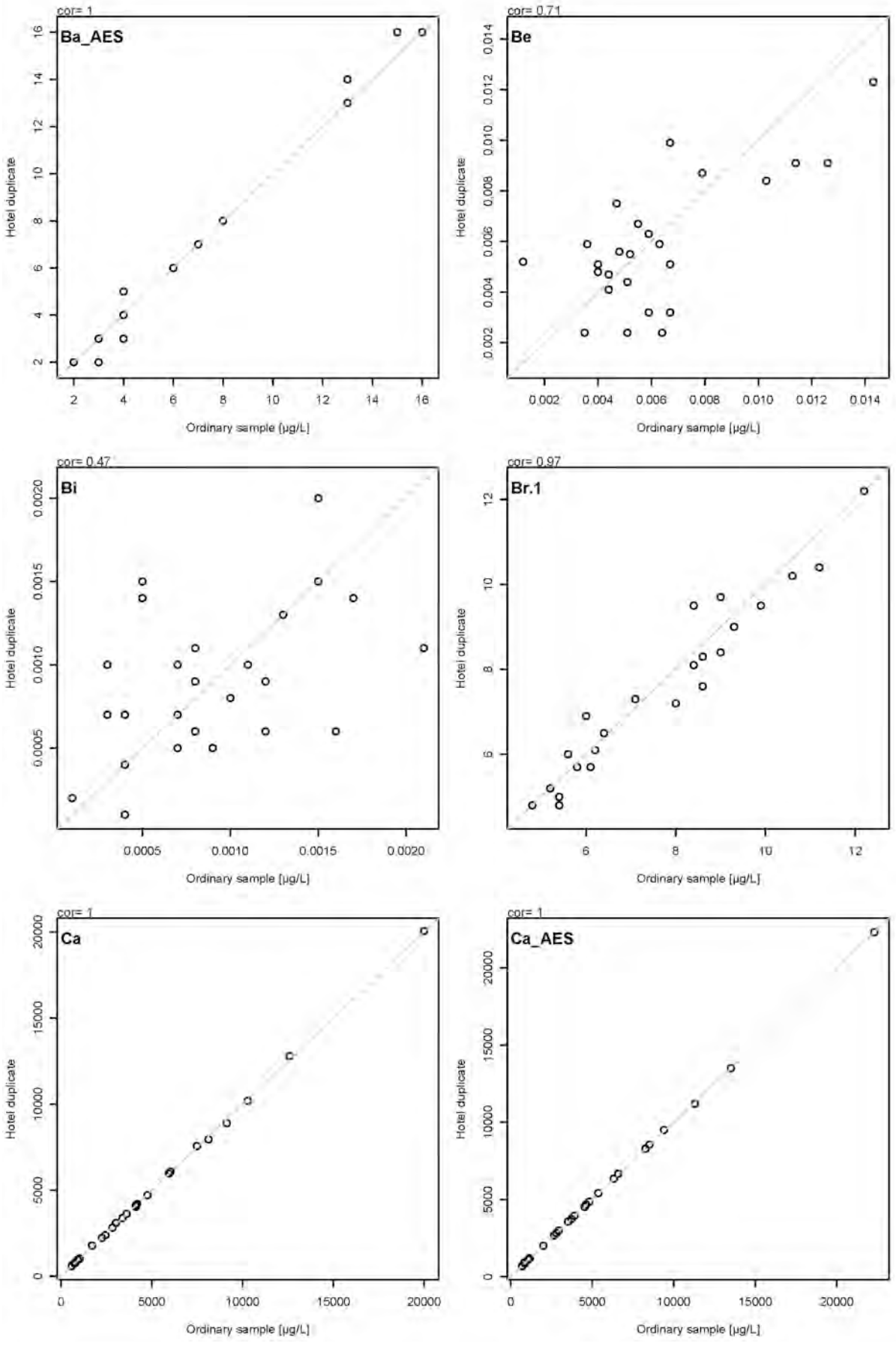

Sr_AES
Sr_MS
0
10
20
30
40
50
60
70
80

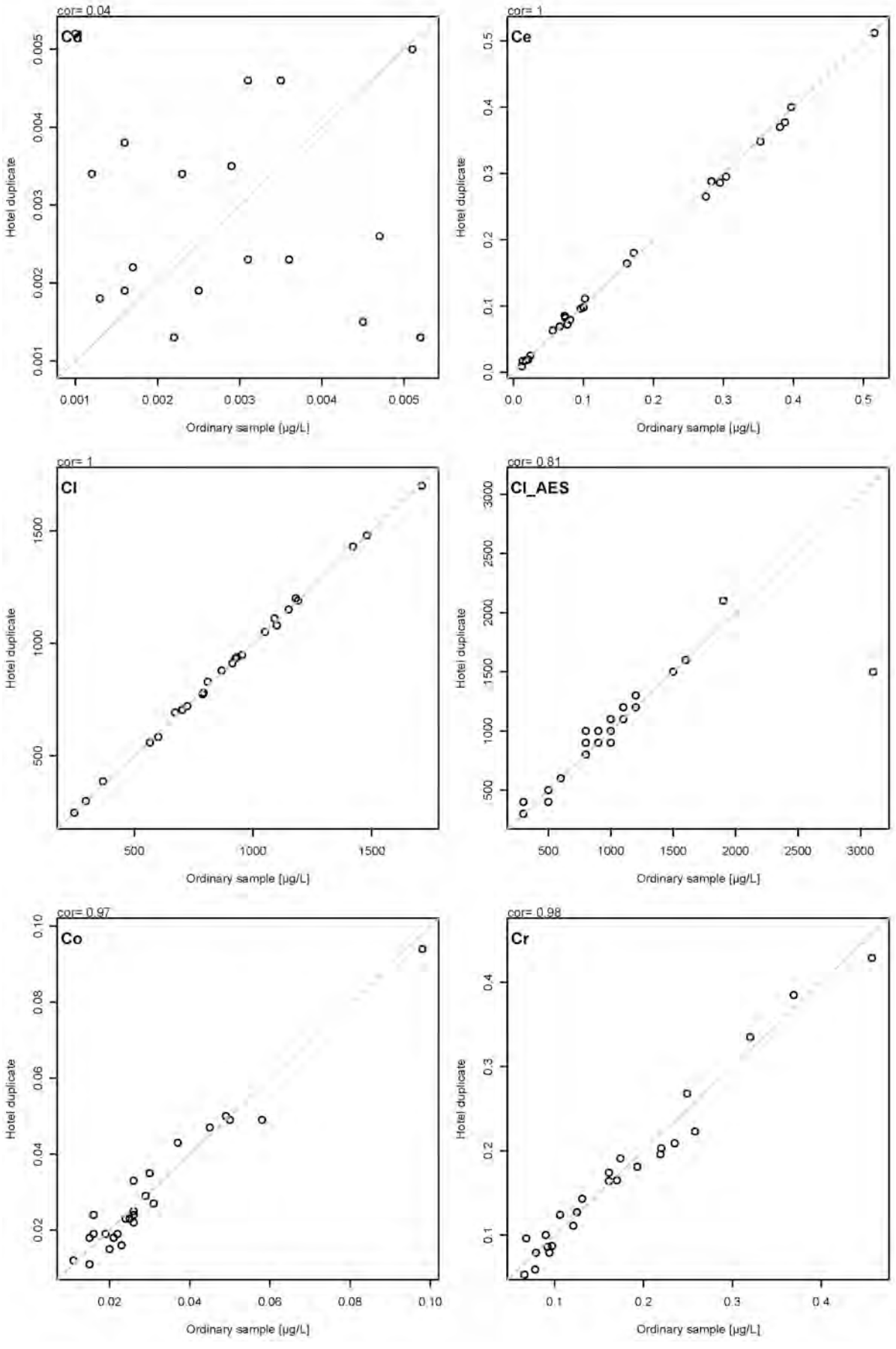
Appendix IV: XY plots for samples acidified in field and in the evening

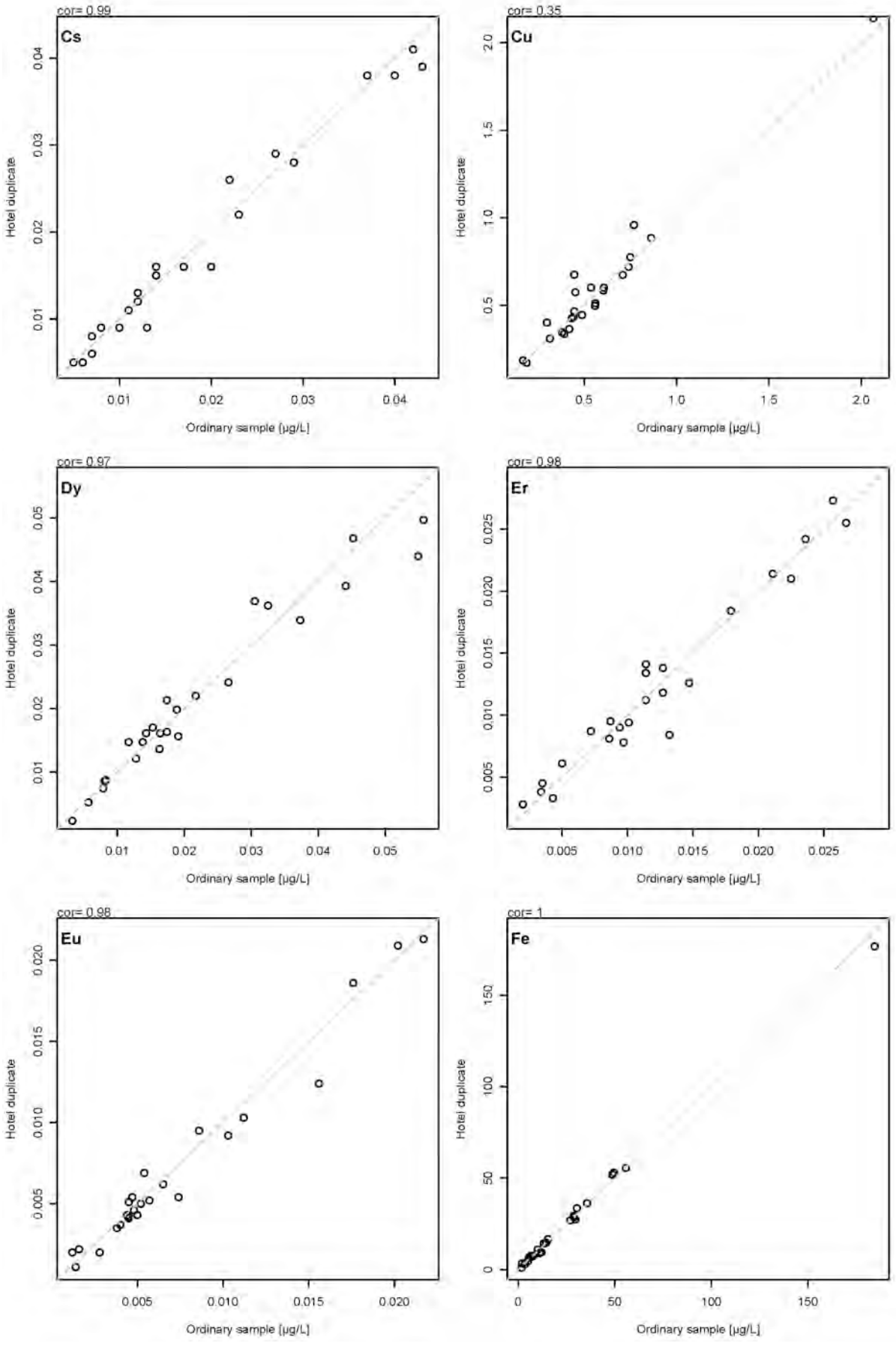
Comparison of the analytical results of the field filtered and acidified samples to those filtered and acidified in the evening in the hotel (“hotellduplicate”).

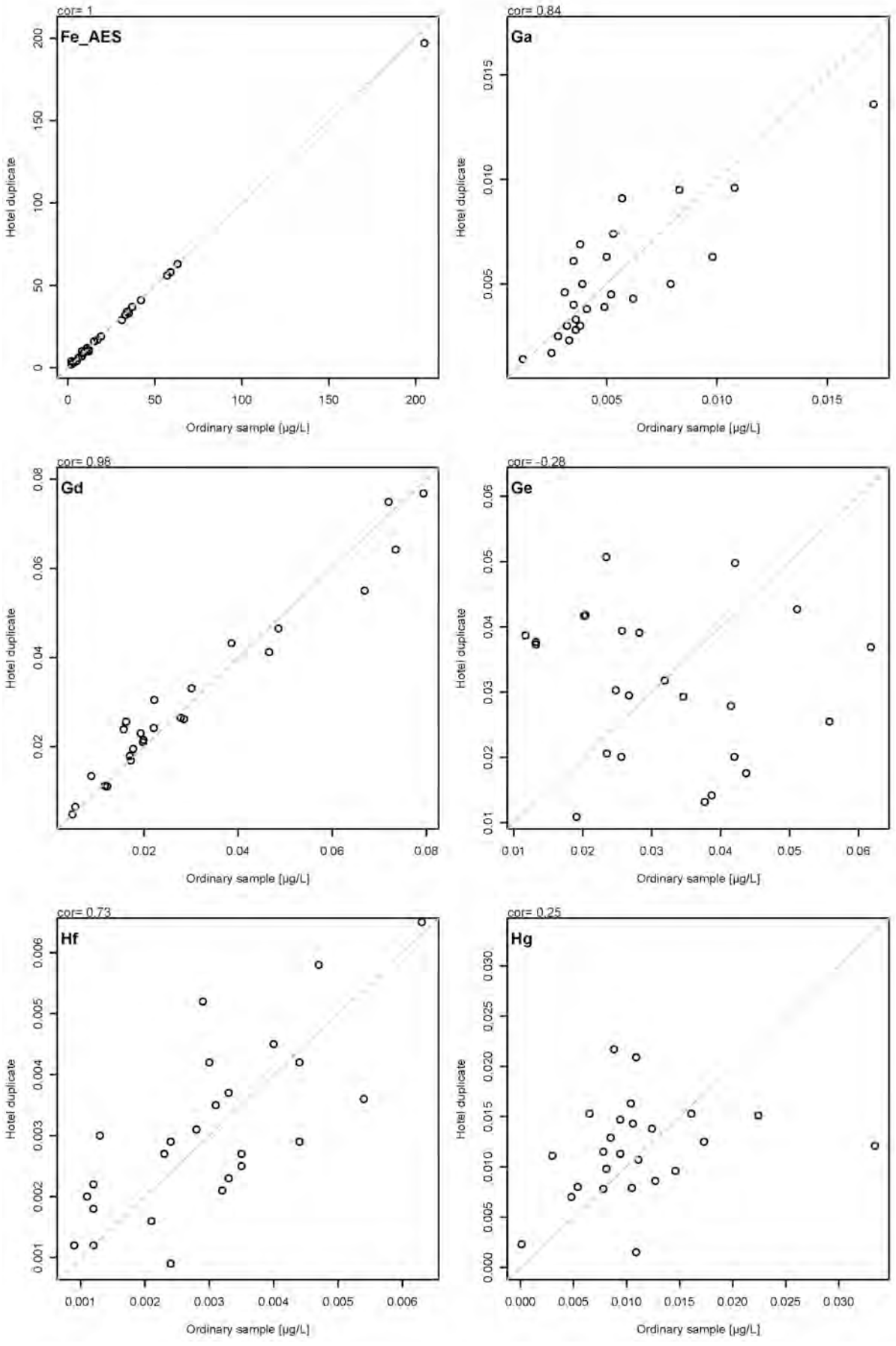

cor= 0.81
pH
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.97
pH_lab
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
COND
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.99
COND_lab
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.92
ALK
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.21
Ag
Hotel duplicate
Ordinary sample [µg/L]

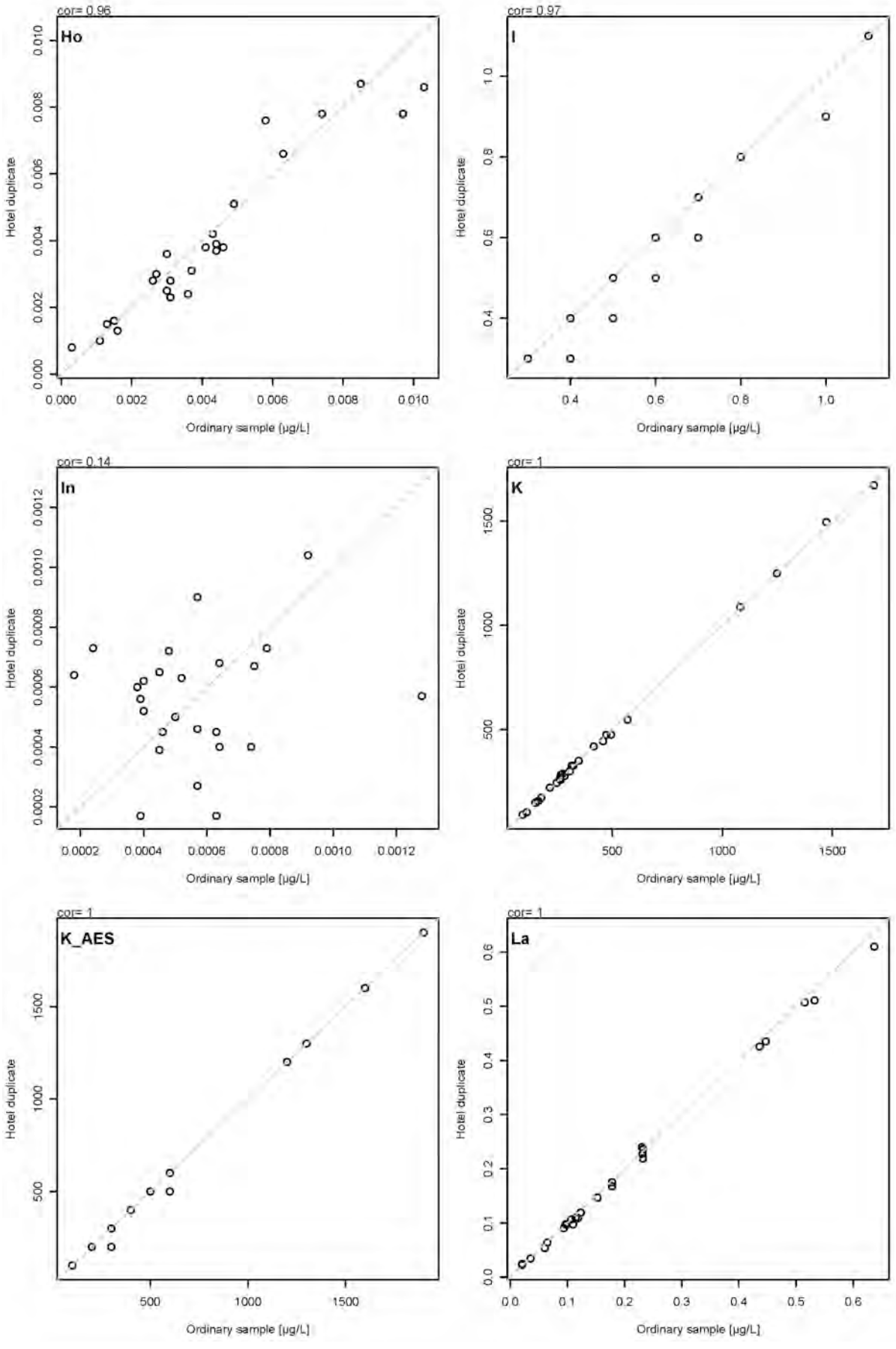

cor= 1
Al
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Al_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.98
As
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.47
Au
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.96
B
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Ba
Hotel duplicate
Ordinary sample [µg/L]

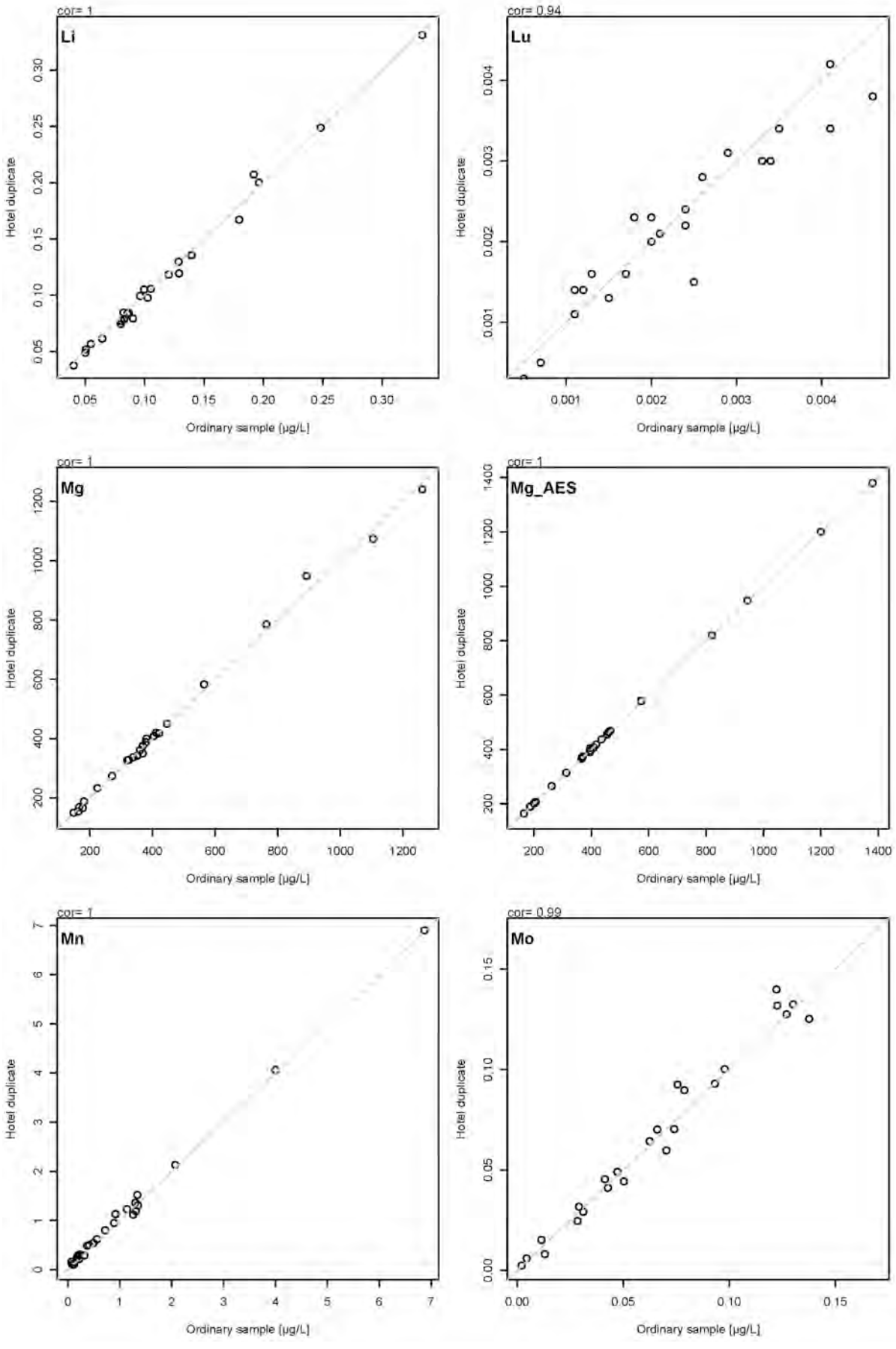

cor= 1
Ba_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.71
Be
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.47
Bi
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.97
Br.1
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Ca
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Ca_AES
Hotel duplicate
Ordinary sample [µg/L]

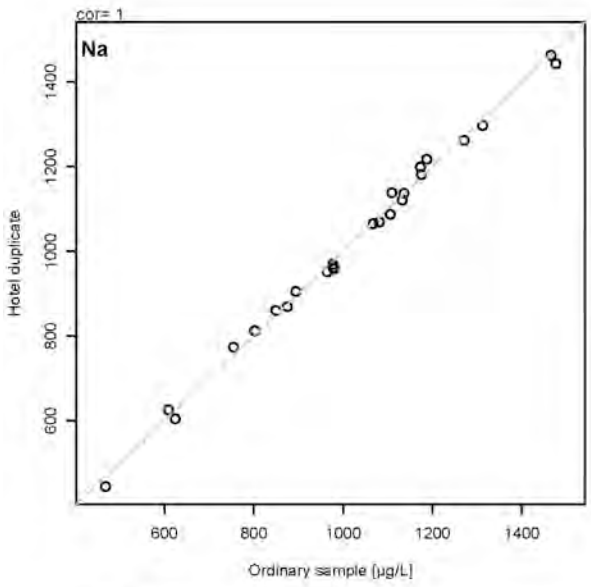

cor= 0.04
Cd
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Ce
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Cl
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.81
Cl_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.97
Co
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.98
Cr
Hotel duplicate
Ordinary sample [µg/L]

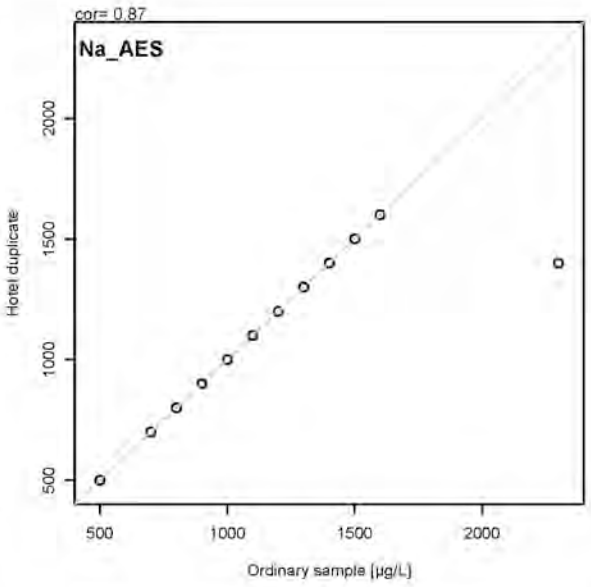

cor= 0.99
Cs
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.35
Cu
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.97
Dy
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.98
Er
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.98
Eu
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Fe
Hotel duplicate
Ordinary sample [µg/L]

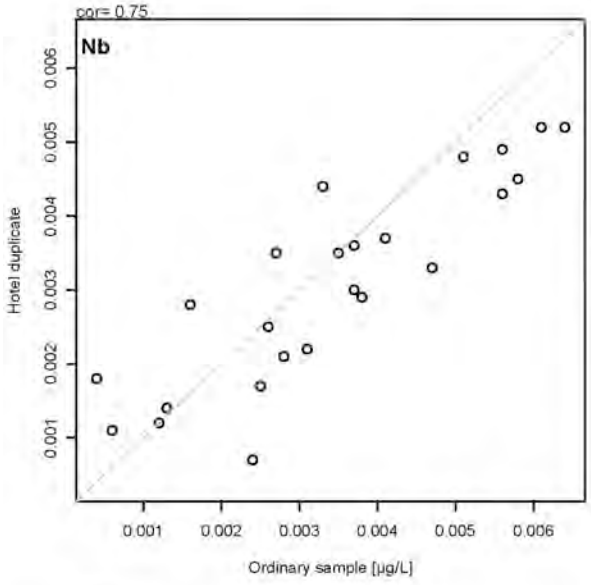

cor= 1
Fe_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.84
Ga
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.98
Gd
Hotel duplicate
Ordinary sample [µg/L]
cor= -0.28
Ge
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.73
Hf
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.25
Hg
Hotel duplicate
Ordinary sample [µg/L]

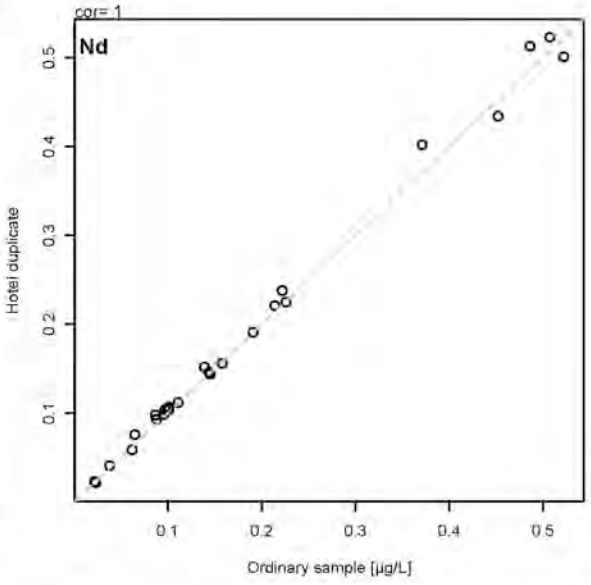

cor= 0.96
Ho
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.97
I
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.14
In
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
K
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
K_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
La
Hotel duplicate
Ordinary sample [µg/L]

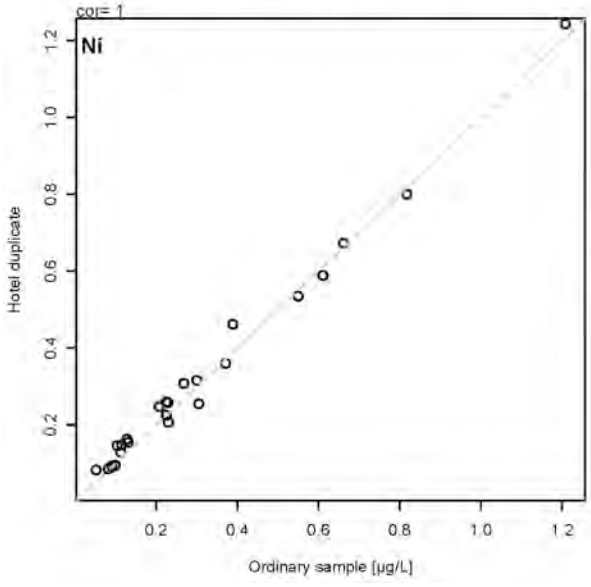

cor= 1
Li
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.94
Lu
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Mg
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Mg_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Mn
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.99
Mo
Hotel duplicate
Ordinary sample [µg/L]

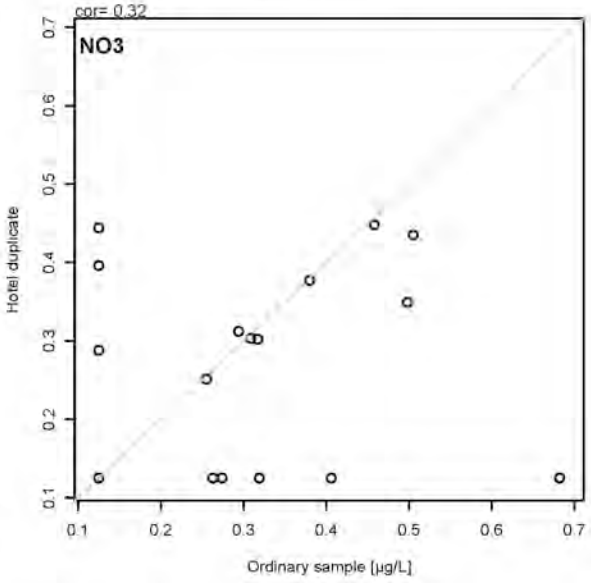

cor= 1
Na
Hotel duplicate
Ordinary sample [µg/L]

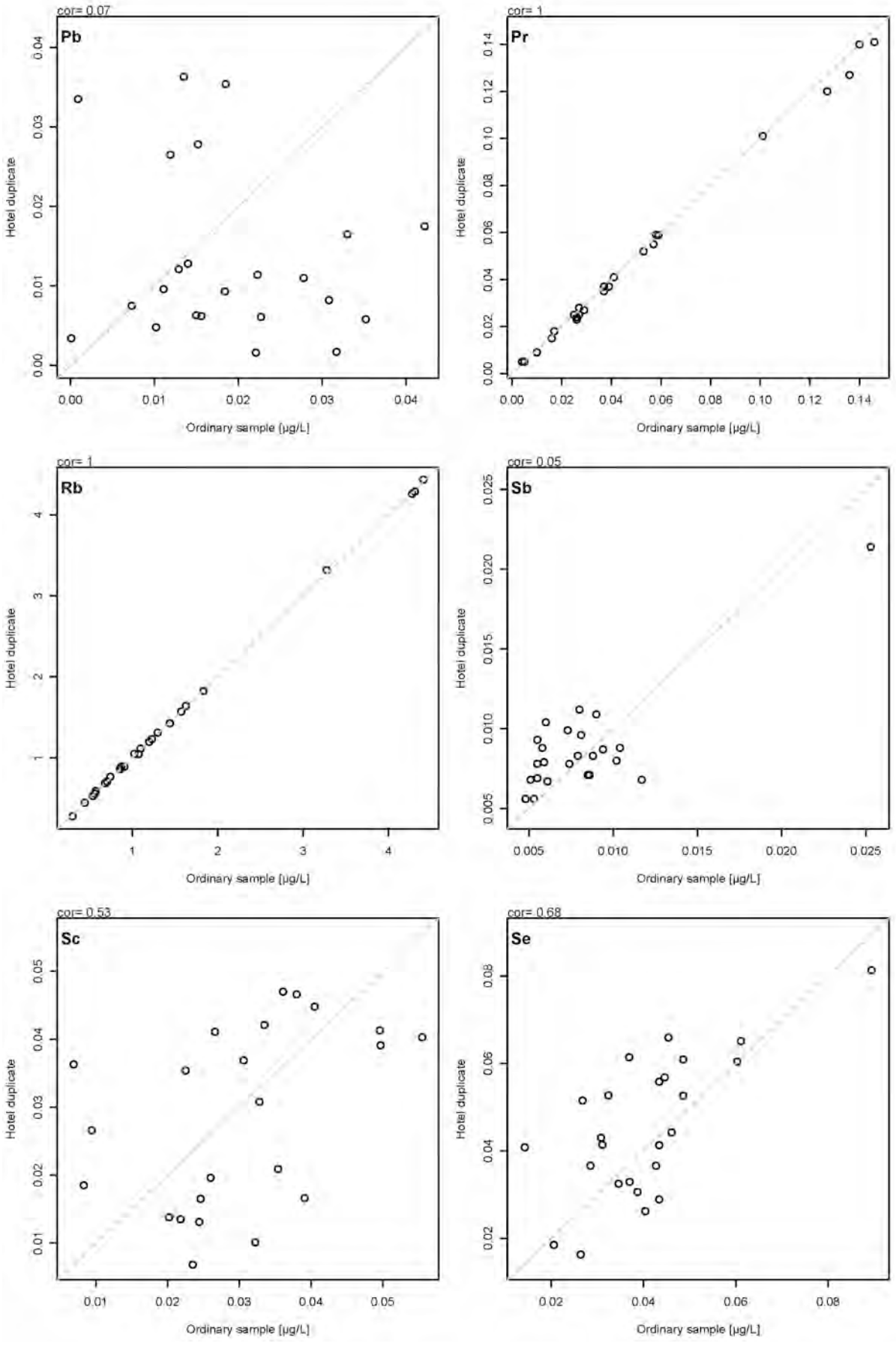

cor= 0.87
Na_AES
Hotel duplicate
Ordinary sample [µg/L]

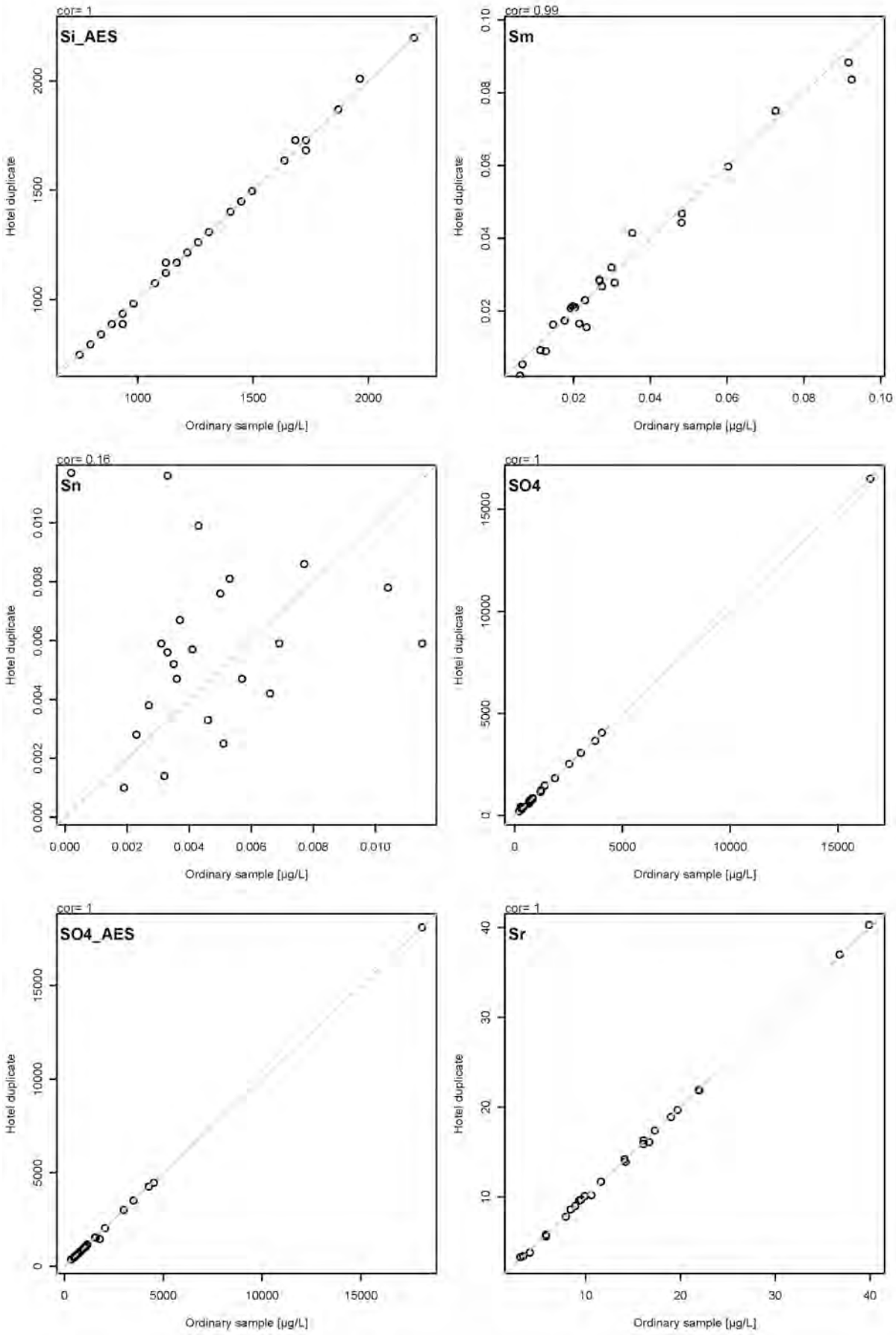

cor= 0.75
Nb
Hotel duplicate
Ordinary sample [µg/L]

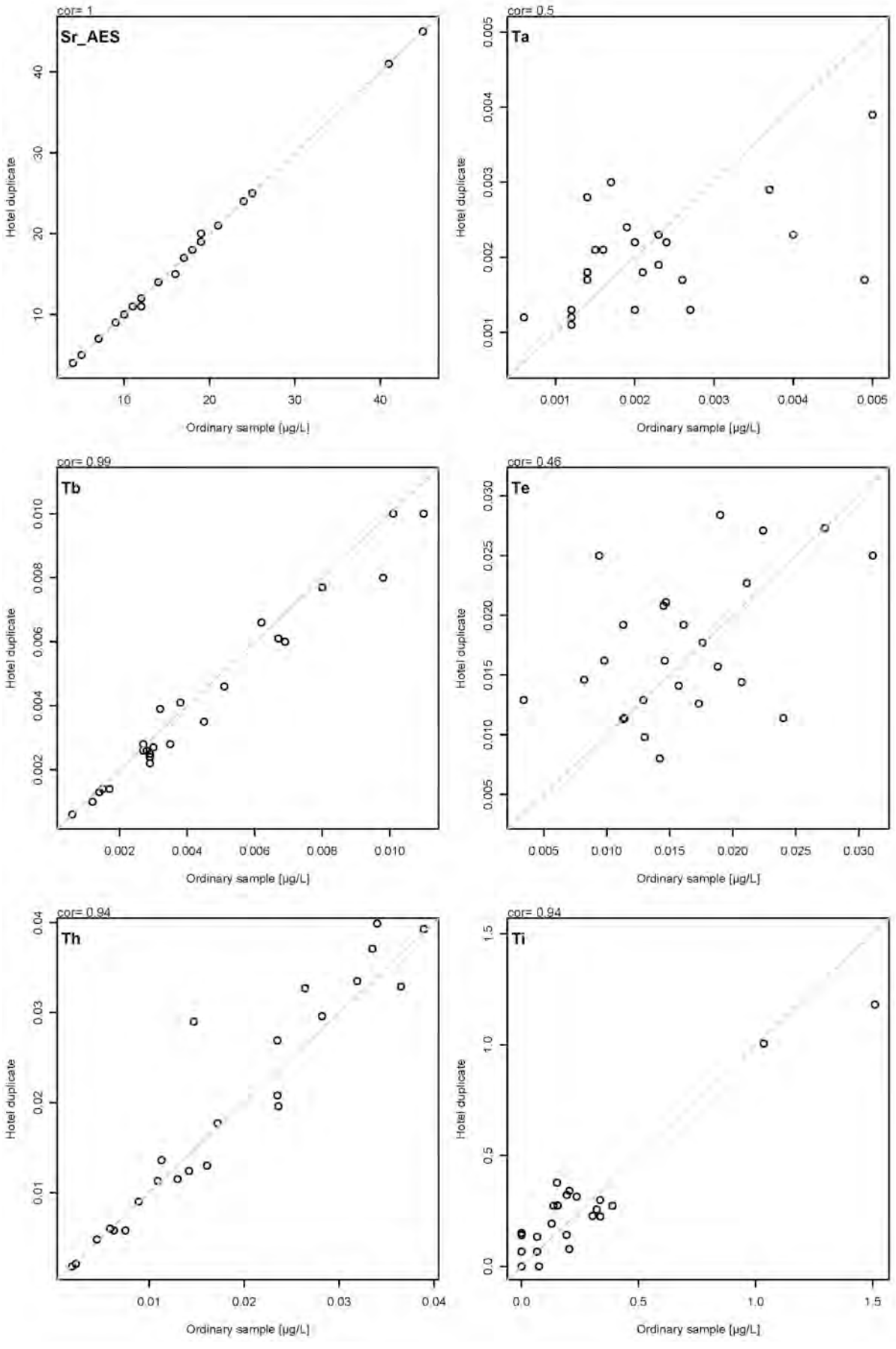

cor= 1
Nd
Hotel duplicate
Ordinary sample [µg/L]

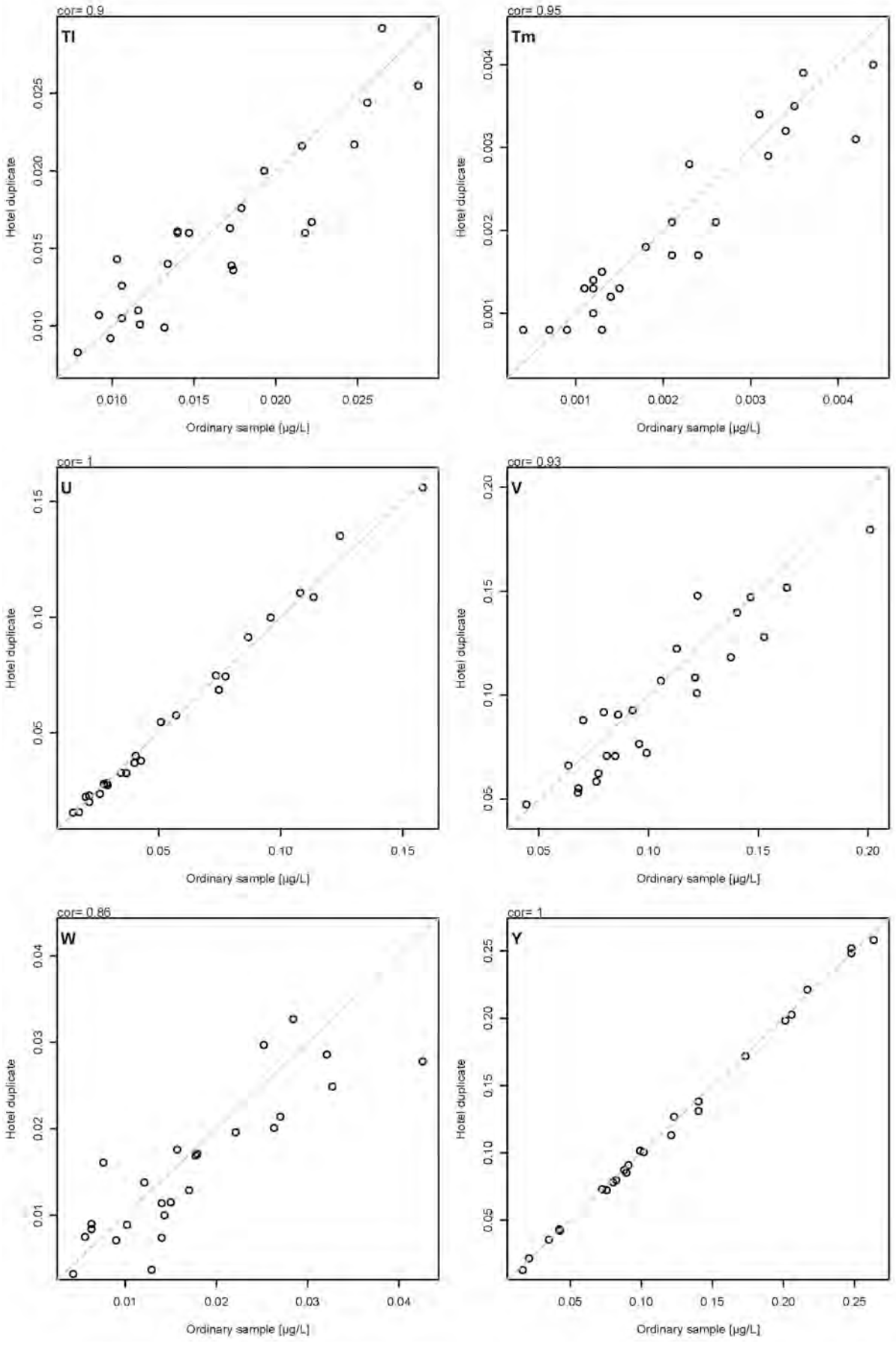

cor= 1
Ni
Hotel duplicate
Ordinary sample [µg/L]

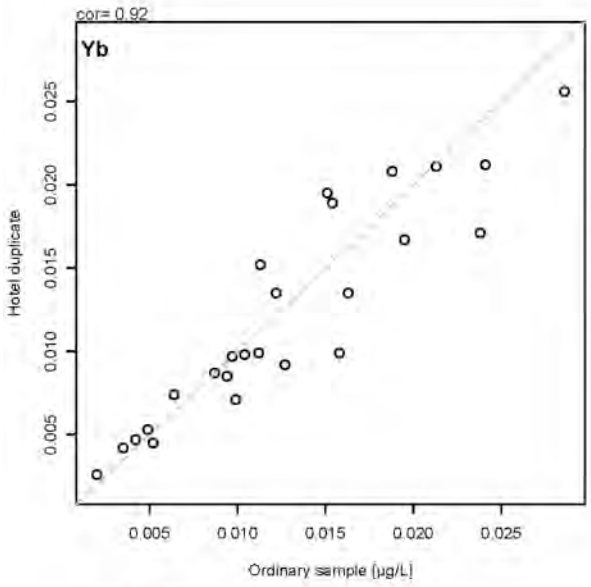

cor= 0.32
NO3
Hotel duplicate
Ordinary sample [µg/L]

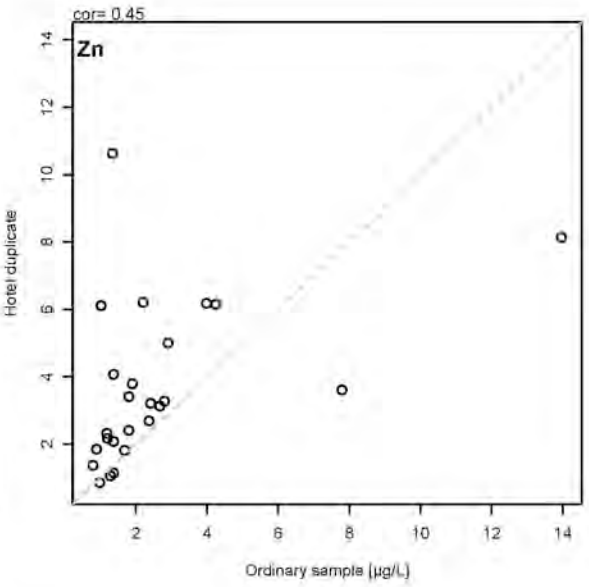

cor= 0.07
Pb
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Pr
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Rb
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.05
Sb
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.53
Sc
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.68
Se
Hotel duplicate
Ordinary sample [µg/L]

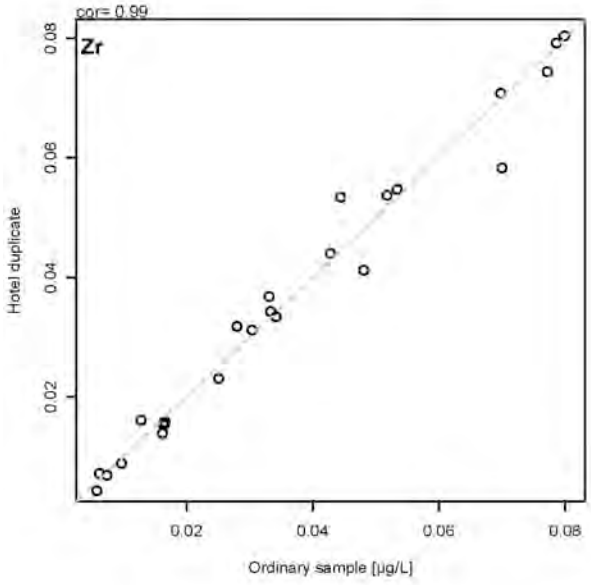

cor= 1
Si_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.99
Sm
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.16
Sn
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
SO4
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
SO4_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Sr
Hotel duplicate
Ordinary sample [µg/L]


cor= 1
Sr_AES
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.5
Ta
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.99
Tb
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.46
Te
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.94
Th
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.94
Ti
Hotel duplicate
Ordinary sample [µg/L]


cor= 0.9
Tl
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.95
Tm
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
U
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.93
V
Hotel duplicate
Ordinary sample [µg/L]
cor= 0.86
W
Hotel duplicate
Ordinary sample [µg/L]
cor= 1
Y
Hotel duplicate
Ordinary sample [µg/L]

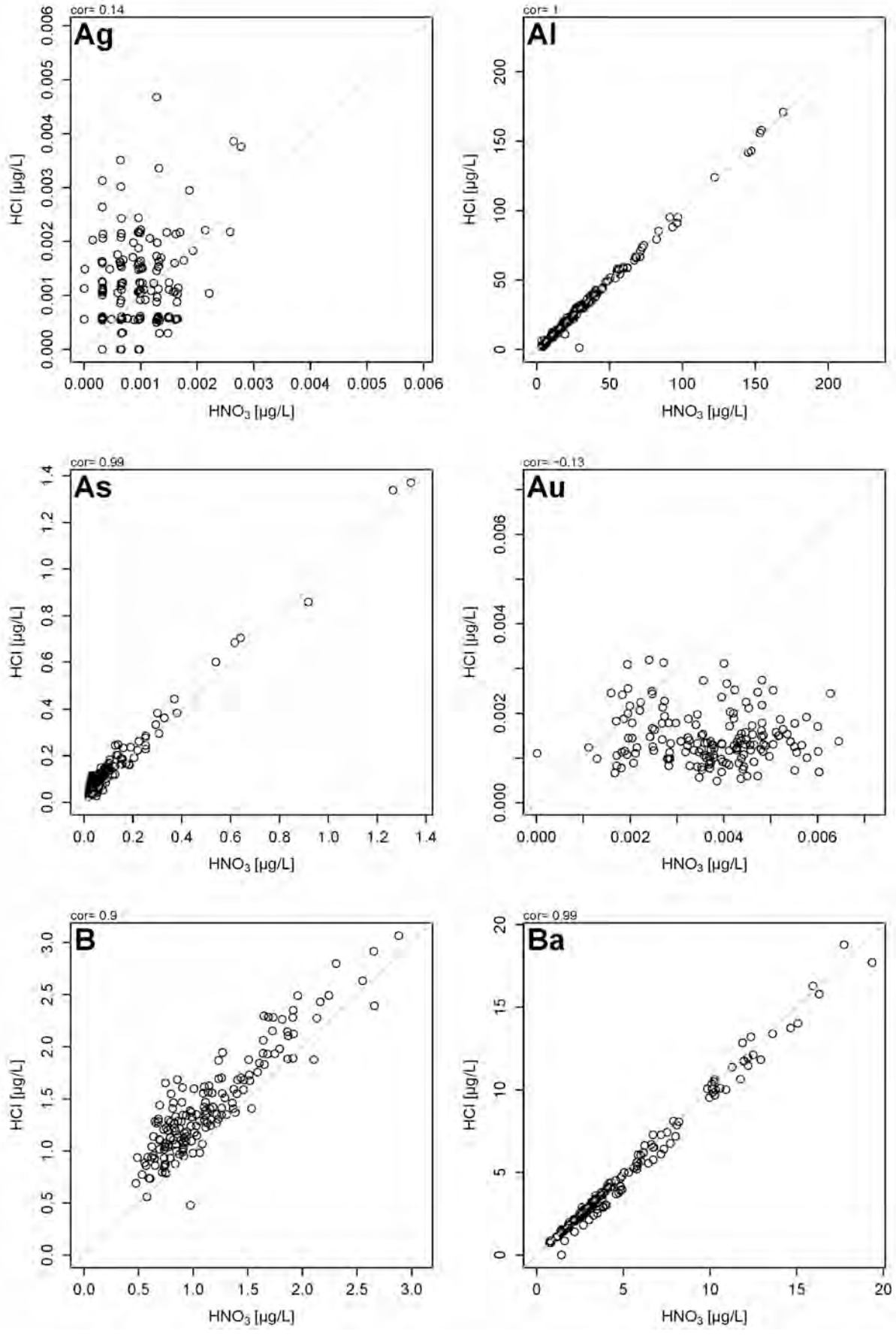

cor= 0.92
Yb
Hotel duplicate
Ordinary sample [µg/L]
0.005
0.010
0.015
0.020
0.025

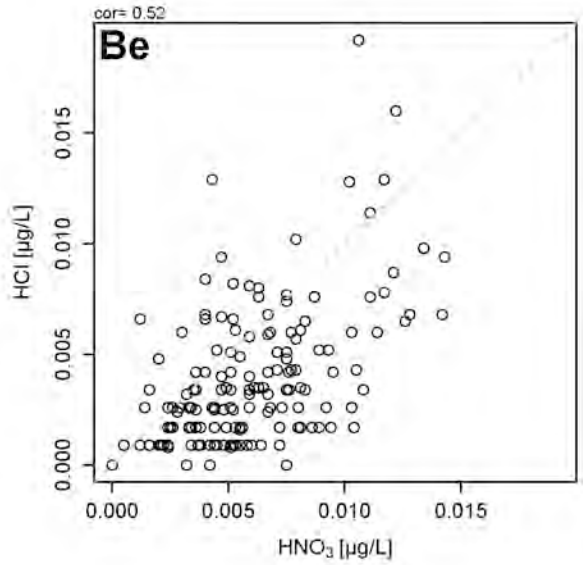

cor= 0.45
Zn
Hotel duplicate
Ordinary sample [µg/L]
2
4
6
8
10
12
14

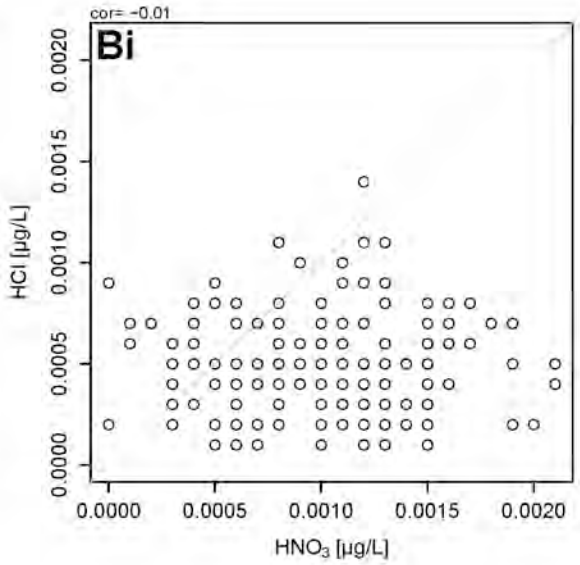

cor= 0.99
Zr
Hotel duplicate
Ordinary sample [µg/L]
0.02
0.04
0.06
0.08

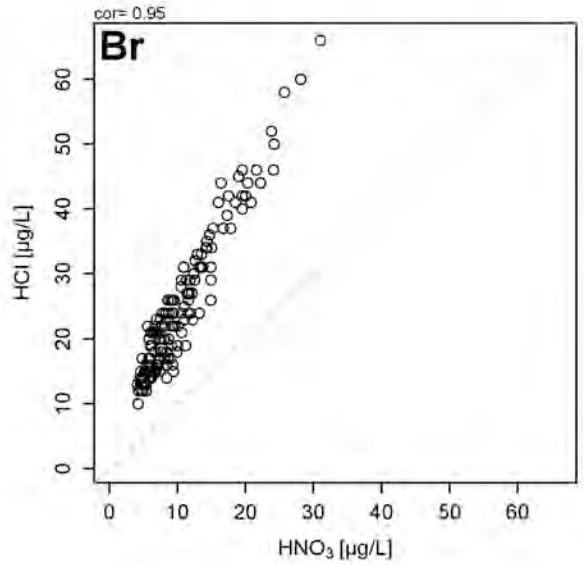
Appendix V: HNO_3 vs. HCl

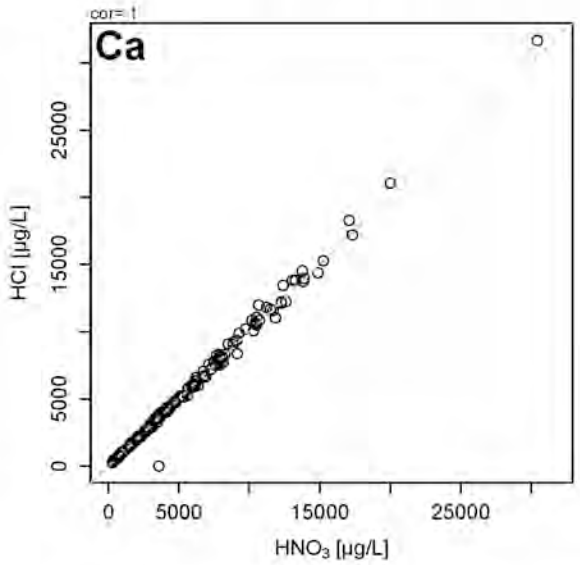
Comparison of analytical results of the HNO_3 vs. the HCl acidified samples.

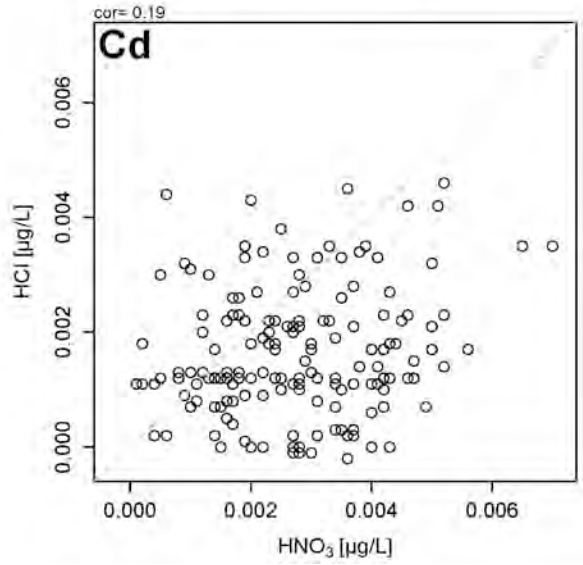

cor= 0.14
Ag
HCl [µg/L]
HNO3 [µg/L]
cor= 1
Al
HCl [µg/L]
HNO3 [µg/L]
cor= 0.99
As
HCl [µg/L]
HNO3 [µg/L]
cor= −0.13
Au
HCl [µg/L]
HNO3 [µg/L]
cor= 0.9
B
HCl [µg/L]
HNO3 [µg/L]
cor= 0.99
Ba
HCl [µg/L]
HNO3 [µg/L]

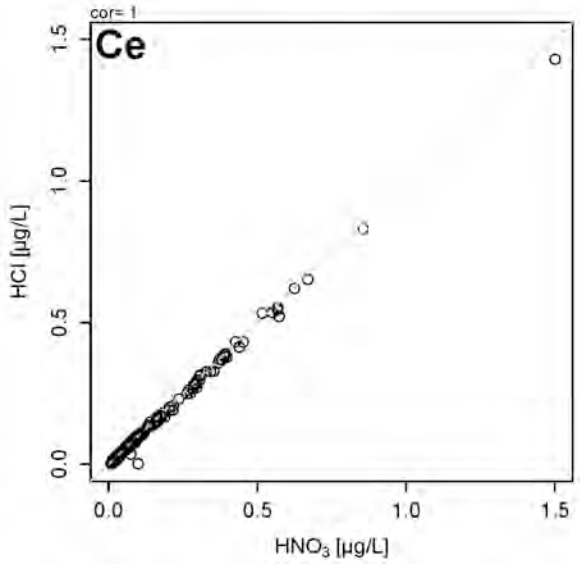

cor= 0.52
Be
HCl [µg/L]
HNO3 [µg/L]
0.000
0.005
0.010
0.015

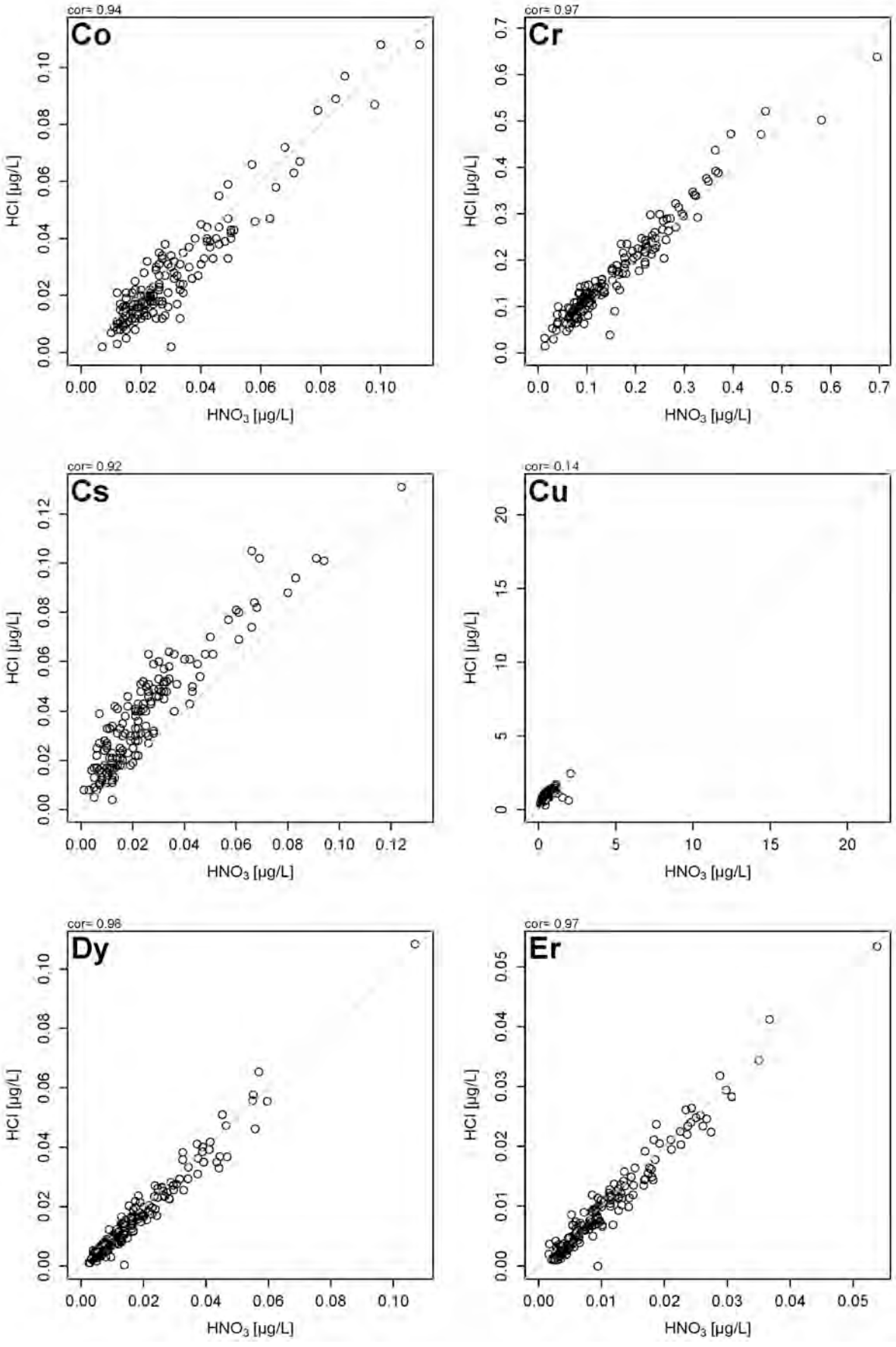

cor= -0.01
Bi
HCl [µg/L]
HNO3 [µg/L]
0.0000
0.0005
0.0010
0.0015
0.0020

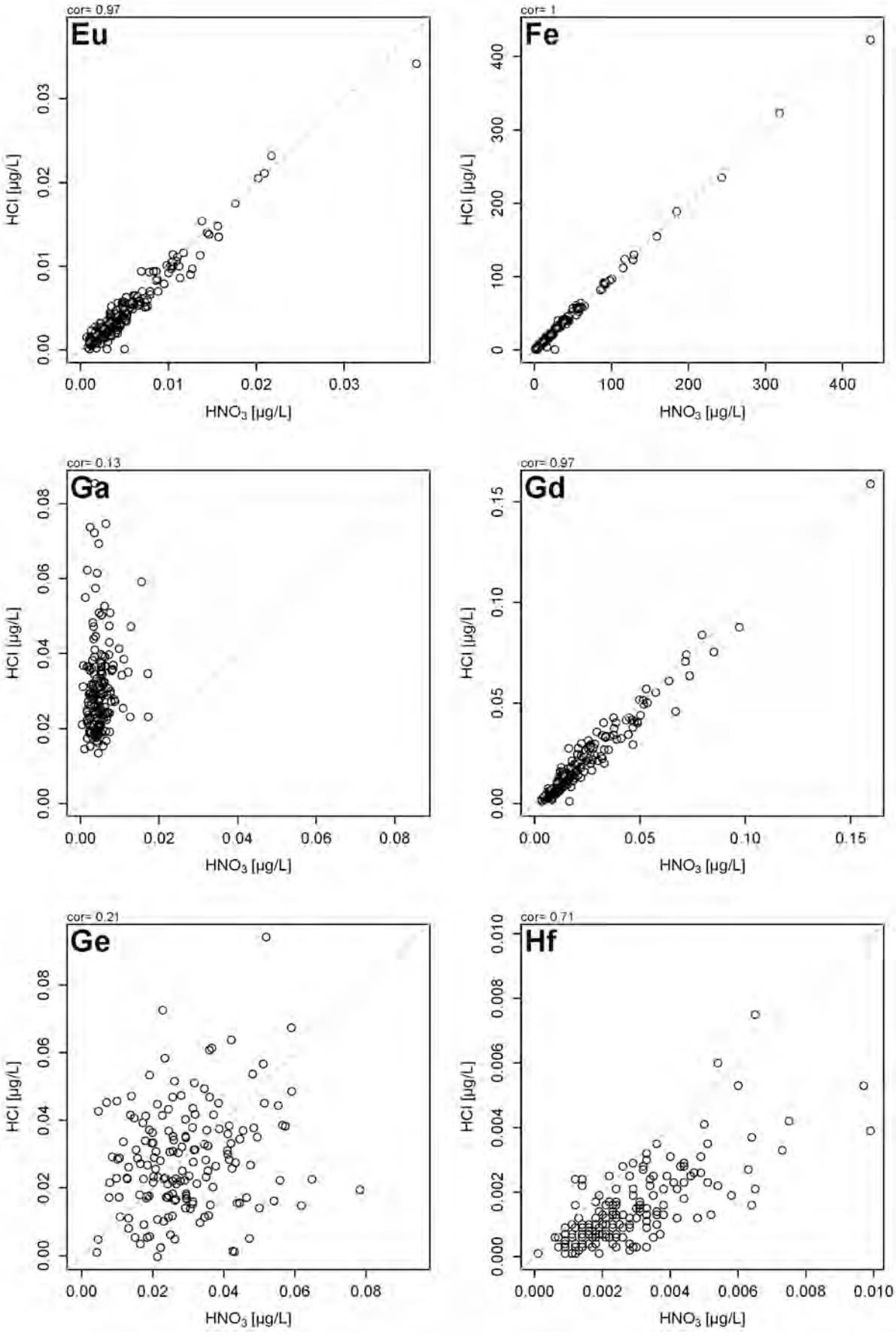

cor= 0.95
Br
HCl [µg/L]
HNO3 [µg/L]
0
10
20
30
40
50
60

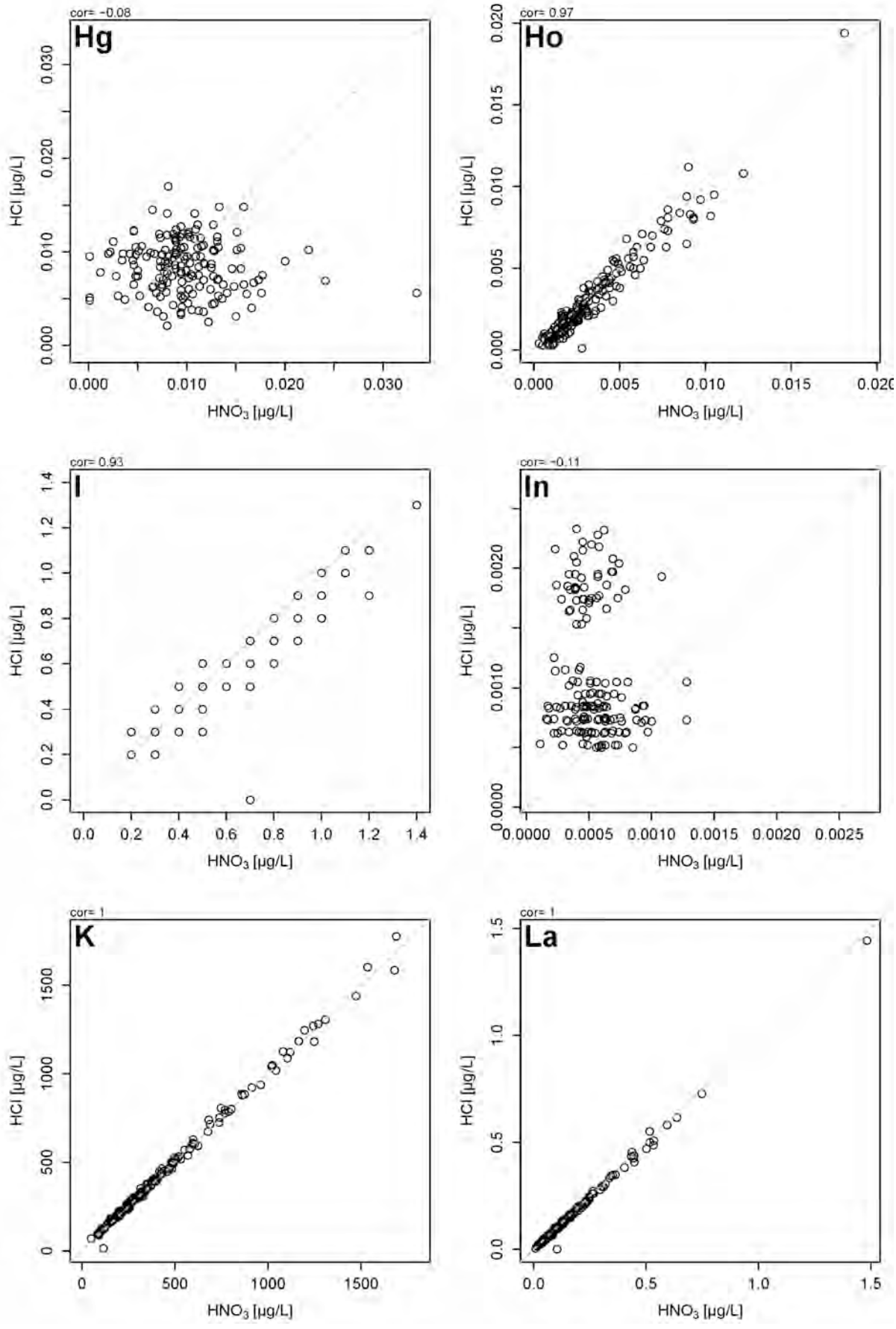

cor= 1
Ca
HCl [µg/L]
HNO3 [µg/L]
0
5000
15000
25000

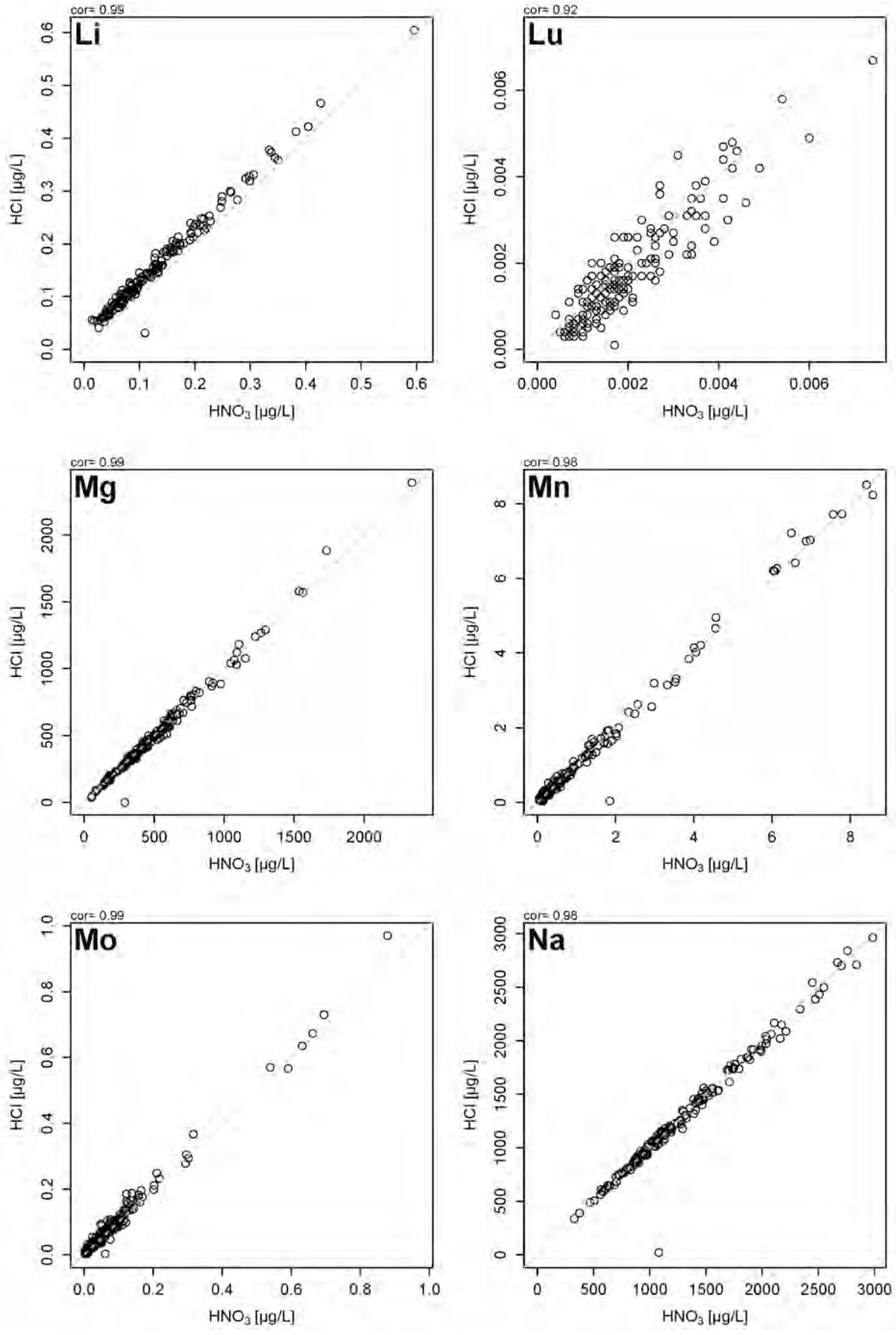

cor= 0.19
Cd
HCl [µg/L]
HNO3 [µg/L]
0.000
0.002
0.004
0.006

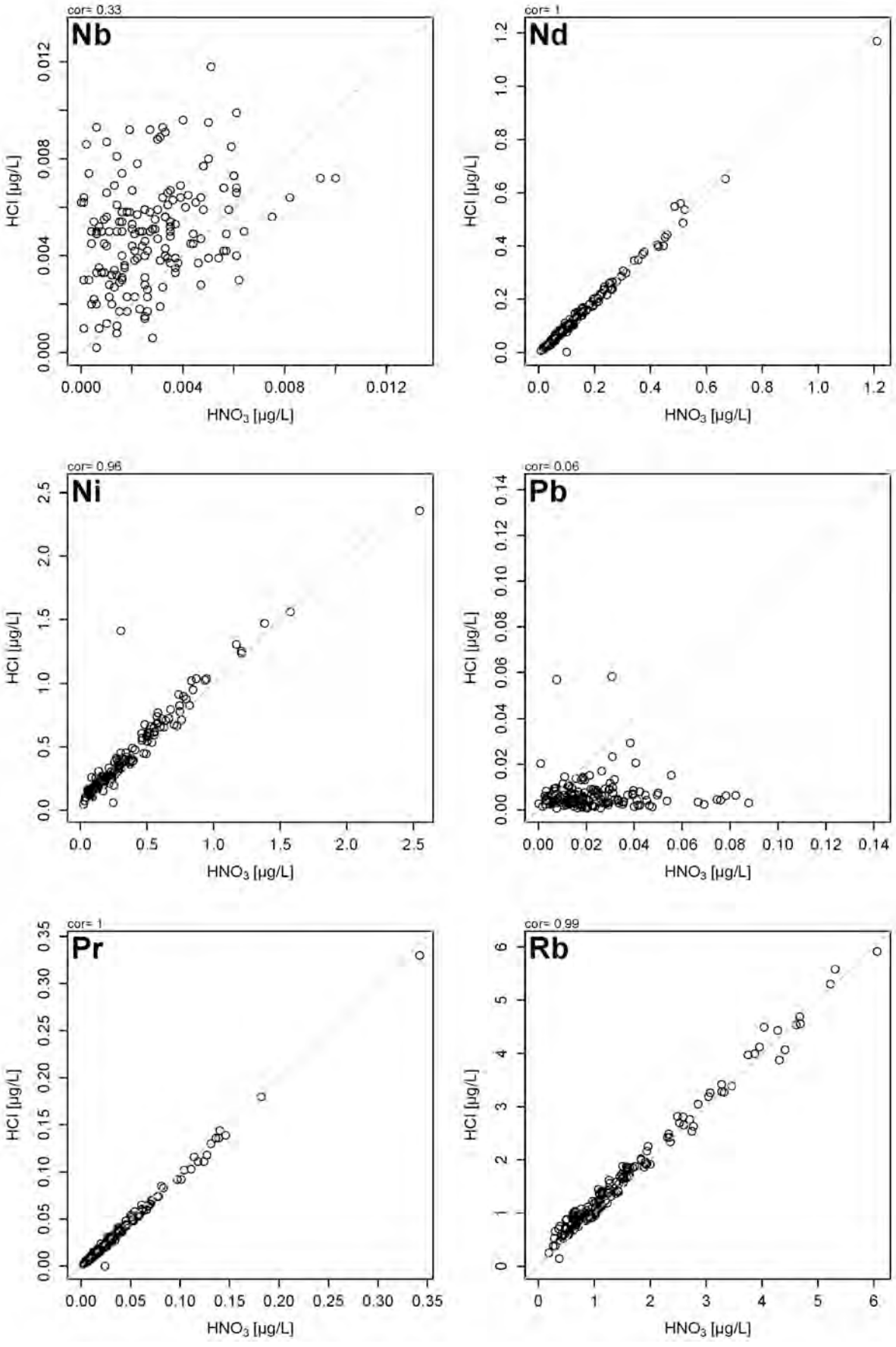

cor= 1
Ce
HCl [µg/L]
HNO3 [µg/L]
0.0
0.5
1.0
1.5

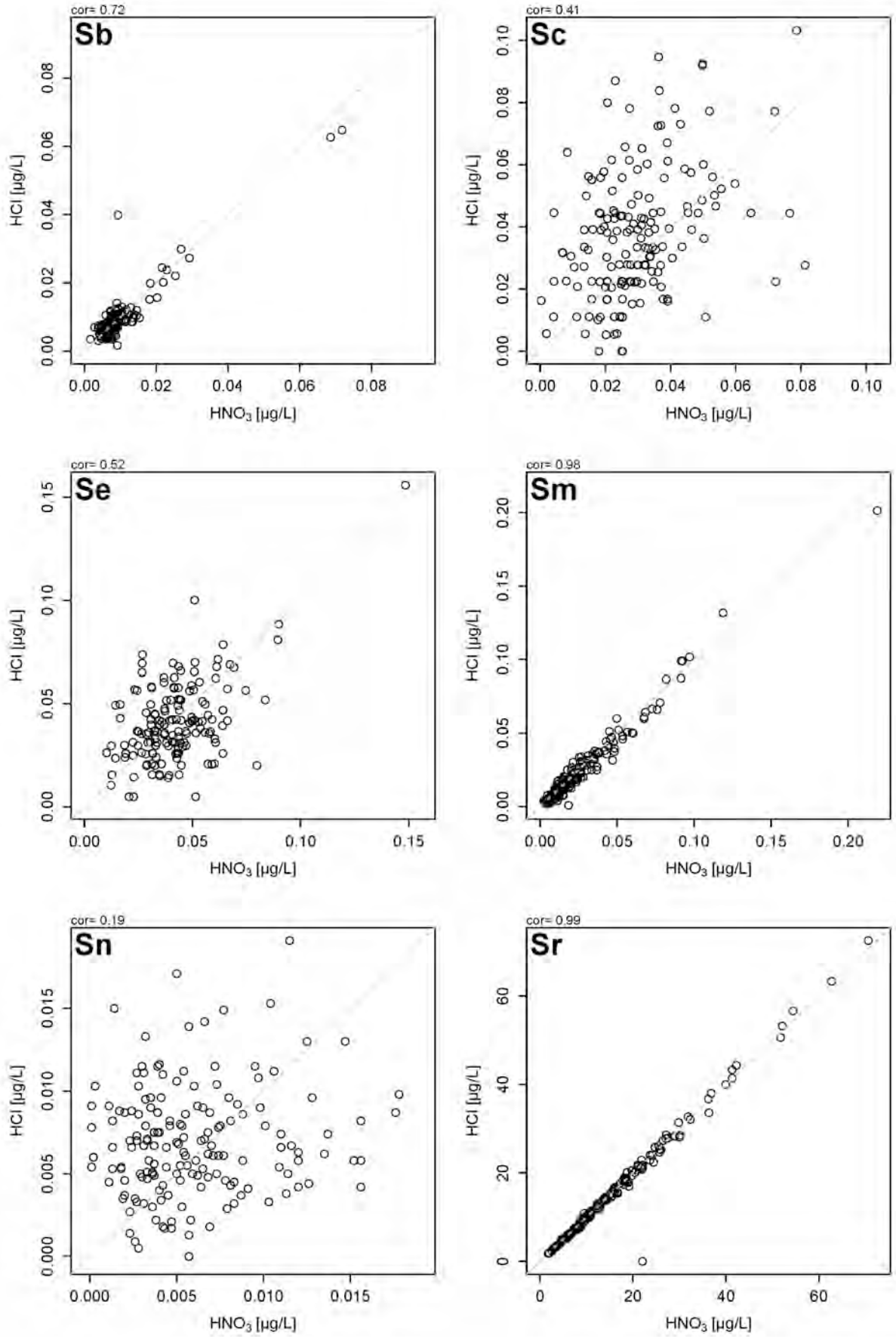

cor= 0.94
Co
HCl [µg/L]
HNO3 [µg/L]
cor= 0.97
Cr
HCl [µg/L]
HNO3 [µg/L]
cor= 0.92
Cs
HCl [µg/L]
HNO3 [µg/L]
cor= 0.14
Cu
HCl [µg/L]
HNO3 [µg/L]
cor= 0.96
Dy
HCl [µg/L]
HNO3 [µg/L]
cor= 0.97
Er
HCl [µg/L]
HNO3 [µg/L]

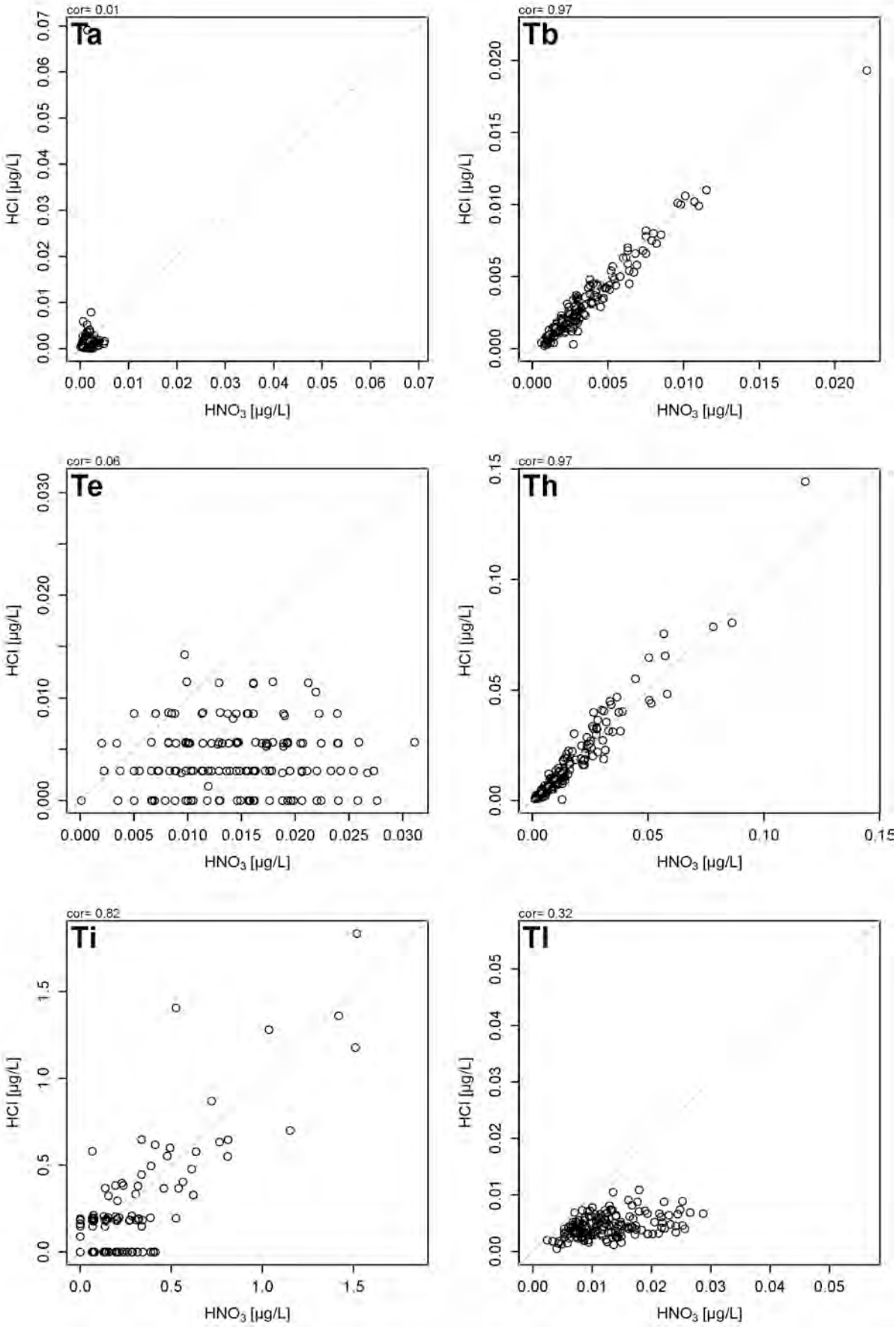

cor= 0.97
Eu
HCl [µg/L]
HNO3 [µg/L]
cor= 1
Fe
HCl [µg/L]
HNO3 [µg/L]
cor= 0.13
Ga
HCl [µg/L]
HNO3 [µg/L]
cor= 0.97
Gd
HCl [µg/L]
HNO3 [µg/L]
cor= 0.21
Ge
HCl [µg/L]
HNO3 [µg/L]
cor= 0.71
Hf
HCl [µg/L]
HNO3 [µg/L]

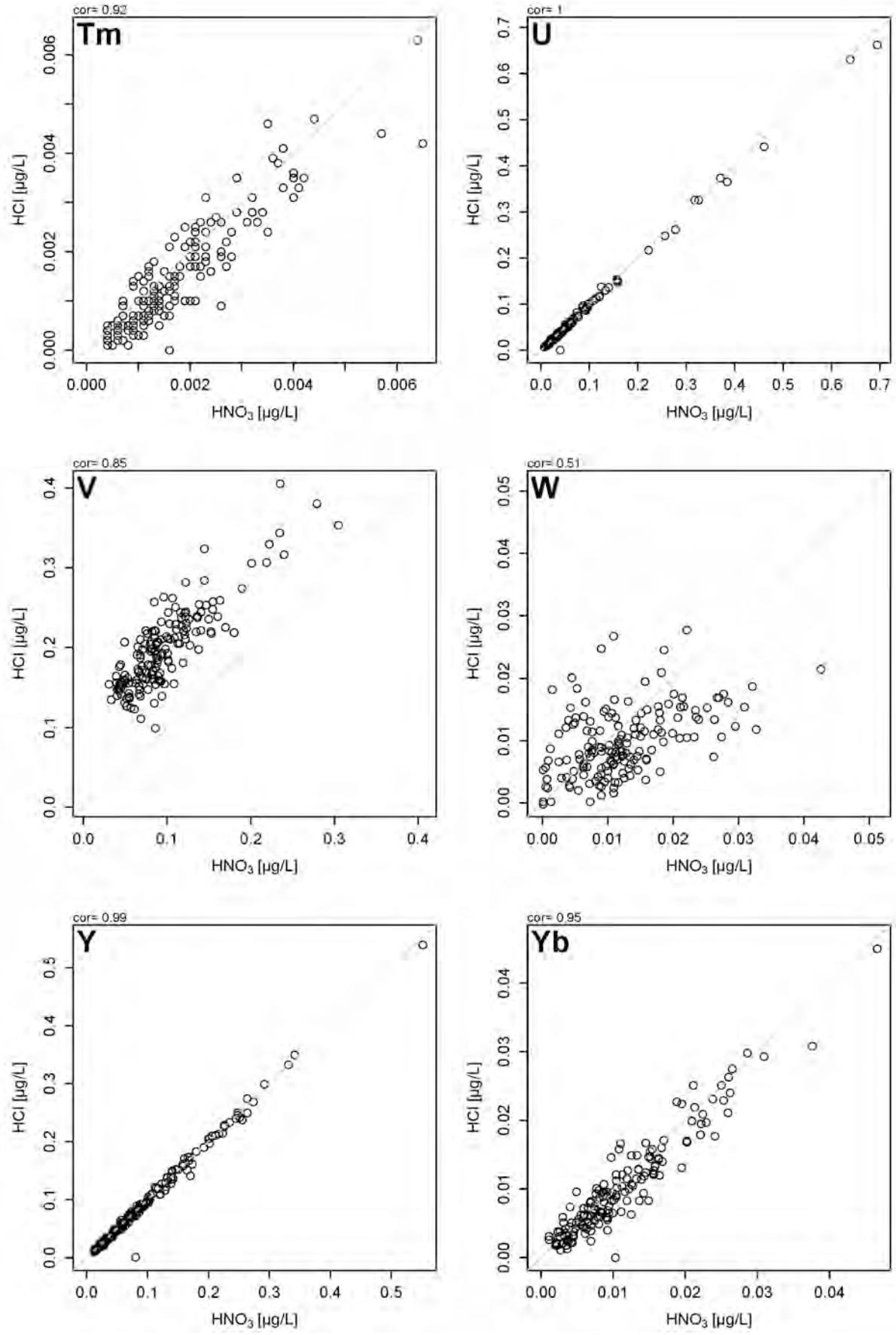

cor= -0.08
Hg
HCl [µg/L]
HNO3 [µg/L]
cor= 0.97
Ho
HCl [µg/L]
HNO3 [µg/L]
cor= 0.93
I
HCl [µg/L]
HNO3 [µg/L]
cor= -0.11
In
HCl [µg/L]
HNO3 [µg/L]
cor= 1
K
HCl [µg/L]
HNO3 [µg/L]
cor= 1
La
HCl [µg/L]
HNO3 [µg/L]

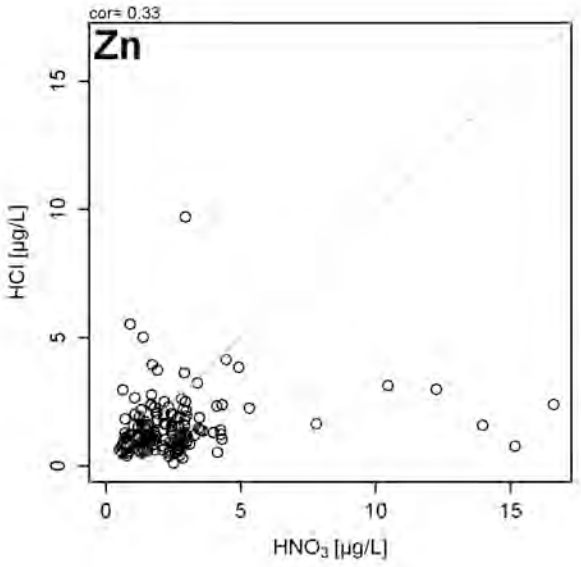

cor= 0.99
Li
HCl [µg/L]
HNO3 [µg/L]
cor= 0.92
Lu
HCl [µg/L]
HNO3 [µg/L]
cor= 0.99
Mg
HCl [µg/L]
HNO3 [µg/L]
cor= 0.98
Mn
HCl [µg/L]
HNO3 [µg/L]
cor= 0.99
Mo
HCl [µg/L]
HNO3 [µg/L]
cor= 0.98
Na
HCl [µg/L]
HNO3 [µg/L]

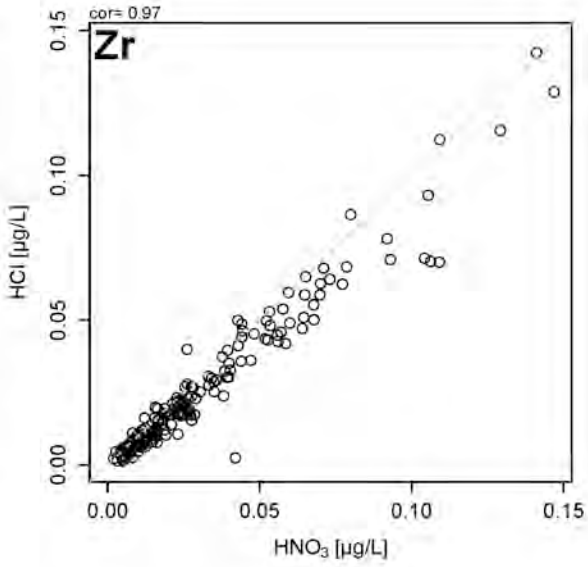

cor= 0.33
Nb
HCl [µg/L]
HNO3 [µg/L]
cor= 1
Nd
HCl [µg/L]
HNO3 [µg/L]
cor= 0.96
Ni
HCl [µg/L]
HNO3 [µg/L]
cor= 0.06
Pb
HCl [µg/L]
HNO3 [µg/L]
cor= 1
Pr
HCl [µg/L]
HNO3 [µg/L]
cor= 0.99
Rb
HCl [µg/L]
HNO3 [µg/L]


cor= 0.72
Sb
HCl [µg/L]
HNO3 [µg/L]
cor= 0.41
Sc
HCl [µg/L]
HNO3 [µg/L]
cor= 0.52
Se
HCl [µg/L]
HNO3 [µg/L]
cor= 0.98
Sm
HCl [µg/L]
HNO3 [µg/L]
cor= 0.19
Sn
HCl [µg/L]
HNO3 [µg/L]
cor= 0.99
Sr
HCl [µg/L]
HNO3 [µg/L]

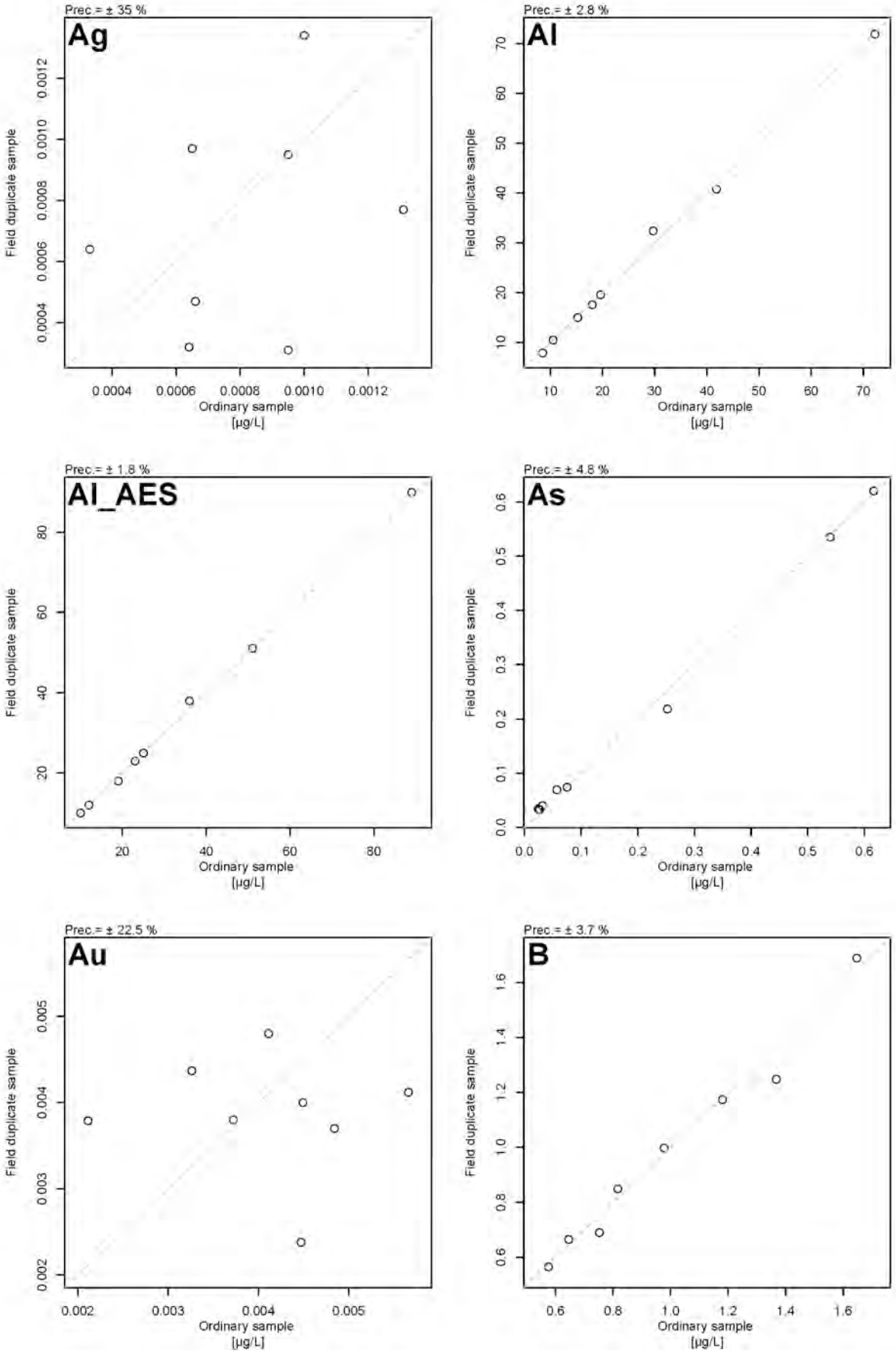

cor= 0.01
Ta
HCl [µg/L]
HNO3 [µg/L]
cor= 0.97
Tb
HCl [µg/L]
HNO3 [µg/L]
cor= 0.06
Te
HCl [µg/L]
HNO3 [µg/L]
cor= 0.97
Th
HCl [µg/L]
HNO3 [µg/L]
cor= 0.82
Ti
HCl [µg/L]
HNO3 [µg/L]
cor= 0.32
Tl
HCl [µg/L]
HNO3 [µg/L]

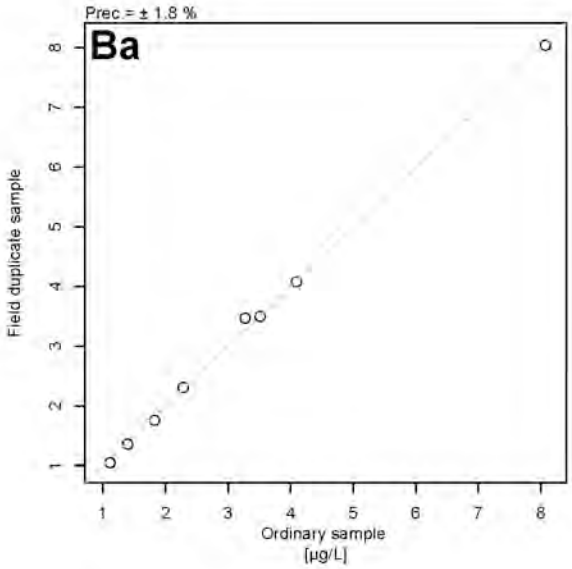

cor= 0.92
Tm
HCl [µg/L]
HNO3 [µg/L]
cor= 1
U
HCl [µg/L]
HNO3 [µg/L]
cor= 0.85
V
HCl [µg/L]
HNO3 [µg/L]
cor= 0.51
W
HCl [µg/L]
HNO3 [µg/L]
cor= 0.99
Y
HCl [µg/L]
HNO3 [µg/L]
cor= 0.95
Yb
HCl [µg/L]
HNO3 [µg/L]

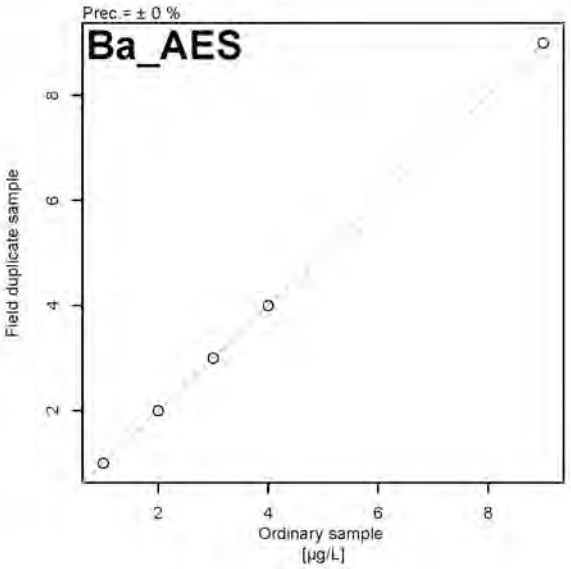

cor= 0.33
Zn
HCl [µg/L]
HNO3 [µg/L]
0
5
10
15

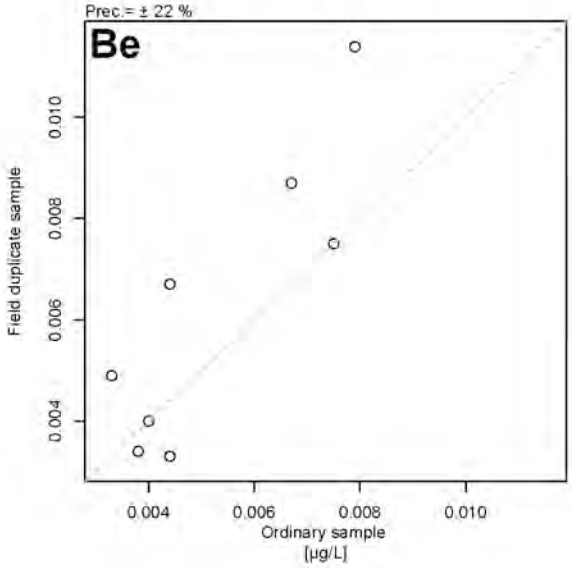

cor= 0.97
Zr
HCl [µg/L]
HNO3 [µg/L]
0.00
0.05
0.10
0.15

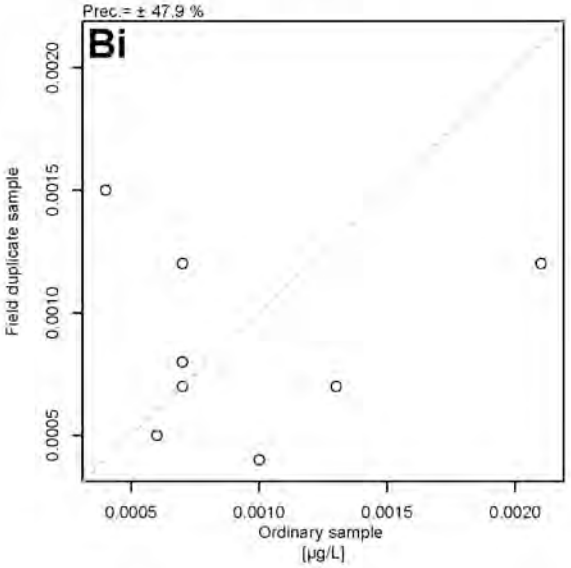
Appendix VI: XY plots of the field duplicates versus the original samples.

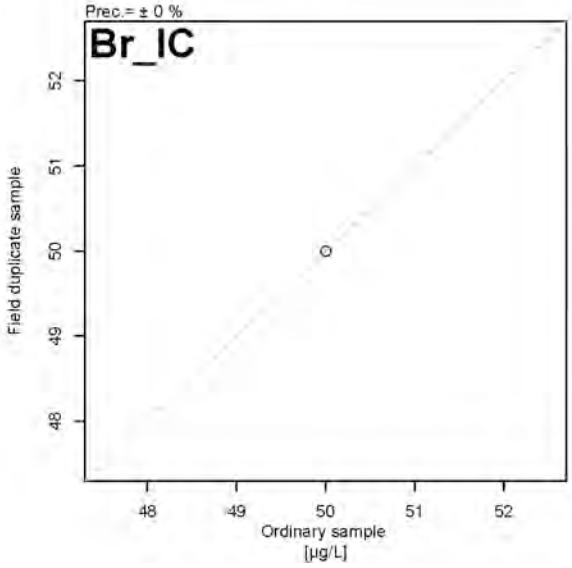

Prec.= ± 35 %
Ag
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 2.8 %
Al
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 1.8 %
Al_AES
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 4.8 %
As
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 22.5 %
Au
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 3.7 %
B
Field duplicate sample
Ordinary sample
[µg/L]

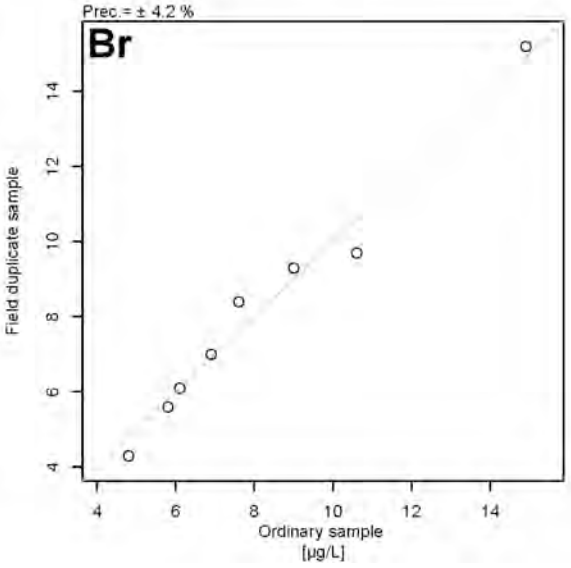

Prec.= ± 1.8 %
Ba
Field duplicate sample
Ordinary sample
[µg/L]

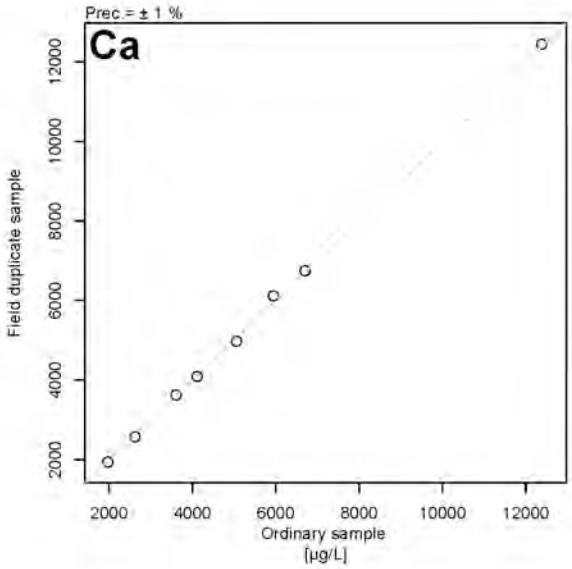

Prec.= ± 0 %
Ba_AES
Field duplicate sample
Ordinary sample
[µg/L]

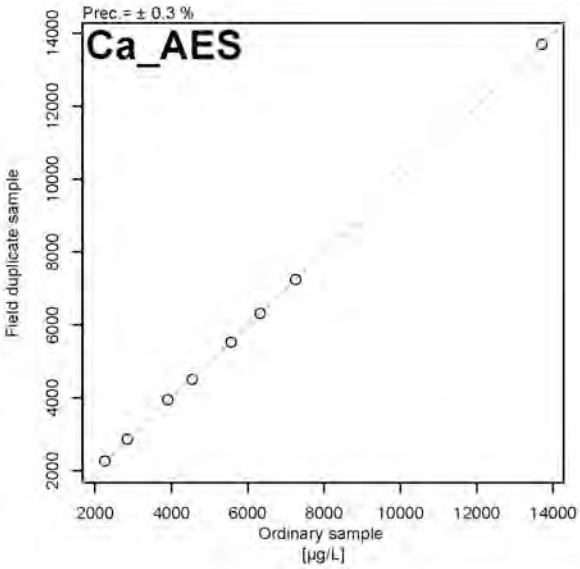

Prec.= ± 22 %
Be
Field duplicate sample
Ordinary sample
[µg/L]

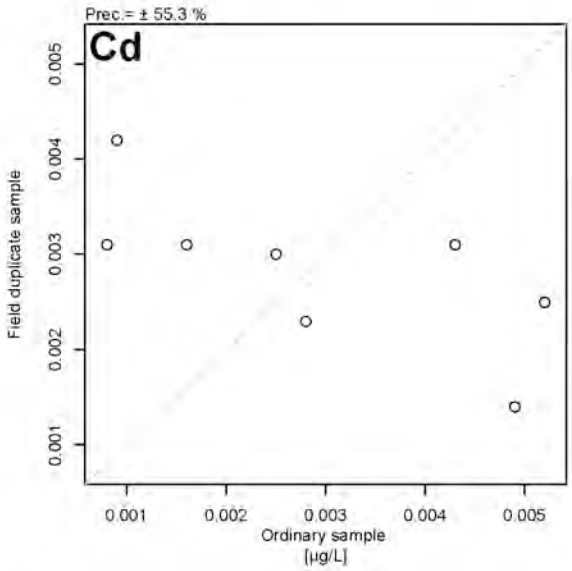

Prec.= ± 47.9 %
Bi
Field duplicate sample
Ordinary sample
[µg/L]

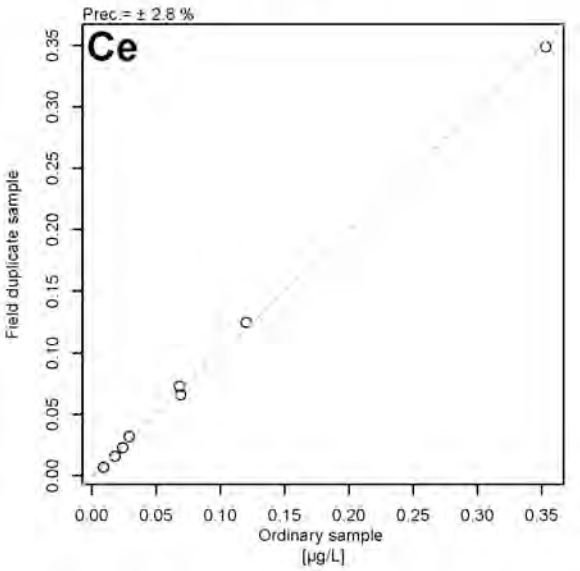

Prec.= ± 0 %
Br_IC
Field duplicate sample
Ordinary sample
[µg/L]

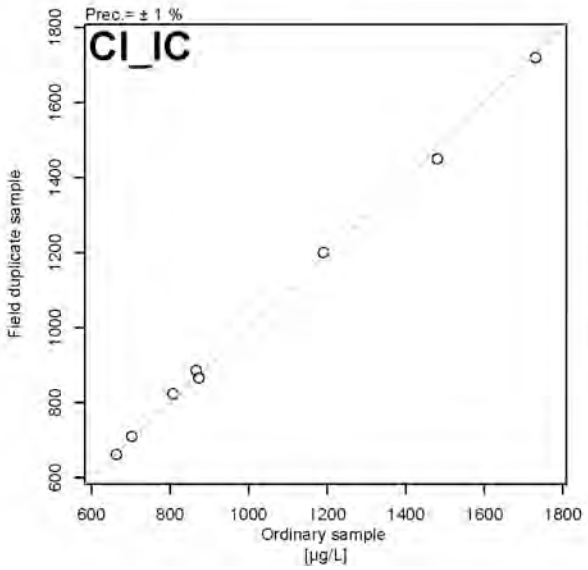

Prec.= ± 4.2 %
Br
Field duplicate sample
Ordinary sample
[µg/L]

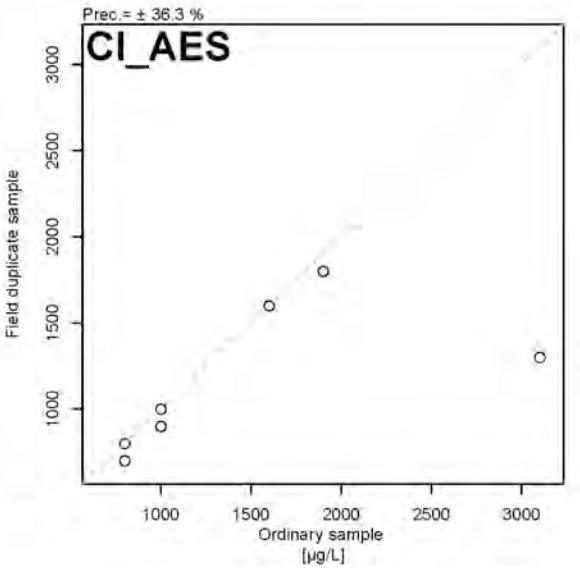

Prec.= ± 1 %
Ca
Field duplicate sample
Ordinary sample
[µg/L]

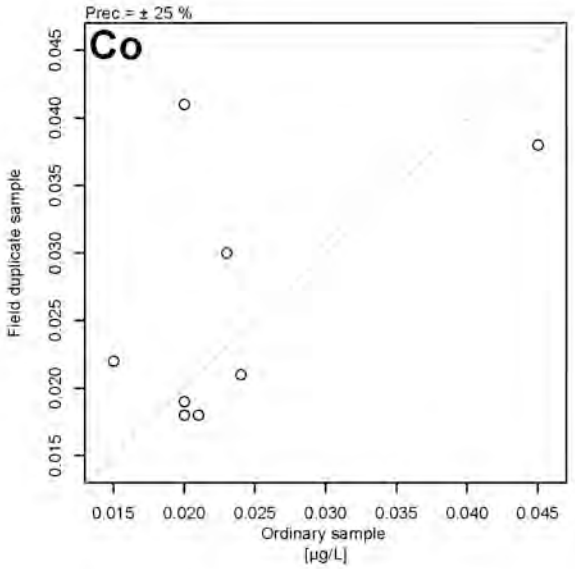

Prec.= ± 0.3 %
Ca_AES
Field duplicate sample
Ordinary sample
[µg/L]

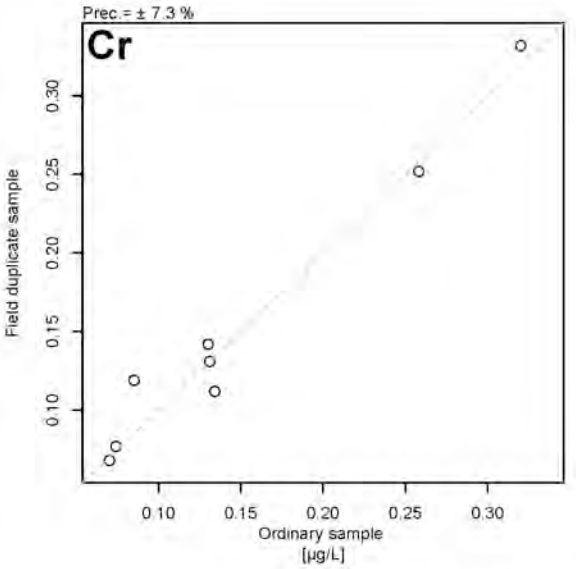

Prec.= ± 55.3 %
Cd
Field duplicate sample
Ordinary sample
[µg/L]

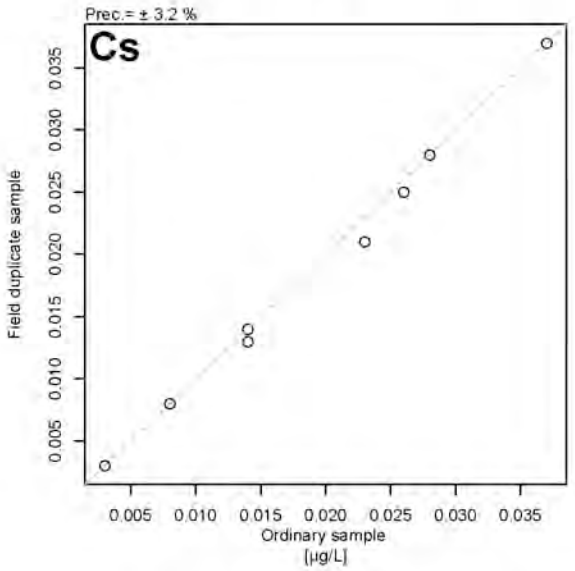

Prec.= ± 2.8 %
Ce
Field duplicate sample
Ordinary sample
[µg/L]

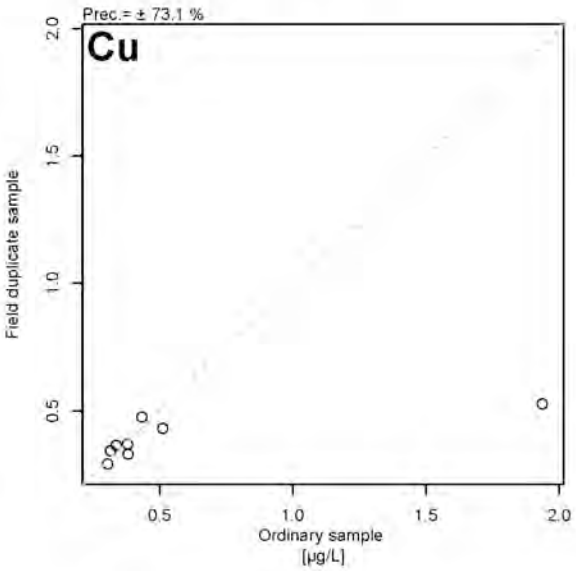

Prec.= ± 1 %
Cl_IC
Field duplicate sample
Ordinary sample
[µg/L]

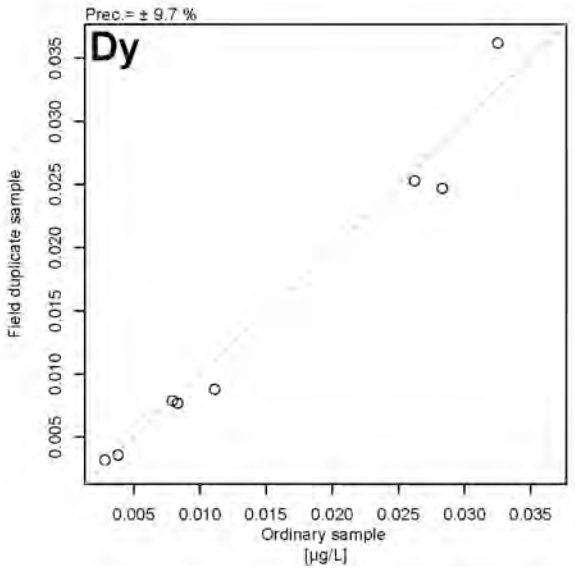

Prec.= ± 36.3 %
Cl_AES
Field duplicate sample
Ordinary sample
[µg/L]

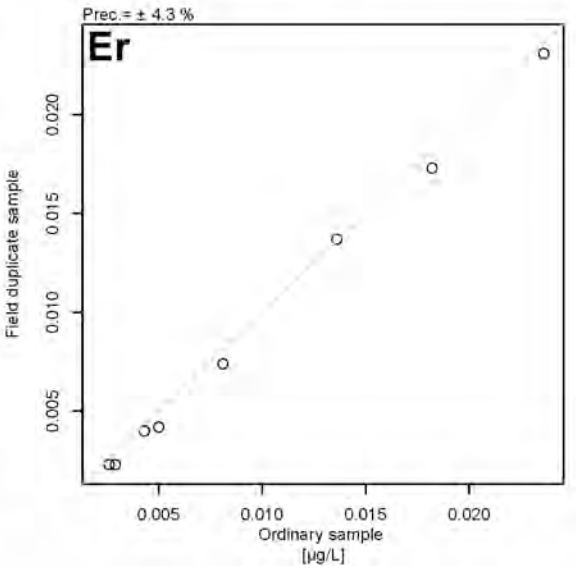

Prec.= ± 25 %
Co
Field duplicate sample
Ordinary sample
[µg/L]

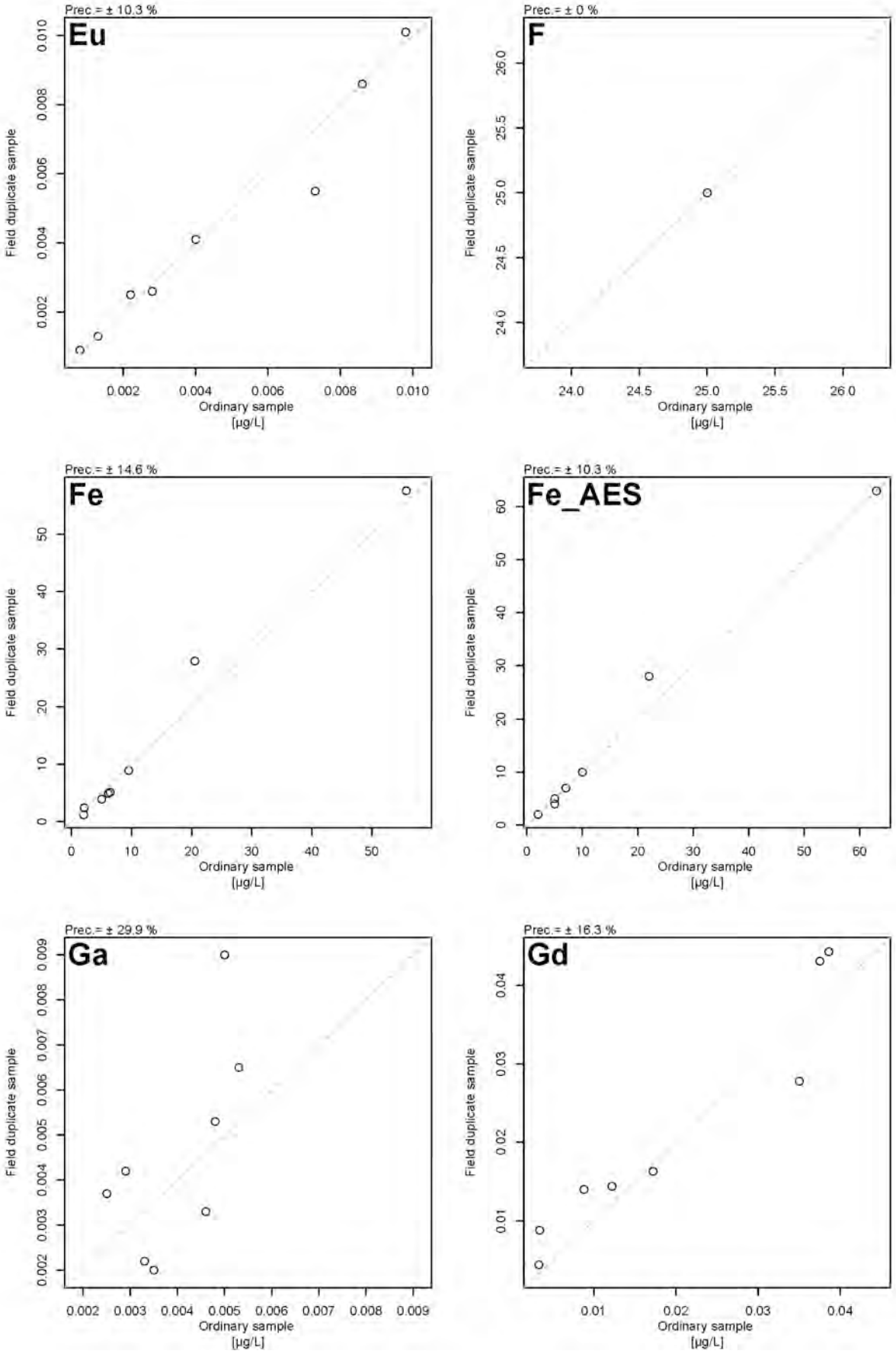

Prec.= ± 7.3 %
Cr
Field duplicate sample
Ordinary sample
[µg/L]

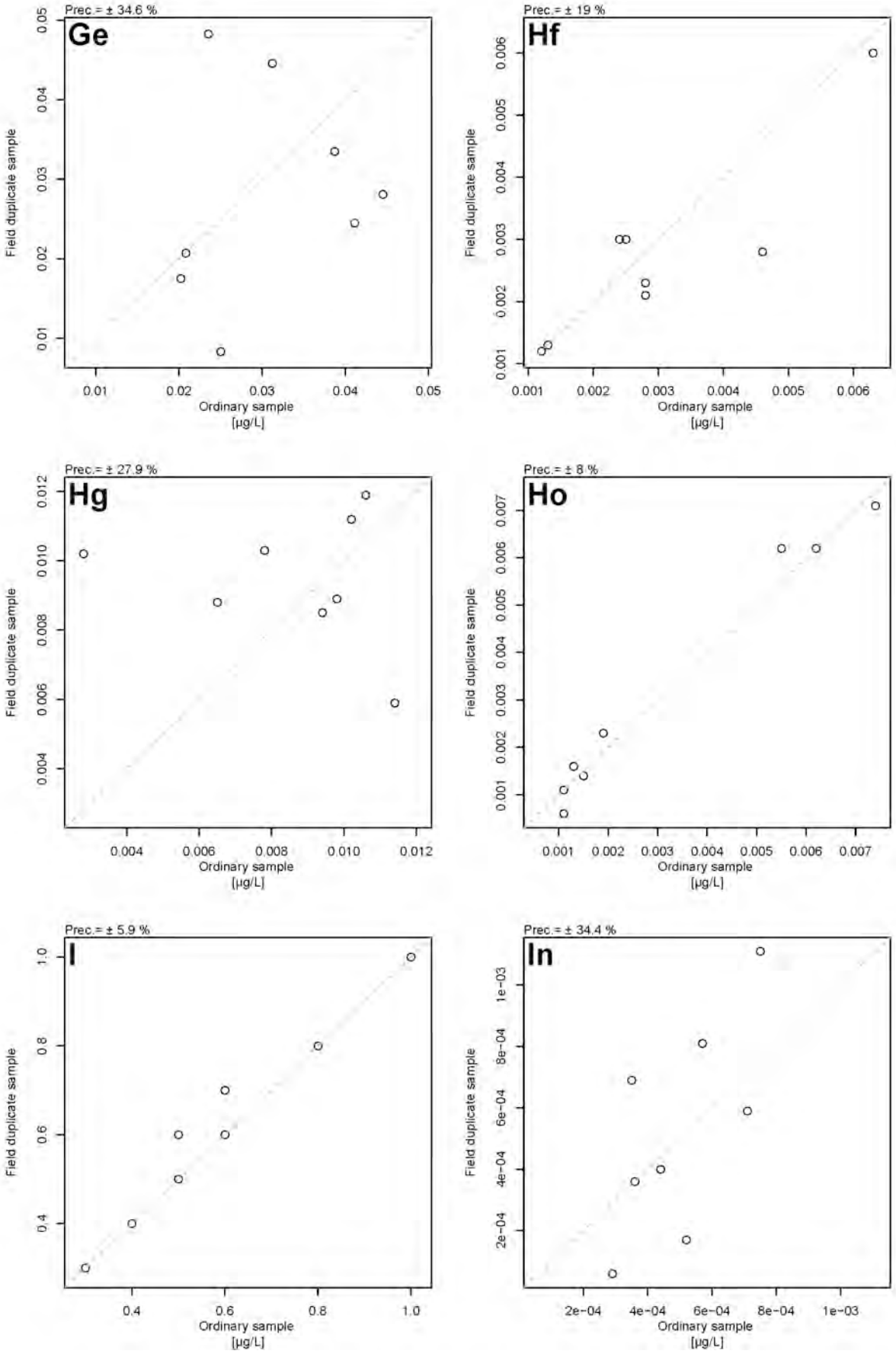

Prec.= ± 3.2 %
Cs
Field duplicate sample
Ordinary sample
[µg/L]

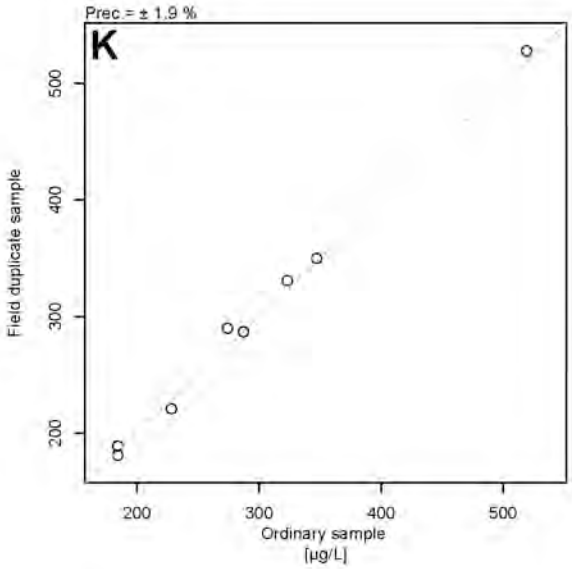

Prec.= ± 73.1 %
Cu
Field duplicate sample
Ordinary sample
[µg/L]

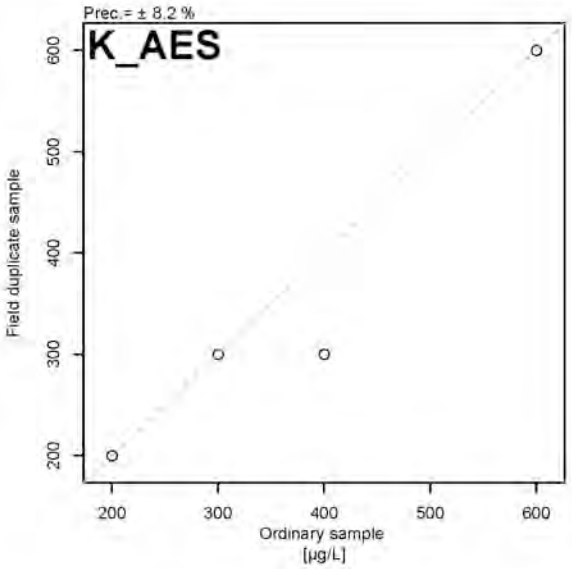

Prec.= ± 9.7 %
Dy
Field duplicate sample
Ordinary sample
[µg/L]

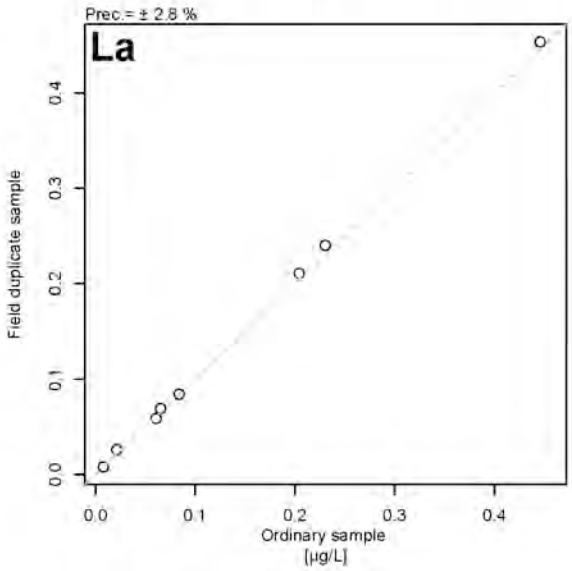

Prec.= ± 4.3 %
Er
Field duplicate sample
Ordinary sample
[µg/L]

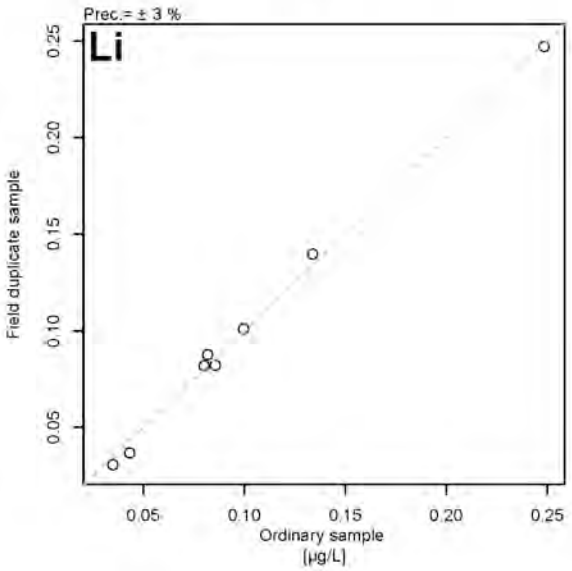

Prec.= ± 10.3 %
Eu
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 0 %
F
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 14.6 %
Fe
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 10.3 %
Fe_AES
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 29.9 %
Ga
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 16.3 %
Gd
Field duplicate sample
Ordinary sample
[µg/L]

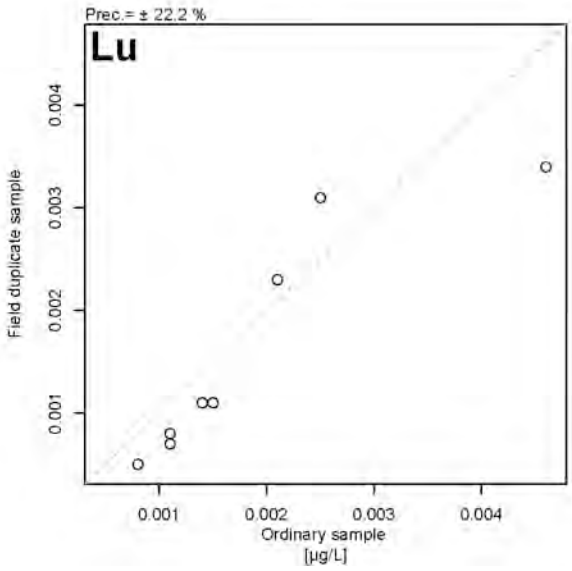

Prec.= ± 34.6 %
Ge
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 19 %
Hf
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 27.9 %
Hg
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 8 %
Ho
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 5.9 %
I
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 34.4 %
In
Field duplicate sample
Ordinary sample
[µg/L]

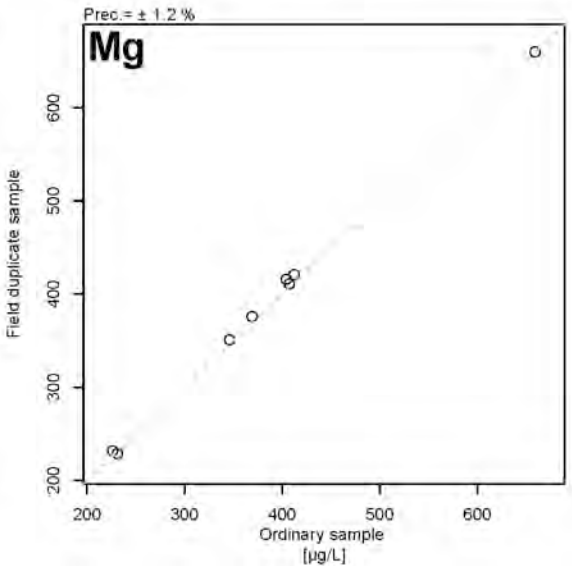

Prec.= ± 1.9 %
K
Field duplicate sample
Ordinary sample
[µg/L]

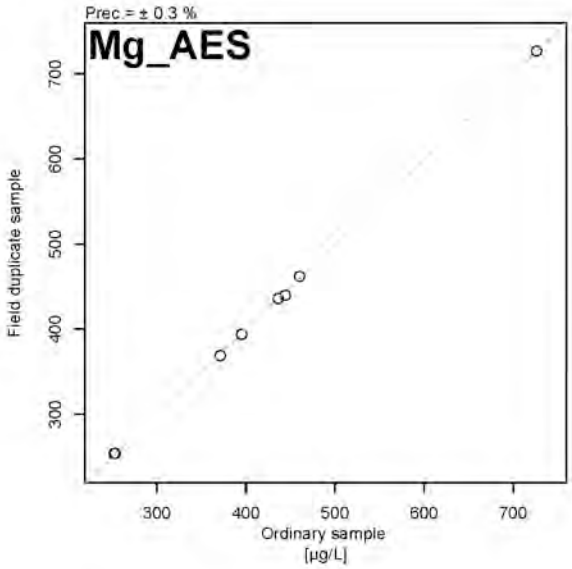

Prec.= ± 8.2 %
K_AES
Field duplicate sample
Ordinary sample
[µg/L]

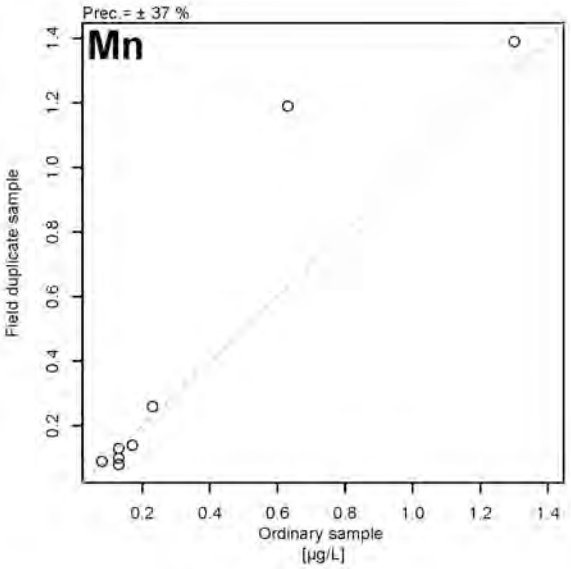

Prec.= ± 2.8 %
La
Field duplicate sample
Ordinary sample
[µg/L]

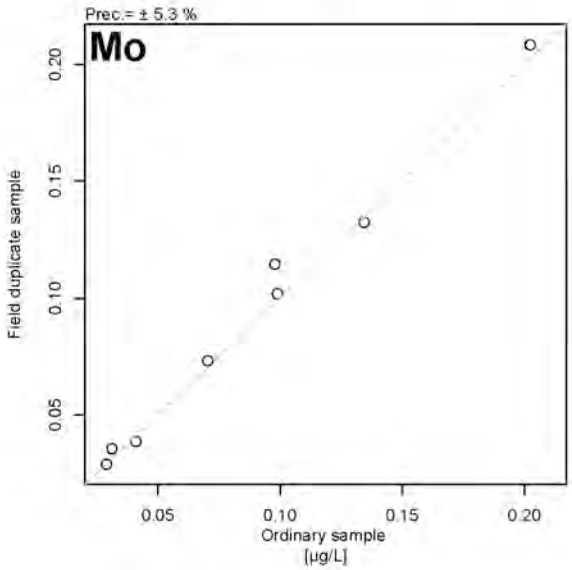

Prec.= ± 3 %
Li
Field duplicate sample
Ordinary sample
[µg/L]

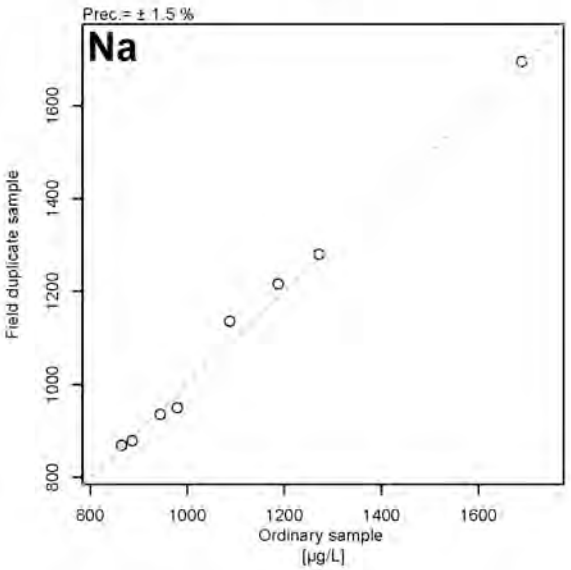

Prec.= ± 22.2 %
Lu
Field duplicate sample
Ordinary sample
[µg/L]

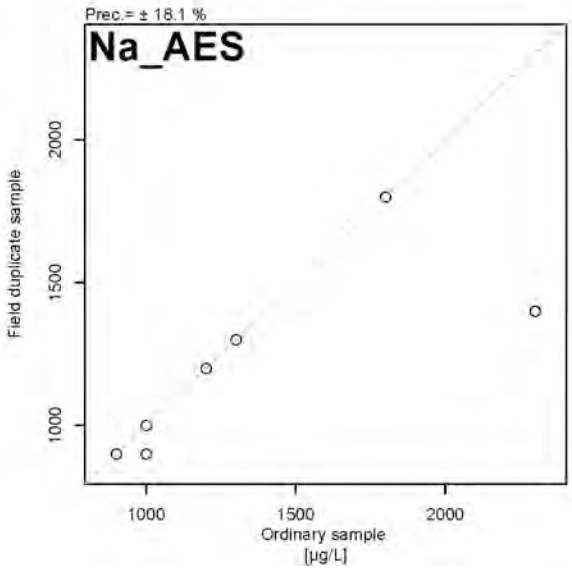

Prec.= ± 1.2 %
Mg
Field duplicate sample
Ordinary sample
[µg/L]

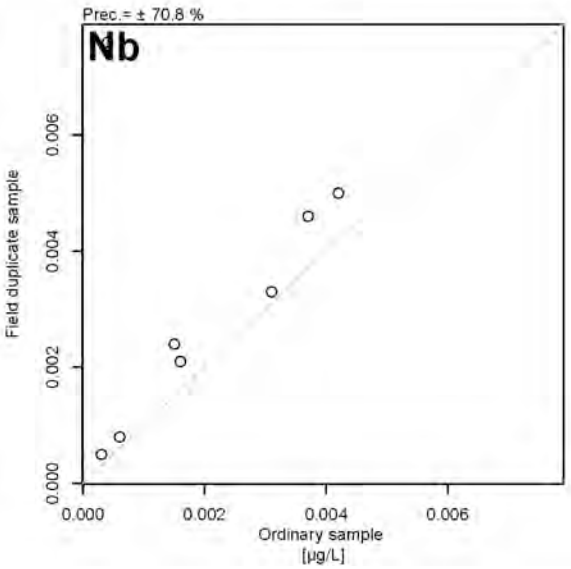

Prec.= ± 0.3 %
Mg_AES
Field duplicate sample
Ordinary sample
[µg/L]

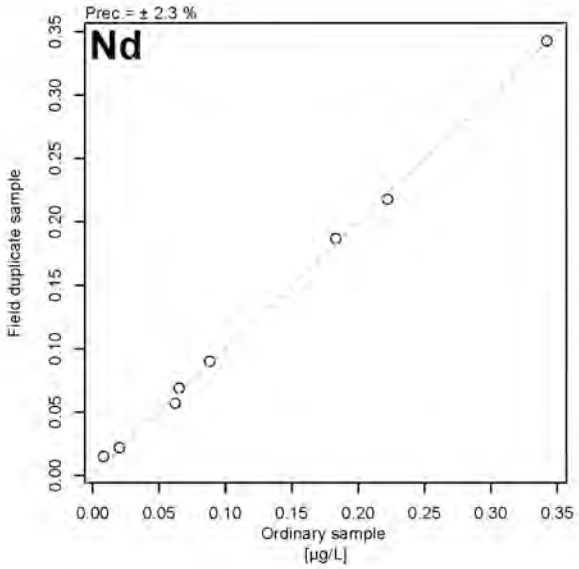

Prec.= ± 37 %
Mn
Field duplicate sample
Ordinary sample
[µg/L]

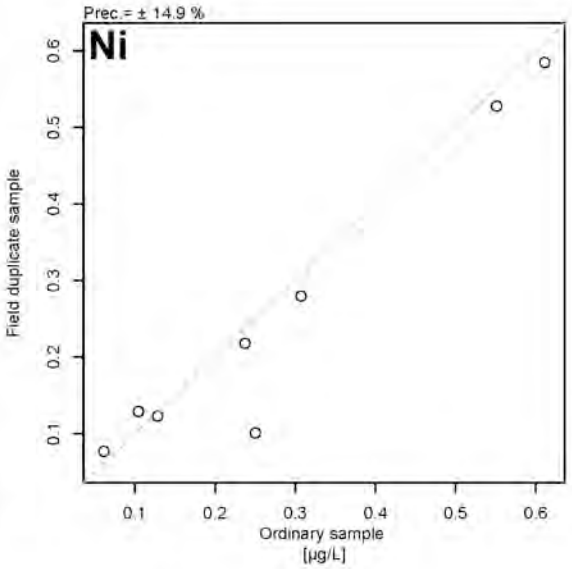

Prec.= ± 5.3 %
Mo
Field duplicate sample
Ordinary sample
[µg/L]

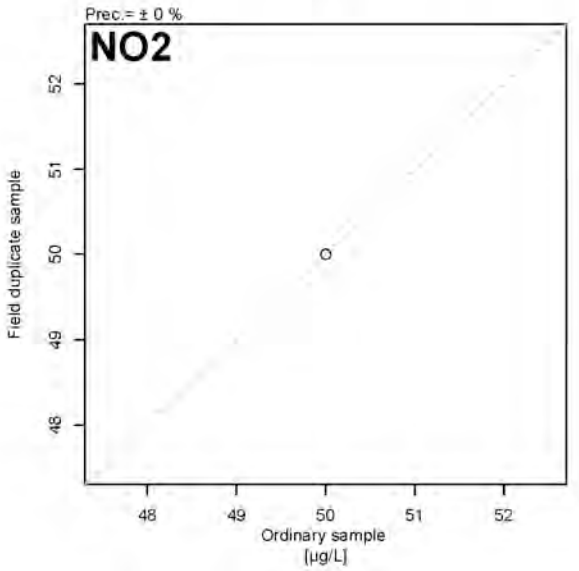

Prec.= ± 1.5 %
Na
Field duplicate sample
Ordinary sample
[µg/L]

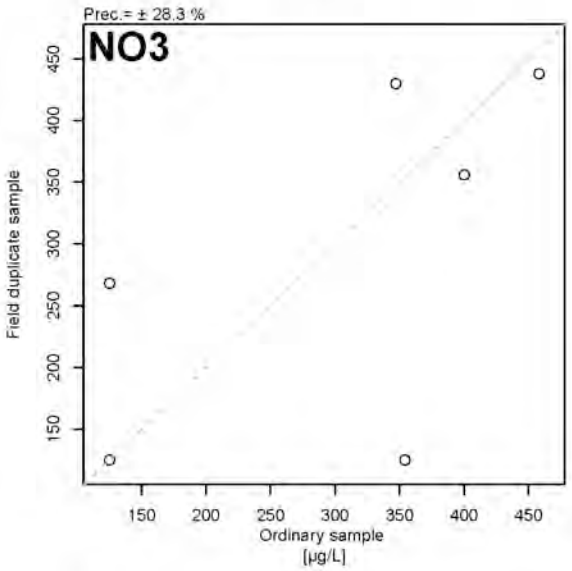

Prec.= ± 18.1 %
Na_AES
Field duplicate sample
Ordinary sample
[µg/L]

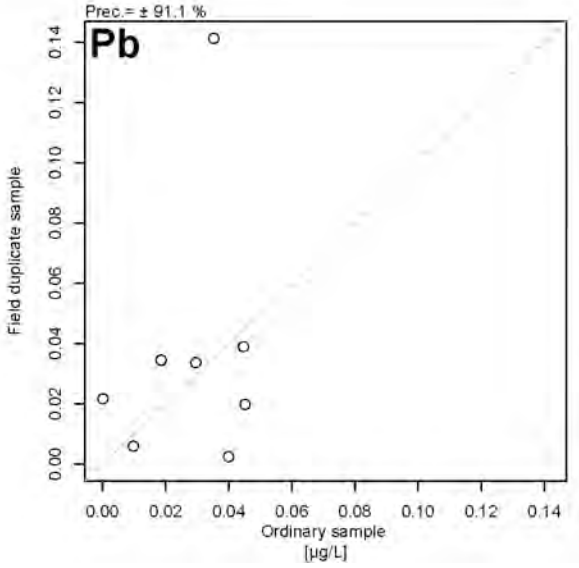

Prec.= ± 70.8 %
Nb
Field duplicate sample
Ordinary sample
[µg/L]

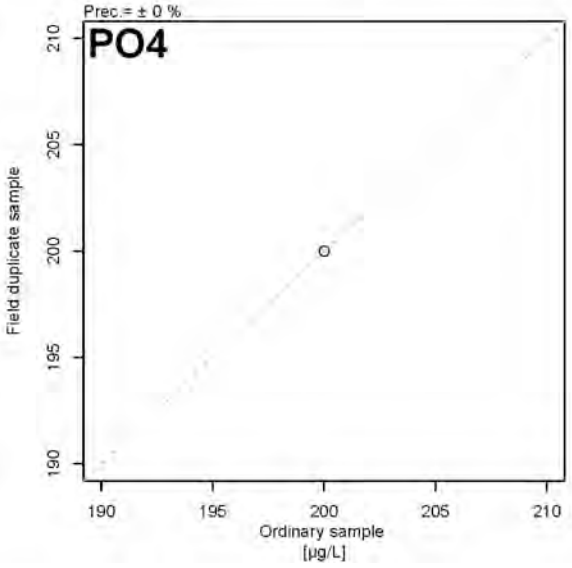

Prec.= ± 2.3 %
Nd
Field duplicate sample
Ordinary sample
[µg/L]

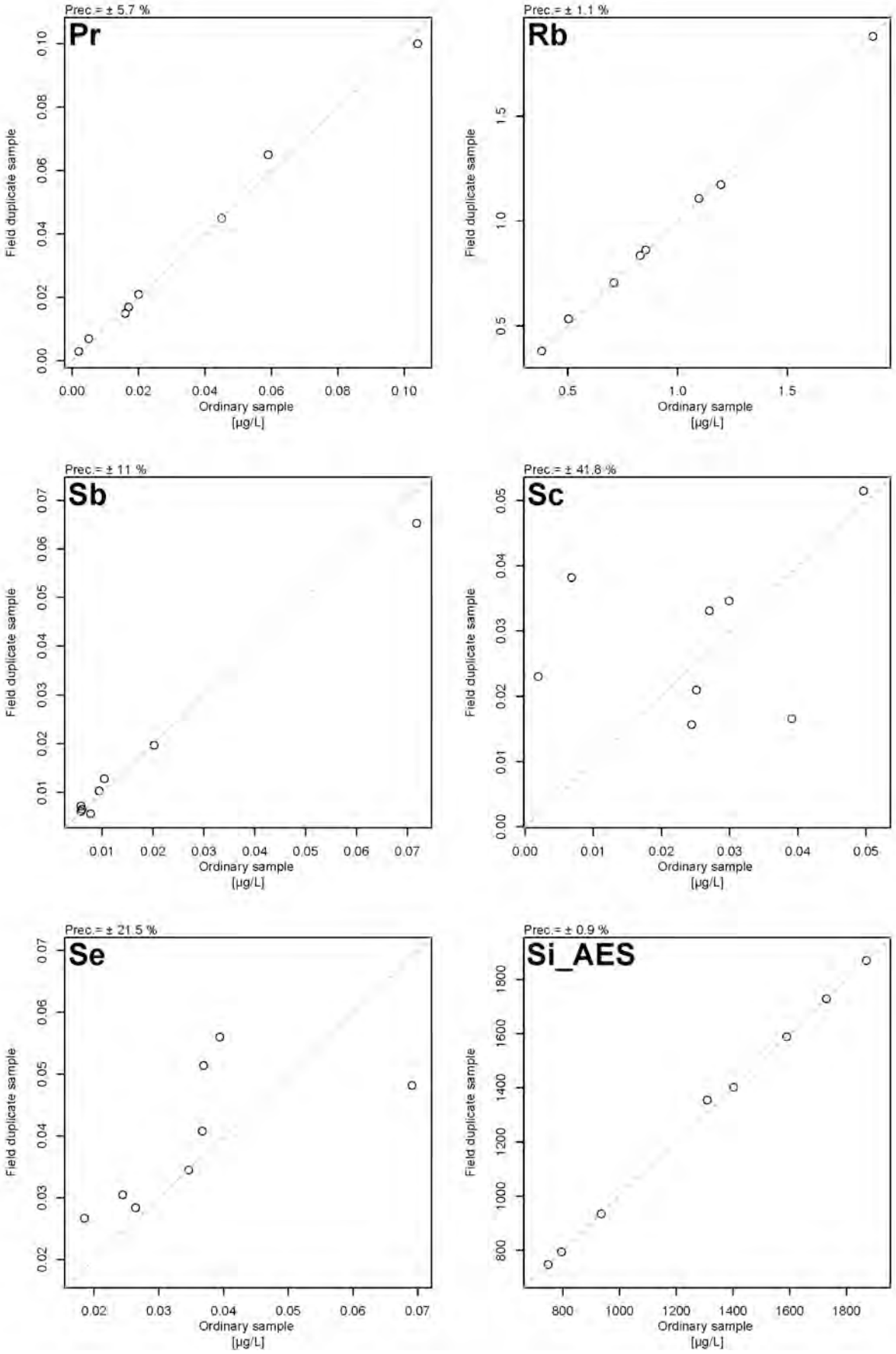

Prec.= ± 14.9 %
Ni
Field duplicate sample
Ordinary sample
[µg/L]

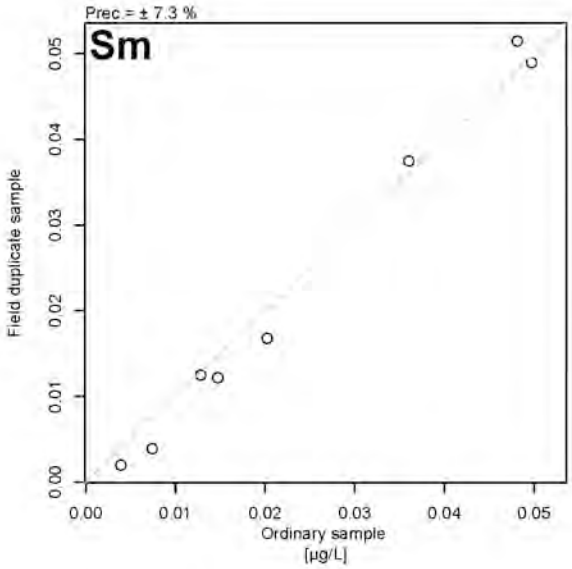

Prec.= ± 0 %
NO2
Field duplicate sample
Ordinary sample
[µg/L]

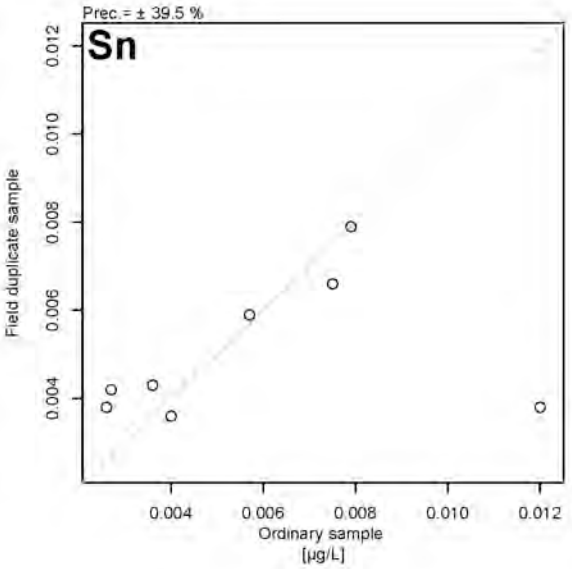

Prec.= ± 28.3 %
NO3
Field duplicate sample
Ordinary sample
[µg/L]

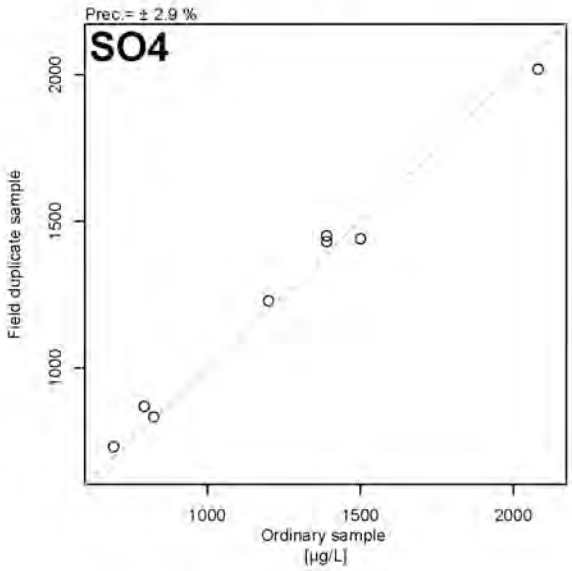

Prec.= ± 91.1 %
Pb
Field duplicate sample
Ordinary sample
[µg/L]

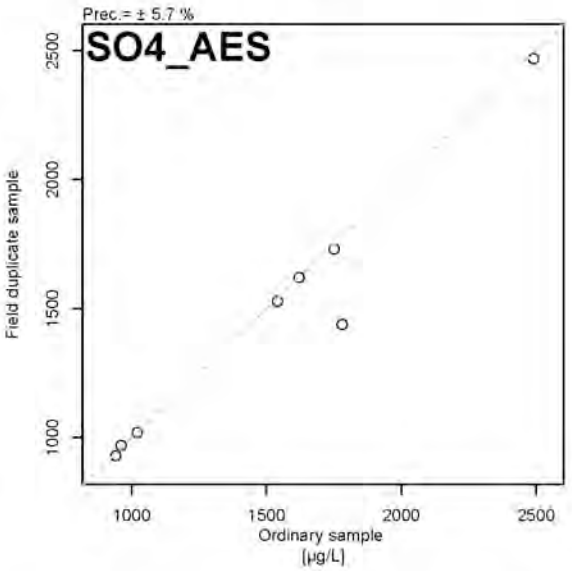

Prec.= ± 0 %
PO4
Field duplicate sample
Ordinary sample
[µg/L]

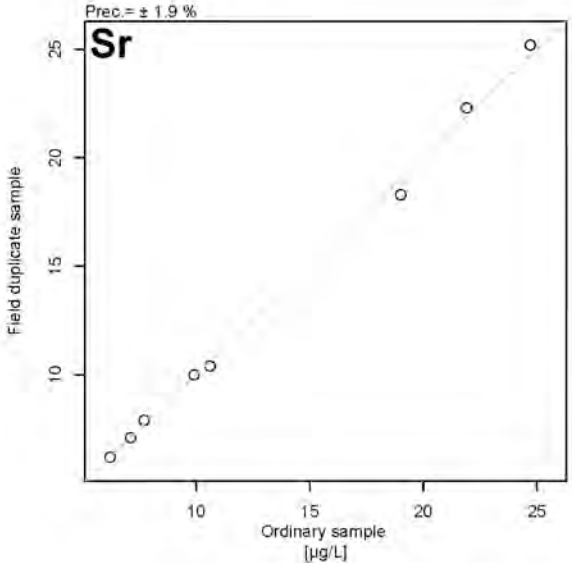

Prec.= ± 5.7 %
Pr
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 1.1 %
Rb
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 11 %
Sb
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 41.8 %
Sc
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 21.5 %
Se
Field duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 0.9 %
Si_AES
Field duplicate sample
Ordinary sample
[µg/L]

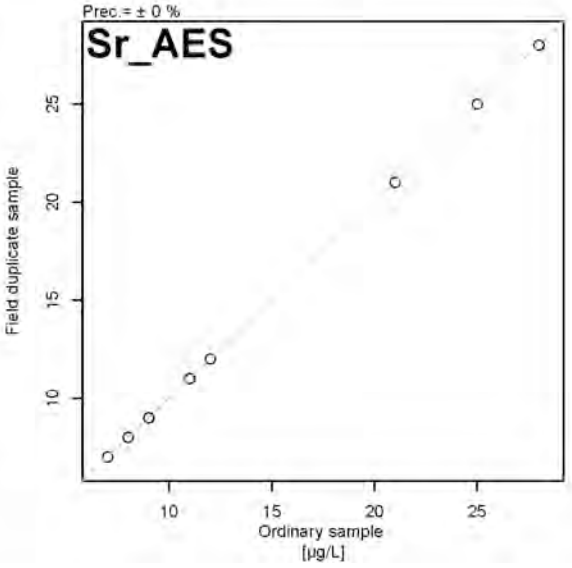

Prec.= ± 7.3 %
Sm
Field duplicate sample
Ordinary sample
[µg/L]

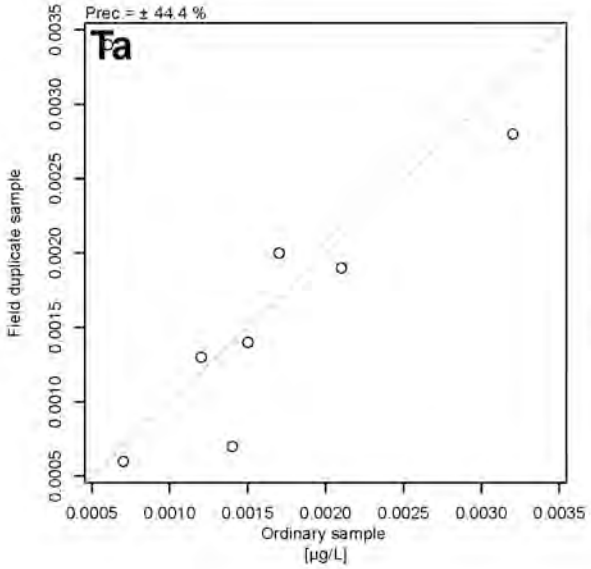

Prec.= ± 39.5 %
Sn
Field duplicate sample
Ordinary sample
[µg/L]

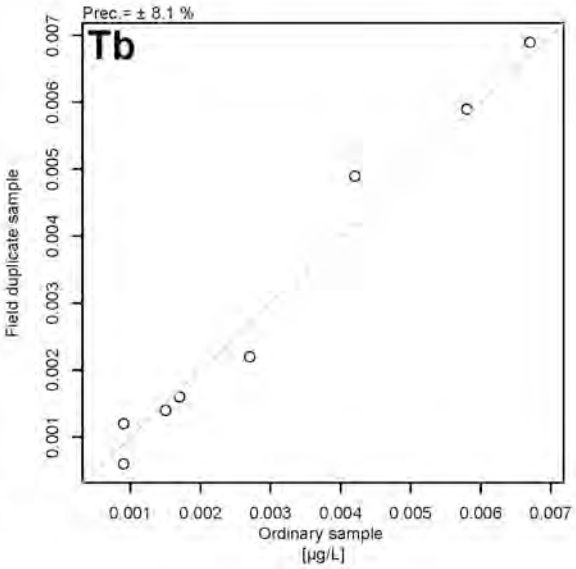

Prec.= ± 2.9 %
SO4
Field duplicate sample
Ordinary sample
[µg/L]

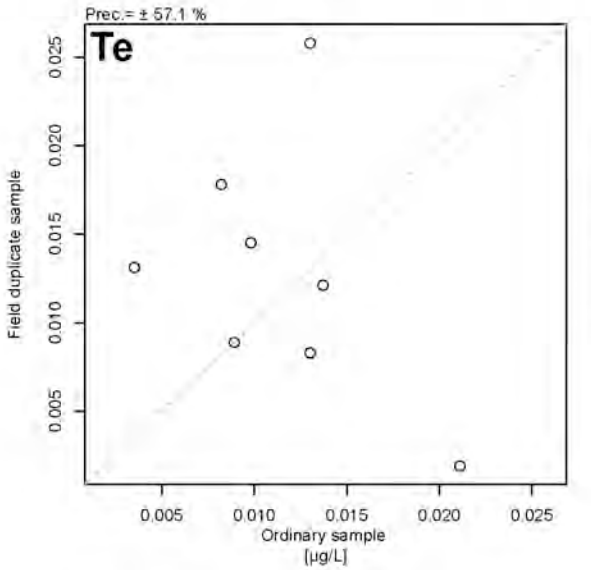

Prec.= ± 5.7 %
SO4_AES
Field duplicate sample
Ordinary sample
[µg/L]

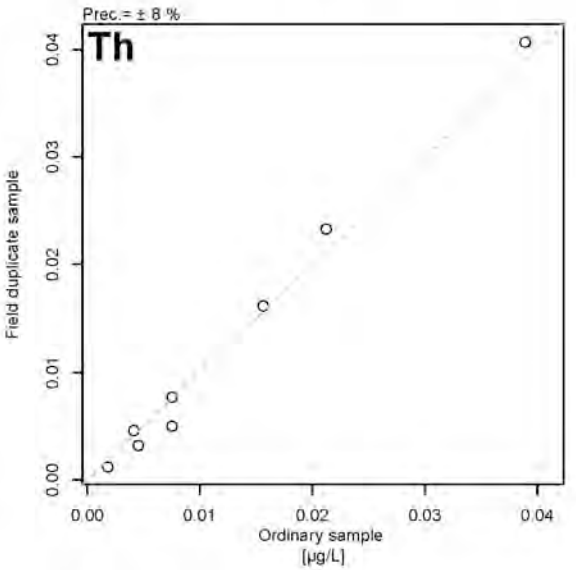

Prec.= ± 1.9 %
Sr
Field duplicate sample
Ordinary sample
[µg/L]

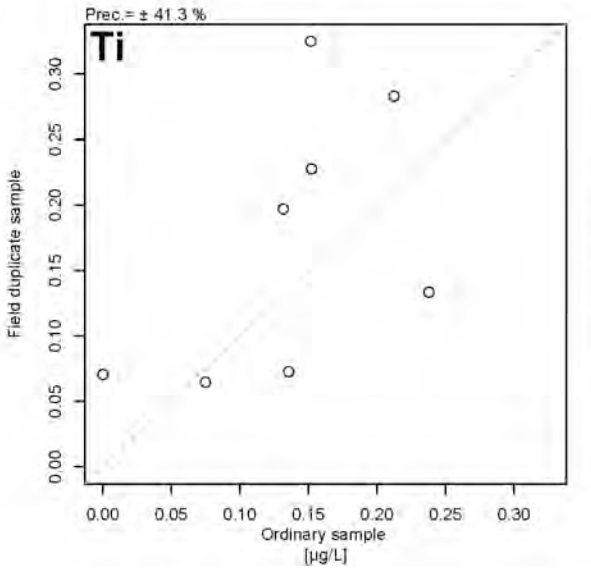

Prec.= ± 0 %
Sr_AES
Field duplicate sample
Ordinary sample
[µg/L]

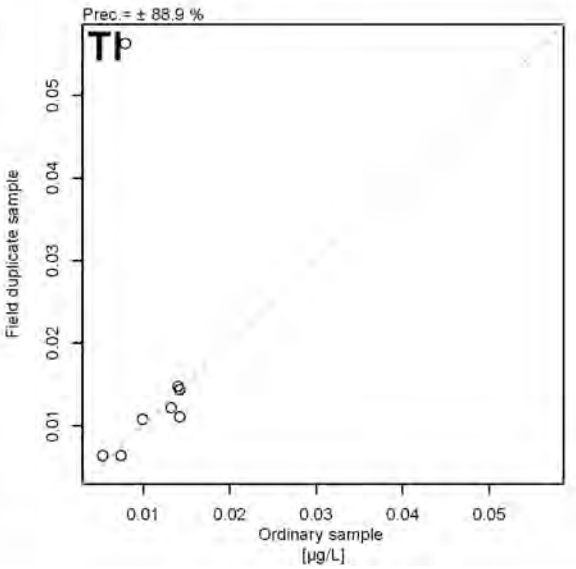

Prec.= ± 44.4 %
Ta
Field duplicate sample
Ordinary sample
[µg/L]

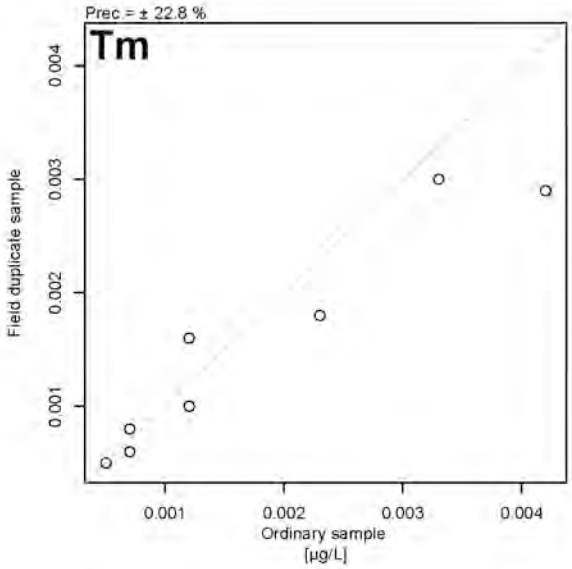

Prec.= ± 8.1 %
Tb
Field duplicate sample
Ordinary sample
[µg/L]

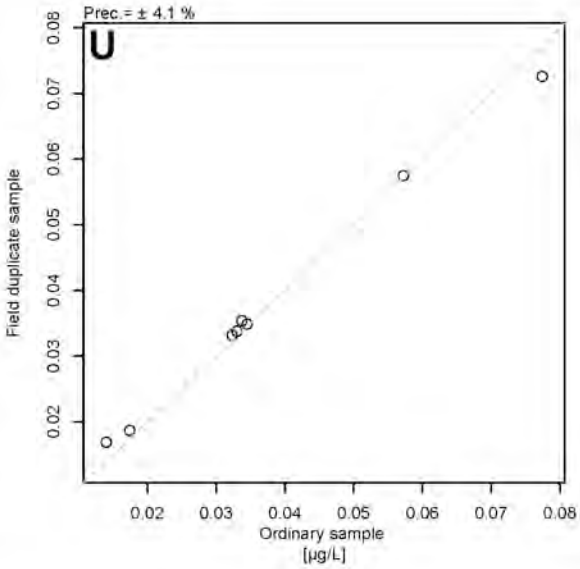

Prec.= ± 57.1 %
Te
Field duplicate sample
Ordinary sample
[µg/L]

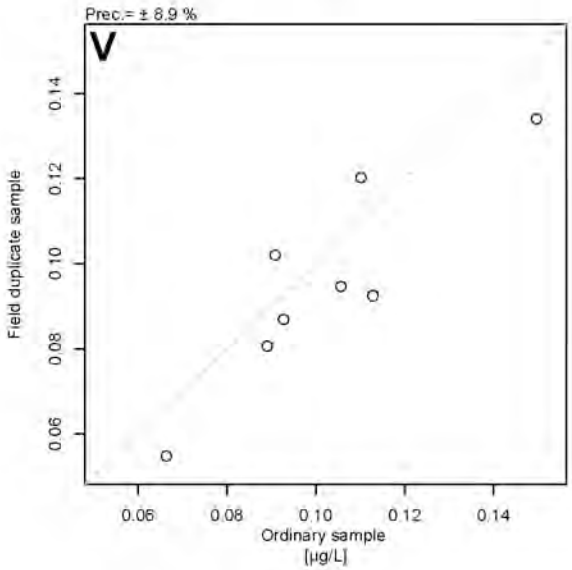

Prec.= ± 8 %
Th
Field duplicate sample
Ordinary sample
[µg/L]

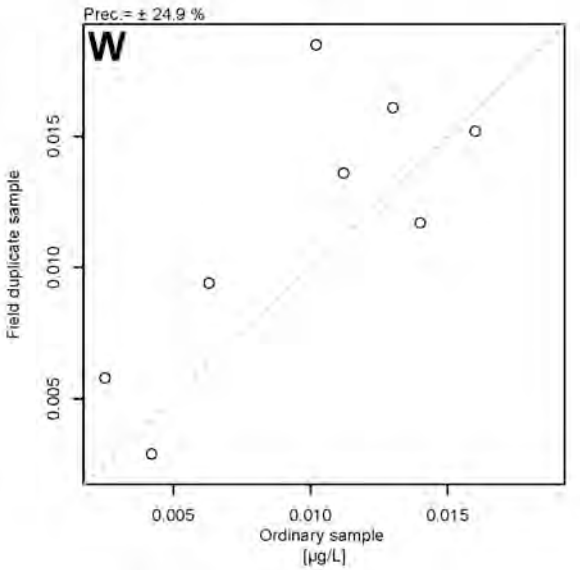

Prec.= ± 41.3 %
Ti
Field duplicate sample
Ordinary sample
[µg/L]

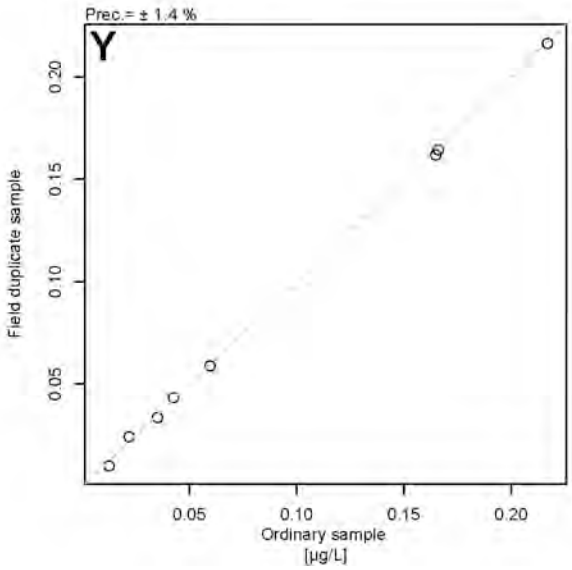

Prec.= ± 88.9 %
Tl
Field duplicate sample
Ordinary sample
[µg/L]

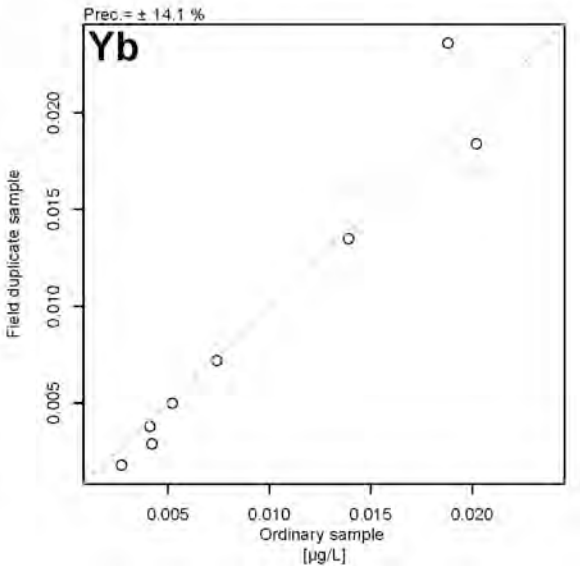

Prec.= ± 22.8 %
Tm
Field duplicate sample
Ordinary sample
[µg/L]

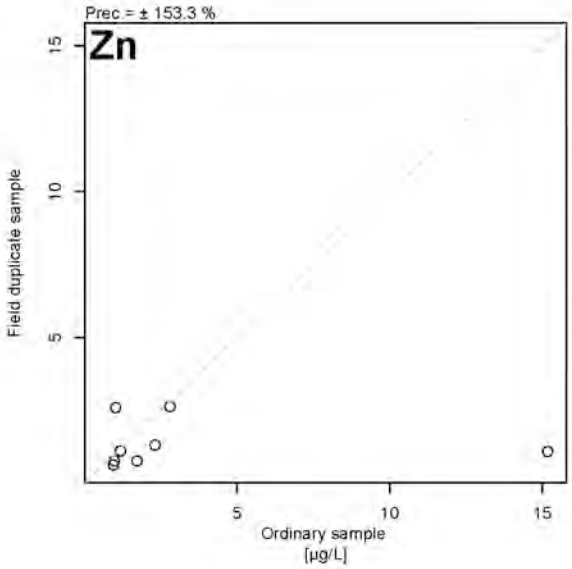

Prec.= ± 4.1 %
U
Field duplicate sample
Ordinary sample
[µg/L]

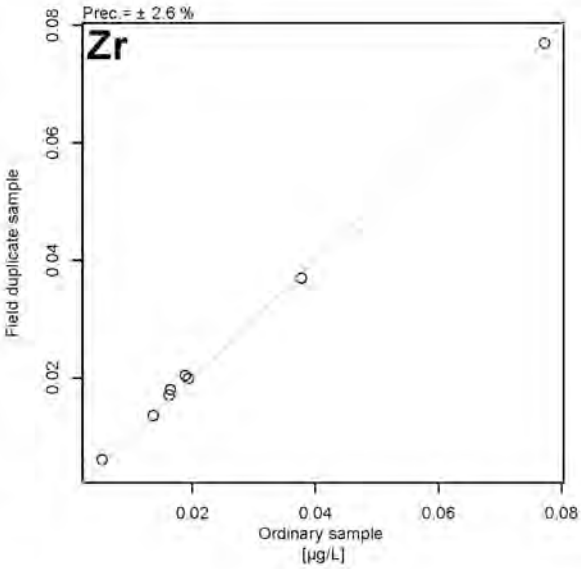

Prec.= ± 8.9 %
V
Field duplicate sample
Ordinary sample
[µg/L]


Prec.= ± 24.9 %
W
Field duplicate sample
Ordinary sample
[µg/L]

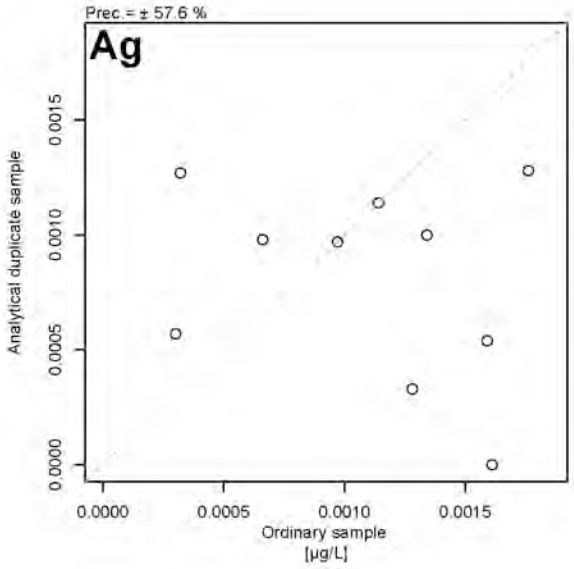

Prec.= ± 1.4 %
Y
Field duplicate sample
Ordinary sample
[µg/L]

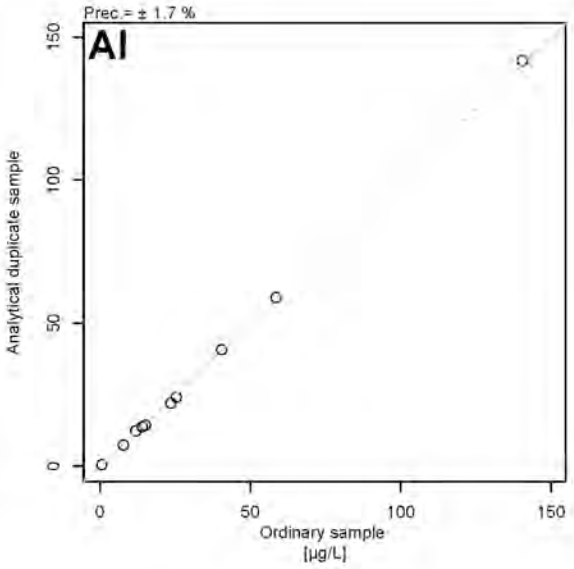

Prec.= ± 14.1 %
Yb
Field duplicate sample
Ordinary sample
[µg/L]

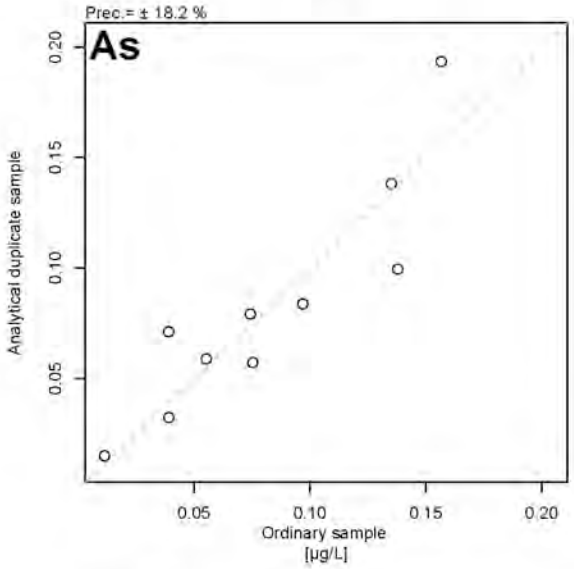

Prec.= ± 153.3 %
Zn
Field duplicate sample
Ordinary sample
[µg/L]
5
10
15

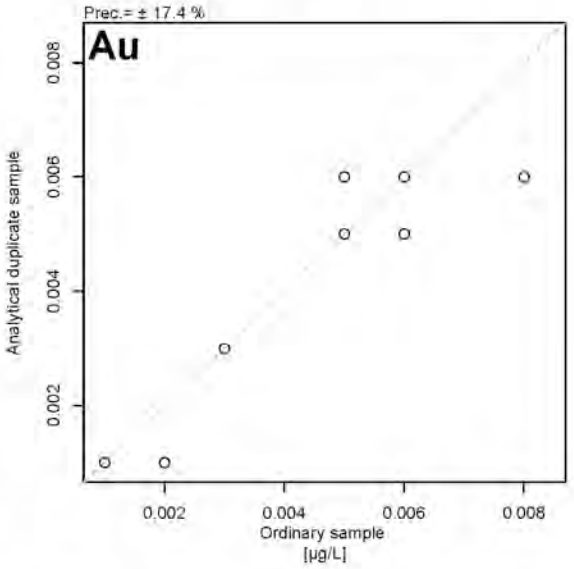

Prec.= ± 2.6 %
Zr
Field duplicate sample
Ordinary sample
[µg/L]
0.02
0.04
0.06
0.08

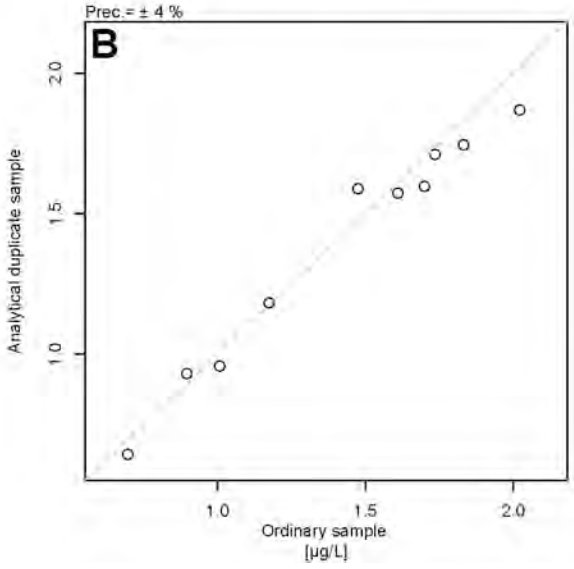
Appendix VII: XY plots for the analytical duplicates (ICP-MS analyses only)

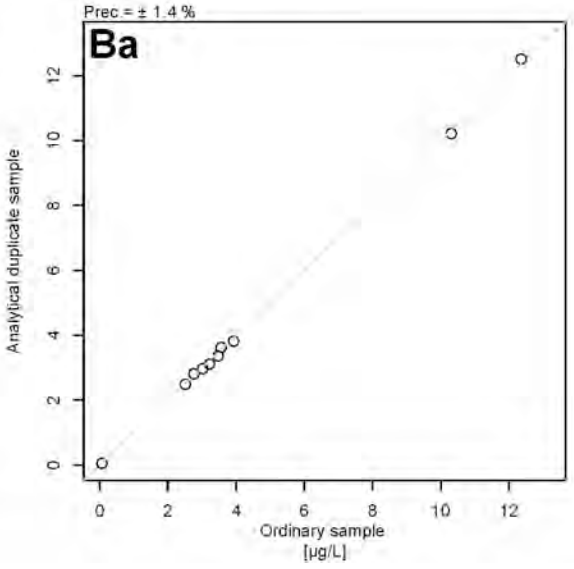

Prec.= ± 57.6 %
Ag
Analytical duplicate sample
Ordinary sample
[µg/L]

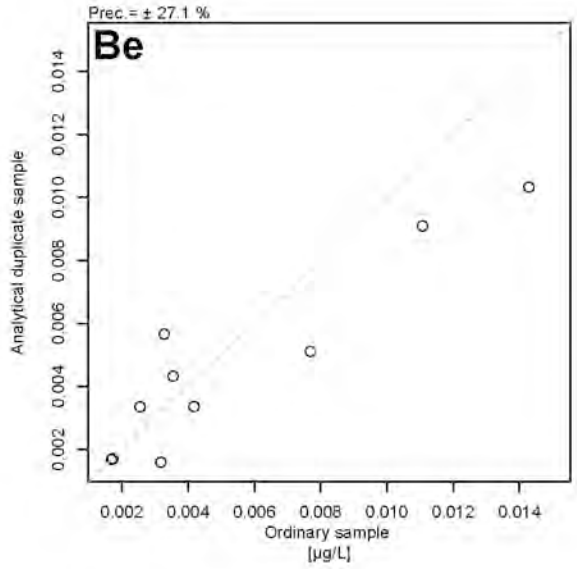

Prec.= ± 1.7 %
Al
Analytical duplicate sample
Ordinary sample
[µg/L]

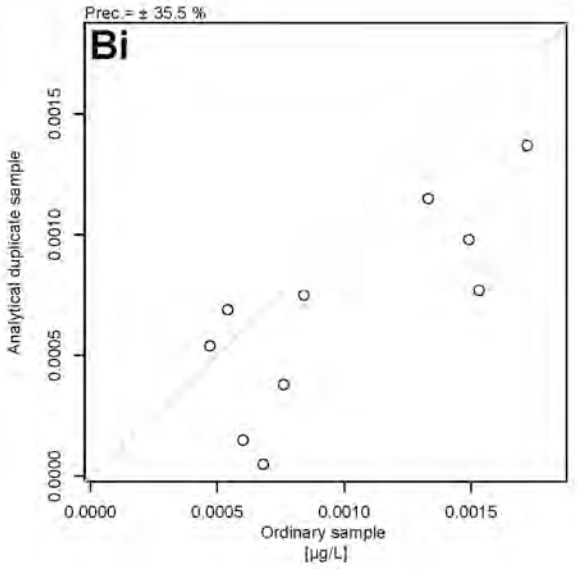

Prec.= ± 18.2 %
As
Analytical duplicate sample
Ordinary sample
[µg/L]

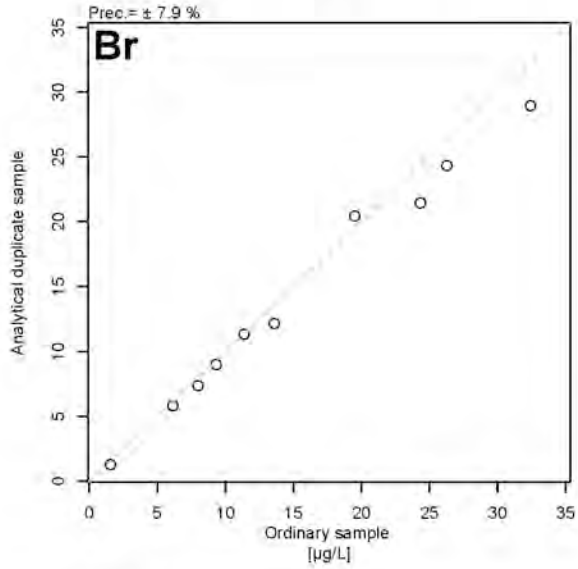

Prec.= ± 17.4 %
Au
Analytical duplicate sample
Ordinary sample
[µg/L]

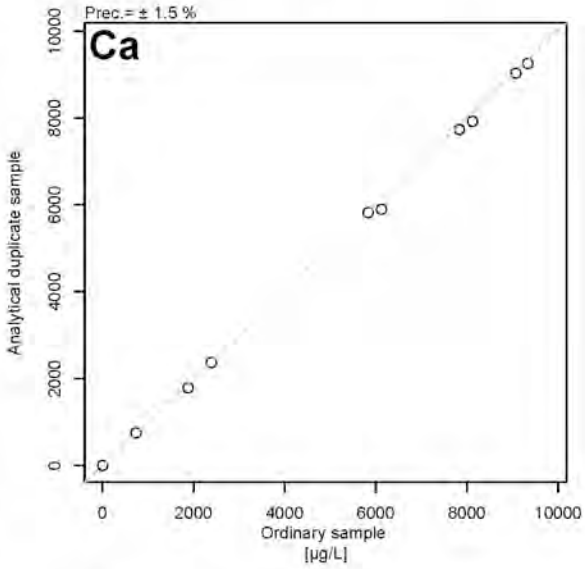

Prec.= ± 4 %
B
Analytical duplicate sample
Ordinary sample
[µg/L]

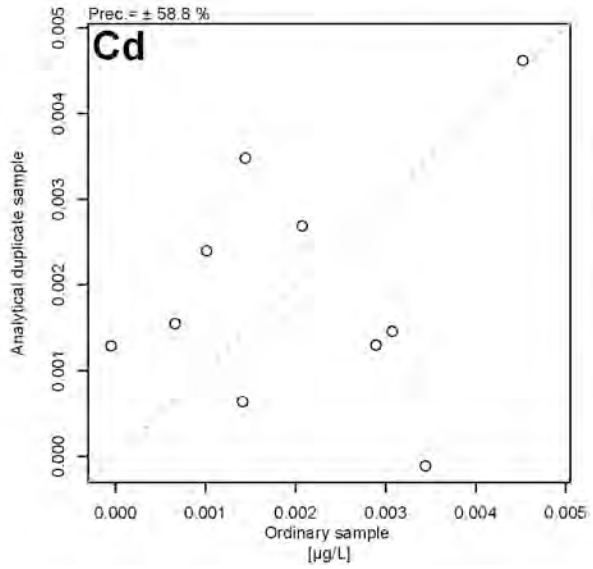

Prec.= ± 1.4 %
Ba
Analytical duplicate sample
Ordinary sample
[µg/L]

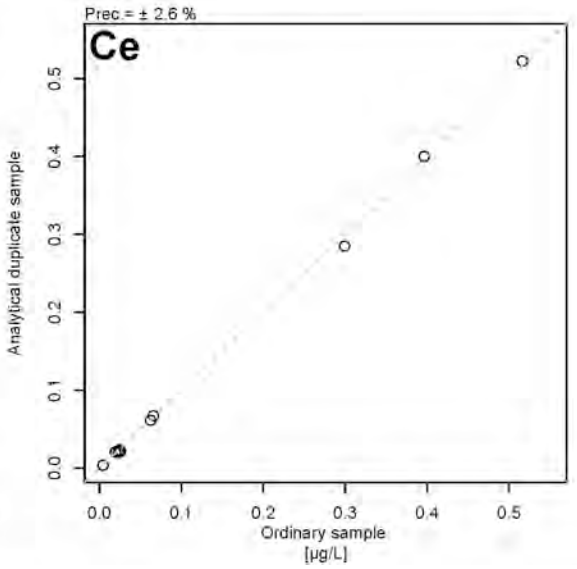

Prec.= ± 27.1 %
Be
Analytical duplicate sample
Ordinary sample
[µg/L]

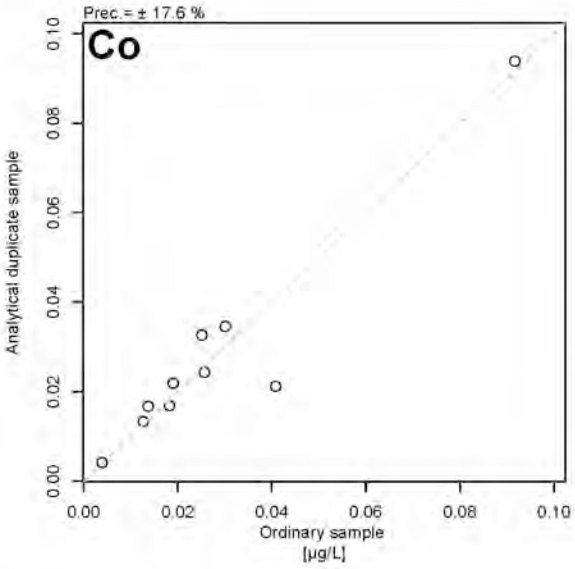

Prec.= ± 35.5 %
Bi
Analytical duplicate sample
Ordinary sample
[µg/L]

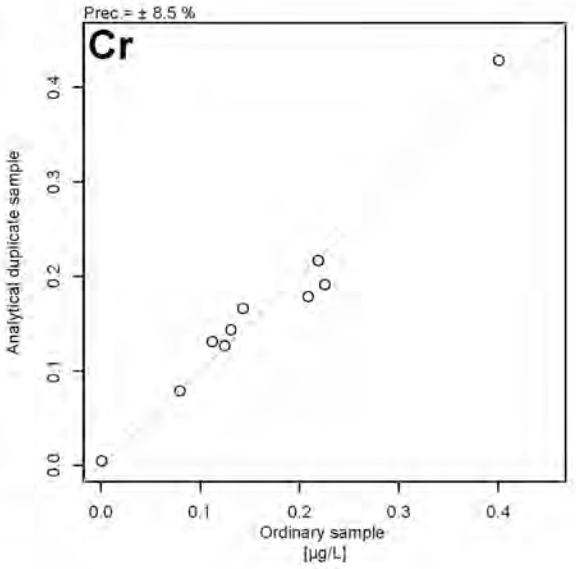

Prec.= ± 7.9 %
Br
Analytical duplicate sample
Ordinary sample
[µg/L]

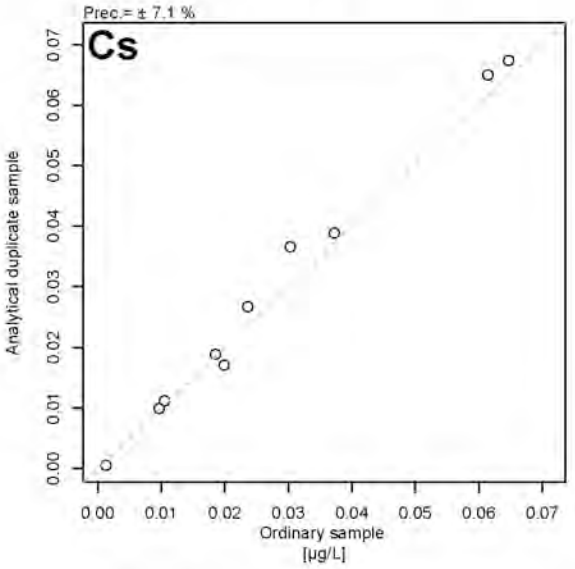

Prec.= ± 1.5 %
Ca
Analytical duplicate sample
Ordinary sample
[µg/L]

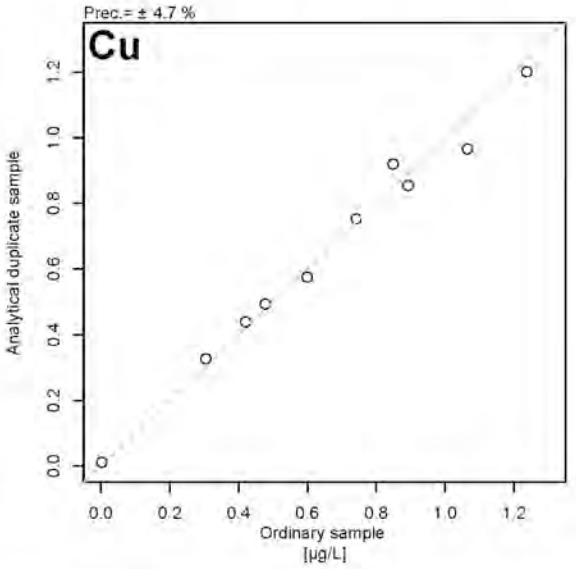

Prec.= ± 58.8 %
Cd
Analytical duplicate sample
Ordinary sample
[µg/L]

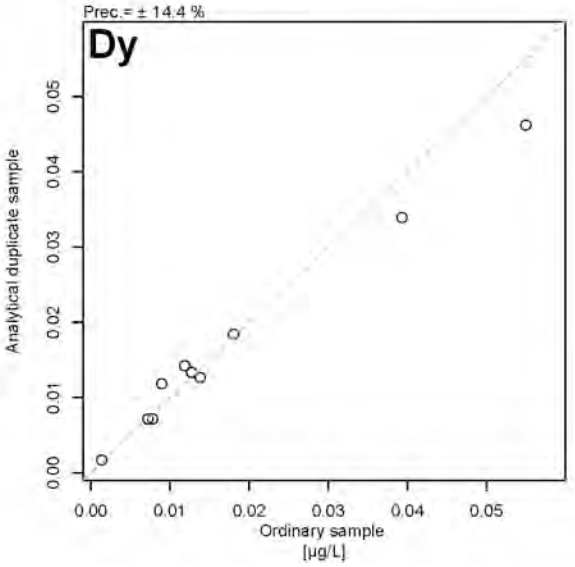

Prec.= ± 2.6 %
Ce
Analytical duplicate sample
Ordinary sample
[µg/L]

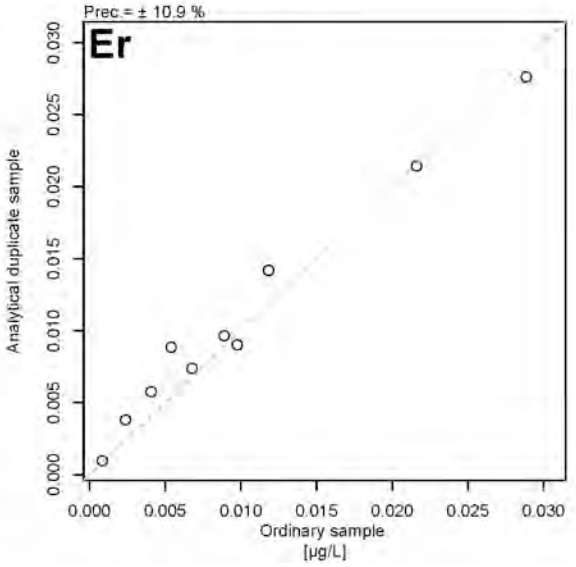

Prec.= ± 17.6 %
Co
Analytical duplicate sample
Ordinary sample
[µg/L]

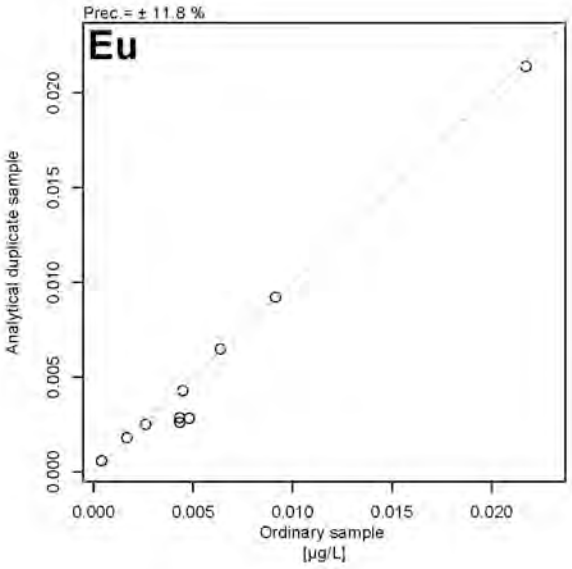

Prec.= ± 8.5 %
Cr
Analytical duplicate sample
Ordinary sample
[µg/L]

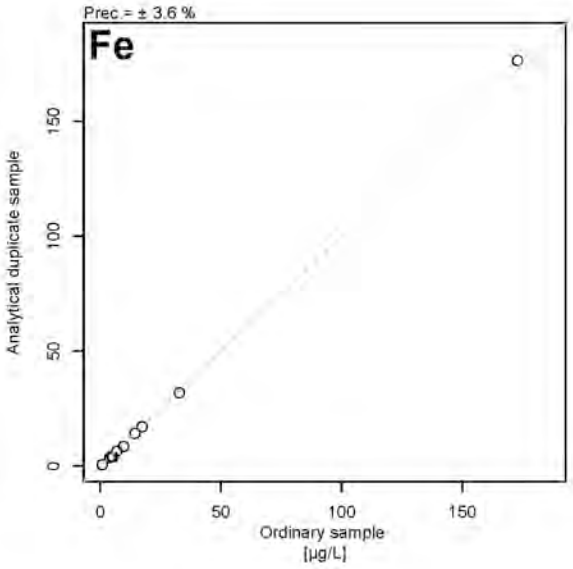

Prec.= ± 7.1 %
Cs
Analytical duplicate sample
Ordinary sample
[µg/L]

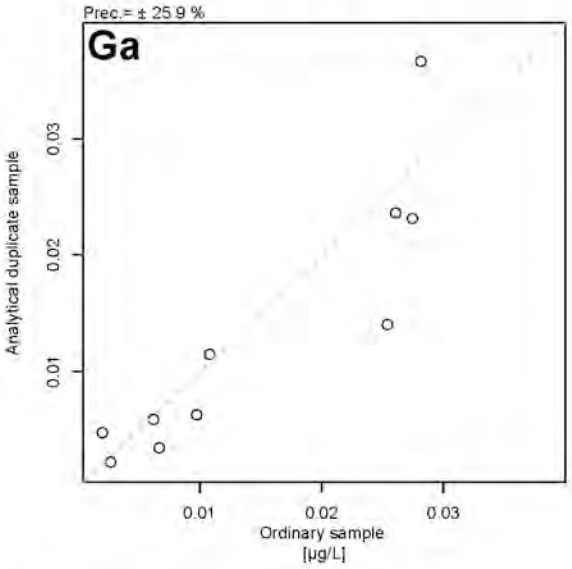

Prec.= ± 4.7 %
Cu
Analytical duplicate sample
Ordinary sample
[µg/L]

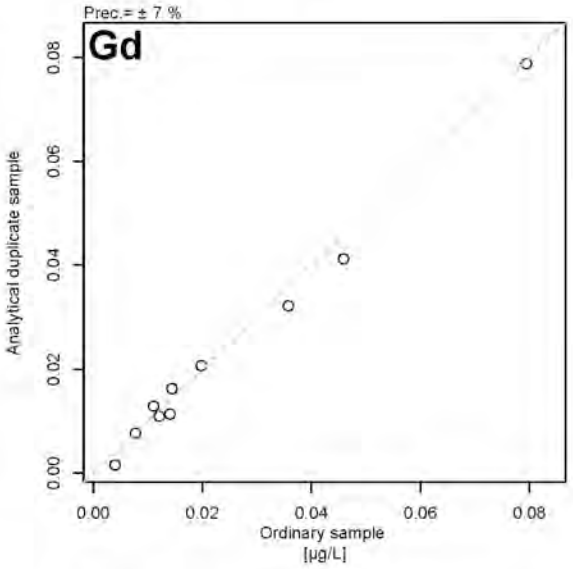

Prec.= ± 14.4 %
Dy
Analytical duplicate sample
Ordinary sample
[µg/L]

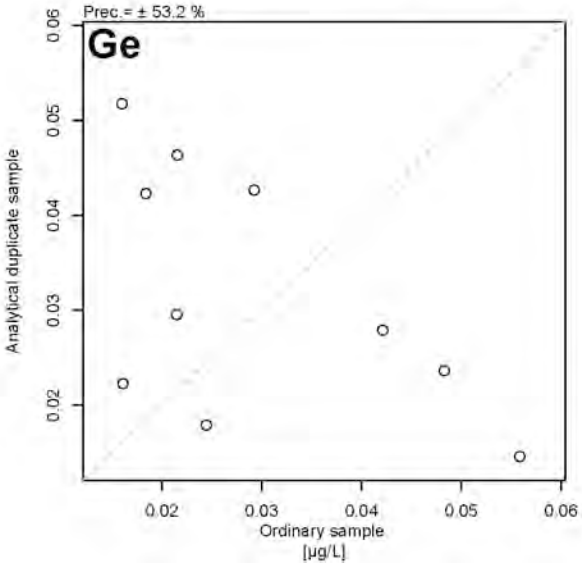

Prec.= ± 10.9 %
Er
Analytical duplicate sample
Ordinary sample
[µg/L]

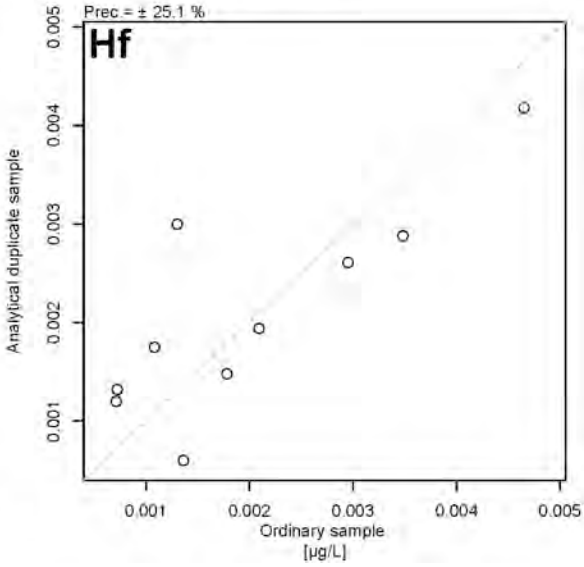

Prec.= ± 11.8 %
Eu
Analytical duplicate sample
Ordinary sample
[µg/L]

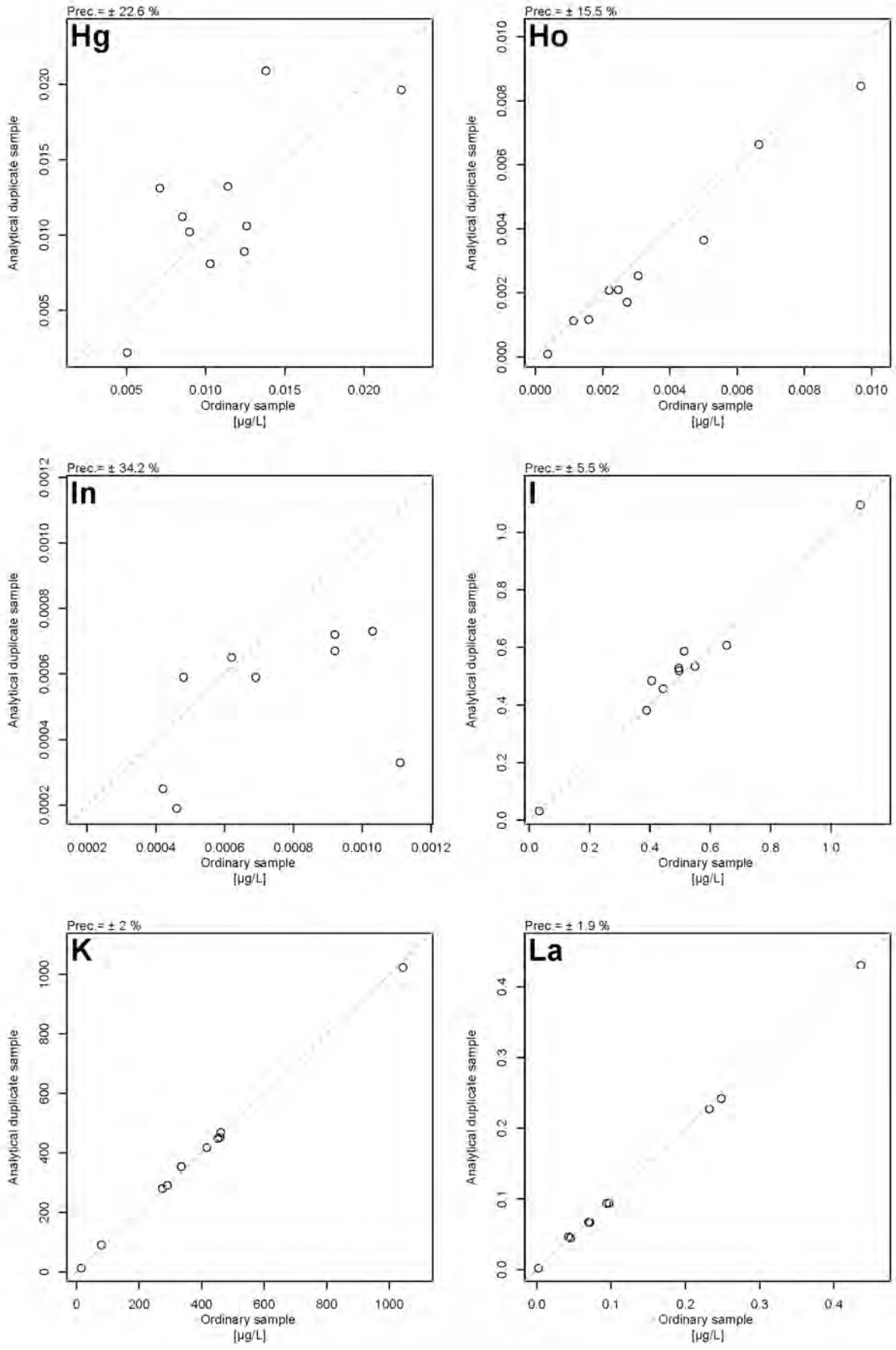

Prec.= ± 3.6 %
Fe
Analytical duplicate sample
Ordinary sample
[µg/L]

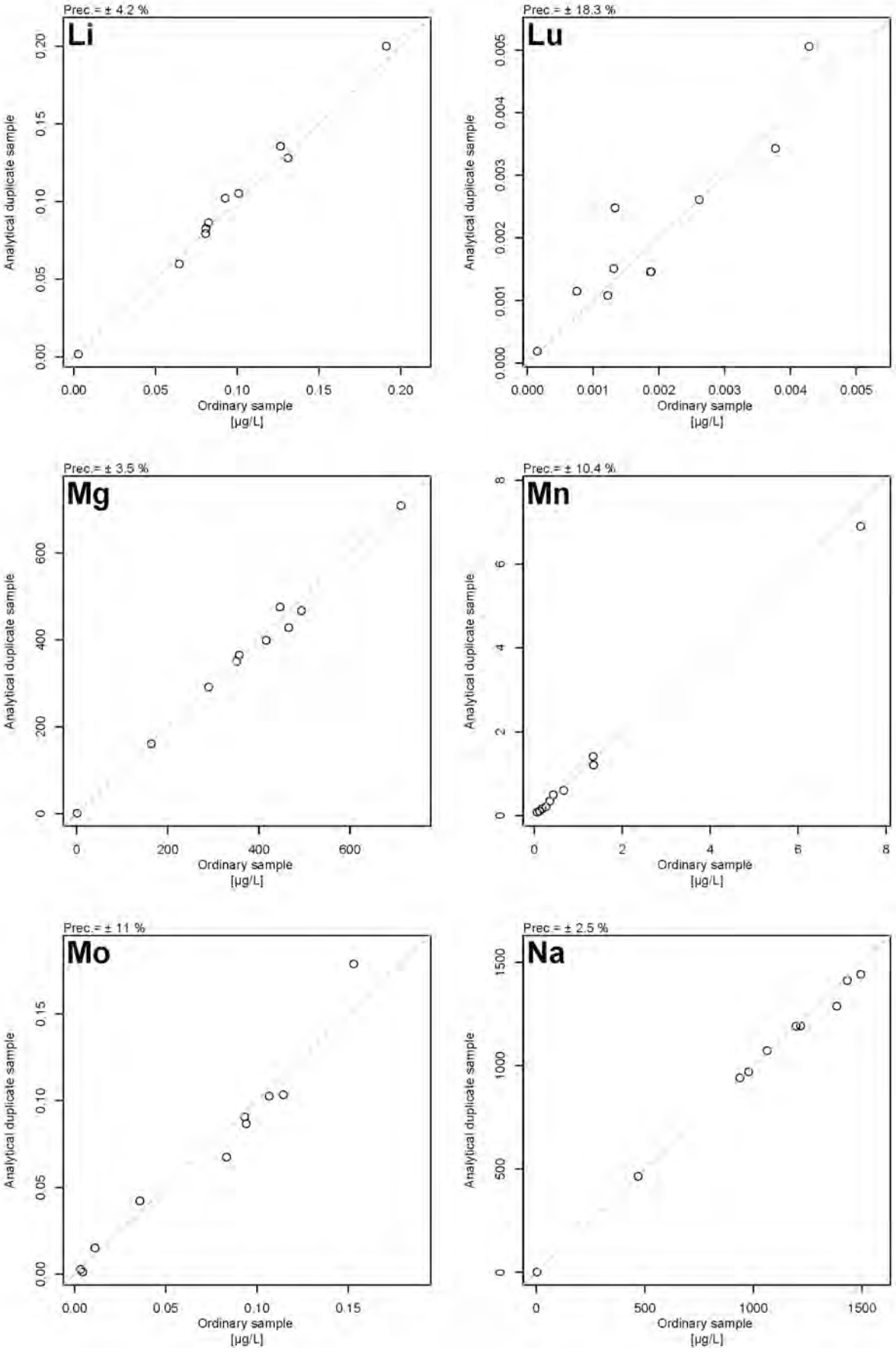

Prec.= ± 25.9 %
Ga
Analytical duplicate sample
Ordinary sample
[µg/L]

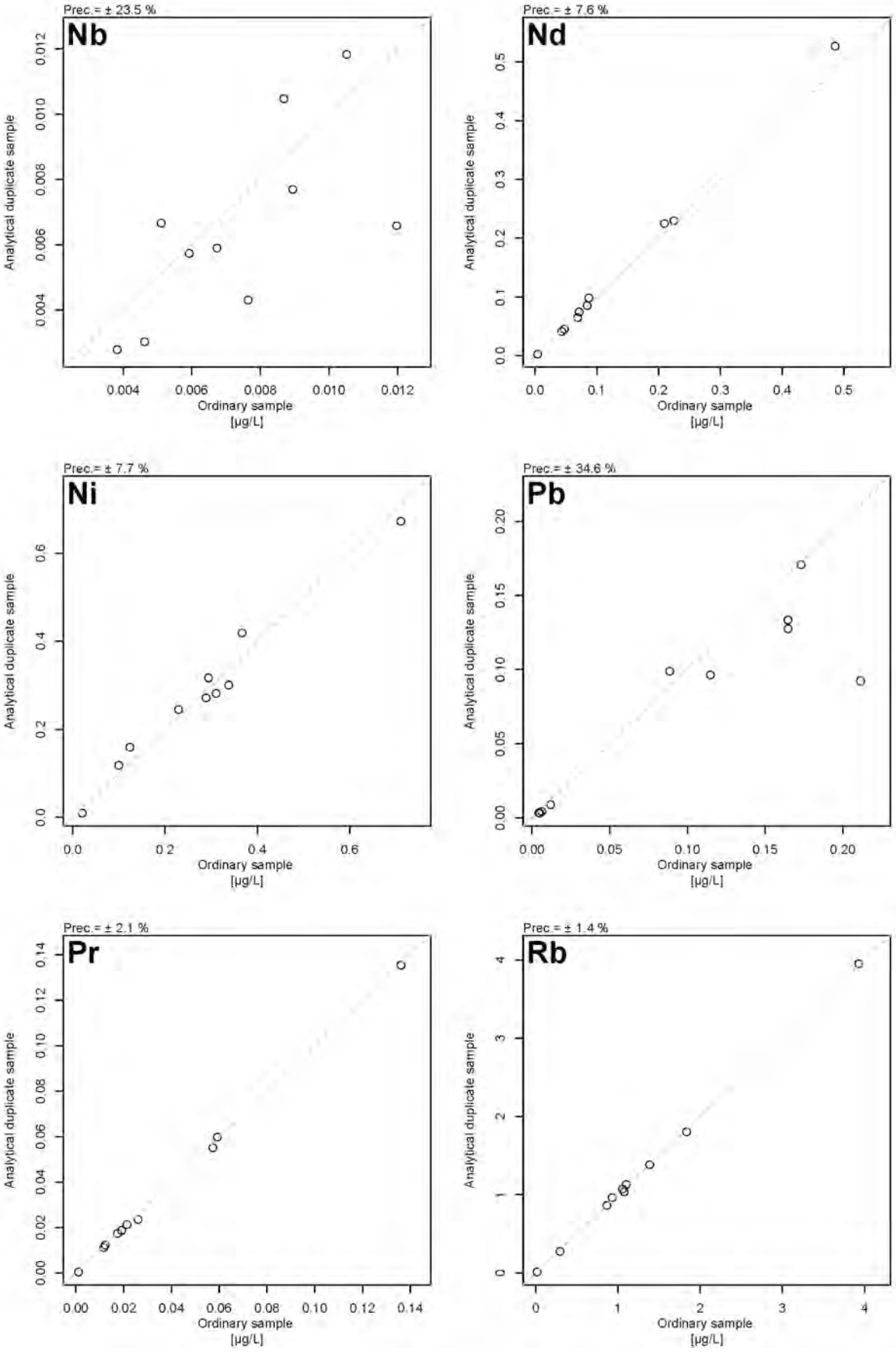

Prec.= ± 7 %
Gd
Analytical duplicate sample
Ordinary sample
[µg/L]

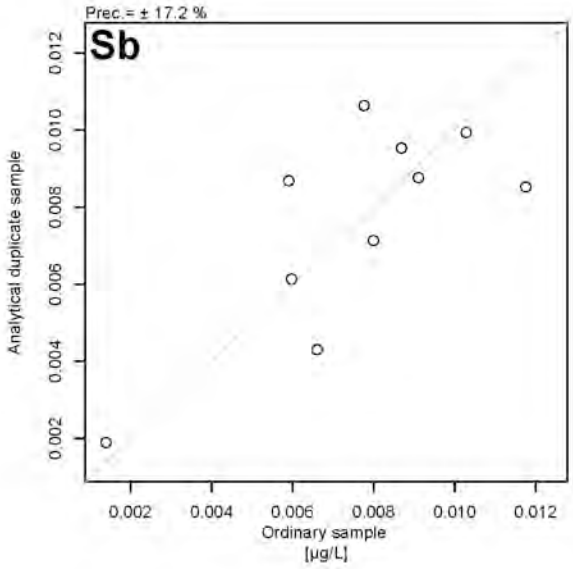

Prec.= ± 53.2 %
Ge
Analytical duplicate sample
Ordinary sample
[µg/L]

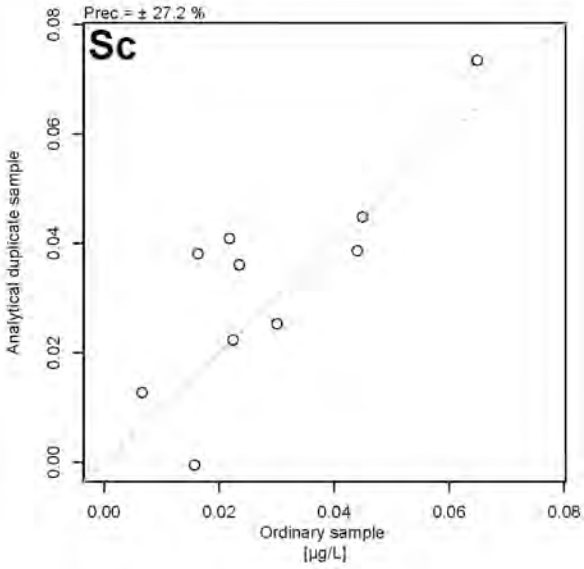

Prec.= ± 25.1 %
Hf
Analytical duplicate sample
Ordinary sample
[µg/L]

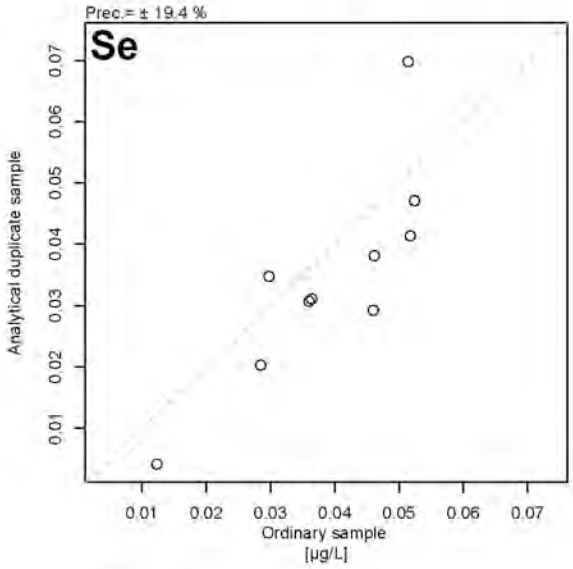

Prec.= ± 22.6 %
Hg
Analytical duplicate sample
Ordinary sample [µg/L]
Prec.= ± 15.5 %
Ho
Analytical duplicate sample
Ordinary sample [µg/L]
Prec.= ± 34.2 %
In
Analytical duplicate sample
Ordinary sample [µg/L]
Prec.= ± 5.5 %
I
Analytical duplicate sample
Ordinary sample [µg/L]
Prec.= ± 2 %
K
Analytical duplicate sample
Ordinary sample [µg/L]
Prec.= ± 1.9 %
La
Analytical duplicate sample
Ordinary sample [µg/L]

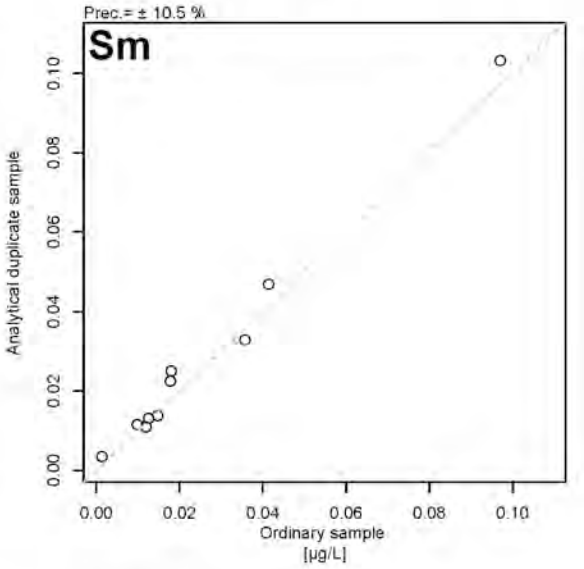

Prec.= ± 4.2 %
Li
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 18.3 %
Lu
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 3.5 %
Mg
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 10.4 %
Mn
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 11 %
Mo
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 2.5 %
Na
Analytical duplicate sample
Ordinary sample
[µg/L]

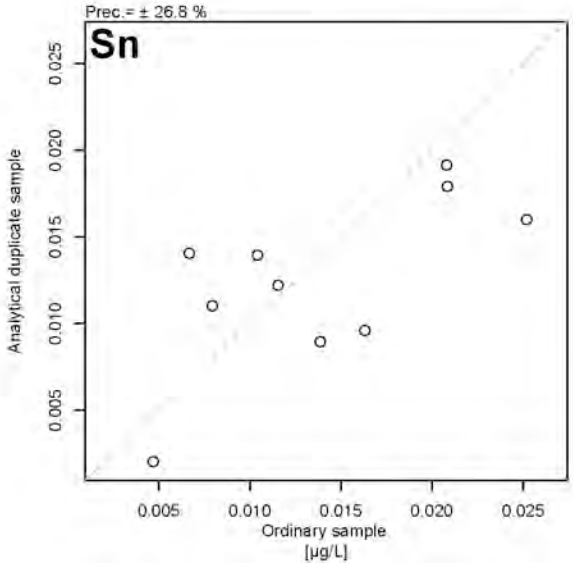

Prec.= ± 23.5 %
Nb
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 7.6 %
Nd
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 7.7 %
Ni
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 34.6 %
Pb
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 2.1 %
Pr
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 1.4 %
Rb
Analytical duplicate sample
Ordinary sample
[µg/L]

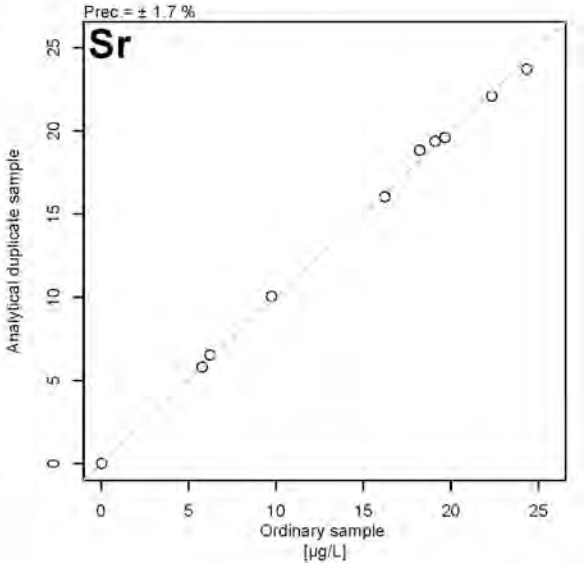

Prec.= ± 17.2 %
Sb
Analytical duplicate sample
Ordinary sample
[µg/L]

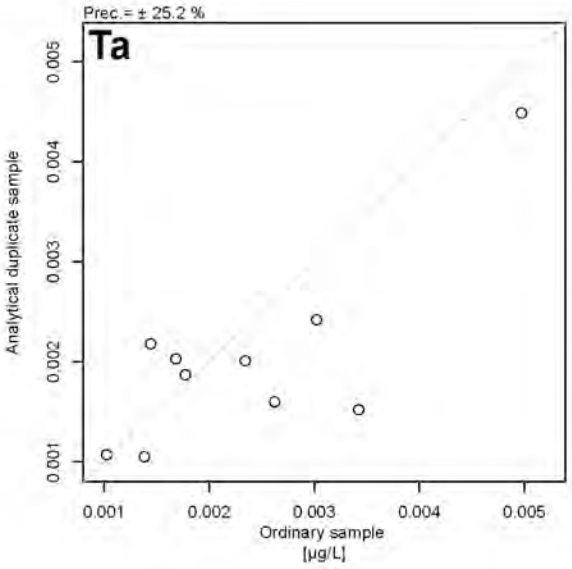

Prec.= ± 27.2 %
Sc
Analytical duplicate sample
Ordinary sample
[µg/L]

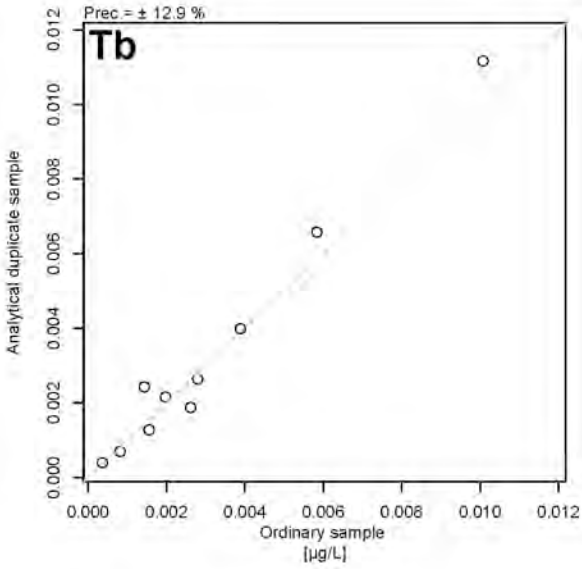

Prec.= ± 19.4 %
Se
Analytical duplicate sample
Ordinary sample
[µg/L]

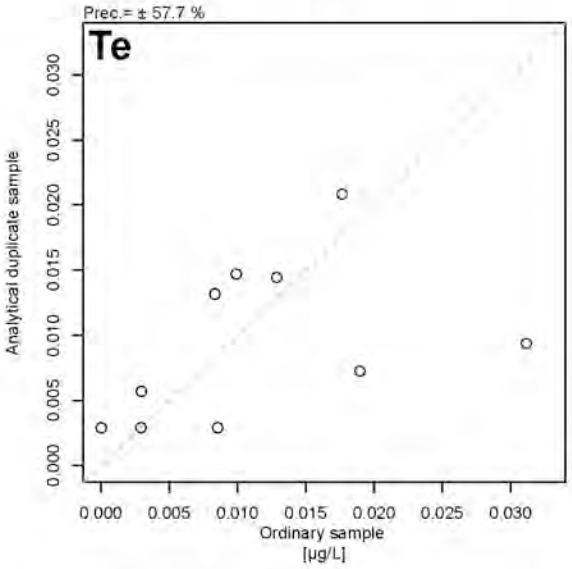

Prec.= ± 10.5 %
Sm
Analytical duplicate sample
Ordinary sample
[µg/L]

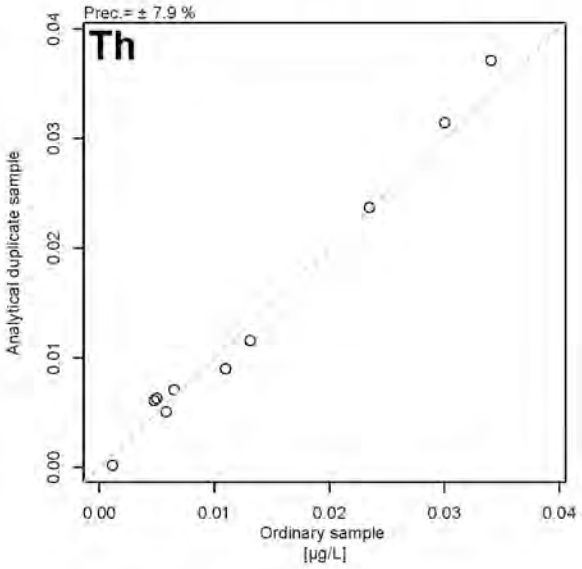

Prec.= ± 26.8 %
Sn
Analytical duplicate sample
Ordinary sample
[µg/L]

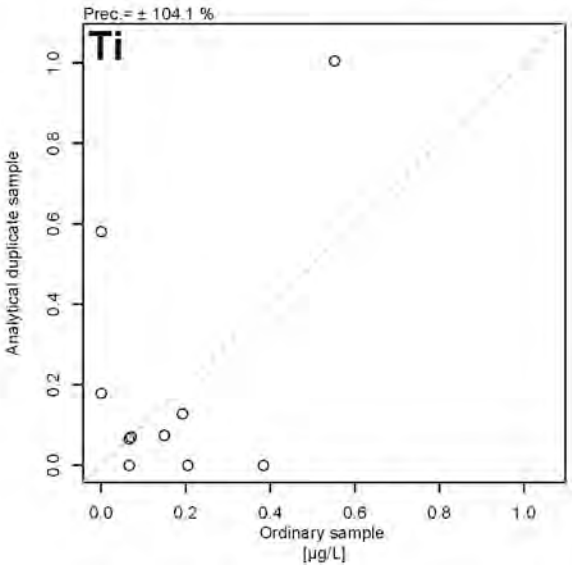

Prec.= ± 1.7 %
Sr
Analytical duplicate sample
Ordinary sample
[µg/L]

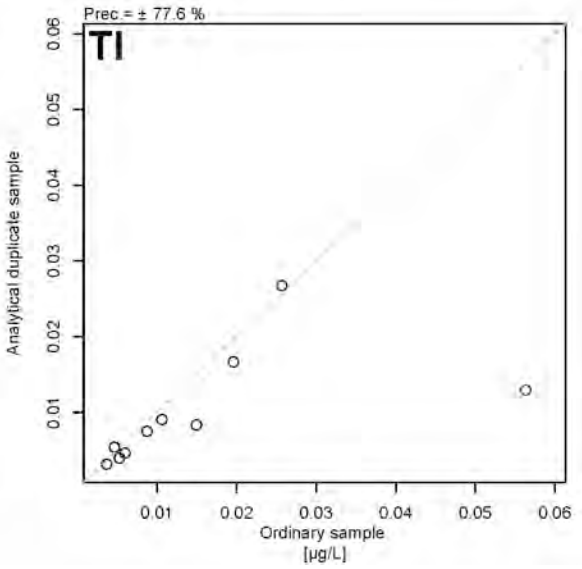

Prec.= ± 25.2 %
Ta
Analytical duplicate sample
Ordinary sample
[µg/L]

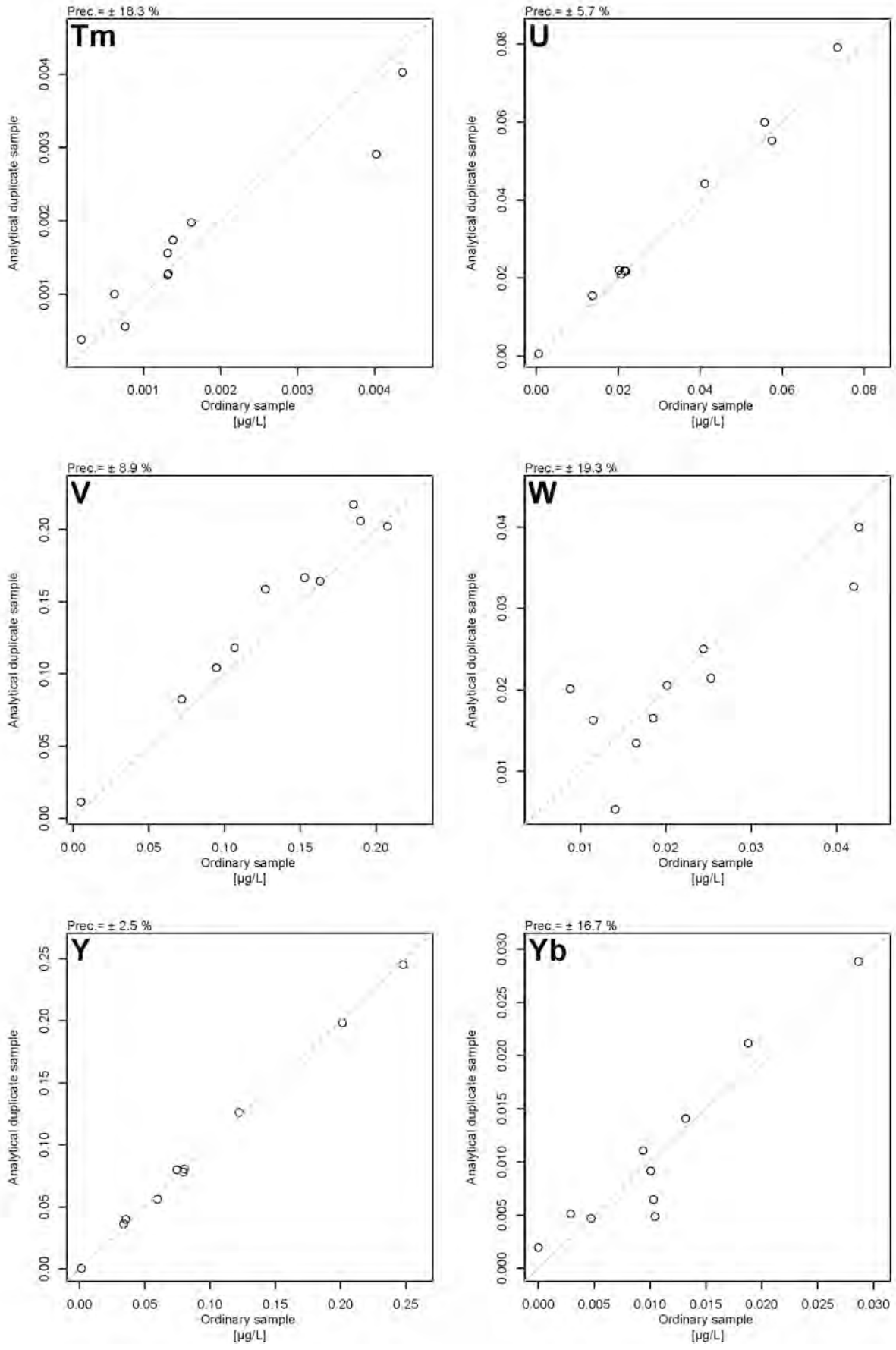

Prec.= ± 12.9 %
Tb
Analytical duplicate sample
Ordinary sample
[µg/L]

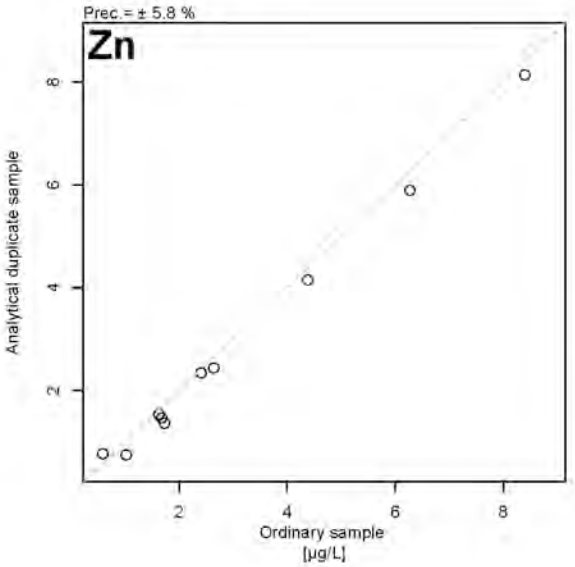

Prec.= ± 57.7 %
Te
Analytical duplicate sample
Ordinary sample
[µg/L]

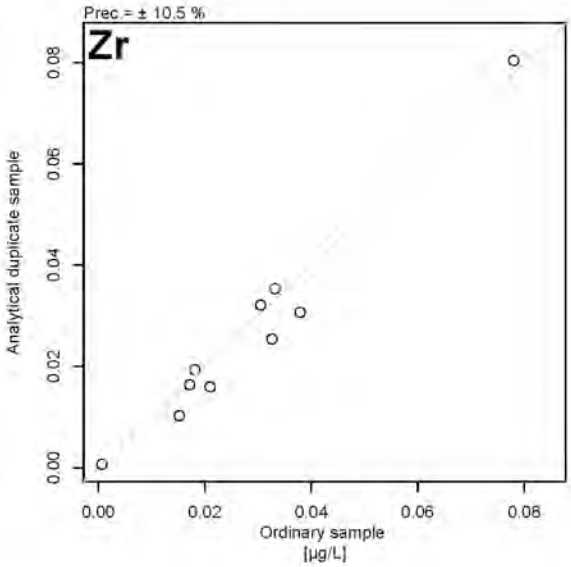

Prec.= ± 7.9 %
Th
Analytical duplicate sample
Ordinary sample
[µg/L]


Prec.= ± 104.1 %
Ti
Analytical duplicate sample
Ordinary sample
[µg/L]


Prec.= ± 77.6 %
Tl
Analytical duplicate sample
Ordinary sample
[µg/L]

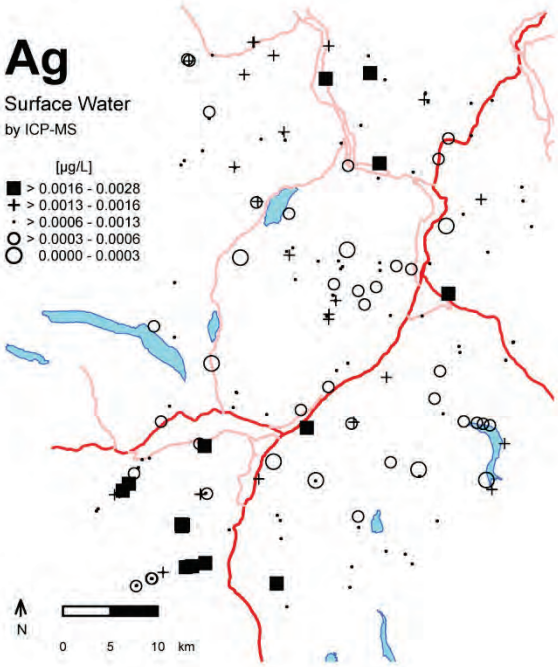

Prec.= ± 18.3 %
Tm
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 5.7 %
U
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 8.9 %
V
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 19.3 %
W
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 2.5 %
Y
Analytical duplicate sample
Ordinary sample
[µg/L]
Prec.= ± 16.7 %
Yb
Analytical duplicate sample
Ordinary sample
[µg/L]

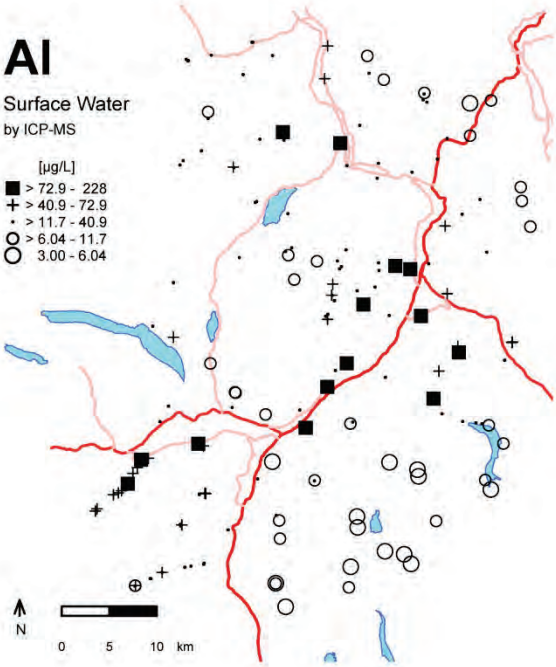

Prec. = ± 5.8 %
Zn
Analytical duplicate sample
Ordinary sample
[µg/L]
2
4
6
8

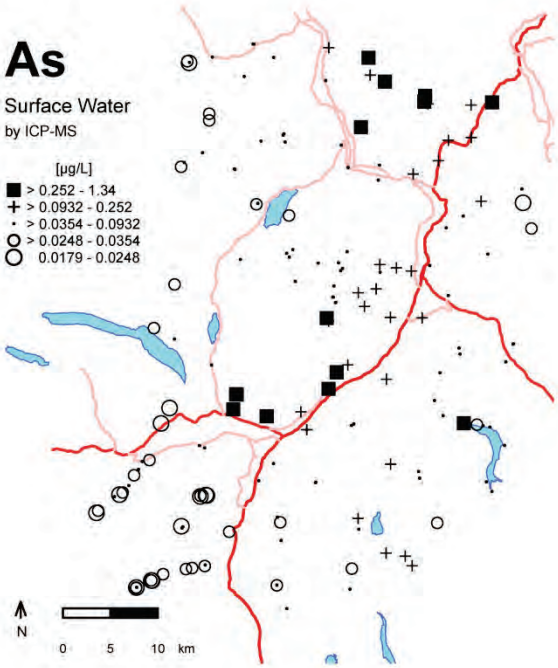

Prec. = ± 10.5 %
Zr
Analytical duplicate sample
Ordinary sample
[µg/L]
0.00
0.02
0.04
0.06
0.08

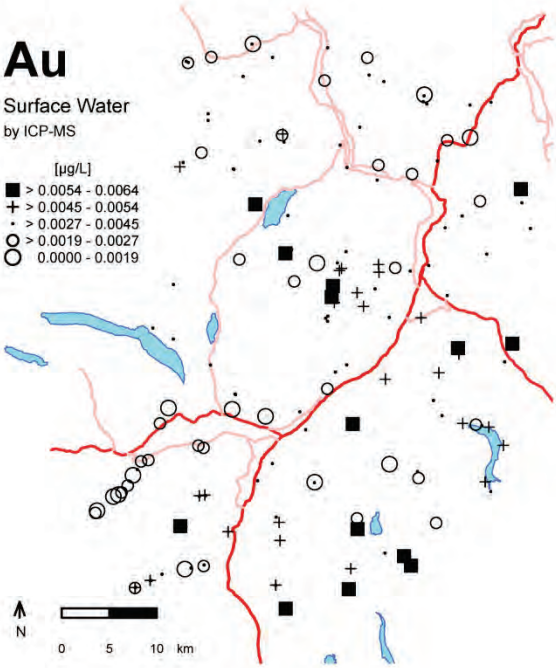
Appendix VIII: Maps for all elements.

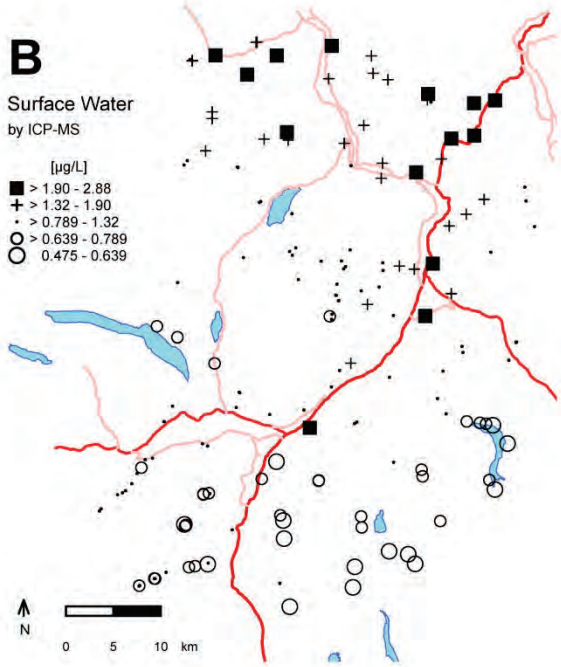
Note that these maps should be studied keeping the results of quality control in mind. For reasons of a complete documentation, maps for all elements/ parameters with results above detection are shown here, independent of overall quality.

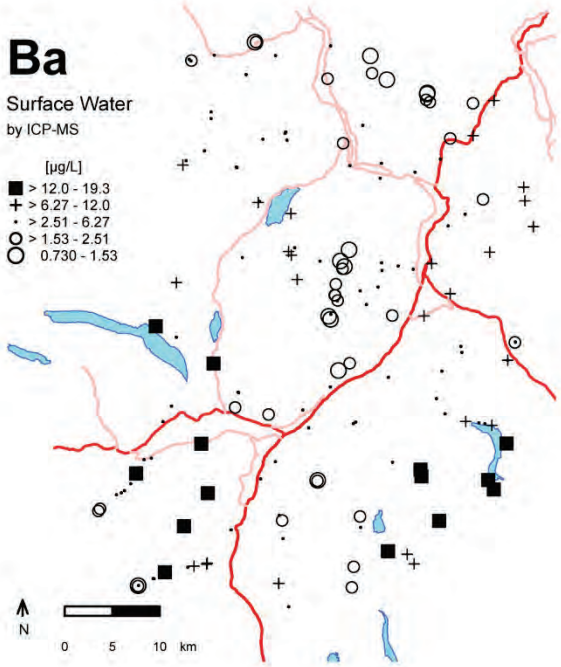

Ag
Surface Water
by ICP-MS
[µg/L]
> 0.0016 - 0.0028
> 0.0013 - 0.0016
> 0.0006 - 0.0013
> 0.0003 - 0.0006
0.0000 - 0.0003
N
0 5 10 km

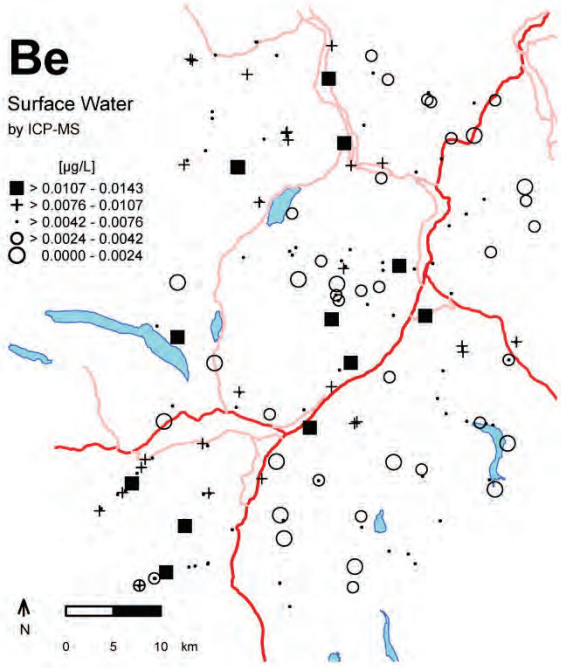

Al
Surface Water
by ICP-MS
[µg/L]
> 72.9 - 228
> 40.9 - 72.9
> 11.7 - 40.9
> 6.04 - 11.7
3.00 - 6.04
N
0 5 10 km

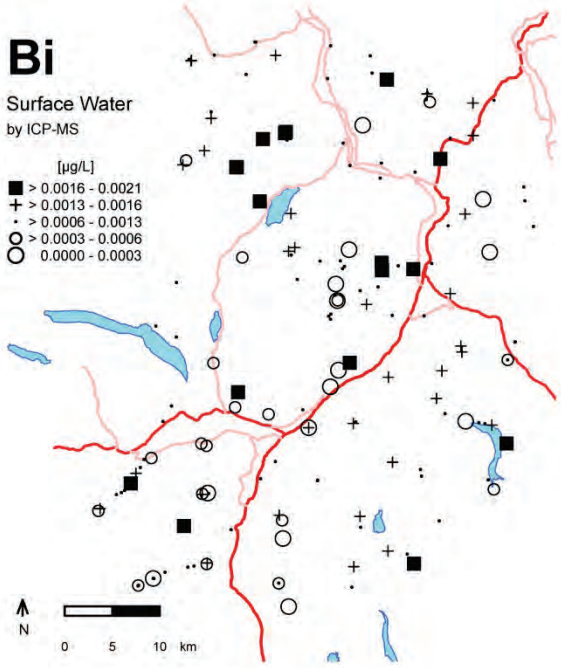

As
Surface Water
by ICP-MS
[µg/L]
> 0.252 - 1.34
> 0.0932 - 0.252
> 0.0354 - 0.0932
> 0.0248 - 0.0354
0.0179 - 0.0248
N
0 5 10 km

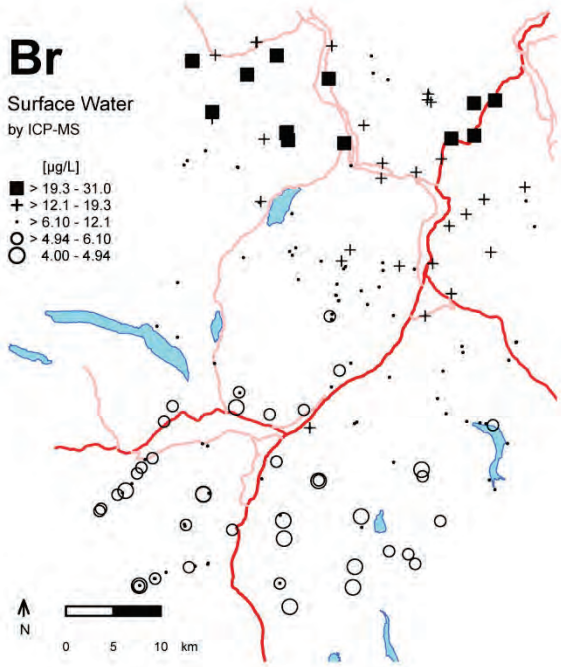

Au
Surface Water
by ICP-MS
[µg/L]
> 0.0054 - 0.0064
> 0.0045 - 0.0054
> 0.0027 - 0.0045
> 0.0019 - 0.0027
0.0000 - 0.0019
N
0 5 10 km

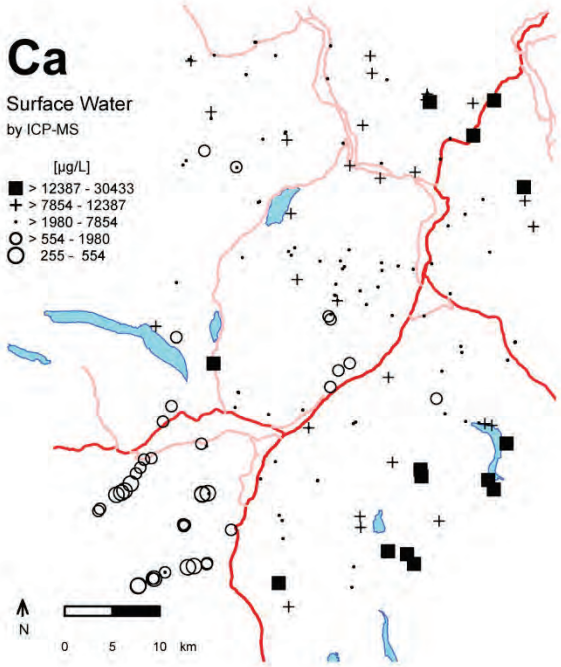

B
Surface Water
by ICP-MS
[µg/L]
> 1.90 - 2.88
> 1.32 - 1.90
> 0.789 - 1.32
> 0.639 - 0.789
0.475 - 0.639
N
0 5 10 km

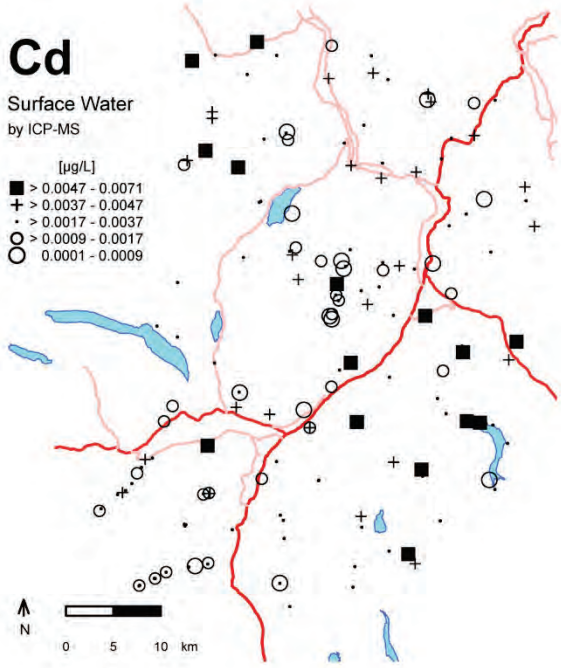

Ba
Surface Water
by ICP-MS
[µg/L]
> 12.0 - 19.3
> 6.27 - 12.0
> 2.51 - 6.27
> 1.53 - 2.51
0.730 - 1.53
N
0 5 10 km

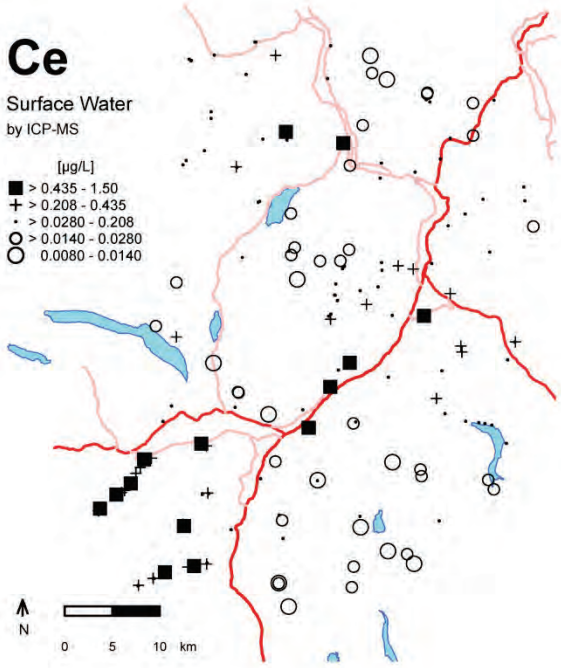

Be
Surface Water
by ICP-MS
[µg/L]
> 0.0107 - 0.0143
> 0.0076 - 0.0107
> 0.0042 - 0.0076
> 0.0024 - 0.0042
0.0000 - 0.0024
N
0 5 10 km

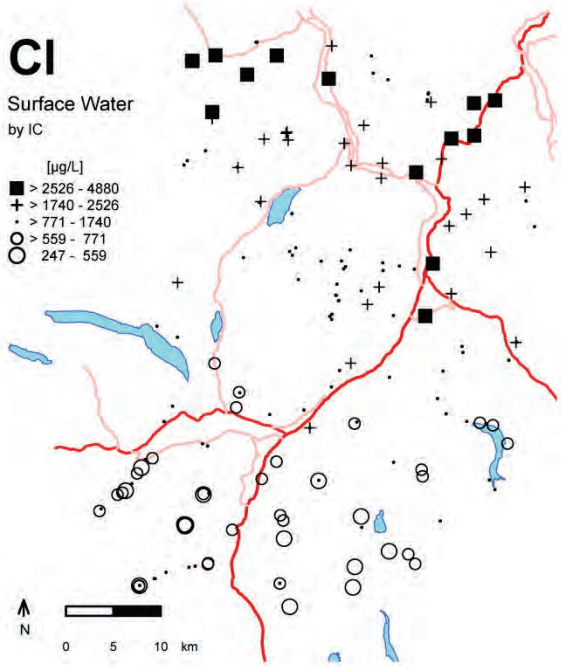

Bi
Surface Water
by ICP-MS
[µg/L]
> 0.0016 - 0.0021
> 0.0013 - 0.0016
> 0.0006 - 0.0013
> 0.0003 - 0.0006
0.0000 - 0.0003
N
0 5 10 km

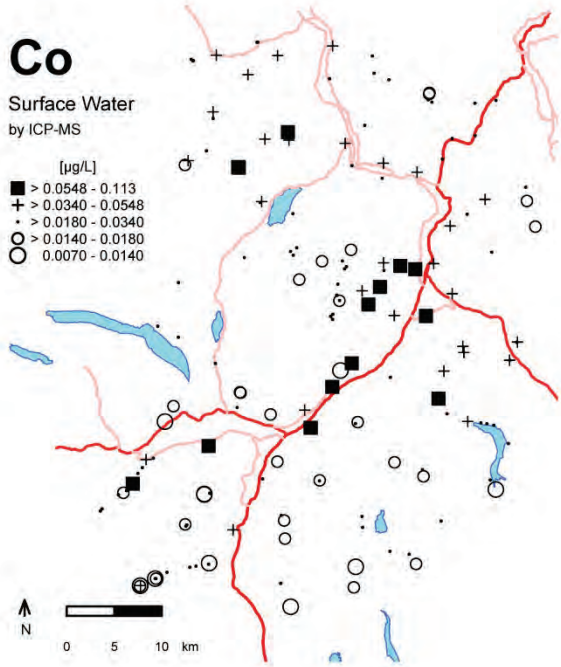

Br
Surface Water
by ICP-MS
[µg/L]
> 19.3 - 31.0
> 12.1 - 19.3
> 6.10 - 12.1
> 4.94 - 6.10
4.00 - 4.94
N
0 5 10 km

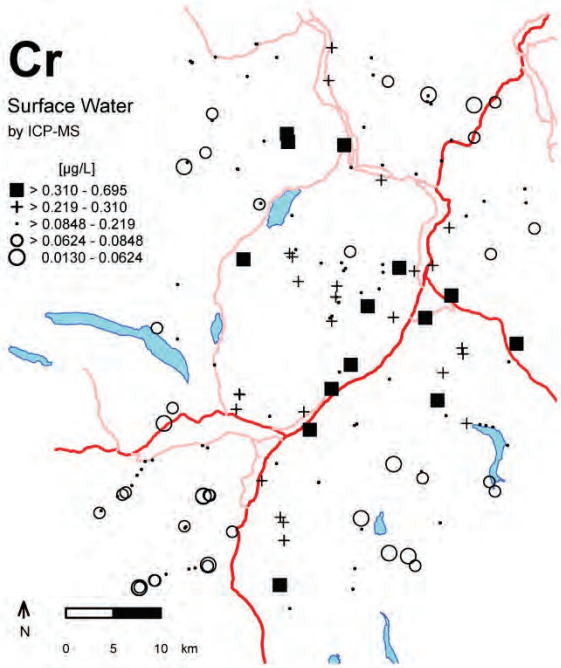

Ca
Surface Water
by ICP-MS
[µg/L]
> 12387 - 30433
> 7854 - 12387
> 1980 - 7854
> 554 - 1980
255 - 554
N
0 5 10 km

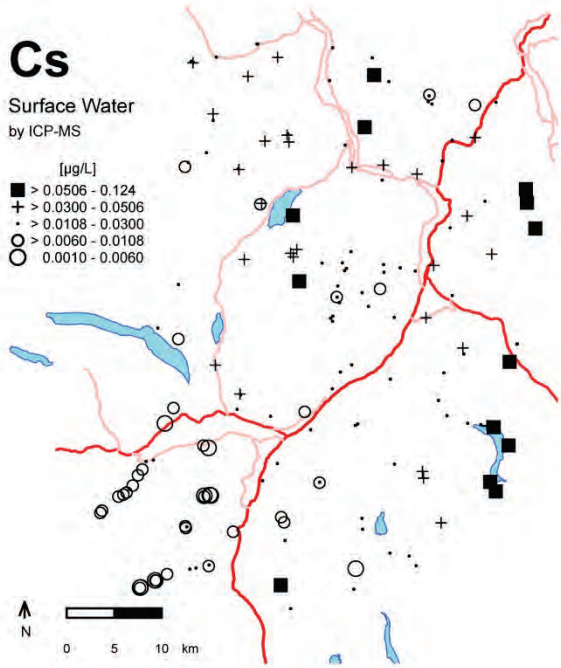

Cd
Surface Water
by ICP-MS
[µg/L]
> 0.0047 - 0.0071
> 0.0037 - 0.0047
> 0.0017 - 0.0037
> 0.0009 - 0.0017
0.0001 - 0.0009
N
0 5 10 km

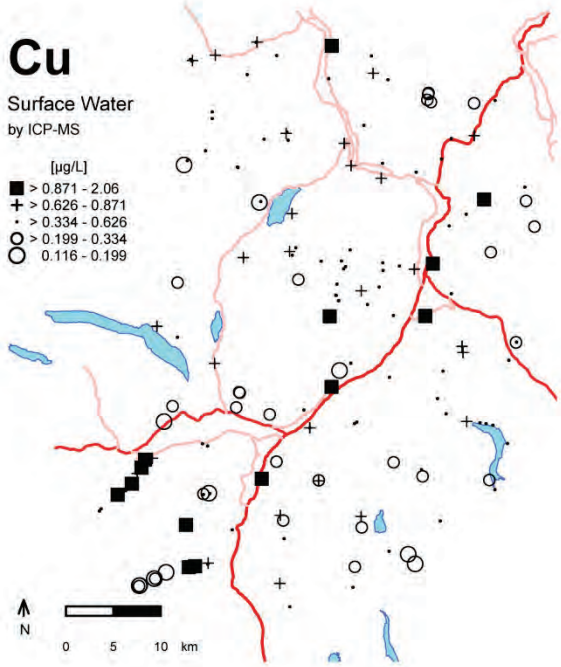

Ce
Surface Water
by ICP-MS
[µg/L]
> 0.435 - 1.50
> 0.208 - 0.435
> 0.0280 - 0.208
> 0.0140 - 0.0280
0.0080 - 0.0140
N
0 5 10 km

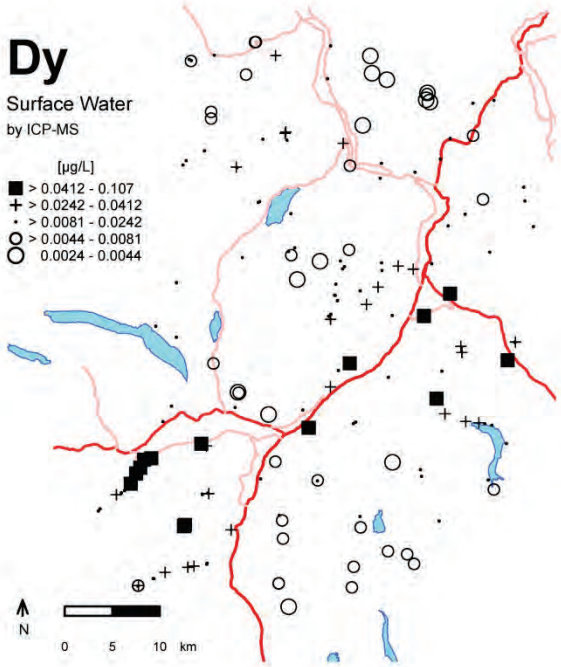

Cl
Surface Water
by IC
[µg/L]
> 2526 - 4880
> 1740 - 2526
> 771 - 1740
> 559 - 771
247 - 559
N
0 5 10 km

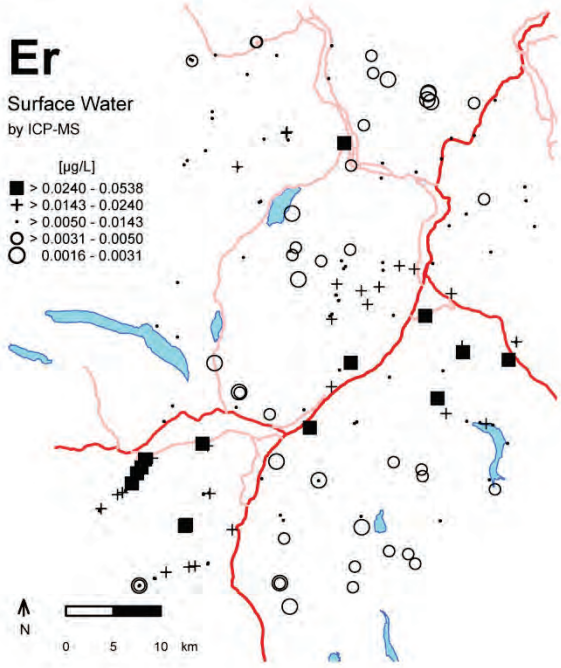

Co
Surface Water
by ICP-MS
[µg/L]
> 0.0548 - 0.113
> 0.0340 - 0.0548
> 0.0180 - 0.0340
> 0.0140 - 0.0180
0.0070 - 0.0140
N
0 5 10 km

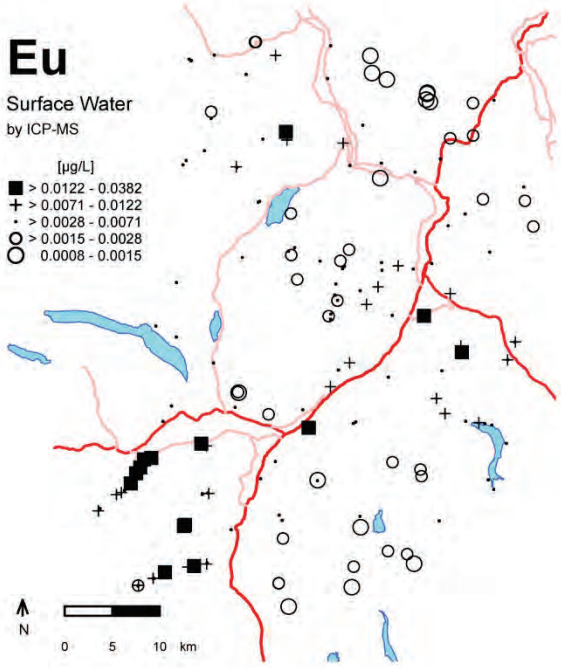

Cr
Surface Water
by ICP-MS
[µg/L]
> 0.310 - 0.695
> 0.219 - 0.310
> 0.0848 - 0.219
> 0.0624 - 0.0848
0.0130 - 0.0624
N
0 5 10 km

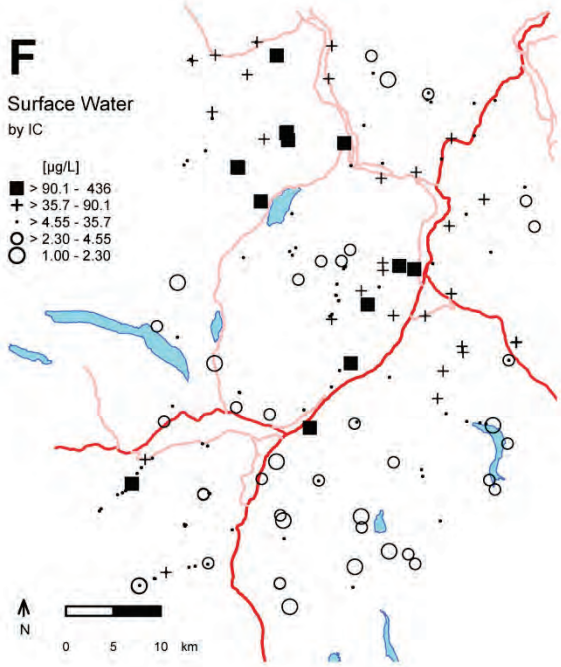

Cs
Surface Water
by ICP-MS
[µg/L]
> 0.0506 - 0.124
> 0.0300 - 0.0506
> 0.0108 - 0.0300
> 0.0060 - 0.0108
0.0010 - 0.0060
N
0 5 10 km

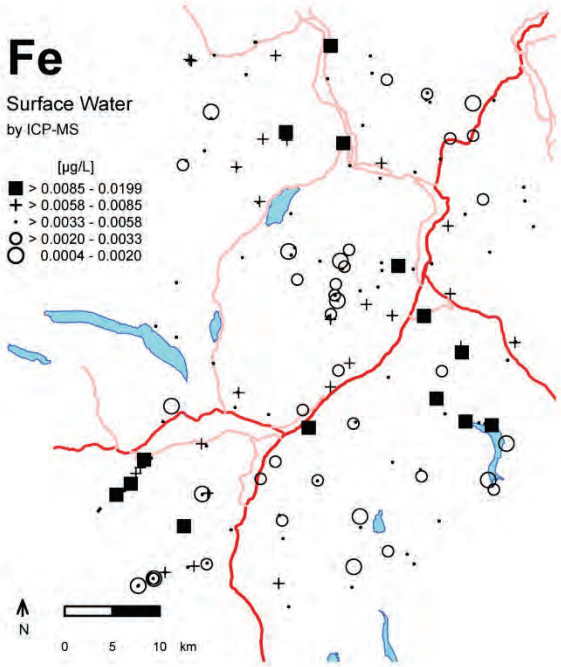

Cu
Surface Water
by ICP-MS
[µg/L]
> 0.871 - 2.06
> 0.626 - 0.871
> 0.334 - 0.626
> 0.199 - 0.334
0.116 - 0.199
N
0 5 10 km

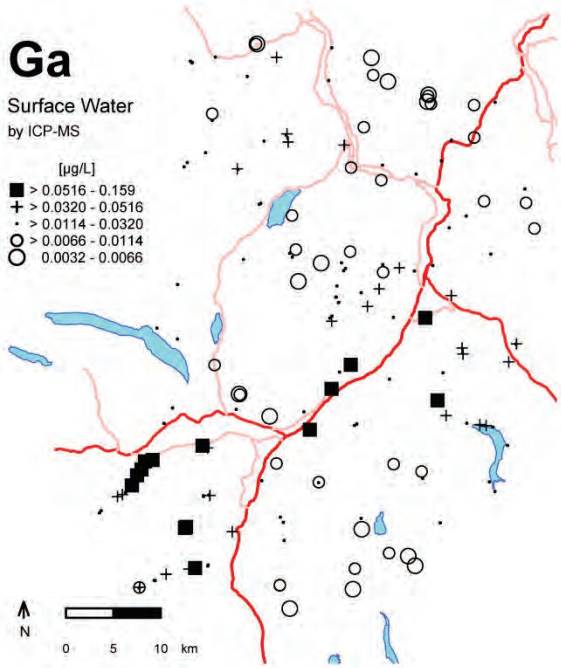

Dy
Surface Water
by ICP-MS
[µg/L]
> 0.0412 - 0.107
> 0.0242 - 0.0412
> 0.0081 - 0.0242
> 0.0044 - 0.0081
0.0024 - 0.0044
N
0 5 10 km

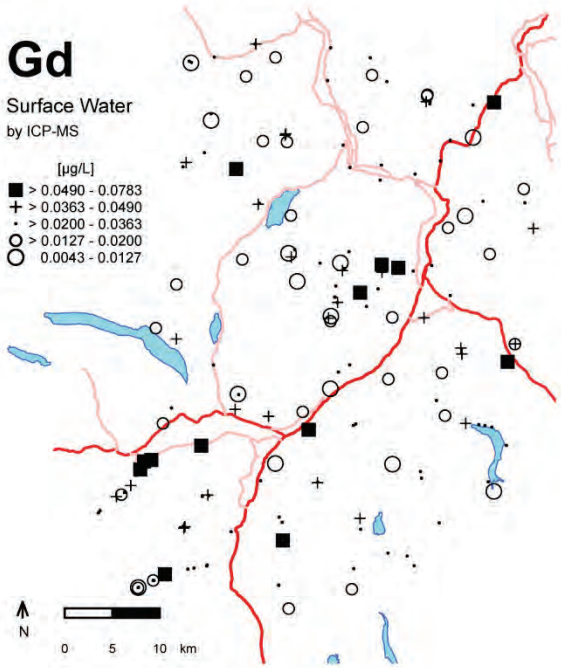

Er
Surface Water
by ICP-MS
[µg/L]
> 0.0240 - 0.0538
> 0.0143 - 0.0240
> 0.0050 - 0.0143
> 0.0031 - 0.0050
0.0016 - 0.0031
N
0 5 10 km

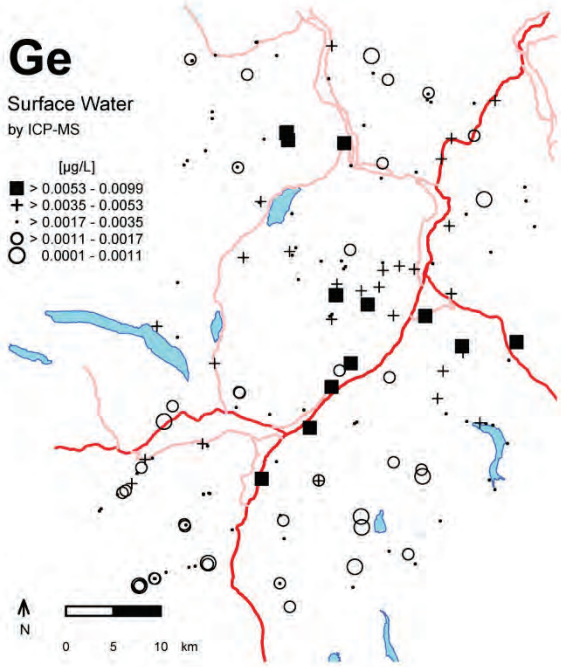

Eu
Surface Water
by ICP-MS
[µg/L]
> 0.0122 - 0.0382
> 0.0071 - 0.0122
> 0.0028 - 0.0071
> 0.0015 - 0.0028
0.0008 - 0.0015
N
0 5 10 km

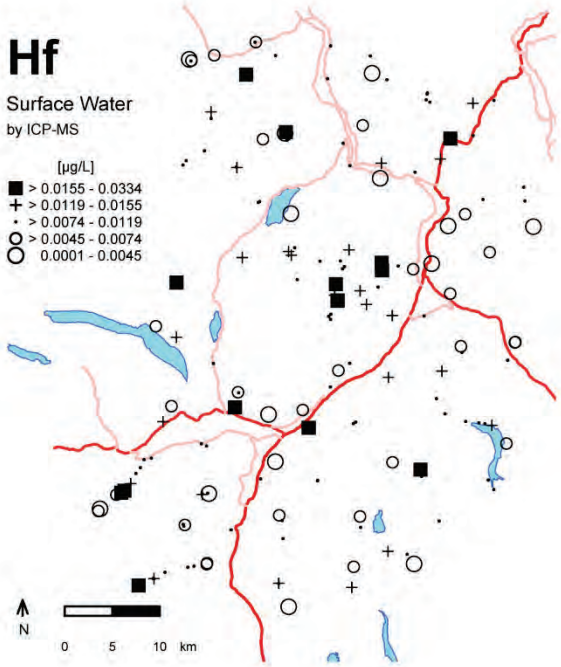

F
Surface Water
by IC
[µg/L]
> 90.1 - 436
> 35.7 - 90.1
> 4.55 - 35.7
> 2.30 - 4.55
1.00 - 2.30
N
0 5 10 km

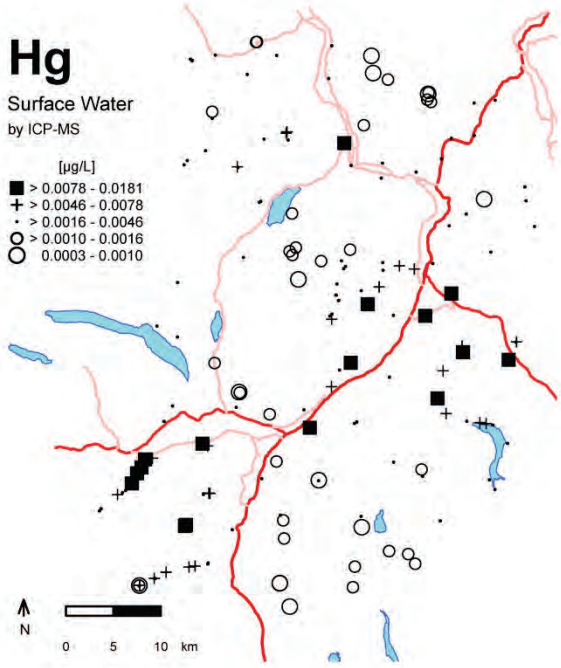

Fe
Surface Water
by ICP-MS
[µg/L]
> 0.0085 - 0.0199
> 0.0058 - 0.0085
> 0.0033 - 0.0058
> 0.0020 - 0.0033
0.0004 - 0.0020
N
0 5 10 km

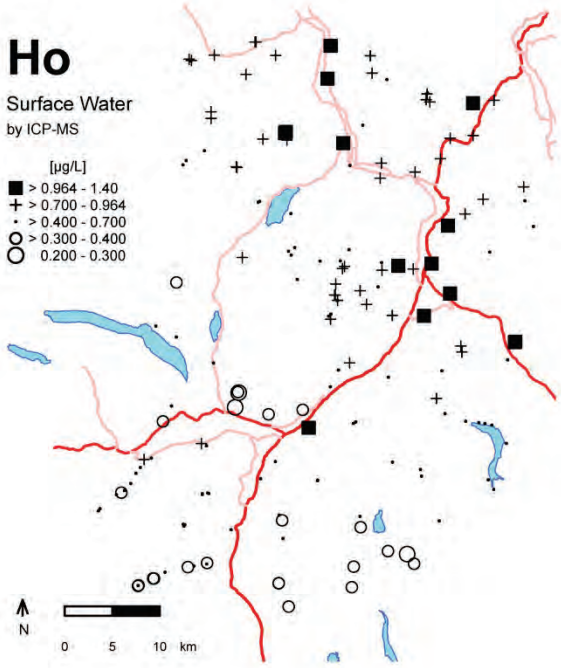

Ga
Surface Water
by ICP-MS
[µg/L]
> 0.0516 - 0.159
> 0.0320 - 0.0516
> 0.0114 - 0.0320
> 0.0066 - 0.0114
0.0032 - 0.0066
N
0 5 10 km

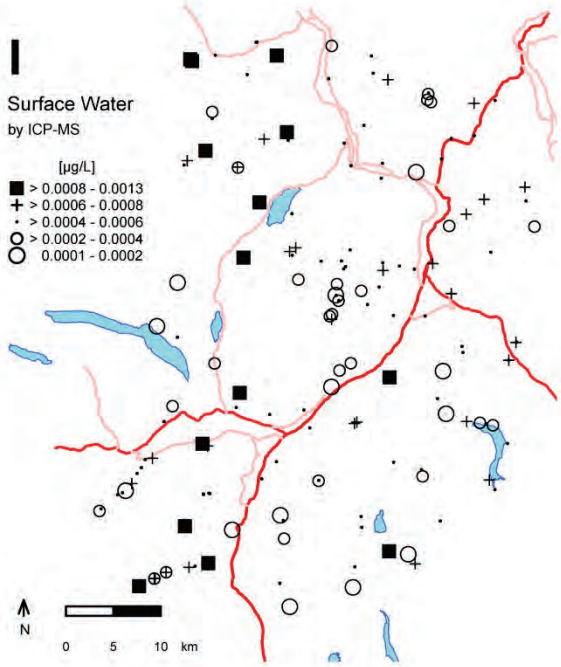

Gd
Surface Water
by ICP-MS
[µg/L]
> 0.0490 - 0.0783
> 0.0363 - 0.0490
> 0.0200 - 0.0363
> 0.0127 - 0.0200
0.0043 - 0.0127
N
0 5 10 km

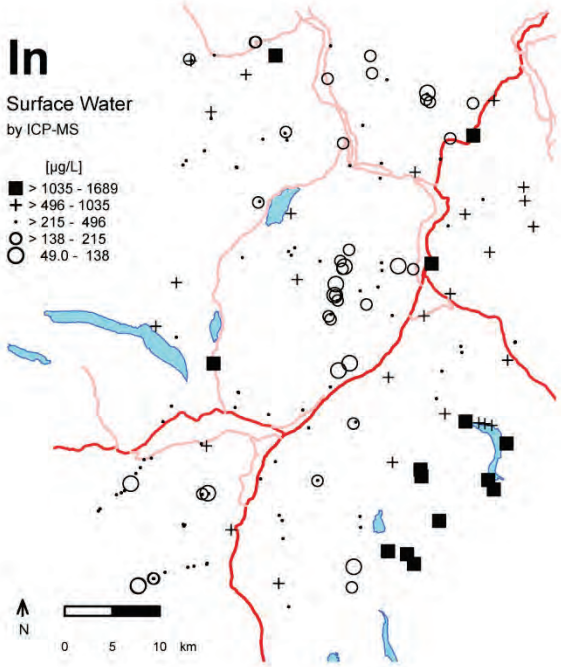

Ge
Surface Water
by ICP-MS
[µg/L]
> 0.0053 - 0.0099
> 0.0035 - 0.0053
> 0.0017 - 0.0035
> 0.0011 - 0.0017
0.0001 - 0.0011
N
0 5 10 km

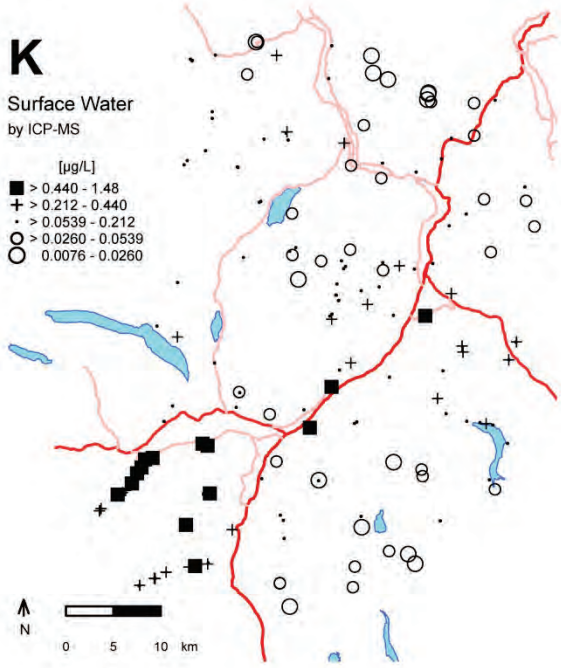

Hf
Surface Water
by ICP-MS
[µg/L]
> 0.0155 - 0.0334
> 0.0119 - 0.0155
> 0.0074 - 0.0119
> 0.0045 - 0.0074
0.0001 - 0.0045
N
0 5 10 km

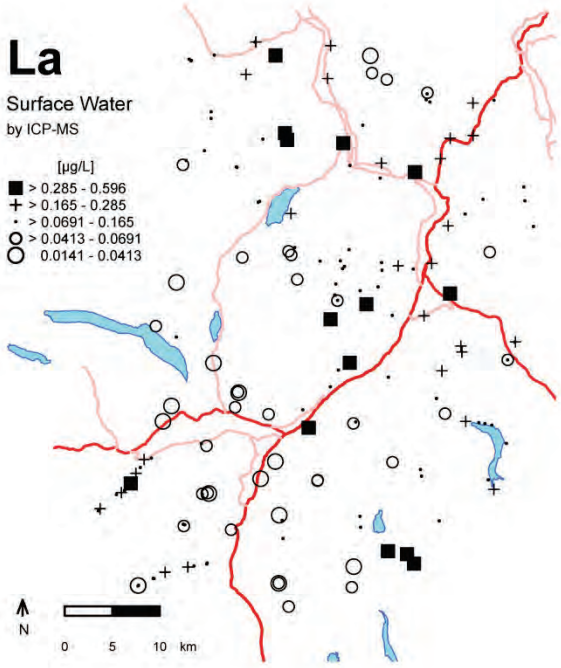

Hg
Surface Water
by ICP-MS
[µg/L]
> 0.0078 - 0.0181
> 0.0046 - 0.0078
> 0.0016 - 0.0046
> 0.0010 - 0.0016
0.0003 - 0.0010
N
0 5 10 km

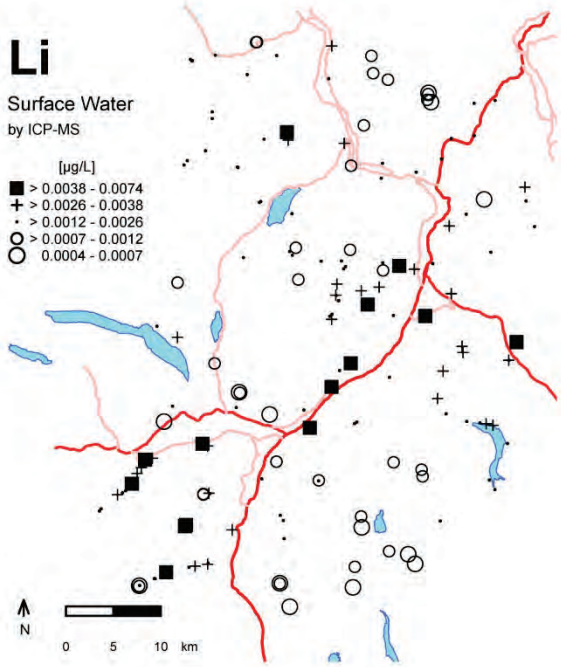

Ho
Surface Water
by ICP-MS
[µg/L]
> 0.964 - 1.40
> 0.700 - 0.964
> 0.400 - 0.700
> 0.300 - 0.400
0.200 - 0.300
N
0 5 10 km

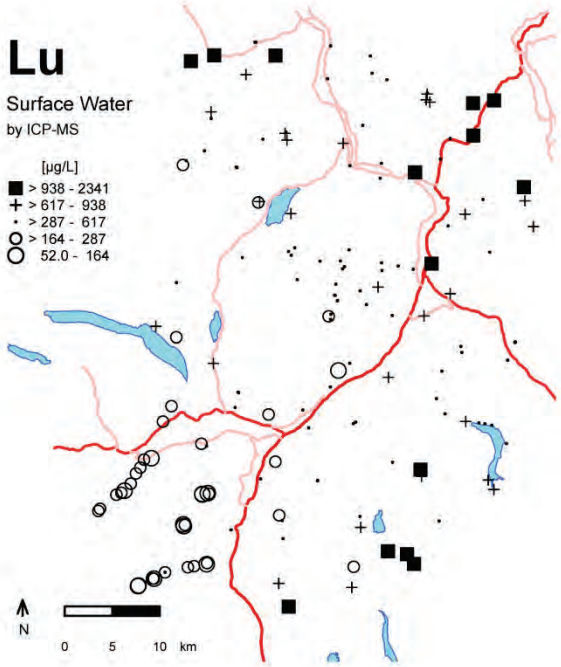

I
Surface Water
by ICP-MS
[µg/L]
> 0.0008 - 0.0013
> 0.0006 - 0.0008
> 0.0004 - 0.0006
> 0.0002 - 0.0004
0.0001 - 0.0002
N
0 5 10 km

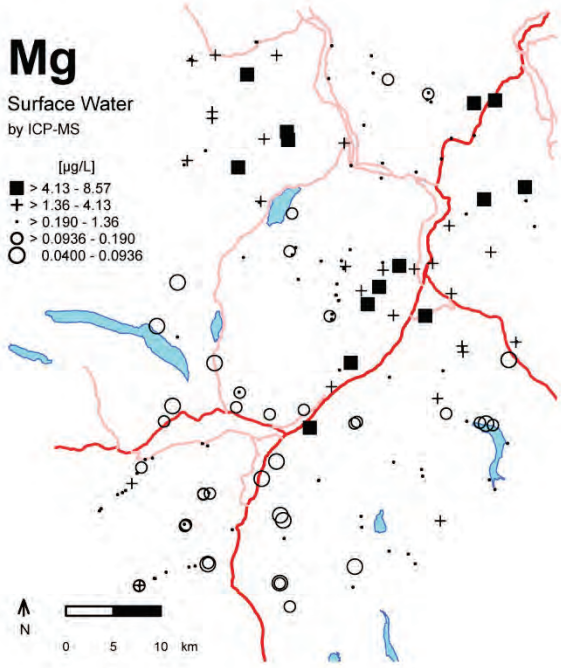

In
Surface Water
by ICP-MS
[µg/L]
> 1035 - 1689
> 496 - 1035
> 215 - 496
> 138 - 215
49.0 - 138
N
0 5 10 km

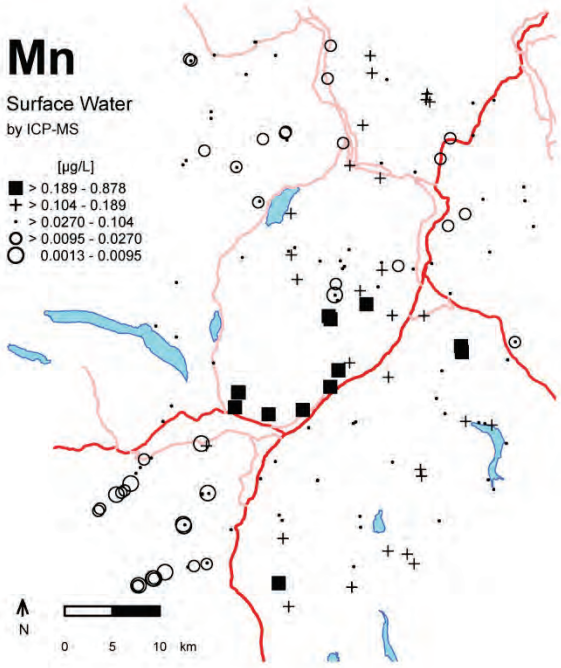

K
Surface Water
by ICP-MS
[µg/L]
> 0.440 - 1.48
> 0.212 - 0.440
> 0.0539 - 0.212
> 0.0260 - 0.0539
0.0076 - 0.0260
N
0 5 10 km

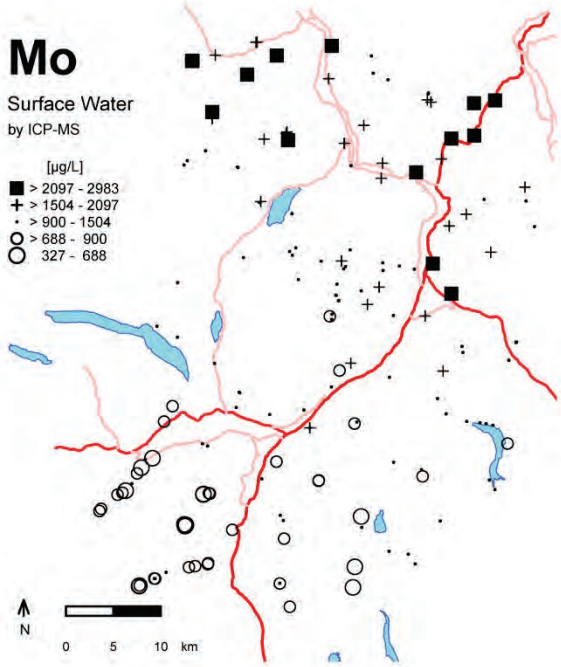

La
Surface Water
by ICP-MS
[µg/L]
> 0.285 - 0.596
> 0.165 - 0.285
> 0.0691 - 0.165
> 0.0413 - 0.0691
0.0141 - 0.0413
N
0 5 10 km

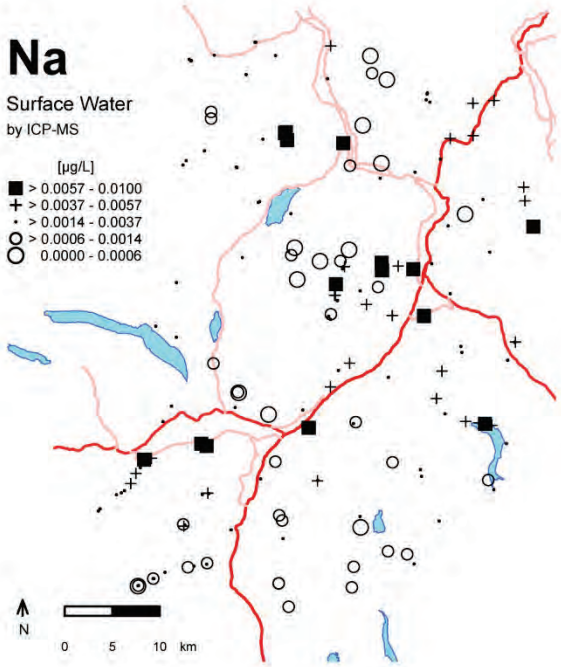

Li
Surface Water
by ICP-MS
[µg/L]
> 0.0038 - 0.0074
> 0.0026 - 0.0038
> 0.0012 - 0.0026
> 0.0007 - 0.0012
0.0004 - 0.0007
N
0 5 10 km

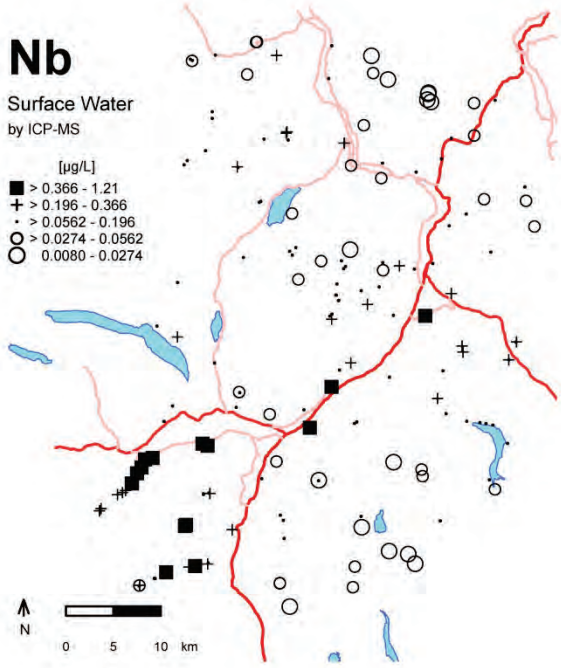

Lu
Surface Water
by ICP-MS
[µg/L]
> 938 - 2341
> 617 - 938
> 287 - 617
> 164 - 287
52.0 - 164
N
0 5 10 km

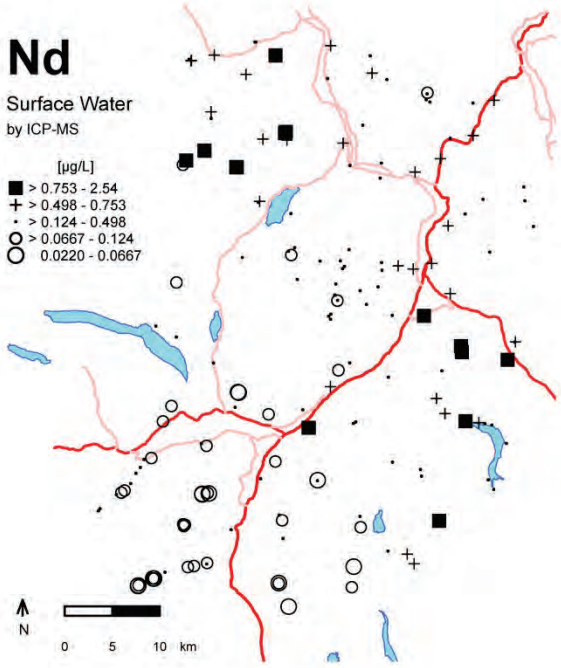

Mg
Surface Water
by ICP-MS
[µg/L]
> 4.13 - 8.57
> 1.36 - 4.13
> 0.190 - 1.36
> 0.0936 - 0.190
0.0400 - 0.0936
N
0 5 10 km

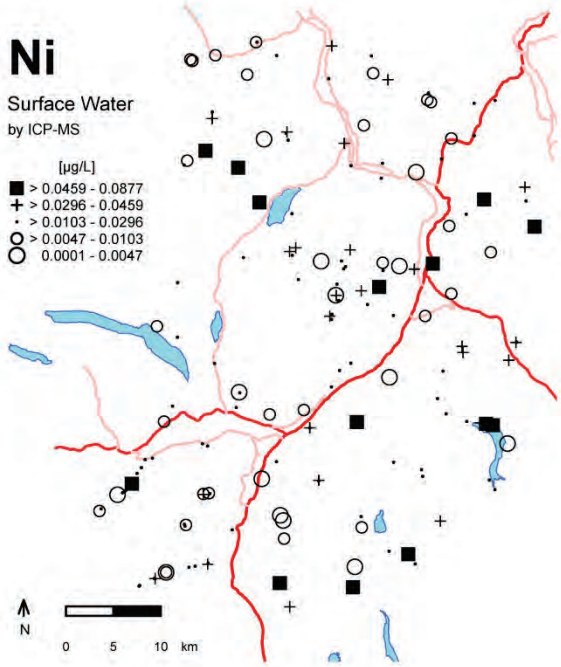

Mn
Surface Water
by ICP-MS
[µg/L]
> 0.189 - 0.878
> 0.104 - 0.189
> 0.0270 - 0.104
> 0.0095 - 0.0270
0.0013 - 0.0095
N
0 5 10 km

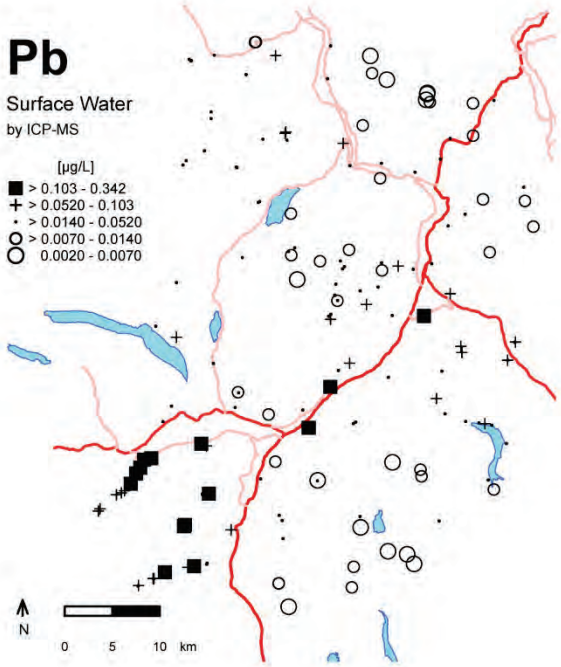

Mo
Surface Water
by ICP-MS
[µg/L]
> 2097 - 2983
> 1504 - 2097
> 900 - 1504
> 688 - 900
327 - 688
N
0 5 10 km

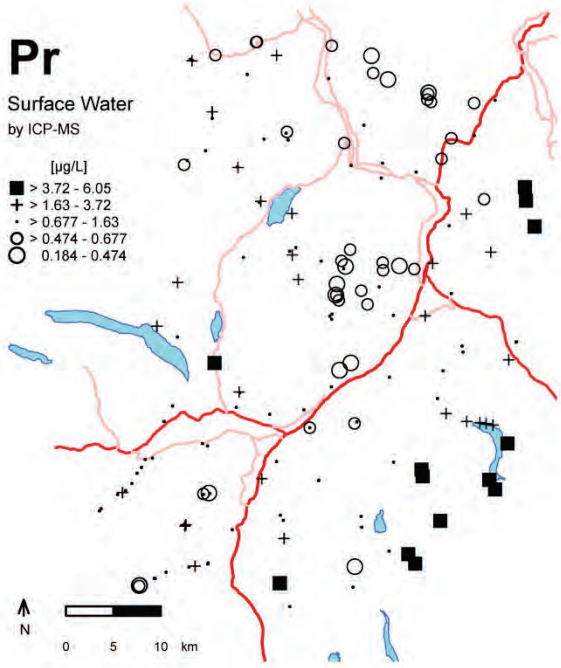

Na
Surface Water
by ICP-MS
[µg/L]
> 0.0057 - 0.0100
> 0.0037 - 0.0057
> 0.0014 - 0.0037
> 0.0006 - 0.0014
0.0000 - 0.0006
N
0 5 10 km

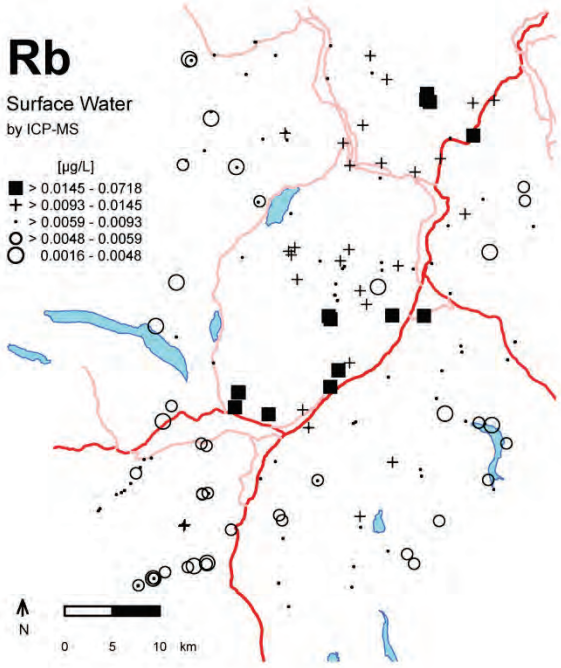

Nb
Surface Water
by ICP-MS
[µg/L]
> 0.366 - 1.21
> 0.196 - 0.366
> 0.0562 - 0.196
> 0.0274 - 0.0562
0.0080 - 0.0274
N
0 5 10 km

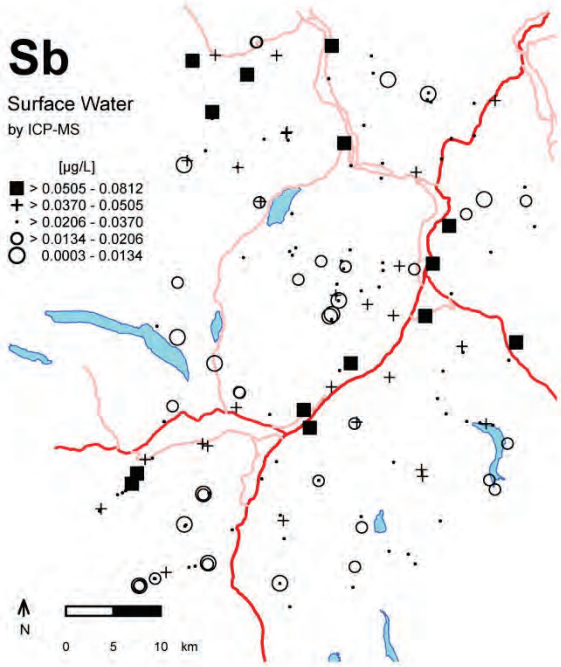

Nd
Surface Water
by ICP-MS
[µg/L]
> 0.753 - 2.54
> 0.498 - 0.753
> 0.124 - 0.498
> 0.0667 - 0.124
0.0220 - 0.0667
N
0 5 10 km

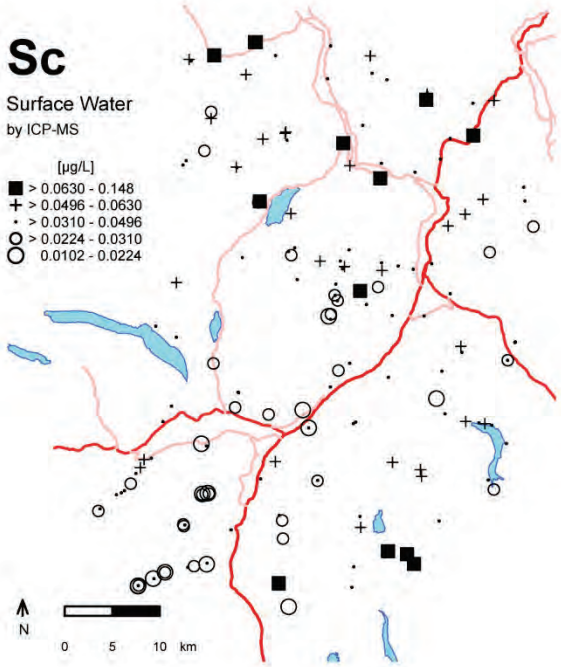

Ni
Surface Water
by ICP-MS
[µg/L]
> 0.0459 - 0.0877
> 0.0296 - 0.0459
> 0.0103 - 0.0296
> 0.0047 - 0.0103
0.0001 - 0.0047
N
0 5 10 km

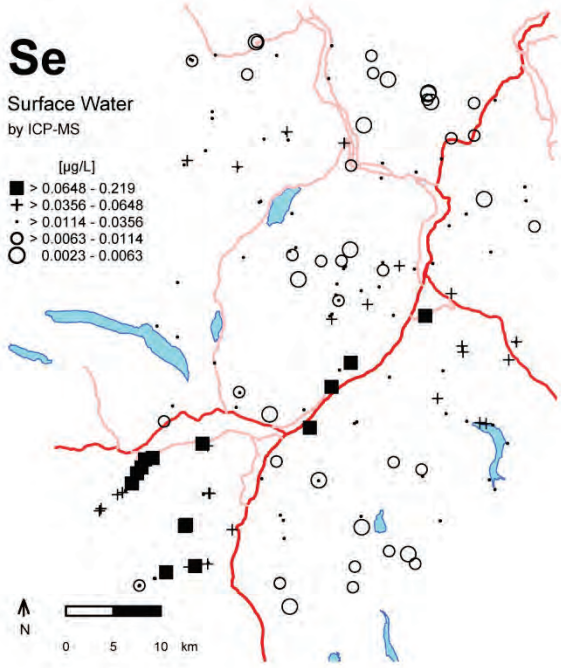

Pb
Surface Water
by ICP-MS
[µg/L]
> 0.103 - 0.342
> 0.0520 - 0.103
> 0.0140 - 0.0520
> 0.0070 - 0.0140
0.0020 - 0.0070
N
0 5 10 km

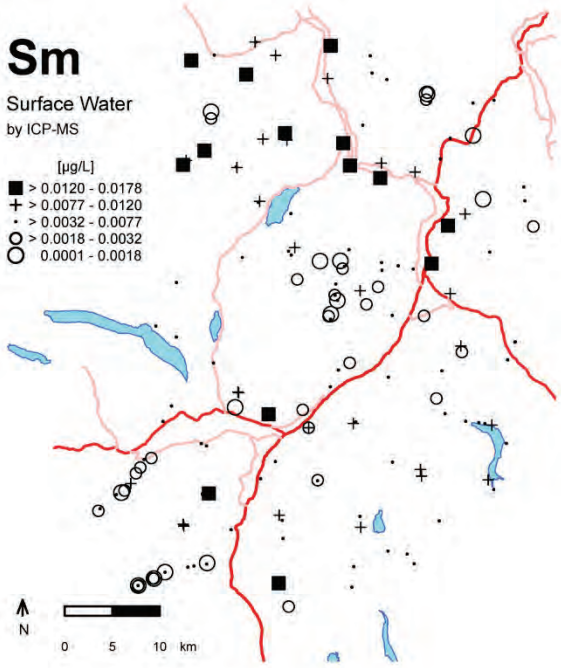

Pr
Surface Water
by ICP-MS
[µg/L]
> 3.72 - 6.05
> 1.63 - 3.72
> 0.677 - 1.63
> 0.474 - 0.677
0.184 - 0.474
N
0 5 10 km

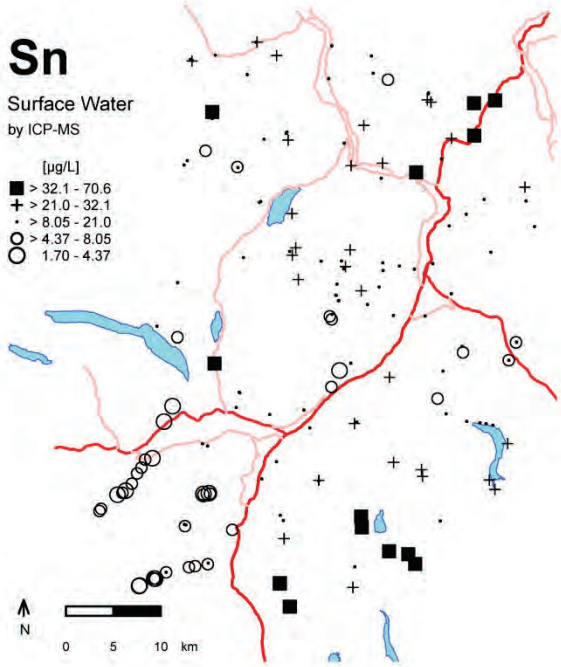

Rb
Surface Water
by ICP-MS
[µg/L]
> 0.0145 - 0.0718
> 0.0093 - 0.0145
> 0.0059 - 0.0093
> 0.0048 - 0.0059
0.0016 - 0.0048
N
0 5 10 km

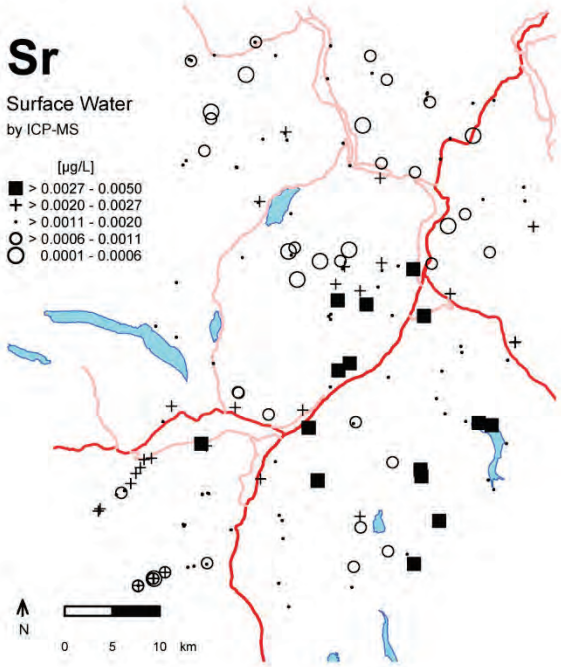

Sb
Surface Water
by ICP-MS
[µg/L]
> 0.0505 - 0.0812
> 0.0370 - 0.0505
> 0.0206 - 0.0370
> 0.0134 - 0.0206
0.0003 - 0.0134
N
0 5 10 km

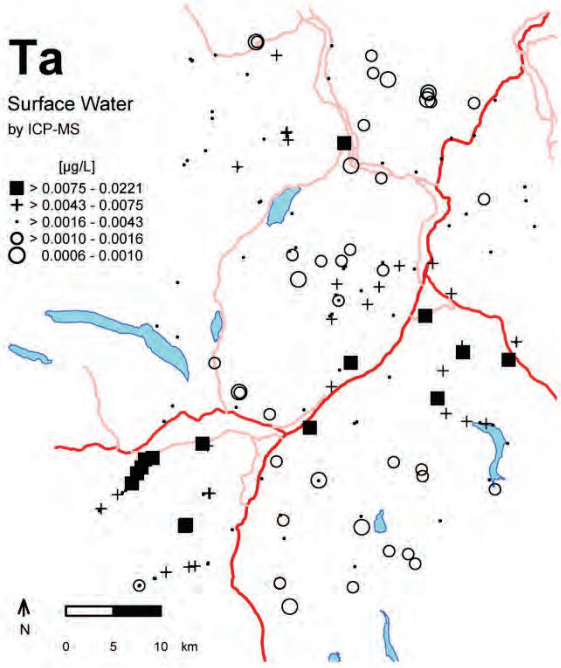

Sc
Surface Water
by ICP-MS
[µg/L]
> 0.0630 - 0.148
> 0.0496 - 0.0630
> 0.0310 - 0.0496
> 0.0224 - 0.0310
0.0102 - 0.0224
N
0 5 10 km

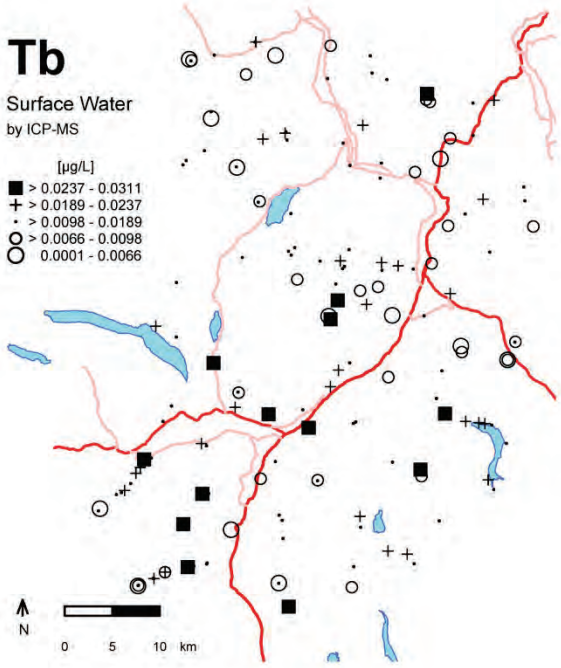

Se
Surface Water
by ICP-MS
[µg/L]
> 0.0648 - 0.219
> 0.0356 - 0.0648
> 0.0114 - 0.0356
> 0.0063 - 0.0114
0.0023 - 0.0063
N
0 5 10 km

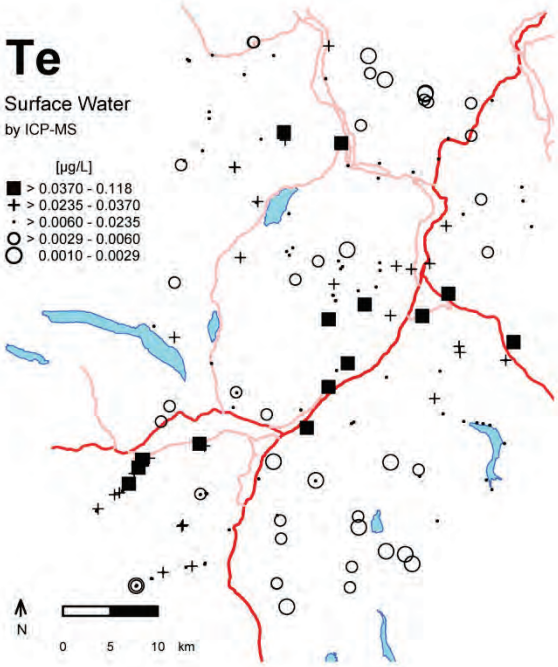

Sm
Surface Water
by ICP-MS
[µg/L]
> 0.0120 - 0.0178
> 0.0077 - 0.0120
> 0.0032 - 0.0077
> 0.0018 - 0.0032
0.0001 - 0.0018
N
0 5 10 km

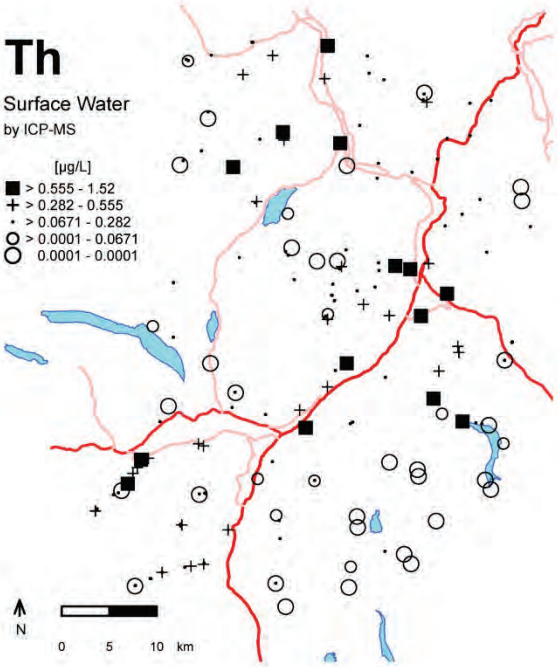

Sn
Surface Water
by ICP-MS
[µg/L]
> 32.1 - 70.6
> 21.0 - 32.1
> 8.05 - 21.0
> 4.37 - 8.05
1.70 - 4.37
N
0 5 10 km

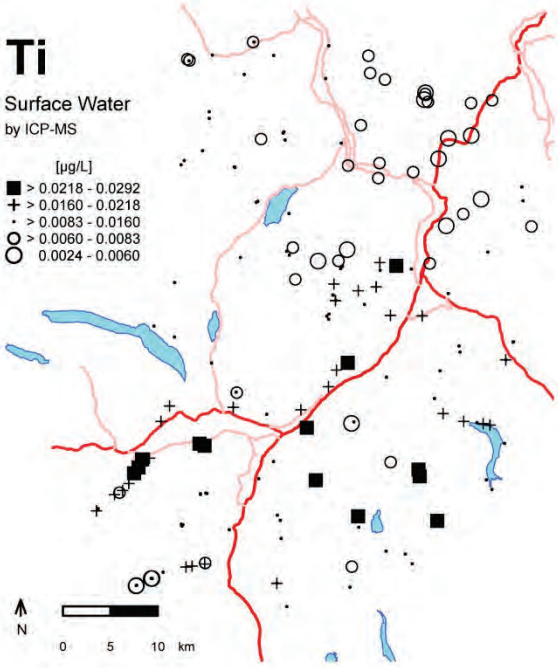

Sr
Surface Water
by ICP-MS
[µg/L]
> 0.0027 - 0.0050
> 0.0020 - 0.0027
> 0.0011 - 0.0020
> 0.0006 - 0.0011
0.0001 - 0.0006
N
0 5 10 km

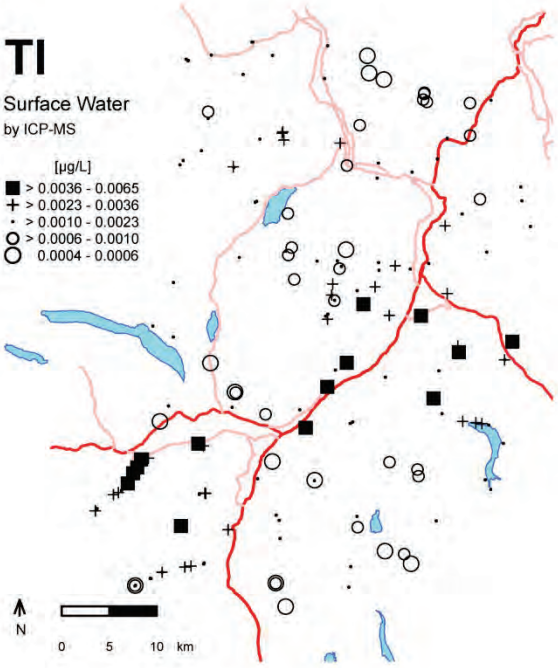

Ta
Surface Water
by ICP-MS
[µg/L]
> 0.0075 - 0.0221
> 0.0043 - 0.0075
> 0.0016 - 0.0043
> 0.0010 - 0.0016
0.0006 - 0.0010
N
0 5 10 km

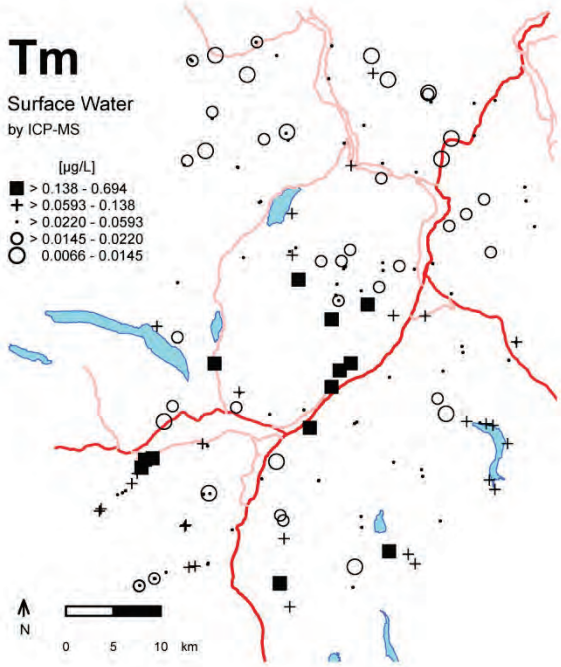

Tb
Surface Water
by ICP-MS
[µg/L]
> 0.0237 - 0.0311
> 0.0189 - 0.0237
> 0.0098 - 0.0189
> 0.0066 - 0.0098
0.0001 - 0.0066
N
0 5 10 km

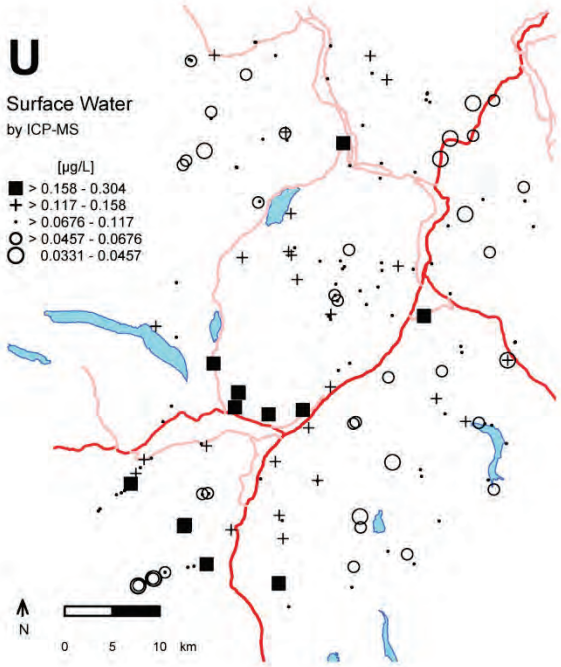

Te
Surface Water
by ICP-MS
[µg/L]
> 0.0370 - 0.118
> 0.0235 - 0.0370
> 0.0060 - 0.0235
> 0.0029 - 0.0060
0.0010 - 0.0029
N
0 5 10 km

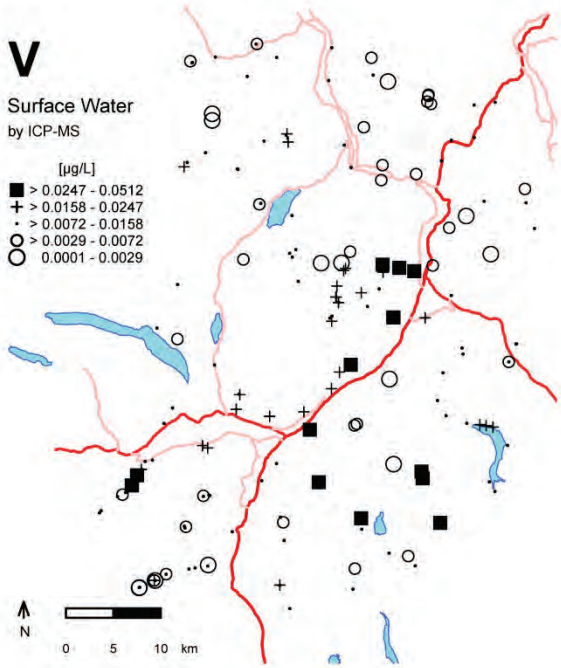

Th
Surface Water
by ICP-MS
[µg/L]
> 0.555 - 1.52
> 0.282 - 0.555
> 0.0671 - 0.282
> 0.0001 - 0.0671
0.0001 - 0.0001
N
0 5 10 km

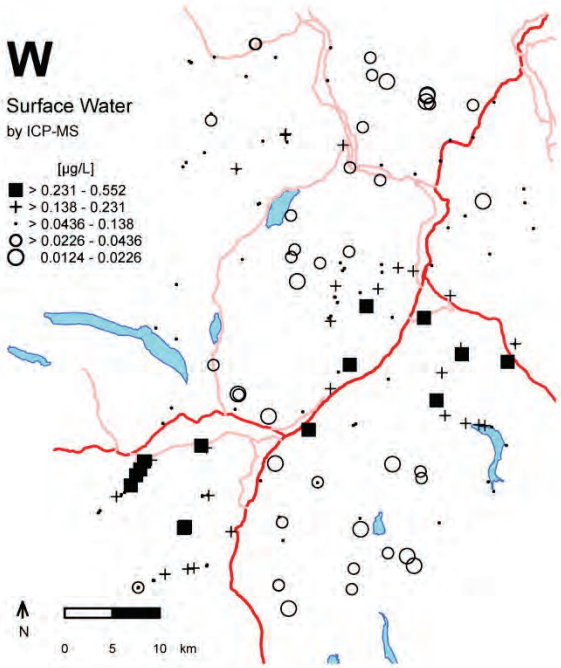

Ti
Surface Water
by ICP-MS
[µg/L]
> 0.0218 - 0.0292
> 0.0160 - 0.0218
> 0.0083 - 0.0160
> 0.0060 - 0.0083
0.0024 - 0.0060
N
0 5 10 km

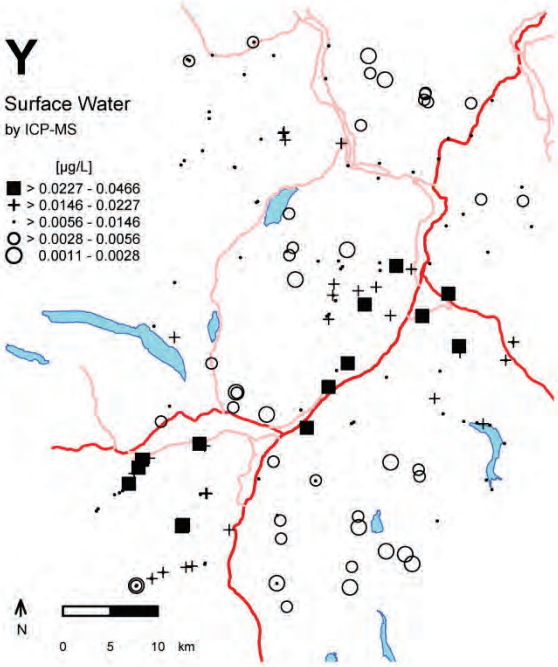

Tl
Surface Water
by ICP-MS
[µg/L]
> 0.0036 - 0.0065
> 0.0023 - 0.0036
> 0.0010 - 0.0023
> 0.0006 - 0.0010
0.0004 - 0.0006
N
0 5 10 km

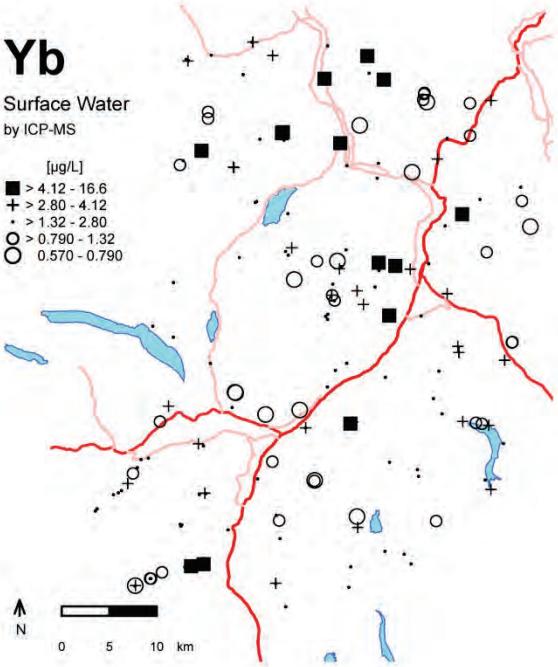

Tm
Surface Water
by ICP-MS
[µg/L]
> 0.138 - 0.694
> 0.0593 - 0.138
> 0.0220 - 0.0593
> 0.0145 - 0.0220
0.0066 - 0.0145
N
0 5 10 km

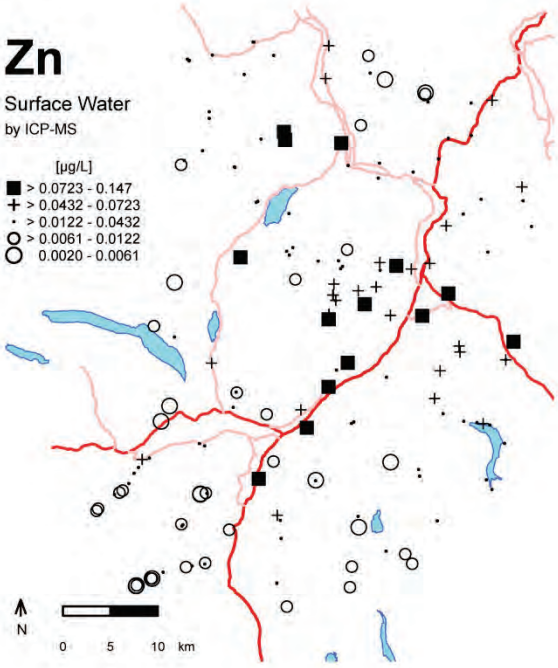

U
Surface Water
by ICP-MS
[µg/L]
> 0.158 - 0.304
> 0.117 - 0.158
> 0.0676 - 0.117
> 0.0457 - 0.0676
0.0331 - 0.0457
N
0 5 10 km

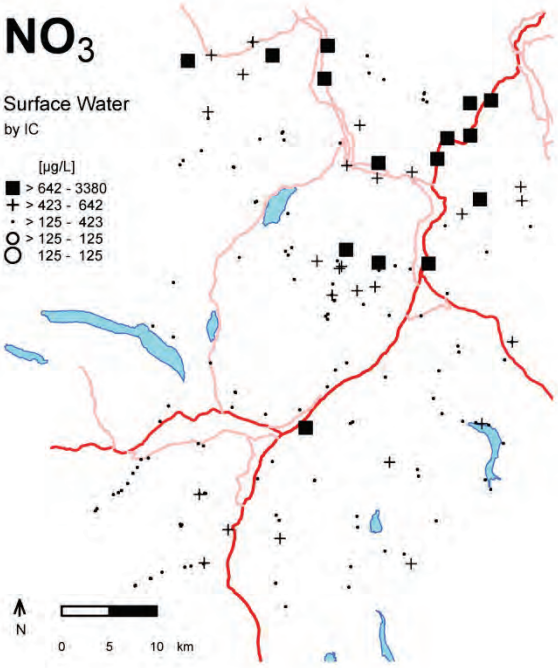

V
Surface Water
by ICP-MS
[µg/L]
> 0.0247 - 0.0512
> 0.0158 - 0.0247
> 0.0072 - 0.0158
> 0.0029 - 0.0072
0.0001 - 0.0029
N
0 5 10 km

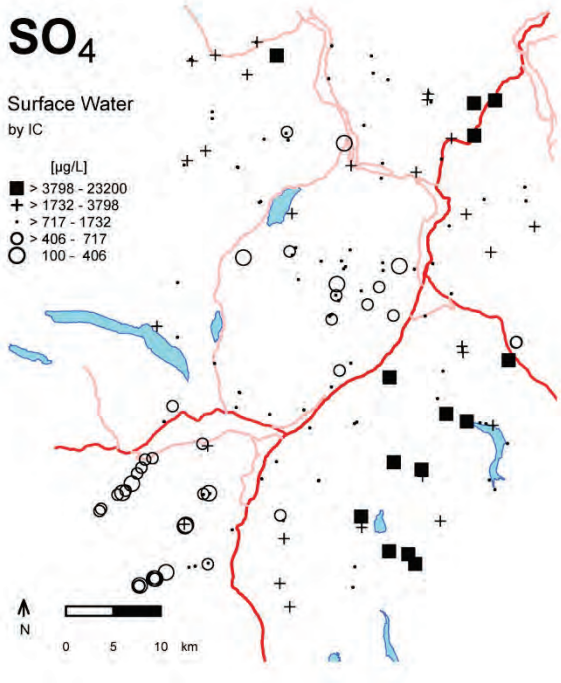

W
Surface Water
by ICP-MS
[µg/L]
> 0.231 - 0.552
> 0.138 - 0.231
> 0.0436 - 0.138
> 0.0226 - 0.0436
0.0124 - 0.0226
N
0 5 10 km


Y
Surface Water
by ICP-MS
[µg/L]
> 0.0227 - 0.0466
> 0.0146 - 0.0227
> 0.0056 - 0.0146
> 0.0028 - 0.0056
0.0011 - 0.0028
N
0 5 10 km


Yb
Surface Water
by ICP-MS
[µg/L]
> 4.12 - 16.6
> 2.80 - 4.12
> 1.32 - 2.80
> 0.790 - 1.32
0.570 - 0.790
N
0 5 10 km

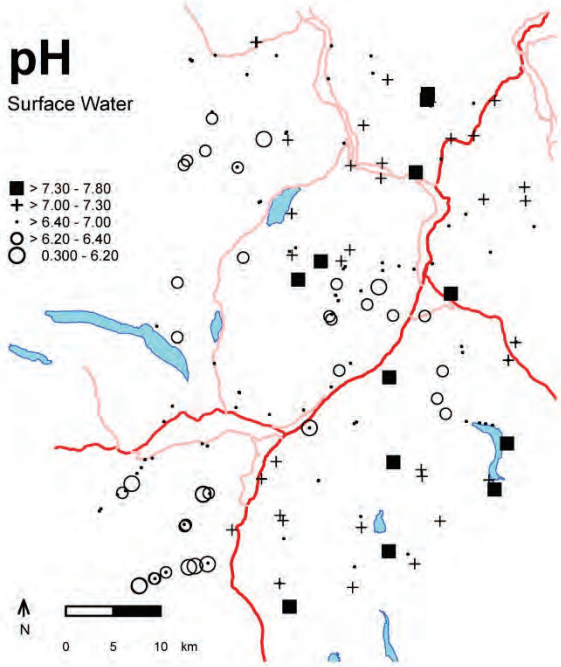

Zn
Surface Water
by ICP-MS
[µg/L]
> 0.0723 - 0.147
> 0.0432 - 0.0723
> 0.0122 - 0.0432
> 0.0061 - 0.0122
0.0020 - 0.0061
N
0 5 10 km

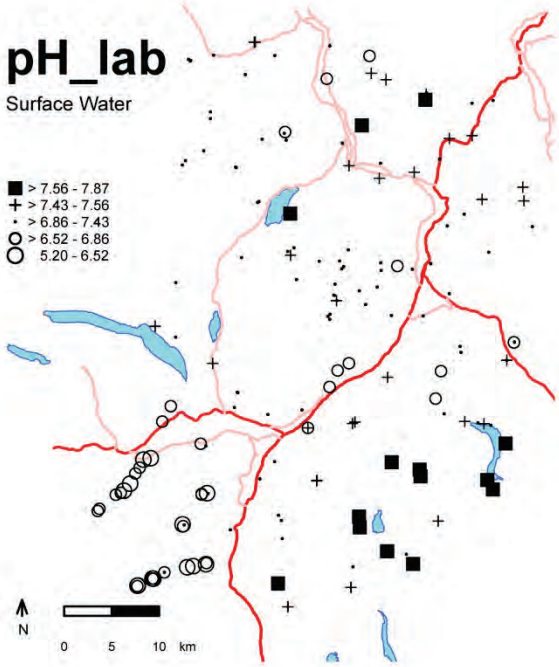

NO3
Surface Water
by IC
[µg/L]
> 642 - 3380
> 423 - 642
> 125 - 423
> 125 - 125
125 - 125
N
0 5 10 km

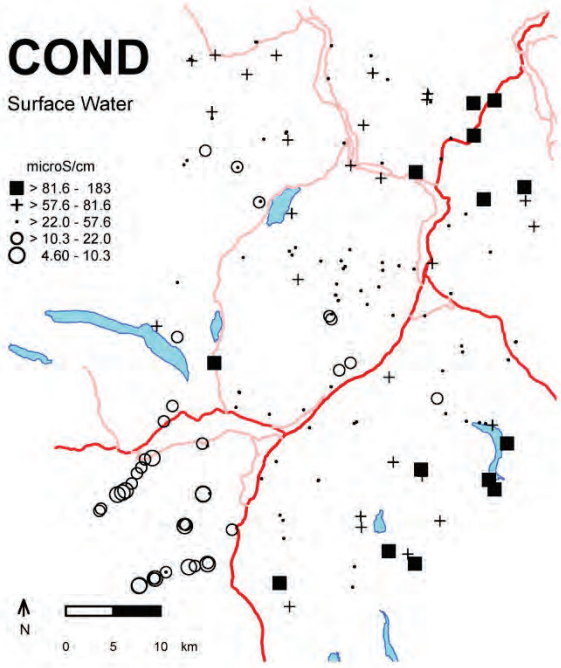

SO4
Surface Water
by IC
[µg/L]
> 3798 - 23200
> 1732 - 3798
> 717 - 1732
> 406 - 717
100 - 406
N
0 5 10 km

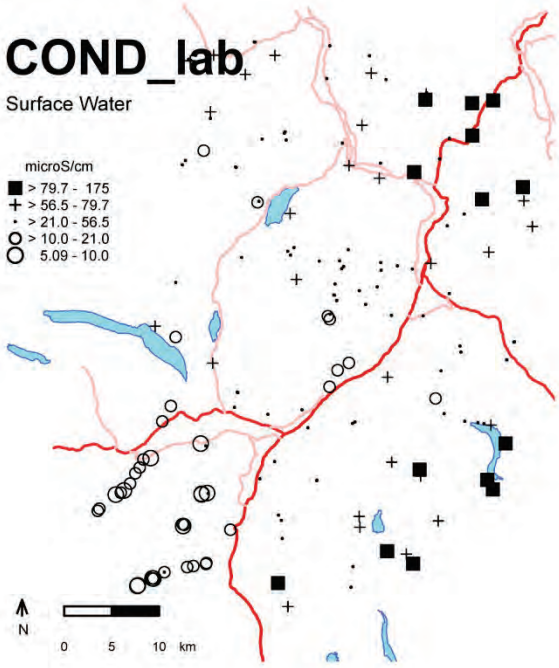
Appendix IX: Maps for the physical parameters

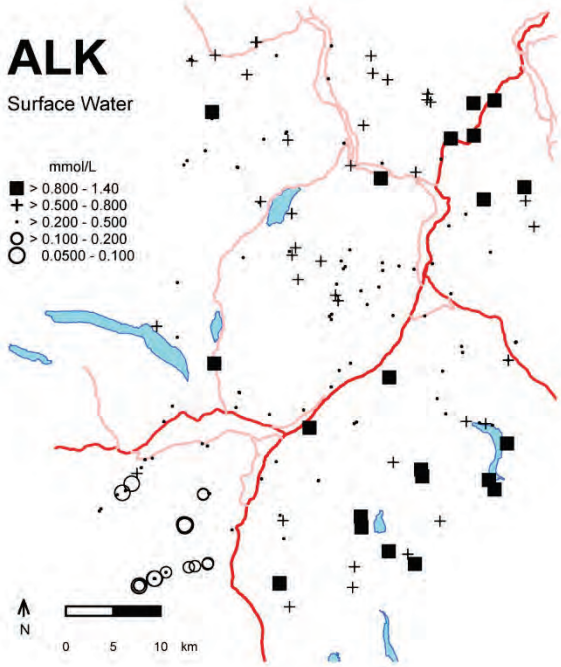
pH, conductivity, alkalinity and temperature.

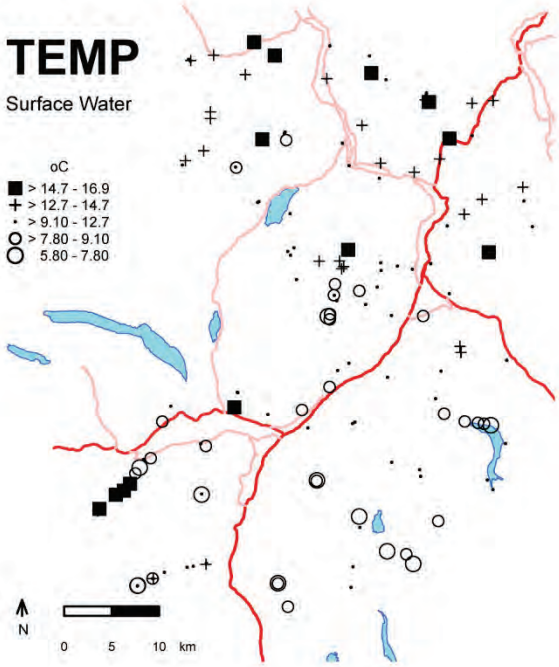

pH
Surface Water
> 7.30 - 7.80
> 7.00 - 7.30
> 6.40 - 7.00
> 6.20 - 6.40
0.300 - 6.20
N
0 5 10 km


pH_lab
Surface Water
> 7.56 - 7.87
> 7.43 - 7.56
> 6.86 - 7.43
> 6.52 - 6.86
5.20 - 6.52
N
0 5 10 km


COND
Surface Water
microS/cm
> 81.6 - 183
> 57.6 - 81.6
> 22.0 - 57.6
> 10.3 - 22.0
4.60 - 10.3
N
0 5 10 km


COND_lab
Surface Water
microS/cm
> 79.7 - 175
> 56.5 - 79.7
> 21.0 - 56.5
> 10.0 - 21.0
5.09 - 10.0
N
0 5 10 km


ALK
Surface Water
mmol/L
> 0.800 - 1.40
> 0.500 - 0.800
> 0.200 - 0.500
> 0.100 - 0.200
0.0500 - 0.100
N
0 5 10 km


TEMP
Surface Water
oC
> 14.7 - 16.9
> 12.7 - 14.7
> 9.10 - 12.7
> 7.80 - 9.10
5.80 - 7.80
N
0 5 10 km

Appendix X: Field sheets

8 – 18^{00} Uhr

Field Sheet Water Sampling Oppdal Date 2017/15

Sample No: 4501 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0537986 YCOO 6941301 UTM 32

Altitude 542 masl kein waypoint gelagert Probleme mit GPS

pH 6.4 Conductivity 51.3 / 51 Alkalinity 1.1 Temp 10 °C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 2 (always start with ID!) no ID-photo

COMMENTS: double sample, the other filtered in Hotel

raining, stream directly at road

Signature

Proben am Abend in den Kühlraum gegeben

ACHTUNG: Die kleinen Flaschen sind nicht ganz dicht

Field Sheet Water Sampling Oppdal Date 20/07/15

Sample No: 4502 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0537986 YCOO 6941301 UTM 32

Altitude 542 masl kein waypoint - Probleme mit GPS

pH 5.8 / 7.5 Conductivity 53 Alkalinity 0.8 Temp 16.6

measured: O in field ⊗ in hotel

number of filters used: 1 filtered: O in field ⊗ in hotel for both

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 1 (always start with ID!)

COMMENTS: same location as 4501 but prepared & measured in hotel

pH schwankt enorm - zum Schluss stabil bei 7.5

Signature

Proben am Abend in den Kühlraum gegeben

ACHTUNG: die kleinen Flaschen nicht ganz dicht!

Field Sheet Water Sampling Oppdal Date 20.07.2015

Sample No: 4503 Taken: ⊗ HCl ⊗ HNO3 O IC

COORDINATES:

XCOO: ✓ YCOO ✓ UTM ✓

Altitude _____masl

pH 7.4 Conductivity 1.4 Alkalinity ✓ Temp 20.9

measured: O in field ⊗ in hotel

number of filters used: _____ filtered: O in field ⊗ in hotel

Stream order: O 1 O 2 O 3 O>3 —

Waterlevel: O very high O high O normal O low O very low —

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow —

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture —

O cabins O other, specify _____

Number of photos: ✓ (always start with ID!)

COMMENTS: _____

Blind (aqua dest)

18.2 MΩ

Signature

8 - 18°°

Field Sheet Water Sampling Oppdal Date 21107

Sample No: 4504 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0549859 YCOO 6936197 UTM 32

Altitude 998 masl

pH 7,2 Conductivity 81,5 Alkalinity 0,9 Temp 9,9°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 21/07

Sample No: 4505 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 0549859 YCOO 6936197 UTM 32

Altitude 998 masl

pH 7.0 Conductivity 81.8 Alkalinity 0.9 Temp 14.1

measured: O in field Ø in hotel

number of filters used: 1 filtered: O in field Ø in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid O rapid Ø fast O normal O slow O v.slow

Weather: O dry O humid Ø wet O very wet

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Duplicate to 4504, filtered in hotel

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 21/07/2015

Sample No: 4506 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

r gelagert (GPS)

XCOO:________ YCOO________ UTM 32

Altitude 1001 masl

pH 7 7 Conductivity 100 Alkalinity 0.8 Temp 9.8

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify________

Number of photos: 4 (always start with ID!)

COMMENTS:________

Signature

Field Sheet Water Sampling Oppdal Date 21/07/15

Sample No: 4507 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: ~~0549860~~ 0551717 YCOO ~~6936197~~ 6931493 UTM 32

Altitude 1031 masl

pH 7,0 7.0 Conductivity ~~80,7~~ 61 59,1 Alkalinity 0,6 Temp 8,9 14.7

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 5.4508 (always start with ID!)

COMMENTS: Duplicate to 4508 - 3 large bottles taken to hotel

Signature

Field Sheet Water Sampling Oppdal Date 21/7/15

Sample No: 4508 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0551717 YCOO 6931493 UTM 32

Altitude _____masl

pH 7 Conductivity 61 Alkalinity 0.6 Temp 8,9

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: Duplicate to 4507
this one filtered in field

Signature

Field Sheet Water Sampling Oppdal Date 21/07/15

Sample No: 4509 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0543386 YCOO 6931970 UTM 32

Altitude 1157 masl

pH 6.7 Conductivity 69,8 Alkalinity 08 Temp 7,4°C

measured: O in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: lots of sheep

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 21/7/15

Sample No: 4510 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0538912 YCOO 6935725 UTM 32

Altitude 1026 masl

pH 6.6 Conductivity 35 Alkalinity 0.4 Temp 8.3

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: gross !

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 21/7/15

Sample No: 4511 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0538934 YCOO 6935776 UTM 32

Altitude 1029 masl

pH 6,5 Conductivity 41,0 Alkalinity 0,4 Temp 6,7°C

measured: Ø in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 Ø 3 O>3

Waterlevel: O very high Ø high O normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: O dry O humid Ø wet O very wet

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: _____

rechtgrosser "Fluss"

_____

Signature

8-194

Field Sheet Water Sampling Oppdal Date 22/07/15

Sample No: 4512 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 0527235 YCOO 6939392 UTM 32

Altitude 691 masl

pH 6,8 Conductivity 27,7 Alkalinity 0,4 Temp 8,7°C

measured: X in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid X rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: double sample for filtration in hotel 4513

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4513 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 527235 YCOO 6939392 UTM 32

Altitude 691 masl

pH 6.7 Conductivity 27.5 Alkalinity 0.4 Temp 17.9

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

Duplicate to 4512, filtered in Hotel

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4514 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0526693 YCOO 6939628 UTM 32

Altitude 695 masl

pH 6,4 Conductivity 10,4 Alkalinity 0,4 Temp 9,2°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4515 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0521429 YCOO 6938106 UTM 32

Altitude 677 masl

pH 6,6 Conductivity 9,3 Alkalinity 0,3 Temp 9,0°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 3 (always start with ID!)

COMMENTS: for photos see 4516

4516 duplicate for hotel filtration

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4516 Taken: ⊘ HCl O HNO3 O IC

COORDINATES:

XCOO: 0521429 YCOO 6938106 UTM 32

Altitude 677 masl

pH 6.8 Conductivity 9 Alkalinity 0.4 Temp 17.2

measured: O in field ⊘ in hotel

number of filters used:_____ filtered: O in field ⊘ in hotel

Stream order: O 1 O 2 ⊘ 3 O>3

Waterlevel: O very high ⊘ high O normal O low O very low

Waterflow: ⊘ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊘ dry O humid O wet O very wet

Land use: ⊘ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 3 (always start with ID!)

COMMENTS: duplicate to 4515 for hotel filtration

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4517 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0520661 YCOO 6937960 UTM 32

Altitude 597 masl

pH 6,4 Conductivity 12,0 Alkalinity 0,3 Temp 10,3°C

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high Ø high O normal O low O very low

Waterflow: Ø very rapid O rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: Ø forestry Ø pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4518 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0522649 YCOO 6941963 UTM 32

Altitude 735 masl

pH 6,5 Conductivity 16,1 Alkalinity 0,4 Temp 8,2°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: _____

large stream

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4519 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: ~~4154~~ 0523547 YCOO 6943586 UTM 32

Altitude 862 masl

pH 6,6 Conductivity 13,2 Alkalinity 0,3 Temp 9,9

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: 6 (always start with ID!)

COMMENTS: 4520 as duplicate f. hotel processing

cows

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4520 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0523547 YCOO 6943586 UTM 32

Altitude 862 masl

pH 6.8 Conductivity 13.9 Alkalinity 0.4 Temp 17

measured: O in field ⊗ in hotel

number of filters used: 1 filtered: O in field ⊗ in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: _____ (always start with ID!) see 4519

COMMENTS: cows !

duplicate of 4519 for hotel processing

Signature

Field Sheet Water Sampling Oppdal Date 22/7/15

Sample No: 4521 Taken: X HCl O HNO3 O IC

COORDINATES:

XCOO: 0530264 YCOO 6943448 UTM 32

Altitude 753 masl

pH 6,8 Conductivity 25,7 Alkalinity 0,4 Temp 11,7°C

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high X high O normal O low O very low

Waterflow: X very rapid O rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry X pasture O alpine pasture O agriculture

X cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

8-10°°

Field Sheet Water Sampling Oppdal Date 23/7/15

Sample No: 4522 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0515854 YCOO 6932549 UTM 32

Altitude 916 masl

pH 6.7 Conductivity 13.1 Alkalinity 0.2 Temp 14.2

measured: O in field ⊗ in hotel

number of filters used: 1 filtered: O in field ⊗ in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 2 (always start with ID!)

COMMENTS: _____

only hotel sample taken

only hotel sample taken

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 23/7/15

Sample No: 4523 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0516026 YCOO 6932779 UTM 32

Altitude 918 masl

pH 6.8 Conductivity 12.8 Alkalinity 0.2 Temp 15

measured: O in field ⊗ in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 2 (always start with ID!)

COMMENTS: only hotel sample

Signature

Field Sheet Water Sampling Oppdal Date 23/7/15

Sample No: 4524 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0517752 YCOO 6934262 UTM 32

Altitude 840 masl

pH 6.7 Conductivity 10 Alkalinity 0.3 Temp 16.2

measured: O in field X in hotel

number of filters used: 1 filtered: O in field X in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: X very high X high O normal O low O very low

Waterflow: O very rapid X rapid O fast O normal O slow O v.slow

Weather: O dry O humid X wet O very wet

Land use: O forestry X pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 23/7/15

Sample No: 4525 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0518606 YCOO 6934688 UTM 32

Altitude 784 masl

pH 6.5 Conductivity 7.0 Alkalinity 0.2 Temp 14.8

measured: O in field ⊗ in hotel

number of filters used: 1 filtered: O in field ⊗ in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 23/7

Sample No: 4526 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0519259 YCOO 6935425 UTM 32

Altitude 751 masl

pH 5.4 Conductivity 12.7 Alkalinity 0 Temp 16.2

measured: O in field ⊗ in hotel

number of filters used: 1 filtered: O in field ⊗ in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: 5 (always start with ID!)

COMMENTS: _____

small stream, foam!

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 23/7/15

Sample No: 4527 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0519811 YCOO 6930504 UTM 32

Altitude 607 masl

pH 6.8 Conductivity 12.3 Alkalinity 0.5 Temp 8.1

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: 4528 is duplicate for hotel processing

4528 is duplicate for hotel processing

Signature

Field Sheet Water Sampling Oppdal Date 23/7/15

Sample No: 4528 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 519811 YCOO 6936504 UTM 32

Altitude 607 masl

pH 6.4 Conductivity 12.4 Alkalinity 0.5 Temp 17.9

measured: O in field Ø in hotel

number of filters used: 1 filtered: O in field Ø in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high Ø high O normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: O dry O humid Ø wet O very wet

Land use: O forestry Ø pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Duplicate for hotel processing of 4527

Signature

Field Sheet Water Sampling Oppdal Date 23/7/15

Sample No: 4529 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0520267 YCOO 9637113 UTM 32

Altitude 549 masl

pH 6.5 Conductivity 10.6 Alkalinity 0.4 Temp 7.7°C

measured: X in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high X high O normal O low O very low

Waterflow: O very rapid X rapid O fast O normal O slow O v.slow

Weather: O dry O humid X wet O very wet

Land use: X forestry X pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 23/7/15

Sample No: 4530 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 6.4 Conductivity 0.7 Alkalinity 0 Temp 21.1

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: BLIND

neue HCl

add HNO3

hat Ungeziefer im Zimmer gestorben

Signature

8-15°
+ Einlieferung Trondheim

Field Sheet Water Sampling Oppdal **Date** 24/7/15

Sample No: 4531 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0537361 YCOO 6943180 UTM 32

Altitude 710 masl

pH 6,6 Conductivity 27,2 Alkalinity 301 Temp 7,8°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: 5 (always start with ID!)

COMMENTS: Skilifts etc Lange "Hyttefelt"

Signature

Field Sheet Water Sampling Oppdal Date 24/7/15

Sample No: 4532 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 0540266 YCOO 6945610 UTM 32

Altitude 642 masl

pH 6,6 Conductivity 234 Alkalinity 03 Temp 8,5°C

measured: Ø in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: Ø 1 Ø 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid O rapid Ø fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: Ø forestry Ø pasture O alpine pasture O agriculture

Ø cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: near road

HNO3-sample: bottle possibly not cleaned with filtered water

Signature

Field Sheet Water Sampling Oppdal **Date** 24/7/15

Sample No: 4533 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 054116 YCOO 6947341 UTM 32

Altitude 642 masl

pH 6.3 Conductivity 10.5 Alkalinity 0.3 Temp 9.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: large stream, very rapid

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 24/7/15

Sample No: 4534 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0542302 YCOO 6948103 UTM 32

Altitude 665 masl

pH 6,5 Conductivity 21,2 Alkalinity 0,3 Temp 10,3

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: 2 (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 24/7/15

Sample No: 4535 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0537986 YCOO 6941301 UTM 32

Altitude 542 masl

pH 6,1 Conductivity 28,5 Alkalinity 0,2 Temp 11,2°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: ⊗ 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture ⊗ agriculture

O cabins O other, specify ___

Number of photos: 3 (always start with ID!)

COMMENTS: ___

___

Signature

11⁰⁰ ab Trondheim

– 19³⁰ ~~am~~

Field Sheet Water Sampling Oppdal Date 27/7/15

Sample No: 4536 Taken: ⊘ HCl ⊘ HNO3 ⊘ IC

COORDINATES:

XCOO: ~~0570953~~ 0547412 YCOO ~~7034937~~ 6958315 UTM 32

Altitude 610 masl

pH 6.5 Conductivity 22.2 Alkalinity 0.2 Temp 11.1

measured: ⊘ in field O in hotel

number of filters used: 1 filtered: ⊘ in field O in hotel

Stream order: O 1 ⊘ 2 O 3 O>3

Waterlevel: O very high ⊘ high O normal O low O very low

Waterflow: O very rapid O rapid ⊘ fast O normal O slow O v.slow

Weather: ⊘ dry O humid O wet O very wet

Land use: ⊘ forestry ⊘ pasture O alpine pasture O agriculture

O cabins O other, specify ____________________

Number of photos: 3 (always start with ID!)

COMMENTS: ____________________

____

Signature

Field Sheet Water Sampling Oppdal **Date** 27/7/15

Sample No: 4537 Taken: ~~O~~ HCl ~~O~~ HNO3 ~~O~~ IC

COORDINATES:

XCOO: 0547414 YCOO 6958315 UTM 32

Altitude 610 masl

pH 6.3 Conductivity 23.8 Alkalinity _____ Temp 19.3

measured: O in field O in hotel

number of filters used: _____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Duplicate for hotel processing to 4536

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 27/7/15

Sample No: 4538 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0545659 YCOO 6958656 UTM 32

Altitude 798 masl

pH 6.5 Conductivity 35.1 Alkalinity 0.3 Temp 10.8

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 3 (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 27/7/15

Sample No: 4539 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0545657 YCOO 6958658 UTM 32

Altitude 798 masl

pH 6.5 Conductivity 35.2 Alkalinity 0.4 Temp 18

measured: O in field ⊗ in hotel

number of filters used:_____ filtered: O in field ⊗ in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry ⊗ humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Duplicate to 4538 for hotel processing

Signature

Field Sheet Water Sampling Oppdal **Date** 27/7/15

Sample No: 4540 Taken: X HCl O HNO3 O IC

COORDINATES:

XCOO: 0545657 YCOO 6958658 UTM 32

Altitude 798 masl

pH 6.7 Conductivity 45.4 Alkalinity 0.3 Temp 12.4

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high X high O normal O low O very low

Waterflow: O very rapid X rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry X pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: comes from a little lake this stream right underneath the confluence of another small stream

Signature

Field Sheet Water Sampling Oppdal **Date** 27/7/15

Sample No: 4541 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0548988 YCOO 6957979 UTM 32

Altitude 494 masl

pH 6.7 Conductivity 32.7 Alkalinity 0.3 Temp 12

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture ⊗ alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: large stream down here
4540 is same stream almost at source

Signature

Field Sheet Water Sampling Oppdal **Date** 27.7.15

Sample No: 4542 Taken: ⊗ HCl O HNO3 O IC

COORDINATES:

XCOO: 0546783 YCOO 6953102 UTM 32

Altitude 581 masl

pH 6.3 Conductivity 26.9 Alkalinity ~~26.9~~ 0.3 Temp 11.3

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture ⊗ alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: large stream ⇒ GISNA 1/6

Signature

Field Sheet Water Sampling Oppdal **Date** 27.8./15

Sample No: 4543 Taken: ⊗ HCl ~~O~~ HNO3 ~~O~~ IC

COORDINATES:

XCOO: 0546784 YCOO 6953108 UTM 32

Altitude 581 masl

pH 6.3 Conductivity 27.2 Alkalinity 0.3 Temp 17°

measured: O in field ~~O~~ in hotel

number of filters used:_____ filtered: O in field ⊗ in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture ⊗ alpine pasture O agriculture

⊗ cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: GISNA ! Large river

Duplicate to 4542 for hotel processing

Signature

8 - 2000 D

Field Sheet Water Sampling Oppdal **Date** 28/7/15

Sample No: 4544 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0540713 YCOO 6955195 UTM 32

Altitude 701 masl

pH 6.3 Conductivity 22 Alkalinity 0.3 Temp 8.6

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: about 250m above gold-washing site
Duplicate for hotel is 4545

Signature

Field Sheet Water Sampling Oppdal **Date** 28/7/15

Sample No: 4545 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0540715 YCOO 6955191 UTM 32

Altitude 701 masl

pH 6.5 Conductivity 23.4 Alkalinity 0.3 Temp 18.2

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Duplicate for hotel processing

Signature

Field Sheet Water Sampling Oppdal **Date** 25/7/15

Sample No: 4546 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 540723 YCOO 6955243 UTM 32

Altitude 699 masl

pH 6.8 Conductivity 52 Alkalinity 0.5 Temp 7.9

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: This is probably the stream I wanted instead of the smaller 4544/45

Signature

Field Sheet Water Sampling Oppdal **Date** 28.7.15

Sample No: 4547 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 540770 YCOO 6955226 UTM 32

Altitude 596 masl

pH 6.5 Conductivity 30.9 Alkalinity 0.3 Temp 9.6

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 3 (always start with ID!)

COMMENTS: GISNA

Signature

Field Sheet Water Sampling Oppdal **Date** 28.7.15

Sample No: 4548 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0540770 YCOO 6955226 UTM 32

Altitude 696 masl

pH 6.6 Conductivity 31.2 Alkalinity 0.4 Temp 18.2

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Duplicat for hotel processing to 4547

Signature

Field Sheet Water Sampling Oppdal **Date** 28/7/15

Sample No: 4549 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0541005 YCOO 6954657 UTM 32

Altitude 677 masl

pH 6.5 Conductivity 57.3 Alkalinity 0.7 Temp 10.9

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: ⊗ 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 28/7/15

Sample No: 4550 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0541034 YCOO 6954686 UTM 32

Altitude _____masl

pH 6.6 Conductivity 32.3 Alkalinity 0.4 Temp 10.8

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: GISNA - ca. 250m downstream

the gold site

pretty much a river already here

Signature

Field Sheet Water Sampling Oppdal **Date** 23/7/15

Sample No: 4551 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 054027 YCOO 6954687 UTM 32

Altitude 674 masl

pH 6.8 Conductivity 32.5 Alkalinity 0.3 Temp 20.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: Duplicate for hotel processing to 4550
GLSNA ~ ca. 250m downstream
the gold site

Signature

Field Sheet Water Sampling Oppdal **Date** 28/7/2015

Sample No: 4552 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0541548 YCOO 6958021 UTM 32

Altitude 920 masl

pH 6.7 Conductivity 34.5 Alkalinity 0.3 Temp 12.7°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: upper part of Gisna - long walk in here there is a road in here - though last part only advisable with 4WD

This one taken from Svartbekken

Signature

Field Sheet Water Sampling Oppdal **Date** 28/07/15

Sample No: 4553 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0541750 YCOO 6958250 UTM 32

Altitude 920 masl

pH 6.5 Conductivity 28.3 Alkalinity 0.3 Temp 12.9°C

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: starts to rain while filtering last sample
forgot to save coordinates
much larger valley than it looks at map

Signature

Field Sheet Water Sampling Oppdal **Date** 28/07/15

Sample No: 4554 Taken: ~~O~~ HCl ~~O~~ HNO3 ~~O~~ IC

COORDINATES:

XCOO: 543400 YCOO 6955700 UTM 32

Altitude 725 masl

pH 6.5 Conductivity 0.2 Alkalinity 13 Temp 8.5 2 0

measured: ~~O~~ in field O in hotel

number of filters used: 1 filtered: ~~O~~ in field O in hotel

Stream order: O 1 ~~O~~ 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid ~~O~~ wet O very wet

Land use: O forestry O pasture ~~O~~ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: this field sheet was missing ?

Signature

8-20°° 12 h

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4555 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 0520262 YCOO 6924923 UTM

Altitude 848 masl

pH 6.0 Conductivity 9.1 Alkalinity 0.1 Temp 6.4°

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: 4 (always start with ID!)

COMMENTS: Langt inn i Amotsdalen very steep! 2h hike

Signature

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4556 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 0520037 YCOO 6924685 UTM 32

Altitude 816 masl

pH 6.1 Conductivity 5.1 Alkalinity 0.1 Temp 7.3

↑ max

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: ⊗ very high O high O normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry ⊗ humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!)

COMMENTS: wenig höher Schnee!

Hämmar bekken

unpassierbar ☒ Nachbarbach unerreichbar

kommt aus einem See → Lakewater?

hätte man nicht nehmen sollen

Signature

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4557 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 521622 YCOO 6925441 UTM 32

Altitude 776 masl

pH 6.2 Conductivity 10.5 Alkalinity 0.2 Temp 8.7

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry ⊗ humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4558 Taken: ~~O~~ HCl ~~O~~ HNO3 ~~O~~ IC

COORDINATES:

XCOO: 521622 YCOO 6925441 UTM 32

Altitude_____masl

pH 6.0 Conductivity 10.8 Alkalinity 0.2 Temp 16°C

measured: O in field ~~O~~ in hotel

number of filters used:_____ filtered: O in field ~~O~~ in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ~~O~~ high O normal O low O very low

Waterflow: O very rapid ~~O~~ rapid O fast O normal O slow O v.slow

Weather: O dry ~~O~~ humid O wet O very wet

Land use: O forestry ~~O~~ pasture ~~O~~ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Field duplicate to 4557 for hotel processing

Signature

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4559 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 521711 YCOO 6925426 UTM 32

Altitude 767 masl

pH 6.2 Conductivity 8.7 Alkalinity 0.2 Temp 9.1

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

Nummer fehlt?

Field Sheet Water Sampling Oppdal **Date**_____

Sample No: 4560 Taken: O HCl O HNO3 O IC

COORDINATES: 4561 each

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH_____ Conductivity_____ Alkalinity_____ Temp_____

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

MISSING SAMPLE ID's

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4562 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 522867 YCOO 6926090 UTM 32

Altitude 700 masl

pH 6.2 Conductivity 15 Alkalinity 0.2 max. Temp 10.4

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3 (not on map)

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry ⊗ humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: nice flowers here near stream Vammervoll seter

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4563 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 525269 YCOO 6926629 UTM 32

Altitude 710 masl

pH 6.1 Conductivity 16.1 Alkalinity 0.1 Temp 10.9

measured: Ø in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: Ø 1 O 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid O rapid Ø fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: O forestry Ø pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: quite a few (very) small streams between 4562 & 4563 - in part with iron coatings (see photos) - no unusual pH or Cond.

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 29/7/15

Sample No: 4564 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 525918 YCOO 6926742 UTM 32

Altitude 690 masl

pH 5.8 Conductivity 11.3 Alkalinity 0.1 Temp 9.1

measured: X in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: X 1 O 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry X pasture X alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: small bottle for ICP

Signature

Field Sheet Water Sampling Oppdal **Date** 29/7

Sample No: 4565 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 527250 YCOO 6926950 UTM_____

Altitude 680 masl

pH 6.0 Conductivity 10.3 Alkalinity 0.1 Temp 13° C (hotel!)

measured: O in field ⊗ in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry ⊗ humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: large waterfall more or less

Signature

10h

Field Sheet Water Sampling Oppdal **Date** 30.7.

Sample No: 4566 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 540322 YCOO 6953236 UTM 32

Altitude 750 masl

pH 6.6 Conductivity 41.2 Alkalinity 0-4 Temp 9.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!)

COMMENTS: Hestbekken

Neue Sprite

Signature

Field Sheet Water Sampling Oppdal **Date** 30/7

Sample No: 4567 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 540324 YCOO 6953239 UTM 32

Altitude 749 masl

pH 6.6 6.3 Conductivity 41.2 43.4 Alkalinity 0.4 0.4 Temp 8.1 field 16.2 hotel

measured: O in field ⊗ in hotel

number of filters used:_____ filtered: O in field ⊗ in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Duplicate to 4566 for hotel processing

Hestbakken

Signature

Field Sheet Water Sampling Oppdal **Date** 30/7

Sample No: 4568 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 540087 YCOO 6953020 UTM 32

Altitude 770 masl

pH 6.3 Conductivity 182 Alkalinity 0.2 Temp 7.4

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: 4 (always start with ID!)

COMMENTS: 4569 is a true (field filtered) duplicate

Grytdalen

Signature

Field Sheet Water Sampling Oppdal **Date** 30/9/15

Sample No: 4569 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 540085 YCOO 6953016 UTM 32

Altitude 770 masl

pH 6.3 Conductivity 18.2 Alkalinity 0.2 Temp 7.4

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 X 3 O>3

Waterlevel: O very high X high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4568 (always start with ID!)

COMMENTS: Duplicate (true) to 4568

Grytdalen

nach dieser Probe: Säure nachgefüllt D (beide)
0

Signature

Field Sheet Water Sampling Oppdal Date 30/7

Sample No: 4570 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 540286 YCOO 6952699 UTM 32

Altitude 761 masl

pH 6.3 Conductivity 18.4 Alkalinity 0.2 Temp 8.3

measured: O in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 O 2 Ø 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: O dry Ø humid O wet O very wet

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 30/7

Sample No: 4571 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 545285 YCOO 6956101 UTM 32

Altitude 621 masl

pH 6.1 Conductivity 35.2 Alkalinity 0.2 Temp 9.1

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: ⊗ 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast O normal ⊗ slow O v.slow

Weather: O dry ⊗ humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture ⊗ agriculture

O cabins O other, specify _____

Number of photos: 2 (always start with ID!)

COMMENTS: smallest stream up to now

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 30/7/15

Sample No: 4572 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 544063 YCOO 6954261 UTM 32

Altitude 629 masl

pH 6.3 Conductivity 31.6 Alkalinity 0.2 Temp 9.8

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast O normal ⊗ slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: nice place! Hängebrücke über Gjøng

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 30/7/15

Sample No: 4573 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 5.3 Conductivity 1.8 Alkalinity 0 Temp 17.4

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: BLIND

Signature

Field Sheet Water Sampling Oppdal **Date** 31/7

Sample No: 4574 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 557258 YCOO 6941574 UTM 32

Altitude 818 masl

pH 6.5 Conductivity 60.6 Alkalinity 0.35 Temp 7.4

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: bom at dom!

Signature

Field Sheet Water Sampling Oppdal **Date** 31/7/15

Sample No: 4575 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 556533 YCOO 6941732 UTM

Altitude 828 masl

pH 6.4 Conductivity 54.9 Alkalinity 0.5 Temp 7.8

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: ⊗ 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: O dry ⊗ humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!)

COMMENTS:

very small stream

dark schists!

Signature

Field Sheet Water Sampling Oppdal **Date** 31/7/15

Sample No: 4576 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 555893 YCOO 6941833 UTM 32

Altitude 835 masl

pH 6.4 Conductivity 374 Alkalinity 0.3 Temp 8

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: X very rapid O rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: mineralized black shale

new syringe

Signature

Field Sheet Water Sampling Oppdal **Date** 31/7/15

Sample No: 4577 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 555895 YCOO 6941833 UTM 32

Altitude 835 masl

pH 6.4 Conductivity 37.3 Alkalinity 0.3 Temp 8

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: TRUE Field Duplicate to 4576
! small IC-bottle !
black shale with some sulphide mineralisation here

Signature

Field Sheet Water Sampling Oppdal Date 31/7/15

Sample No: 4578 Taken: O HCl O HNO3 ⊗ IC

COORDINATES:

XCOO: 554506 YCOO 6941977 UTM 32

Altitude 755 masl

pH 6.7 Conductivity 57.2 Alkalinity 0.6 Temp 9°C

measured: ⊗ in field O in hotel

number of filters used: 2 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: photos of gossens taken before number! Large gossens at roadcut needs filter change during HNO_3 sample.

Signature

Field Sheet Water Sampling Oppdal **Date** 31/7/15

Sample No: 4579 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 554506 YCOO 6941975 UTM 32

Altitude 755 masl

pH 6.3 Conductivity 59 Alkalinity 0.35 Temp 17 °C

measured: O in field O in hotel

number of filters used: 2 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: "Oystein" - Duplicate for hotel processing
filter change during HNO_3 sample

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 31/7/15

Sample No: 4580 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 552334 YCOO 6942782 UTM 32

Altitude 694 masl

pH 6.3 Conductivity 43 Alkalinity 0.3 Temp 8.8

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry X pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Very nice place!

Signature

Field Sheet Water Sampling Oppdal Date 31/7/15

Sample No: 4581 Taken: ⊘ HCl ⊘ HNO3 ⊘ IC

COORDINATES:

XCOO: 551430 YCOO 6944382 UTM 32

Altitude 669 masl

pH 6.3 Conductivity 14.9 Alkalinity 0.25 Temp 9.2

measured: ⊘ in field O in hotel

number of filters used: 1 filtered: ⊘ in field O in hotel

Stream order: ⊘ 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊘ normal O low O very low

Waterflow: O very rapid O rapid ⊘ fast O normal O slow O v.slow

Weather: ⊘ dry O humid O wet O very wet

Land use: ⊘ forestry ⊘ pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 31/7/15

Sample No: 4582 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 552006 YCOO 6947272 UTM 32

Altitude 633 masl

pH 6.3 Conductivity 26.6 Alkalinity 0.3 Temp 10.3

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high X high O normal O low O very low

Waterflow: O very rapid X rapid O fast O normal O slow O v.slow

Weather: O dry X humid O wet O very wet

Land use: X forestry X pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: a little shower while sampling

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 31/07/15

Sample No: 4583 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 550127 YCOO 6953052 UTM 32

Altitude 458 masl

pH 6.3 Conductivity 32.3 Alkalinity 0.3 Temp 8.9

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid O fast O normal X slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry X pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 1/8/15

Sample No: 4584 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 526789 YCOO 6934281 UTM 32

Altitude 1027 masl

pH 5.7 Conductivity 9.0 Alkalinity 0.1 Temp 6.9

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS:

AB – cross country läufer in lo[illegible] con[illegible]

Signature

Field Sheet Water Sampling Oppdal **Date** 1/8/15

Sample No: 4585 Taken: ⊘ HCl ⊘ HNO3 ⊘ IC

COORDINATES:

XCOO: 526792 YCOO 6934343 UTM 32

Altitude 1032 masl

pH 6.1 Conductivity 73 Alkalinity 0.1 Temp 9.2

measured: ⊘ in field O in hotel

number of filters used: 1 filtered: ⊘ in field O in hotel

Stream order: ⊘ 1 O 2 O 3 O>3

Waterlevel: O very high ⊘ high O normal O low O very low

Waterflow: ⊘ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊘ dry O humid O wet O very wet

Land use: O forestry O pasture ⊘ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: pH-Meter scheint zu spinnen

Photos von AB / Wasserfall

Signature

Field Sheet Water Sampling Oppdal Date 1/8/15

Sample No: 4586 Taken: ⊘ HCl ⊘ HNO3 ⊘ IC

COORDINATES:

XCOO: 527366 YCOO 6934424 UTM 32

Altitude 988 masl

pH 6.2 Conductivity ~~/~~ Alkalinity 0.2 Temp ~~/~~

measured: ⊘ in field O in hotel

number of filters used: 1 filtered: ⊘ in field O in hotel

Stream order: ⊘ 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊘ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊘ normal O slow O v.slow

Weather: ⊘ dry O humid O wet O very wet

Land use: O forestry O pasture ⊘ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: very small stream

Conductivity meter broken

unangenehm viele Fliegen

Signature

Field Sheet Water Sampling Oppdal **Date** 1/8/15

Sample No: 4587 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 527475 YCOO 6934377 UTM 32

Altitude 984 masl

pH 6.8 Conductivity ✓ (22.3 (in hotel)) Alkalinity 0.2 Temp ✓

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: extra sample taken along to measure conductivity with the other instrument in the hotel

Signature

Field Sheet Water Sampling Oppdal **Date** 1/8/15

Sample No: 4588 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 527474 YCOO 6934374 UTM 32

Altitude 983 masl

pH 6.7 Conductivity 22.3 Alkalinity 0.2 Temp /

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: see 4587 (always start with ID!)

COMMENTS:

TRUE Duplicate to 4587

Signature

Field Sheet Water Sampling Oppdal Date 2/8/15

Sample No: 4589 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 559740 YCOO 6950319 UTM 32

Altitude 669 masl

pH 6.8 Conductivity 29.3 Alkalinity 0.2 Temp ~~~

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 X 3 O>3 small for high order

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid O fast X normal O slow O v.slow

Weather: O dry X humid O wet O very wet

Land use: X forestry X pasture O alpine pasture O agriculture

X cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: viele Moore hier oben, dazwischen kleine Seen

many sheep!

Signature

Field Sheet Water Sampling Oppdal **Date** 21/8/15

Sample No: 4590 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 559740 YCOO 6950319 UTM 32

Altitude 669 masl

pH 7.2 Conductivity 30.6 Alkalinity 0.3 Temp /

measured: O in field ⊗ in hotel

number of filters used:_____ filtered: O in field ⊗ in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: "Q-sten Duplicat" for hotelprocessing

Signature

Field Sheet Water Sampling Oppdal **Date** 2/8/15

Sample No: 4591 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 559740 YCOO 6950319 UTM 32

Altitude 669 masl

pH 6.8 Conductivity 29.2 Alkalinity 0.2 Temp —

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3 small for high order

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: (⊗ forestry) ⊗ pasture O alpine pasture O agriculture

⊗ cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: TRUE Duplicate, field filtered + acidified

starts to rain during filtration

Signature

Field Sheet Water Sampling Oppdal **Date** 2/8/15

Sample No: 4592 Taken: ⊗ HCl O HNO3 O IC

COORDINATES:

XCOO: 559686 YCOO 6950288 UTM_____

Altitude 664 masl

pH 7.1 Conductivity 27.5 Alkalinity 0.3 Temp ✓

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: ⊗ 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: small stream

Signature

Field Sheet Water Sampling Oppdal **Date** 31/8/15

Sample No: 4593 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 529823 YCOO 6930564 UTM 32

Altitude 578 masl

pH 7.1 Conductivity 18.9 Alkalinity 0.2 Temp /

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet (heavy rain yesterday

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!)

COMMENTS: new syringe!

Signature

Field Sheet Water Sampling Oppdal **Date** 3/8/15

Sample No: 4594 535283 Taken: Ø HCl O HNO3 O IC

COORDINATES:

XCOO: 535283 YCOO 6929640 UTM 32

Altitude 922 masl

pH 6.6* Conductivity 51.2 Alkalinity 0.2 Temp ~~~

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 O 2 Ø 3 O>3

Waterlevel: O very high Ø high O normal O low O very low

Waterflow: Ø very rapid O rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet rain yesterday

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!) on GPS!

COMMENTS: Camera destroyed!

new HCl!

* newly calibrated pH-Meter

Signature

Field Sheet Water Sampling Oppdal **Date** 3/8/15

Sample No: 4595 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 535194 YCOO 6931549 UTM 32

Altitude 995 masl

pH 7.0 Conductivity 32.4 Alkalinity 0.5 Temp /

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet rain yesterday

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!) with GPS

COMMENTS: nice stream

4596: Qyste in Duplicate

4597: true duplicate

Signature

Field Sheet Water Sampling Oppdal Date 3/8/15

Sample No: 4596 Taken: ~~O~~ HCl ~~O~~ HNO3 ~~O~~ IC

COORDINATES:

XCOO: 535193 YCOO 6931545 UTM 32

Altitude 995 masl

pH ~~7.4~~ 7.1 Conductivity 33 Alkalinity ~~0.4~~ 0.3 Temp /

measured: O in field ~~O~~ in hotel

number of filters used: 1 filtered: O in field ~~O~~ in hotel

Stream order: O 1 ~~O~~ 2 O 3 O>3

Waterlevel: O very high ~~O~~ high O normal ? O low O very low

Waterflow: O very rapid ~~O~~ rapid O fast O normal O slow O v.slow

Weather: ~~O~~ dry O humid O wet O very wet rain yesterday

Land use: O forestry O pasture ~~O~~ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Qystein - Duplicat of 4596 for hotel processing

Signature

Field Sheet Water Sampling Oppdal **Date** 3/8/15

Sample No: 4597 Taken: Ø HCl O HNO3 O IC

COORDINATES:

XCOO: 535191 YCOO 6931546 UTM 32

Altitude 995 masl

pH 7.1 Conductivity 32.5 Alkalinity 0.4 Temp /

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high Ø high O normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet rain yesterday

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!) with GPS

COMMENTS: true duplicate to 4595

many sheep here!

Signature

Field Sheet Water Sampling Oppdal **Date** 3/8/15

Sample No: 4598 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 534885 YCOO 6932095 UTM 32

Altitude 999 masl

pH 7.2 Conductivity 27.4 Alkalinity 0.3 Temp ✓

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet rain yesterday

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 3 (always start with ID!)

COMMENTS: HNO_3 start to take on a brownish colour

Signature

Field Sheet Water Sampling Oppdal **Date** 3/8/15

Sample No: 4599 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 532930 YCOO 6935930 UTM 32

Altitude 523 masl

pH 7.1 Conductivity 37.7 Alkalinity 0.3 Temp

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet rain yesterday

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: below the railway line

Signature

Field Sheet Water Sampling Oppdal **Date** 3/8/15

Sample No: 4600 Taken: Ø HCl O HNO3 O IC

COORDINATES:

XCOO: 534479 YCOO 6937743 UTM 32

Altitude 621 masl

pH 7.0 Conductivity 30.8 Alkalinity 0.3 Temp /

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high Ø high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet rain yesterday

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: water intake for Oppdal waterworks

Signature

Field Sheet Water Sampling Oppdal Date 4/8/15

Sample No: 4601 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 521899 YCOO 6951871 UTM 32

Altitude 720 masl

pH 6.6 Conductivity 61.8 Alkalinity 0.6 Temp —

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

⊗ cabins O other, specify

Number of photos: 3 (always start with ID!)

COMMENTS: Håmårbekken

neue Spritze

pH-Meter frisch geeicht!

Signature

Field Sheet Water Sampling Oppdal **Date** 4/8/15

Sample No: 4602 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 524057 YCOO 6950821 UTM 32

Altitude 749 masl

pH 6.3 Conductivity 19.1 Alkalinity 0.3 Temp

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: Grabbelliter

Signature

Field Sheet Water Sampling Oppdal Date 4/8/15

Sample No: 4603 Taken: ☒ HCl ☒ HNO3 ☒ IC

COORDINATES:

XCOO: 524061 YCOO 6950821 UTM 32

Altitude 750 masl

pH 6.4 Conductivity 19.5 Alkalinity 0.3 Temp —

measured: O in field ☒ in hotel

number of filters used: 1 filtered: O in field ☒ in hotel

Stream order: O 1 O 2 ☒ 3 O>3

Waterlevel: O very high O high ☒ normal O low O very low

Waterflow: O very rapid ☒ rapid O fast O normal O slow O v.slow

Weather: ☒ dry O humid O wet O very wet

Land use: O forestry O pasture ☒ alpine pasture O agriculture

O cabins O other, specify__________

Number of photos:______ (always start with ID!)

COMMENTS:

Oystein Dup (for hotel processed)

Signature

Field Sheet Water Sampling Oppdal **Date** 4/8/15

Sample No: 4604 Taken: O HCl O HNO3 X IC

COORDINATES:

XCOO: 527964 YCOO 6948084 UTM 33

Altitude 817 masl

pH 6.7 Conductivity 817 Alkalinity 0.9 Temp _____

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry X pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Border!

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 4/8/15

Sample No: 4605 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 524071 YCOO 6956548 UTM 32

Altitude 957 masl

pH 6.3 Conductivity 35.4 Alkalinity 0.3 Temp

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: 2 (always start with ID!)

COMMENTS: Landschaftsgebiet

gleich ausserhalb grosser Steinbruch

Signature

Field Sheet Water Sampling Oppdal Date 4/8/15

Sample No: 4606 Taken: O HCl O HNO3 O IC

COORDINATES: see GPS

XCOO:________ YCOO________ UTM 32

Altitude 900 masl

pH 6.3 Conductivity 27.4 Alkalinity 0.3 Temp____

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify________

Number of photos:____ (always start with ID!)

COMMENTS: skyss med traktor ut!

coordinates in GPS

Signature

Field Sheet Water Sampling Oppdal **Date** 4/8/15

Sample No: 4607 Taken: O HCl O HNO3 X O IC

COORDINATES: see GPS

XCOO:_____ YCOO_____ UTM_____

Altitude 900 masl

pH 6.7 Conductivity 27.2 Alkalinity 0.3 Temp_____

measured: O in field X O in hotel

number of filters used:_____ filtered: O in field X O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry X O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Oystein - Duplicate for hotel-processing

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 06.08.2015

Sample No: 4608 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 524954 YCOO 6931082 UTM 32

Altitude 1286 masl

pH 6,3 / 6,2 Conductivity 11,3 / 11,4 Alkalinity < 0,1 / 0,1 Temp – µS/cm ← Hotell

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field ⊗ in hotel

Stream order: O 1 O 2 ⊗ 3 O>3 2 check

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify –

Number of photos: 3 (always start with ID!)

COMMENTS: HNO_3 påfyllt!

new syringe

Dystein F.

Signature

Field Sheet Water Sampling Oppdal **Date** 06.08.2015

Sample No: 4609 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 524847 YCOO 6930954 UTM 32

Altitude 1300 masl

pH 6,3 / 6,3 Conductivity 9,4 / 9,4 Alkalinity <0,1 / 0,1 Temp — ← Hotell

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field ~~O~~ in hotel

Stream order: O 1 O 2 ~~O 3~~ O>3 ?

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

⊗ cabins O other, specify Fakkhytte ca 200m oppstrøms

Number of photos: 3 (always start with ID!)

COMMENTS: Liten bekk

Snø-lommer ca 3-400 m oppstrøms pr.p.

Øystein L.

Signature

Field Sheet Water Sampling Oppdal **Date** 06.08.2015

Sample No: 4610 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 524 786 YCOO 6931 141 UTM 32

Altitude 1300 masl

pH 6,4 Conductivity 10,7 Alkalinity < 0,1 Temp —

measured: O in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ~~⊗~~ 3 O>3 2

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify —

Number of photos: _____ (always start with ID!)

COMMENTS: Snø i bekkefaret ca 300 - 400 m oppstrøms p. plet.

Ø. Jæger

Signature

Field Sheet Water Sampling Oppdal **Date** 6/8/15

Sample No: 4611 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 6.2 Conductivity 11.4 Alkalinity 0.1 Temp_____

measured: O in field ⊘ in hotel

number of filters used: 1 filtered: O in field ⊘ in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Oystein Dup for hotel processing of 4608

Signature

Field Sheet Water Sampling Oppdal **Date** 6/8/15

Sample No: 4612 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 6.3 Conductivity 9.4 Alkalinity 0.1 Temp ~

measured: O in field ⊘ in hotel

number of filters used: 1 filtered: O in field ⊘ in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Oystein Dup for hotel processing of 4609

_____

Signature

Field Sheet Water Sampling Oppdal Date 9/8/15

Sample No: 4613 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 549077 YCOO 6926977 UTM 32

Altitude 1060 masl

pH 7.3 Conductivity 128.2 Alkalinity 6.9 Temp 6.9

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 X 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: O dry X humid O wet O very wet

Land use: O forestry X pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

new syringe

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 9/8/15

Sample No: 4614 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 549077 YCOO 6926979 UTM

Altitude 1060 masl

pH 7.5 Conductivity 128.5 Alkalinity 1.0 Temp 17.9

measured: O in field X in hotel

number of filters used: filtered: O in field X in hotel

Stream order: O 1 O 2 X 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: O dry X humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: Oystein Duplicate for hotel filtering

Signature

Field Sheet Water Sampling Oppdal **Date** 9/8/15

Sample No: 4615 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 548348 YCOO 6927997 UTM 32

Altitude 1057 masl

pH 6.9 Conductivity 62.8 Alkalinity 0.5 Temp 7.8

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: many rusty rocks

Signature

Field Sheet Water Sampling Oppdal **Date** 9/8/15

Sample No: 4616 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 546333 YCOO 6928310 UTM 32

Altitude 1077 masl

pH 7.5 Conductivity 183.1 Alkalinity 1.4 Temp 7.6

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3 Small for 3!

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: sulphid mineralized rocks in stream bed

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 9/8/15

Sample No: 4617 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 542526 YCOO 6924511 UTM 32

Altitude 1081 masl

pH 7.1 Conductivity 41.2 Alkalinity 0-7 Temp 10.2

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3 large one!

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 9/8/15

Sample No: 4618 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 542727 YCOO 6926675 UTM 32

Altitude 1077 masl

pH 6.9 Conductivity 292 Alkalinity 0.5 Temp 9.2

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 X 3 O>3 much smaller than 4617 !

Waterlevel: O very high O high X normal O low O very low

Waterflow: X very rapid O rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 9/8/15

Sample No: 4619 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 543455 YCOO 6930824 UTM 32

Altitude 1101 masl

pH 7.2 Conductivity 74.5 Alkalinity 0.8 Temp 10.7

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 X 3 O>3 Unna

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid X rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 9/8/15

Sample No: 4620 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 7 Conductivity 1.2 Alkalinity ϕ Temp 18.9

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

BLIND at end of day

_____

Signature

114

Field Sheet Water Sampling Oppdal Date 10/8/15

Sample No: 4621 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 55 6883 YCOO 6935811 UTM 32

Altitude 823 masl

pH 7.2 Conductivity 85.6 Alkalinity 0.8 Temp 10.3

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: new syringe

Signature

Field Sheet Water Sampling Oppdal Date 10/8/15

Sample No: 4622 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 557472 YCOO 6934812 UTM 32

Altitude 812 masl 84.9

pH 7.6 Conductivity 849 Alkalinity 1.0 Temp 11.5

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

the stream flows into Innsjøvatnet here

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 10/8/15

Sample No: 4623 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 558796 YCOO 6939651 UTM 32

Altitude 814 masl

pH 7.6 Conductivity 98.2 Alkalinity 1.4 Temp 11.4

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 10/8/15

Sample No: 4624 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 558934 YCOO 6948419 UTM 32

Altitude 566 masl

pH 7.1 Conductivity 48.8 Alkalinity 0.5 Temp 11.6

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Photos on GPS, forgot camera

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 10/8/15

Sample No: 4625 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 558921 YCOO 6948419 UTM 32

Altitude 564 masl

pH 6.7 Conductivity 28.6 Alkalinity 0.3 Temp 11.6

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

maybe regulated(?)

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 10/8/15

Sample No: 4626 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 552877 YCOO 6955402 UTM 32

Altitude 580 masl

pH 7.8 Conductivity 42.8 Alkalinity 0.4 Temp 11.6

measured: ⊗ in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: needed to walk a piece to get rid of the all too obvious signs of "civilization"

Signature

Field Sheet Water Sampling Oppdal Date 10/8/15

Sample No: 4627 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 554007 YCOO 6949875 UTM 32

Altitude 564 masl

pH 6.7 Conductivity 28.3 Alkalinity 0.3 Temp 16.4

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 O 2 Ø 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid O rapid O fast O normal Ø slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: Ø forestry Ø pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Salzsäure nachgefüllt

Signature

Field Sheet Water Sampling Oppdal Date 10/8/15

Sample No: 4628 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 554108 YCOO 6949240 UTM 32

Altitude 571 masl

pH 6.5 Conductivity 22.6 Alkalinity 0.4 Temp 12.8

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

mh

Field Sheet Water Sampling Oppdal Date 11/8/15

Sample No: 4629 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 535881 YCOO 6922479 UTM 32

Altitude 1082 masl

pH 7.4 Conductivity 69.1 Alkalinity 0.7 Temp 8.6

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: cold!
Steinbubekken (the other one could not be reached, Vinstra too large to cross

_____

Signature

Field Sheet Water Sampling Oppdal Date 11/8/15

Sample No: 4630 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 535881 YCOO 6922479 UTM 32

Altitude 1082 masl

pH 7.2 Conductivity 69.8 Alkalinity 0.8 Temp 18.6

measured: O in field Ø in hotel

number of filters used: (filtered: O in field Ø in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Øystein Dup for hotel processing
Cold!
The other (earlier) Steinbubekken war nicht zugänglich

_____
Signature

Field Sheet Water Sampling Oppdal **Date** 11/8/15

Sample No: 4631 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 534830 YCOO 6924921 UTM 32

Altitude 951 masl

pH 7.3 Conductivity 73.8 Alkalinity 0.8 Temp 8.1

measured: Ø in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 Ø 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid O rapid Ø fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: upstream from the large "saethers" (Setre) with many cows road parallel to creek, Zn-Rohre in Bücher

_____

Signature

Field Sheet Water Sampling Oppdal Date 11/8/15

Sample No: 4632 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 534834 YCOO 6924946 UTM 32

Altitude 952 masl

pH 6.9 Conductivity 84.7 Alkalinity 1 Temp 58

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3 O ! Kilde

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: "Kilden" – 3 little springs

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 11/8/15

Sample No: 4633 Taken: ⊘ HCl O HNO3 O IC

COORDINATES:

XCOO: 542938 YCOO 6941960 UTM 32

Altitude 799 masl

pH 6.9 Conductivity 39.3 Alkalinity 0.4 Temp 10.3

measured: ⊘ in field O in hotel

number of filters used: 1 filtered: ⊘ in field O in hotel

Stream order: O 1 O 2 ⊘ 3 O>3

Waterlevel: O very high O high ⊘ normal O low O very low

Waterflow: O very rapid ⊘ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊘ wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: starts to rain

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 21/8/15

Sample No: 4634 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 542692 YCOO 6941753 UTM 32

Altitude 831 masl

pH 6.8 Conductivity 40.8 Alkalinity 0.4 Temp 10.3

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: raining

Signature

Field Sheet Water Sampling Oppdal Date 11/8/15

Sample No: 4635 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 546372 YCOO 6946622 UTM 32

Altitude 576 masl

pH 7.4 Conductivity 61.8 Alkalinity 0-8 Temp 12

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 ⊗ >3

Waterlevel: O very high ⊗ high O normal O low O very low

Waterflow: ⊗ very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: ⊗ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: up to now the largest stream!

Signature

12h

Henning abholen

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4636 Taken: ~~O~~ HCl ~~O~~ HNO3 ~~O~~ IC

COORDINATES:

XCOO: 530366 YCOO 6968732 UTM 32

Altitude 756 masl

pH 6.4 Conductivity 21.4 Alkalinity 0.2 Temp 10°C

measured: ~~O~~ in field O in hotel

number of filters used: 3 filtered: ~~O~~ in field O in hotel (2 for HNO_3-sample)

Stream order: O 1 ~~O~~ 2 O 3 O>3

Waterlevel: O very high O high ~~O~~ normal O low O very low

Waterflow: O very rapid O rapid ~~O~~ fast O normal O slow O v.slow

Weather: ~~O~~ dry O humid O wet O very wet

Land use: O forestry O pasture ~~O~~ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: difficult (hard) to filter
completely different landscape-type

Signature

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4637 Taken: X HCl O HNO3 X IC

COORDINATES:

XCOO: 530432 YCOO 6968674 UTM 32

Altitude 753 masl

pH 6.3 Conductivity 32.5 Alkalinity 0.2 Temp 8.9

measured: X in field O in hotel

number of filters used: 2 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid O fast X normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Noorgebiet

Signature

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4638 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 532681 YCOO 6965008 UTM 32

Altitude 651 masl

pH 6.4 Conductivity 19.4 Alkalinity 0.2 Temp 11.7

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O >3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Lage on! nice place

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4639 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 532829 YCOO 6965107 UTM 32

Altitude 656 masl

pH 6.6 Conductivity 43.3 Alkalinity 0.5 Temp 10.8

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3 small for 3rd o

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: much much smaller again

Signature

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4640 Taken: O HCl X O HNO3 X O IC

COORDINATES:

XCOO: 535865 YCOO 6959849 UTM 32

Altitude 705 masl

pH 6.7 Conductivity 385 Alkalinity 0.3 Temp 9.6

measured: X O in field O in hotel

number of filters used: 1 filtered: X O in field O in hotel

Stream order: O 1 X O 2 O 3 O>3

Waterlevel: O very high O high X O normal O low O very low

Waterflow: O very rapid X O rapid O fast O normal O slow O v.slow

Weather: X O dry O humid O wet O very wet

Land use: O forestry O pasture X O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: ~~was~~ a heavy rain shower prior to Sampling

cows grazing in area

Signature

Field Sheet Water Sampling Oppdal Date 12/8/15

Sample No: 4641 Taken: X HCl O HNO3 X IC

COORDINATES:

XCOO: 536153 YCOO 6959456 UTM 32

Altitude 714 masl

pH 7.0 Conductivity 51.3 Alkalinity 0.5 Temp 10.2

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 O 3 X >3

Waterlevel: O very high X high O normal O low O very low

Waterflow: X very rapid O rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet some showers today

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: large stream drains backside of GLSNA!

Signature

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4642 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 536113 YCOO 6963828 UTM 32

Altitude 668 masl

pH 7.2 Conductivity 78.5 Alkalinity 0.7 Temp 9.5

measured: X O in field O in hotel

number of filters used: 1 filtered: X O in field O in hotel

Stream order: O 1 X O 2 O 3 O>3

Waterlevel: O very high O high X O normal O low O very low

Waterflow: O very rapid X O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet showers

Land use: O forestry O pasture X O alpine pasture O agriculture

X O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4643 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 536517 YCOO 6960238 UTM 32

Altitude 673 masl

pH 6.07 Conductivity 42 Alkalinity 0.5 Temp 10.7

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet showers!

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Vollasaetra

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 12/8/15

Sample No: 4644 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 536517 YCOO 6960238 UTM 32

Altitude 673 masl

pH 7.0 Conductivity 42.4 Alkalinity 0.3 Temp 17.1

measured: O in field ⊗ in hotel

number of filters used:_____ filtered: O in field ⊗ in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet showers

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

⊗ cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Øystein dup for hotel processing Vollaseteren

Signature

Field Sheet Water Sampling Oppdal **Date** 12/8/15

Sample No: 4645 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 536515 YCOO 6960236 UTM 32

Altitude 673 masl

pH 6.7 Conductivity 42 Alkalinity 0.6 Temp 10.9

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet showers

Land use: O forestry O pasture X alpine pasture O agriculture

X cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: TRUE DUP to 4644

Signature

114

Field Sheet Water Sampling Oppdal **Date** 13/8/15

Sample No: 4646 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 535703 YCOO 6971565 UTM 32

Altitude 496 masl

pH 7.1 Conductivity 58 Alkalinity 0.6 Temp 8.6

measured: X in field O in hotel

number of filters used: 3 filtered: X in field O in hotel hard to filter!

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry O pasture O alpine pasture O agriculture

X cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: gravel pit nearby

new syringe

Signature

Field Sheet Water Sampling Oppdal **Date** 13/8/15

Sample No: 4647 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 535497 YCOO 6972287 UTM 32

Altitude 512 masl

pH 6.7 Conductivity 30.6 Alkalinity 0.3 Temp 10.3

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Hobbal!

Signature

Field Sheet Water Sampling Oppdal **Date** 13/8/15

Sample No: 4648 Taken: ~~O~~ HCl O HNO3 O IC

COORDINATES:

XCOO: 535584 YCOO 6972420 UTM 32

Altitude 510 masl

pH 6.4 Conductivity 24.9 Alkalinity 0.3 Temp 10.3

measured: ~~O~~ in field O in hotel

number of filters used: 4/bottle filtered: ~~O~~ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high ~~O~~ normal O low O very low

Waterflow: O very rapid O rapid ~~O~~ fast O normal O slow O v.slow

Weather: ~~O~~ dry O humid O wet O very wet

Land use: ~~O~~ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: worst to filter up to now

only 30/40 ml per filter !

Signature

Field Sheet Water Sampling Oppdal **Date** 13/8/15

Sample No: 4649 Taken: ⊗ HCl O HNO3 O IC

COORDINATES:

XCOO: 524756 YCOO 6968952 UTM 32

Altitude 744 masl

pH 6.3 Conductivity 22 Alkalinity 0.2 Temp 11.2

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: not many animals in area at present
HNO3 filled up with the remainder in last
250ml bottle. Drop bottle washed out with
a bit acid

Signature

Field Sheet Water Sampling Oppdal **Date** 13/3/15

Sample No: 4650 Taken: X O HCl X O HNO3 X O IC

COORDINATES:

XCOO: 525090 YCOO 6969405 UTM 32

Altitude 768 masl

pH 6.3 Conductivity 29.4 Alkalinity 0.3 Temp 14.2

measured: X O in field O in hotel

number of filters used: 1 filtered: X O in field O in hotel

Stream order: O 1 X O 2 O 3 O>3

Waterlevel: O very high O high X O normal O low O very low

Waterflow: O very rapid O rapid X O fast O normal O slow O v.slow

Weather: X O dry O humid O wet O very wet

Land use: O forestry O pasture X O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 13/8/15

Sample No: 4651 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 527015 YCOO 6970441 UTM 32

Altitude 739 masl

pH 6.3 Conductivity 20.0 Alkalinity 0.3 Temp 14.1

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3 knapp 3 !

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

Signature

Field Sheet Water Sampling Oppdal Date 13/8/15

Sample No: 4652 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 533172 YCOO 6971664 UTM 32

Altitude 678 masl

pH 6.3 Conductivity 31.3 Alkalinity 0.3 Temp 16.2

measured: X in field O in hotel

number of filters used: 2 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: X very rapid O rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:

right underneath the stream disappears in a big hole (power!)

drains to Heldal

Signature

Field Sheet Water Sampling Oppdal **Date** 13/8/15

Sample No: 4653 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 5.3 Conductivity 2.3 Alkalinity 0 Temp 22.6

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: BLIND

Water was 1 week in hotel room

last time with "old" HNO_3 - next filled into drop-bottle today

Small IC-bottle

Signature

116

Field Sheet Water Sampling Oppdal **Date** 15/8/15

Sample No: 4654 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 525414 YCOO 6980069 UTM 32

Altitude 439 masl

pH 6.4 Conductivity 26.3 Alkalinity 0.2 Temp 12.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3 → large f 2.0

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: road closed, last 4km walked!

new syringe

Signature

Field Sheet Water Sampling Oppdal **Date** 15/8/15

Sample No: 4655 Taken: X HCl O HNO3 O IC

COORDINATES:

XCOO: 525596 YCOO 6979894 UTM 32

Altitude_____masl

pH 6.4 Conductivity 65 Alkalinity 0.5 Temp 10.5

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3 very small for 2!

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry O pasture O alpine pasture O agriculture

X cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: comes from an area marked with an old mining sign – small stream!

Signature

Field Sheet Water Sampling Oppdal **Date** 15/8/15

Sample No: 4656 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 525641 YCOO 6979938 UTM 32

Altitude 445 masl

pH 6.6 Conductivity 40.2 Alkalinity 0.2 Temp 12.9

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal Date 15/8/15

Sample No: 4657 Taken: O HCl O HNO3 O IC

COORDINATES: GPS im Auto gelassen

XCOO: 528050 YCOO 698050 UTM 32

Altitude 460 masl

pH 6.7 Conductivity 62.9 Alkalinity 0.6 Temp 12.7

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3 small!

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify________________________

Number of photos:_______ (always start with ID!)

COMMENTS:______________________________

Signature

Field Sheet Water Sampling Oppdal **Date** 15/8/15

Sample No: 4658 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 531399 YCOO 6978464 UTM 32

Altitude 468 masl

pH 6.8 Conductivity 58.8 Alkalinity 0.6 Temp 14

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Cabin nearby, owner unknown

Signature

Field Sheet Water Sampling Oppdal **Date** 15/8/15

Sample No: 4659 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 532427 YCOO 6981885 UTM 32

Altitude 460 masl

pH 7.1 Conductivity 54.3 Alkalinity 0.5 Temp 14.4

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: little waterfall directly at road

Signature

Field Sheet Water Sampling Oppdal **Date** 15/8/15

Sample No: 4660 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 532334 YCOO 6951573 UTM 32

Altitude 453 masl

pH 7.1 Conductivity 45.1 Alkalinity 0.5 Temp 15.3

measured: X in field O in hotel

number of filters used:_____ filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry O pasture O alpine pasture O agriculture

X cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 15/8/15

Sample No: 4661 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 534498 YCOO 6930468 UTM 32

Altitude 365 masl

pH 6-8 Conductivity 61 Alkalinity 0.25 Temp 16.2

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

Signature

116

Field Sheet Water Sampling Oppdal Date 16/8/15

Sample No: 4662 Taken: ⊗ HCl O HNO3 O IC

COORDINATES:

XCOO: 545507 YCOO 6967552 UTM 32

Altitude 252 masl

pH 7.3 Conductivity 68.5 Alkalinity 0.8 Temp 11.9

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3 schon gross für "2"

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid ⊗ fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: ⊗ forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: lots of moss on rocks in stream.

Signature

Field Sheet Water Sampling Oppdal Date 16/8/15

Sample No: 4663 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 542325 YCOO 6968873 UTM 32

Altitude 248 masl

pH 7.1 Conductivity 59.6 Alkalinity 0.5 Temp 11.4

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: Ø forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: small power station ca. 20m downstream

Stream comes from lake

Signature

Field Sheet Water Sampling Oppdal **Date** 16/8/15

Sample No: 4664 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 541614 YCOO 6971241 UTM 32

Altitude 467 masl

pH 6.6 Conductivity 0.77 Alkalinity 0.2 Temp 12.3

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: small sh. com

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 16/8/15

Sample No: 4665 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 540298 YCOO 6981487 UTM 32

Altitude 225 masl

pH 6-6 Conductivity 35 Alkalinity 0.2 Temp 12

measured: O in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: little powerstation drains water from this stream further upstream

Signature

Field Sheet Water Sampling Oppdal **Date** 16/8/15

Sample No: 4666 Taken: X O HCl O HNO3 O IC

COORDINATES:

XCOO: 539974 YCOO 6975032 UTM 32

Altitude 272 masl

pH 6.5 Conductivity 269 Alkalinity 0.2 Temp 12.7

measured: X O in field O in hotel

number of filters used:_____ filtered: X O in field O in hotel

Stream order: O 1 X O 2 O 3 O>3

Waterlevel: O very high O high X O normal O low O very low

Waterflow: O very rapid O rapid X O fast O normal O slow O v.slow

Weather: X O dry O humid O wet O very wet

Land use: X O forestry O pasture X O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 16/8/15

Sample No: 4667 Taken: O HCl O HNO3 X O IC

COORDINATES:

XCOO: 544473 YCOO 6980430 UTM 32

Altitude 668 masl

pH 6.4 Conductivity 53.3 Alkalinity 0.6 Temp 11.6

measured: X O in field O in hotel

number of filters used:_____ filtered: X O in field O in hotel

Stream order: O 1 X O 2 O 3 O>3

Waterlevel: O very high O high O normal X O low O very low

Waterflow: O very rapid O rapid O fast X O normal O slow O v.slow

Weather: X O dry O humid O wet O very wet

Land use: O forestry O pasture X O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 16/8/15

Sample No: 4658 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 544655 YCOO 6978507 UTM 32

Altitude 741 masl

pH 6.8 Conductivity 64.6 Alkalinity 0.5 Temp 16.8

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: oberhalb große Quarzader + sulphide genommen weil Fagerli bygda nicht ersichtl.

Signature

11h
Sunday (10!)

Field Sheet Water Sampling Oppdal **Date** 17/8/15

Sample No: 4669 Taken: ~~O~~ HCl ~~O~~ HNO3 ~~O~~ IC

COORDINATES:

XCOO: 546211 YCOO 6977928 UTM 32

Altitude 791 masl

pH 7.2 Conductivity 45.3 Alkalinity 0.5 Temp 11.4

measured: ~~O~~ in field O in hotel

number of filters used: 1 filtered: ~~O~~ in field O in hotel

Stream order: O 1 O 2 ~~O~~ 3 O>3

Waterlevel: O very high O high ~~O~~ normal O low O very low

Waterflow: O very rapid ~~O~~ rapid O fast O normal O slow O v.slow

Weather: ~~O~~ dry O humid O wet O very wet

Land use: O forestry O pasture ~~O~~ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: very nice & very remote, save water

new lt NO3 from new bottle. 46 drops

Signature

Field Sheet Water Sampling Oppdal **Date** 17/8/15

Sample No: 4670 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 546210 YCOO 6977930 UTM 32

Altitude 791 masl

pH 6.9 Conductivity 45.1 Alkalinity 0.5 Temp 12.0

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: Duplicate (true) to 4669

very nice, sunshine, lonely place

Signature

Field Sheet Water Sampling Oppdal **Date** 17/8/15

Sample No: 4671 Taken: O HCl O HNO3 X IC

COORDINATES:

XCOO: 543675 YCOO 6973120 UTM 32

Altitude 346 masl

pH 7.1 Conductivity 70 Alkalinity 0.6 Temp 13.6

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 X 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry O pasture (X alpine pasture) O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: Photos on GPS (wide angle button)

Signature

Field Sheet Water Sampling Oppdal Date 17/8/15

Sample No: 4672 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 545639 YCOO 6969130 UTM 32

Altitude 253 masl

pH 7 Conductivity 46 Alkalinity 0.4 Temp 13

measured: Ø in field O in hotel

number of filters used: 1 filtered: Ø in field O in hotel

Stream order: O 1 O 2 Ø 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: Ø forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: there is a saetha further upstream

Signature

Field Sheet Water Sampling Oppdal **Date** 18/8/15

Sample No: 4673 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 549181 YCOO 6968188 UTM 32

Altitude 392 masl

pH 7.4 Conductivity 82.9 Alkalinity 0.5 Temp 13.9

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid X rapid O fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 17/8/15

Sample No: 4674 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 6.7 Conductivity 0.9 Alkalinity 0.05 Temp 23.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: BLIND SAMPLE

HNO_3: from new bottle

water from Friday!

Signature

Field Sheet Water Sampling Oppdal **Date** 18/8/15

Sample No: 4675 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 550927 YCOO 6958563 UTM 32

Altitude 413 masl

pH 6.8 Conductivity 58.1 Alkalinity 0.4 Temp 10.6

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 18/8/15

Sample No: 4676 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 552659 YCOO 6962534 UTM 32

Altitude 473 masl

pH 6.7 Conductivity 36.9 Alkalinity 0.2 Temp 10.6

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high O normal X low O very low

Waterflow: O very rapid O rapid X fast O normal O slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: X forestry O pasture X alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: _____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 18/9/15

Sample No: 4677 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 554450 YCOO 6963770 UTM 32

Altitude 503 masl

pH 6.6 Conductivity 45.8 Alkalinity 0.3 Temp 12.8

measured: X in field O in hotel

number of filters used:_____ filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: unusual white coatings on the pebbles (AlOOH?) - see photos
Little water

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 18/8/15

Sample No: 4678 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 533764 YCOO 6942711 UTM 32

Altitude 702 masl

pH 6.5 Conductivity 22.6 Alkalinity 0.2 Temp 9.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: relatively large stream

upstream from "human activities"

Signature

Field Sheet Water Sampling Oppdal **Date** 18/8/15

Sample No: 4679 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 530549 YCOO 6945052 UTM 32

Altitude 786 masl

pH 6.8 Conductivity 42.4 Alkalinity 0.4 Temp 11.6

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Large river bed, the amount of water comming down here must sometimes be enormous

very nice place - OX NP

Veldig deilig!

Signature

Field Sheet Water Sampling Oppdal **Date** 18/8/15

Sample No: 4680 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 530615 YCOO 6944995 UTM 32

Altitude 812 masl

pH 6.5 Conductivity 24.4 Alkalinity 0.2 Temp 12

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: nice stream much smaller than 4679 Storbekken!

Signature

Field Sheet Water Sampling Oppdal **Date** 19/8/15

Sample No: 4681 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 561630 YCOO 6962459 UTM 32

Altitude 738 masl

pH 6.8 Conductivity 67.3 Alkalinity 0.5 Temp 11.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: very windy

Signature

Field Sheet Water Sampling Oppdal **Date** 19/8/15

Sample No: 4682 Taken: X O HCl O HNO3 O IC

COORDINATES:

XCOO: 560742 YCOO 6965163 UTM 32

Altitude 665 masl

pH 7.2 Conductivity 74.2 Alkalinity 0.7 Temp 12.2

measured: X O in field O in hotel

number of filters used: 1 filtered: X O in field O in hotel

Stream order: O 1 X O 2 O 3 O>3

Waterlevel: O very high O high O normal O low X O very low

Waterflow: O very rapid O rapid O fast O normal X O slow O v.slow

Weather: X O dry O humid O wet O very wet

Land use: O forestry O pasture X O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: national park very little water left

Signature

Field Sheet Water Sampling Oppdal **Date** 19/8/15

Sample No: 4683 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 560622 YCOO 6966618 UTM 32

Altitude 639 masl

pH 7.0 Conductivity 90.6 Alkalinity 1.0 Temp 14.1

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: hiccplace (O-NP)

Signature

Field Sheet Water Sampling Oppdal **Date** 19/8/15

Sample No: 4684 Taken: X HCl X HNO3 X IC

COORDINATES:

XCOO: 555274 YCOO 6975449 UTM 32

Altitude 487 masl

pH 6.9 Conductivity 95.9 Alkalinity 0.8 Temp 12.7

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 X 2 O 3 O>3

Waterlevel: O very high O high O normal X low O very low

Waterflow: O very rapid O rapid O fast O normal X slow O v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS:_____

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 19/8/15

Sample No: 4685 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 557489 YCOO 6975742 UTM 32

Altitude 403 masl

pH 7.2 Conductivity 104 Alkalinity 0.8 Temp 12.7

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: relatively "dirty" (organic) the stream appears to flood here occasionally

Signature

Field Sheet Water Sampling Oppdal **Date** 19/8/15

Sample No: 4686 Taken: ⊗ HCl O HNO3 O IC

COORDINATES:

XCOO: 555291 YCOO 6972037 UTM 32

Altitude 421 masl

pH 7.2 Conductivity 123.7 Alkalinity 1.2 Temp 12.6

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: ⊗ forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: downstream from railway line

Signature

Field Sheet Water Sampling Oppdal **Date** 19/8/15

Sample No: 4687 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 552882 YCOO 6971742 UTM 32

Altitude 455 masl

pH 7.1 Conductivity 50.4 Alkalinity _____ Temp 15

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: very nice!

Crop

Signature

Field Sheet Water Sampling Oppdal **Date** 11/8/15

Sample No: 4688 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 551850 YCOO 6969581 UTM 32

Altitude 463 masl

pH 6.7 Conductivity 39.6 Alkalinity 0.25 Temp 13.3

measured: O in field O in hotel

number of filters used: 1 filtered: O in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: right above last house

some trees recently felled here

Signature

Field Sheet Water Sampling Oppdal **Date** 20/8/15

Sample No: 4689 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 550480 YCOO 6976539 UTM 32

Altitude 593 masl

pH 7.2 Conductivity 31.6 Alkalinity 0.3 Temp 10.1

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 ⊗ 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: very nice!

CKUP

Signature

Field Sheet Water Sampling Oppdal **Date** 20/8/15

Sample No: 4690 Taken: ⊗ HCl O HNO3 O IC

COORDINATES:

XCOO: 550495 YCOO 6976418 UTM 32

Altitude 592 masl

pH 7.4 Conductivity 60.4 Alkalinity 0.5 Temp 11.8

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: very nice place!

Signature

Field Sheet Water Sampling Oppdal **Date** 20/8/15

Sample No: 4691 Taken: Ø HCl Ø HNO3 Ø IC

COORDINATES:

XCOO: 550354 YCOO 6975810 UTM 32

Altitude 584 masl

pH 7.5 Conductivity 80.8 Alkalinity 0.7 Temp 12.8

measured: Ø in field O in hotel

number of filters used:_____ filtered: Ø in field O in hotel

Stream order: O 1 Ø 2 O 3 O>3

Waterlevel: O very high O high Ø normal O low O very low

Waterflow: O very rapid Ø rapid O fast O normal O slow O v.slow

Weather: Ø dry O humid O wet O very wet

Land use: O forestry O pasture Ø alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: very, very nice place with little waterfalls

_____

_____

_____

Lee

Signature

Field Sheet Water Sampling Oppdal **Date** 20/8/15

Sample No: 4692 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 550355 YCOO 6975808 UTM 32

Altitude 587 masl

pH 7.5 Conductivity 81 Alkalinity 0.6 Temp 13.6

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 ⊗ 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: TRUE DUPLICATE TO 4691

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 20/8/15

Sample No: 4693 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 550737 YCOO 6975569 UTM 32

Altitude 574 masl

pH 7.0 Conductivity 55.2 Alkalinity 0.6 Temp 15.6

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 X 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow X v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: unusual large very slow stream

_____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 20/8/15

Sample No: 4693 Taken: X HCl O HNO3 O IC

COORDINATES:

XCOO: 550737 YCOO 6975569 UTM 32

Altitude 574 masl

pH 7.0 Conductivity 55.2 Alkalinity 0.6 Temp 15.6

measured: X in field O in hotel

number of filters used: 1 filtered: X in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high X normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow X v.slow

Weather: X dry O humid O wet O very wet

Land use: O forestry O pasture X alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: unusual large very slow stream

Signature

Field Sheet Water Sampling Oppdal **Date** 20/8/15

Sample No: 4694 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO:_____ YCOO_____ UTM_____

Altitude_____masl

pH 6.3 Conductivity 0.8 Alkalinity_____ Temp 24.5

measured: O in field Ø in hotel

number of filters used: 1 filtered: O in field Ø in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low O very low

Waterflow: O very rapid O rapid O fast O normal O slow O v.slow

Weather: O dry O humid O wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos:_____ (always start with ID!)

COMMENTS: aq. dest stored in hotel room at room temp. since one week

BLIND

Signature

Field Sheet Water Sampling Oppdal **Date** 24.08.2015

Sample No: 4695 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 556331 YCOO 6965329 UTM 32

Altitude 572 masl

pH 7,1 Conductivity 90,3 Alkalinity 0,8 Temp 14,0

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast O normal ⊗ slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify —

Number of photos: 4 (always start with ID!)

COMMENTS:

Øystein J

Signature

Field Sheet Water Sampling Oppdal **Date** 24.08.2015

Sample No: 4696 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 557036 YCOO 6959764 UTM 32

Altitude 659 masl

pH 6,9 Conductivity 56,9 Alkalinity 93 Temp 16,9

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low ⊗ very low

Waterflow: O very rapid O rapid O fast O normal O slow ⊗ v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: _____

_____

_____

_____

Signature

Field Sheet Water Sampling Oppdal **Date** 25.08.2015

Sample No: 4697 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 520 022 YCOO 6924643 UTM 32

Altitude 889 masl

pH 5,6 Conductivity 6,5 Alkalinity < 0,1 Temp 11,0

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!)

COMMENTS:

Oystein F

Signature

Field Sheet Water Sampling Oppdal **Date** 25.08.2015

Sample No: 4698 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 520051 YCOO 6924690 UTM 32

Altitude 903 masl

pH 5,8 Conductivity 4,6 Alkalinity <0,1 Temp 10,9

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: ⊗ very rapid ⊗ rapid O fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: _____

Oystein F.

Signature

Field Sheet Water Sampling Oppdal **Date** 25.08.2015

Sample No: 4699 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 521 626 YCOO 6925432 UTM

Altitude 871 masl

pH 6,3 Conductivity 12,4 Alkalinity < 0,1 Temp 12,0

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify

Number of photos: 3 (always start with ID!)

COMMENTS:

Øystein L.

Signature

Field Sheet Water Sampling Oppdal **Date** 25.08.2015

Sample No: 4700 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 521705 YCOO 6925428 UTM 32

Altitude 845 masl

pH 6,4 Conductivity 11,8 Alkalinity < 0,1 Temp 12,7

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 3 (always start with ID!)

COMMENTS:_____

Øystein F

Signature

Field Sheet Water Sampling Oppdal **Date** 25.08.2015

Sample No: 4701 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES: 522868

XCOO: _____ YCOO 6926098 UTM 32

Altitude 851 masl

pH 6,7 Conductivity 23,4 Alkalinity 0,1 Temp 12,1

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: _____ (always start with ID!)

COMMENTS: Vammervollsæter oppstrøms prøvepunktet, ca 400 m.

Øystein T

Signature

Field Sheet Water Sampling Oppdal **Date** 25/08/2015

Sample No: 4702 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 527295 YCOO 6927062 UTM 32

Altitude 658 masl

pH 6,5 Conductivity 13,6 Alkalinity 0,1 Temp 12,4

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture O alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 4 (always start with ID!)

COMMENTS:_____

Øystein

Signature

Field Sheet Water Sampling Oppdal **Date** 26.08.2015

Sample No: 4703 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 536783 YCOO 6956890 UTM 32

Altitude 892 masl

pH 7,7 Conductivity 63,7 Alkalinity 0,5 Temp 12,2

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: _____

_____

_____

_____

Øystein F

Signature

Field Sheet Water Sampling Oppdal **Date** 26/08/2015

Sample No: 4704 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 542233 YCOO 6960018 UTM 32

Altitude 852 masl

pH 7,3 Conductivity 48,6 Alkalinity 0,35 Temp 14,7

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low ⊗ very low

Waterflow: O very rapid O rapid O fast O normal ⊗ slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 4 (always start with ID!)

COMMENTS: _____

Øystein J.

Signature

Field Sheet Water Sampling Oppdal **Date** 26.08.2015

Sample No: 4705 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 541320 YCOO 6958844 UTM 32

Altitude 868 masl

pH 7,2 Conductivity 31,6 Alkalinity 0,2 Temp 14,0

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal O low ⊗ very low

Waterflow: O very rapid O rapid O fast O normal ⊗ slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: Veldig lite vann.

Oystein L.

Signature

Field Sheet Water Sampling Oppdal **Date** 26.08.2015

Sample No: 4706 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 539180 YCOO 6958817 UTM 32

Altitude 914 masl

pH 7,5 Conductivity 54,5 Alkalinity 0,5 Temp 13,9

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify_____

Number of photos: 4 (always start with ID!)

COMMENTS:_____

Øystein L.

Signature

Field Sheet Water Sampling Oppdal **Date** 27.08.2015

Sample No: 4707 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 546 809 YCOO 6937674 UTM 32

Altitude 1015 masl

pH 7,4 Conductivity 69,8 Alkalinity 0,5 Temp 10,5

measured: O in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: Regn siste natt, vått i terrenget

Øystein F.

Signature

Field Sheet Water Sampling Oppdal **Date** 27.08.15

Sample No: 4708 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 518273 YCOO 6934467 UTM

Altitude 821 masl

pH 6,3 Conductivity 9,6 Alkalinity < 0,1 Temp 11,3

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high ⊗ normal O low O very low

Waterflow: O very rapid O rapid ⊗ fast O normal O slow O v.slow

Weather: ⊗ dry O humid O wet O very wet

Land use: O forestry ⊗ pasture ⊗ alpine pasture O agriculture

O cabins O other, specify

Number of photos: (always start with ID!)

COMMENTS: Regn sist natt. Bekken er tydelig større enn den var igår

Øystein F.

Signature

Field Sheet Water Sampling Oppdal **Date** 27/8 -15

Sample No: 4709 Taken: O HCl O HNO3 O IC

COORDINATES:

XCOO: 527718 YCOO 6974537 UTM 32

Altitude 670 masl

pH 6.9 Conductivity 74,0 Alkalinity 0.9 Temp 14.4

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture O alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: Kraftig regn under prøvetakingen.

Signature

Field Sheet Water Sampling Oppdal **Date** 27.08.2015

Sample No: 4710 Taken: ⊗ HCl ⊗ HNO3 ⊗ IC

COORDINATES:

XCOO: 527715 YCOO 6973836 UTM 32

Altitude _____ masl

pH 6,3 Conductivity 37,8 Alkalinity 0,4 Temp 14,2

measured: ⊗ in field O in hotel

number of filters used: 1 filtered: ⊗ in field O in hotel

Stream order: O 1 O 2 O 3 O>3

Waterlevel: O very high O high O normal ⊗ low O very low

Waterflow: O very rapid O rapid O fast ⊗ normal O slow O v.slow

Weather: O dry O humid ⊗ wet O very wet

Land use: O forestry O pasture ⊗ alpine pasture O agriculture

O cabins O other, specify _____

Number of photos: 3 (always start with ID!)

COMMENTS: Regnvær under prøvetakingen

Signature

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SURVEY OF
NORWAY

· NGU ·

Geological Survey of Norway
PO Box 6315, Sluppen
N-7491 Trondheim, Norway

Visitor address
Leiv Eirikssons vei 39
7040 Trondheim

Tel (+ 47) 73 90 40 00
E-mail ngu@ngu.no
Web www.ngu.no/en-gb/