Rapport nr. 87.170

REISERAPPORT

Deltakelse med foredrag ved
ICA kongress i Morelia, Mexico

Norges geologiske undersøkelse

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Tittel:
Reiserapport
Deltakelse med foredrag ved ICA kongress i Morelia, Mexico

Forfatter:
Arne Haugan

Oppdragsgiver:
NGU

Fylke:

Kommune:

Kartbladnavn (M. 1:250 000)

Kartbladnr. og -navn (M. 1:50 000)

Forekomstens navn og koordinater:

Sidetall: 54 Pris: kr. 80,-

Kartbilag:

Feltarbeid utført:	Rapportdato: 30.11.1987	Prosjektnr.:	Prosjektleder:

Sammendrag:

Reiserapport fra kongress for International Cartographic Association.

Rapporten gir forskjellige inntrykk fra kongressen og har som bilag en introduksjon av temakartprosjekt i Valencia-regionen, Spania, samt forfatterens foredrag om NGUs kartframstilling.

To bilag som er nevnt i teksten finnes bare i ett eksemplar og er levert med rapporteksemplaret til biblioteket, nemlig møteprogram og 2 kart fra Valencia-regionen.

Emneord		
Reiserapport		
Kartografi		

INNHOLD

VEDLEGG

1. Deltakerliste
2. Valencia-regionens temakart, introduksjon
3. Artikkel/foredrag om NGUs kartproduksjonssystem
   (Møteprogram samt 2 kart fra Valencia-regionen foreligger bare i ett eksemplar som er levert sammen med bibliotekets rapporteksemplar)

RAPPORT FRA ICA-KONGRESS, 12.-21. OKTOBER 1987

INNLEDNING

Den 13. ICA-kongress (kartografi) ble holdt i Morelia i Mexico i tidsrommet 12.-21. oktober 1987.
Det var ca. 750 deltakere fra hele verden, jfr. vedlagte deltakerliste og møteprogram.
I tilknytning til kongressen var det en kartutstilling og en teknisk utstilling.
Fra den tekniske utstilling deltok prosjektet "NORWAY MAPPING" i regi av Statens kartverk, og NGU hadde en dobbel poster ved siden av.

Konferansen var lagt opp med stort sett bare plenumsmøter, som startet kl. 09.00 og ble avsluttet ca. kl. 20.00, med et 2 timers avbrudd midt på dagen.

KARTOGRAFIEN I SAMFUNNSPLANLEGGINGEN

Flere talere, bl.a. fra Mexico og Spania, framholdt nødvendigheten av koordinering av den totale kartleggingsinnsats nasjonalt som umåtelig viktig. I begge disse land hadde de politiske myndigheter innsett dette og gjennom lover påbudt koordineringer som skal hindre at forskjellige institusjoner/institutter utfører samme jobb parallelt.

I Spania er et stort kartleggingsprosjekt for langtidsplanlegging såvidt dratt i gang. "Alle" typer tema er med: geologi, landbruk, skog, fauna, industri, kommunikasjon osv. Gjennom nyorganiseringen/koordineringen har de oppnådd å kunne utføre det samme som før med 40% mindre innsats av penger, samtidig som et integrert nasjonalt informasjonssystem blir etablert.

GIS-systemet er slik bygd opp at det kan motta feed-back fra forskjellige computersystemer for oppdatering og utvidelse av databasen. Kartinformasjon fra store målestokker (>1:25 000) er holdt utenfor systemet, i hvert fall foreløpig.

Sovjetunionen går nå inn for å lage regionale kart i målestokk 1:500 000 - 1:1 500 000 som et ledd i samfunnsplanleggingen.

Kartene gjengir forenklet berggrunnsgeologi som er av prospekteringsinteresse samt løsmasser og vannressurser.
Til kartene lages det profilsamlinger som gir ytterligere opplysninger om vann-, gass- og mineralfunnmuligheter.

Atlaskart utgis i målestokk 1:10 mill. Kart i målestokk 1:50 000 utgis med forklarende tekst i margen, og det utgis senere små skrifter for oppdatering av teksten.
Det kartprogrammet som er vedtatt er beregnet å skulle koste 250 milliarder rubler.

TEKNOLOGI INNEN KARTOGRAFIEN

Fraser Taylor fra Canada presenterte en undersøkelse som var gjort m.h.t. kartografisk kommunikasjon via skjermbilde. Bruken av dette er ikke så liketil som en skulle tro. Fordi mediet er et helt annet enn det trykte kart, må kartbildet bygges opp på en helt annen måte, ja kart-design må revideres fullstendig. Det betyr blant annet at et kart som er generert for framstilling av filmer til trykking, ikke vil egne seg som skjerm-kart, ifølge Fraser Taylor.

Det var i undersøkelsen også tatt med en evaluering av skjermkartet brukt i undervisning i kartografi. Det har her fordeler ved at de forskjellige elementene kan legges på steg for steg, men samtidig den bakdel at innholdet glemmes mye hurtigere enn

når trykte kart ble brukt. Stoffet blir for ferdigtygget, tankene skjerpes for lite.

Fraser Taylor advarte mot satsing på store og tunge maskinutrustninger nå. Det er under utvikling systemer basert på avansert PC-teknologi, noe av det vil bli lansert i løpet av 1988.

R.M. Defoe fra Canada: Mapping from Space - Bit by bit, diskuterte bruken av satelittscener og airborne radar i framstilling av kart, samt til revisjon av eksisterende kart. Kartrevisjon via satelitt koster 1/10-del av vanlig kostnad.
Særlig innenfor atlaskart i målestokk 1:1,5 mill. og 1:2 mill. har teknologi av denne type vært anvendt. De har bl.a. klart å gjengi satelittscener i tilnærmet riktige farger, noe som er avgjørende for lesbarheten i en slik sammenheng.

R.M. Defoe og D.J. Hawkins, begge fra Energy, Mines and Resources, Can. er navn en bør ha i tankene hvis en vil diskutere bruk av satelittdata og airborne radar data.

KARTET OG BRUKERNE, UNDERVISNING

Flere innlegg tok for seg forholdet mellom kartprodusenter og brukere. En av de meksikanske foredragsholderne betonte sterkt at kartframstillerne (kartografene) må lære seg mer om hvordan samfunnet kan bruke kart, og innrette sin produksjon etter det. Det må foretas en uavhengig vurdering av hva som er mest tjenlig m.h.t. presentasjonsform, inntrykk fra brukerne må være korrektiv.

C. Board (UK) understreket betydningen av å ha en god sammenheng mellom lanseringen av et produkt (kart) og produktet i seg selv. Faktiske undersøkelser viste at presentasjon av et dårlig framstilt kart i lekkert omslag slo grusomt tilbake fra brukerne.

S. Bonin (Frankrike) drøftet problemet med de store mengder kart som trykkes og at selv folk som åpenbart kunne spare både tid og penger på å bruke dem ikke gjorde det.

En massiv påvirkning ovenfor politikerne for å få dem til å forstå betydningen av kart var etter hans mening helt nødvendig. Dette ville kunne få dem til å få inn undervisning om kart i skolene, særlig videregående og høyere, noe som etter hvert vil få store ringvirkninger m.h.t. forståelsen av kartets verdi som planleggingsmedium og praktisk bruk.

Finland har laget en undervisningsbok for skolene som kan være et godt utgangspunkt.

I Japan er det etablert private skoler på videregående skoles nivå som har kartografi som hovedfag. Elevene starter med å lage kart ved å tegne kopier av eksisterende kart. Senere får de lage fargelagte atlaskart, og viderefører dette ved å bygge atlaskart digitalt via PC.
Forståelsen av kartet blir på denne måten meget stor.

R.H.W. Linton (USA), som er ekspert på geografiske informasjonssystemer, la vekt på at forskere ikke måtte gjøre den tabben å betrakte kartografien som et nødvendig sidespor for å få sitt produkt framstilt. Samtidig må kartografene stille seg til rådighet for oppbyggingen av GIS-systemer, fordi behandlingen av kartografiske data forutsetter en slik faglig kartkompetanse. Et slikt samspill kan bidra til at informasjonssystemene lages mere "spiselige" for et bredere publikum enn det rent vitenskapelige. Dette er helt nødvendig for å utvide forståelsen av verdien av kart og kartinformasjon via digitale media. Særlig de digitale media kan ellers virke som en mur hvis dataene er for vanskelig tilgjengelige eller presenteres på en måte som er problematisk å forstå.

TEMAKART OVER VALENCIA-REGIONEN, SPANIA

I en videosesjon, som dessverre foregikk på spansk uten oversettelse, presenterte spanske forskere en serien på 7 temakart over Valencia-regionen i M 1:200 000.

Kartene er laget med tanke på å være et planleggingsverktøy for administrasjonen og politikerne i regionen.

Kartene behandler følgende tema:
1. Basiskart for geomiljøet
2. Sårbarhet overfor vannforurensing og jordskredfare
3. Flomrisiko, innsynkning og jordskjelv
4. Tilstandskart for erosjon
5. Potensielle erosjonsområder
6. Verneverdige områder
7. Anbefalt arealbruk, bruksbegrensning

Det er igjen et eksempel på hvor meget andre land finner grunn til å satse for å sikre seg et godt utgangspunkt for planlegging.

Kart nr. 3, 4 og 5 er vel nokså fremmed for vårt miljø, og brukbare basiskart (1) har vi kanskje i våre tradisjonelle kartserier. Men kanskje tiden er moden for å lansere et kart som er en syntese av nr. 2, 6 og 7 i samarbeid med MD og LD?

Jeg vedlegger kart nr. 1 og kart nr. 7 samt skriftlig materiale jeg har fått tilsendt slik at det eventuelt kan vurderes av de geofaglige avdelinger ved NGU.

UTSTILLINGER

Kartutstillingen, som var meget omfattende, viste bl.a. at Kina er i ferd med å bli en gigant også på kartfronten. Deres utstilling gav, som mange andre store nasjoners utstillinger, inntrykk av at det ikke var grenser for hvilke midler som satses på kart.

Utstillingen fortalte også at mange andre land satser svært mye på trykking av lite tilfredsstillende produkter, noe som tildels skyldes at utviklingen av kartografien ikke har fulgt den teknologiske utvikling i verden, hvilket har lite med penger å gjøre.

Den tekniske utstilling var av langt mere begrenset omfang. Det som interesserte undertegnede var INTERGRAPHS stand, for øvrig nabo med vår poster. De viste foruten sin veletablerte dobbeltskjermstasjon en ny arbeidsstasjon med gode muligheter og til en langt lavere pris. De forklarte også at vi i Norge kunne regne med lavere pris enn vi var vant med fra INTERGRAPHs side etter at de nå var i ferd med å etablere en fabrikk i Belgia.

NORWAY MAPPING, som var satt opp av Statens kartverk, var en stand som tok sikte på å gjøre kjent at Norge har et bredt potensiale når det gjelder oppmåling og kartlegging samt konsulenttjenester. En rekke private firma er med i dette sammen med Norges Eksportråd. Siden NGUs poster var ved siden av, ble det rettet forespørsler til Norway Mapping om tilsending av informasjon om vårt kartproduksjonssystem.

EGET FOREDRAG

Under kongressen i Praha for ett år siden holdt jeg et improvisert innlegg for den kommisjon jeg er medlem av (Map Technology) om NGUs manuelle kartproduksjonssystem.

Det førte til at jeg ble bedt om å forberede en artikkel om dette for presentasjon på kongressen i Morelia.

Vårt produksjonssystem er bygget på komponenter som er vanlig handelsvare i den grafiske bransje, men vi har satt produksjonen i system på en måte som gjør prosessene enklere enn hva tilfelle er når man følger de tradisjonelle produksjonsdiagrammer som er i bruk.

Det viste seg også at mange var interessert i å få mere informasjon om dette enn foredraget kunne gi, bl.a. ved konkret å be om kopier av vårt fargesystem og våre produksjonsskjema. Det meste av dette (unntatt fargeplansjen med tabell) vil foreligge i den trykte artikkelen, men kompendiet fra konferansen foreligger dessverre ikke ennå.

Jeg vedlegger en (dårlig) kopi av artikkelen til orientering.

KONKLUSJON

NGUs representasjon ved konferansen har igjen bidratt til å plassere NGU på verdenskartet. NGUs kartprodukter blir omtalt som noe det er verdt å studere nærmere, både p.g.a. den kartografiske kvalitet og den klare framstilling av tema.

Den teknologiske utvikling innen kartografien i retning av dataassistert konstruksjon og design skyter fart. Det advares fra kompetente forskere mot å satse på store og tunge anlegg før en har sett hva som kommer fram de nærmeste to år. Det antydes at svært gode løsninger kan komme allerede i 1988 basert på kraftig PC-teknologi og laserplottere. Slike anlegg vil selvsagt bli langt billigere enn f.eks. SCITEX, men det gjenstår ennå å se om de kan ha ytelser som gjør dem brukbare til NGUs formål.

Signalene er imidlertid så tydelige at NGU helt klart bør unngå å gå inn i forpliktende samarbeid med eksterne anlegg før en avklaring foreligger.

NGU bør studere det spanske temakartprosjektet i Valencia-regionen med tanke på utvikling av norske planleggingskart.

Norway Mapping - prosjektet for markedsføring av karttjenester i videste forstand i utlandet, innbefattet konsulenttjenester, ønsker nærmere kontakt med NGU. Det bør vurderes hvorvidt NGU kan være interessert i dette.

Trondheim, 30.11.1987
NORGES GEOLOGISKE UNDERSØKELSE
Geofysisk avdeling

Arne Haugan
seksjonssjef

VEDLEGG 1: Deltakerliste

10/19/87

LISTADO DE PARTICIPANTES REGISTRADOS AL 10-19-87
(HASTA ANTES DE LAS 10:00 HORAS)

No DE REG.	N O M B R E		CONDICION	P A I S	ORGANIZACION QUE REPRESENTAN
708	ISAAC AYINDE	ADALEMO	DEL	NIGERIA	UNIV, OF LAGOS & NIG. CARTO
275	GODWIN HENLEY	ADIKA	PAR	KENYA	REGIONAL CENTRE FOR SURVEYING
299	RON	ADLER	DEL	ISRAEL	SURVEY OF ISRAEL
300	ANUVA	ADLER	ACC	ISRAEL	
62	JOSE LUIS	ALCANTARA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
681	RAFAEL	ALLENDE LASTRA	PAR	MEXICO	I.N.E.G.I. REGIONAL SURESTE
282	JOSE DAVID	ALVAREZ DE LA FUENTE	PAR	MEXICO	INST. MEXICANO DEL PETROLEO
51	GABRIEL	ALVAREZ GARCIA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
59	FERNANDO	ALVAREZ LOPEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
704	LUIS	AMEZCUA Y FERNANDEZ	PAR	MEXICO	I.N.E.G.I, REGIONAL D.F.
231	K. ERIC	ANDERSON	ICA	U.S.A.	U.S. GEOLOGICAL SURVEY
232	DIANE F.	ANDERSON	ACC	U.S.A.	
214	GORDON ALFRED	ANDREASSEND	DEL	HONG KONG	HONG KONG GOVERNMENT
215	WAI	ANDREASSEND	ACC	HONG KONG	
191	ROGER WILLIAM	ANSON	DEL	UNITED KINGDOM	OXFORD POLYTECHNIC
531	EDUARDO	ANTARAMIAN	PAR	MEXICO	UNIVERSIDAD MICHOACANA
349	SHIGEHARU	ARAI	PAR	JAPAN	KOKUSAI KOGYO CO.,LTD
461	FERNANDO	ARANAZ DEL RIO	PAR	SPAIN	D. GRAL. INSTITUTO GEOGRAFICO
358	ANGEL	AREVALO BARROSO	PAR	SPAIN	INSTITUTO GEOGRAFICO NACIONAL
543	PETROVITSCH	ARSANOV EVGUENY	ICA	U.S.S.R.	CARTOGRAPHIC AGENSY
99	ERNESTO	ATILANO GUERRERO	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
61	ANGEL ALONSO	AVALOS	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
225	AUSMA	BALODIS	ACC	CANADA	
224	JOHN	BALODIS MIERVALDIS	PAR	CANADA	CANADIAN CARTOGRAPHICS LTD
709	OLAYINKA YARD	BALOGUN	DEL	NIGERIA	NIG. CART ASS. UNIV. OF LAGOS
423	NIKOLA	BAMBALDOKOV	DEL	BULGARIA	RESEARCH INST OF GEODESY & C.
272	MAREK	BARANOWSKI	PAR	POLAND	INS.GEOD. & CART.DATA PROCES.
219	SOFIA	BARATA PINTO	ACC	PORTUGAL	
357	EDUARDO	BARREDO RISCO	PAR	SPAIN	INSTITUTO GEOGRAFICO NACIONAL
220	YOSE MANUEL	BARREIRO GUEDES	DEL	PORTUGAL	INST. GEOGRAFICO E CADASTRAL
154	J. CHRISTOPHER	BARTHOLOMEW	PAR	UNITED KINGDOM	ROYAL SCOTTISH GEOG. SOCIETY
155	GENEVIEVE	BARTHOLOMEW	ACC	UNITED KINGDOM	
380	A.	BAUKO	PAR	HUNGARY	CENTRE FOR REGIONAL RESEARCH
80	ARMANDO	BAYONA CELIS	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
576	MOHAMED	BELKABIR	PAR	MOROCCO	DIV. CARTOGRAPHIE MOROKKO
508	GIAMPIERO	BELLUCCI C.	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
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594	ROBERT THOMAS	BLACK	PAR	U.S.A.	INTERGRAPH CORP.
373	CHRISTOPHER	BOARD	ICA	UNITED KINGDOM	LONDON SCHOOL OF ECONOMICS
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92	LUIS G.	BONILLA SANCHEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
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446	MADELEINE	BONIN	ACC	FRANCE	
305	EMANUELE	BOSCHI	PAR	ITALY	CENTRO INF.GEOTOPOGRAFICHE A.
719	PATRICK C.	BOTOMANI	PAR	MALAWI	CARTOGRAPHIC SUPERINTENDENT
309	CLAUDE	BOUET	PAR	MEXICO	ORSTOM
536	ALEXANDER	BOURDE	DEL	U.S.S.R.	MINISTRY OF GELOGY USSR
173	A. RAYMOND	BOYLE	PAR	CANADA	UNIV. OF SASKATCHEWAN CANADA

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278	KURT E.	BRASSEL	PAR	SWITZERLAND	UNIVERSITY OF ZURICH
713	JORGE ENRIQUE	BRENA ZEPEDA	PAR	MEXICO	I.M.T.A
237	EDNA M.	BURKETT	INV	U.S.A.	U.S. GEOLOGICAL SURVEY
401	KJELD	BURMESJER	ICA	DENMARK	HORSENS TECHNICAL COLLEGE
425	LUIS	CABRERA	PAR	MEXICO	SECRETARIA DE RELACIONES EXT.
153	BERNARD	CAILLAULT	DEL	FRANCE	BUREAU DE RECHERCHES D. ET M.
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618	JOSE ORLANDO	CARDENAS HERNANDEZ	DEL	CHILE	INSTITUTO GEOGRAFICO MILITAR
408	JEAN	CARRE	PAR	FRANCE	INST. GEOGRAPHIQUE NATIONAL
169	JEAN	CARRIERE	PAR	CANADA	UNIV. DU QUEBEC A MONTREAL
301	WILLIAM EDWARD	CARTWRIGHT	PAR	AUSTRALIA	ROYAL MELBOURNE INS. OF TECH.
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192	GREGORY H.	CHU	DEL	U.S.A.	UNIV. OF MINNESOTA CART. LAB.
257	ANDRZEJ	CIOLKOSZ	DEL	POLAND	INST. OF GEODESY & CARTOGRAPHY
246	HINRICH	CLANSSEN	PAR	FEDERAL REPUBLIC OF GERMANY	UNIVERSITY OF HANNOVER
369	GREGORY ERIC D.	COLE	PAR	UNITED KINGDOM	BRITISH CARTOGRAPHIC SOCIETY
267	JOSE LUIS	COLOMER	PAR	SPAIN	INST. CARTOGRAFIC DE CATALUNYA
366	MICHEL ANDRE	COMEAU	PAR	CANADA	ENVIRONMENT CANADA
168	JOHN TERENCE	COPPOCK	PAR	UNITED KINGDOM	UNIVERSITY OF EDINBURGH
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91	JAVIER	COSIO TENORIO	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
736	FRANCISCO J.	COSSIO L.	PAR	MEXICO	CASA DE LA CULTURA DE S.L.P.
502	HUGO	COTA SANCHEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
352	VICTOR MANUEL	CRUZ CRUZ	PAR	MEXICO	UNAM-GEOGRAPHY-COLLEGE
500	MANUEL	CRUZ PINEDA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
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124	DORIS	CURRAN	ACC	CANADA	
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167	MAURICE A.	DAMOISEAUX	PAR	NETHERLANDS	RIJKSWATERSTAAT SURVEY DEPT.
469	L. D'ANDIGNE	DE ASIS	VIP	FRANCE	UNESCO
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593	ALAN	DE LUCIA	PAR	U.S.A.	INTERGRAPH CORPORATION
337	ROGER M.	DEFOE	DEL	CANADA	ENERGY M. & RESOURCES CANADA
338	CATHERINE E.	DEFOE	ACC	CANADA	
201	HECTOR	DEL CASTILLO GLEZ.	PAR	MEXICO	INST. DE GEOGRAFIA U.N.A.M.
499	CARLOS	DELGADILLO CARDENAS	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
303	JEAN	DENEGRE	ICA	FRANCE	CONSEIL NAT. INFORM GEOGRAPH.
410	PATRICIA	DIAZ ROMO	INV	MEXICO	CUARTO MENGUANTE EDITORES
146	STIG	DILLING	DEL	DENMARK	DANISH CARTOGRAPHIC ASS.
147	LISE	DILLING	ACC	DENMARK	
427	ANDREW V.	DOUGLAS	PAR	U.S.A.	
235	FREDERICK J.	DOYLE	PAR	U.S.A.	U.S. GEOLOGICAL SURVEY
419	BERNHARD	DRESSE	PAR	FEDERAL REPUBLIC OF GERMANY	BAYER LANDESVERMESSUNGSAMT
104	STANISLAUS	DUFFY	PAR	AUSTRALIA	WEMBLEY COLLEGE OF TAFE

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(HASTA ANTES DE LAS 10:00 HORAS)

No DE REG.	N O M B R E		CONDICION	P A I S	ORGANIZACION QUE REPRESENTAN.
105	GLENICE E.	DUFFY	ACC	AUSTRALIA	
444	ULLA	DURVALL	PAR	SWEDEN	ESSELTE MAP SERVICE
241	ALEX	ELDER	PAR	UNITED KINGDOM	JOHN BARTHOLOMEW AND SON LTD
68	JAIME	EMETERIO SALGADO	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
580	JESUS	ESCARENO RAMIREZ	PAR	MEXICO	PETROLEOS MEXICANOS
743	MANUEL	ESPAÑOL GONZALEZ	PAR	ESPAÑA	RHEA CONSULTORES S.A.
676	JOSE CARLOS	ESQUIVEL FLORES	PAR	MEXICO	I.N.E.G.I. REGIONAL NORTE
674	NORA	EVANS	PAR	U.S.A.	INTERGRAPH
669	PLACIDINO	FAGUNDES M	DEL	BRAZIL	SOC.BRASILEIRA DE CARTOGRAFIA
223	RICHARD	FALKE	PAR	FEDERAL REPUBLIC OF GERMANY	INST. FUR ANGEWANDTE GEODASIE
603	EDGARDA	FELETTI MASE	PAR	ITALY	COMUNE DI VENEZIA
607	AGUSTIN	FERNANDEZ EQUIARTE	PAR	MEXICO	INST.DE CIENCIAS DEL MAR,UNAM
463	LUCAS	FERNANDEZ REYES	DEL	CUBA	CUBAN INS.GEODESY CARTOGRAPHY
63	LAZARO	FLORES MORA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
111	ULRICH	FREITAG	ICA	FEDERAL REPUBLIC OF GERMANY	GERMAN SOCIETY OF CARTOGRAPHY
53	JOSE LUIS	FRIAS SALAZAR	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
734	JESUS	FUENTES LOAIZA	PAR	MEXICO	I.N.E.G.I. REG. OCCIDENTE
271	HAROLD	FULLARD	DEL	UNITED KINGDOM	GEORGE PHILIP AND SON LTD.
530	JOAQUIN	GALARZA	VIP	FRANCE	MUSEE D L'HOMME
218	RUI HENRIQUES	GALIANO BARATA PINTO	DEL	PORTUGAL	INST. GEOGRAFICO E CADASTRAL
336	ENRRIQUETA	GARCIA	PAR	MEXICO	ESTADIGRAFIA S.A.
670	EFREN	GARCIA	PAR	MEXICO	LICEO MEXICANO JAPONES A.C.
334	ANGEL	GARCIA AMARO	PAR	MEXICO	ESTADIGRAFIA S.A.
675	FAUSTO	GARCIA CASTAÑEDA	PAR	MEXICO	SRIA.DE LA REFORMA AGRARIA
696	ARTURO G.	GARCIA CASTRO	PAR	MEXICO	DIRECCION GRAL.DE ESTADISTICA
199	ANA	GARCIA DE FUENTES	PAR	MEXICO	INST. DE GEOGRAFIA U.N.A.M.
494	PORFIRIO	GARCIA DE LEON	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
510	FRANCISCO	GARCIA MOCTEZUMA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
187	FERNANDO I.	GARCIA PALOMARES	PAR	MEXICO	S.A.R.H.
367	GEOFFREY	GATHERCOLE	PAR	UNITED KINGDOM	ROYAL GEOGRAPHICAL SOCIETY
416	PATRICIA	GILMARTIN	PAR	U.S.A.	UNIVERSITY OF SOUTH CAROLINA
306	PACE	GIOVANNI BATTISTA	PAR	ITALY	CENTRO INF.GEOTOPOGRAFICHE A.
346	EIJI	GOJO	DEL	JAPAN	NIHON UNIVERSITY
198	MA. CONSUELO	GOMEZ ESCOBAR	PAR	MEXICO	INST. DE GEOGRAFIA U.N.A.M.
686	EMMA	GONZALEZ CARMONA	PAR	MEXICO	COLEGIO MEXIQUENSE
486	IGNACIO I.	GONZALEZ CASSY	PAR	MEXICO	SECRETARIA DE MARINA
49	RAUL	GONZALEZ DE LA TORRE	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
447	HENRYK	GORSKI	PAR	POLAND	GEOKART WARSAW POLAND
464	JOHN J.	GRAHAM	PAR	U.S.A.	AMERICAN SOCIEYT FOR P.
465	EVE	GRAHAM	ACC	U.S.A.	
426	NEIL GORDON	GRANT	PAR	CANADA	SURVEYS AND MAPPING BRANCH
297	JEAN-PHILIPPE	GRELOT	DEL	FRANCE	INST. GEOGRAPHIQUE NATIONAL
414	GYLFI MAR	GUDBERGSSON	DEL	ICELAND	UNIVERSITY OF ICELADN
730	ANGEL CECILIO	GUERRERO ZAMORA	PAR	MEXICO	ESCUELA DE ING.CIVIL U.A.P.
479	HERVE	GUICHARD	PAR	FRANCE	SPOT IMAGE
234	STEPHEN CHARLES	GUPTILL	PAR	U.S.A.	U.S. GEOLOGICAL SURVEY
195	MARIA TERESA	GUTIERREZ DE M.	PAR	MEXICO	INST. DE GEOGRAFIA U.N.A.M.
606	SILVESTRE	GUTIERREZ MENDOZA	PAR	MEXICO	I.N.E.G.I. REG.SAN LUIS P.
100	DOMENICA	GUTIERREZ MIRANDA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
279	JAMES	HALL	DEL	NEW ZEALAND	DPT.SURVEY & LAND INFORMATION
119	FOLKE	HALLBJORNER	PAR	SWEDEN	HYDROGRAPHIC DEPARTMENT

LISTADO DE PARTICIPANTES REGISTRADOS AL 10-19-87
(HASTA ANTES DE LAS 10:00 HORAS)

No DE REG.	N O M B R E		CONDICION	P A I S	ORGANIZACION QUE REPRESENTAN
81	FRANCISCO	HANSEN ALBITES	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
454	ARNE PER	HAUGAN	PAR	NORWAY	GEOLOGICAL SURVEY OF NORWAY
455	ANNE MARGRETHE	HAUGAN	ACC	NORWAY	
398	GRETCHEN	HAWK	PAR	MEXICO	DEFENSE MAPPING AGENCY INT.
711	PETER	HAYWOOD	PAR	UNITED KINGDOM	ORDNANCE SURVEY
703	GRANT	HEAD	ICA	CANADA	WILFRID LAURIER UNIVERSITY
443	OLOF VILHELM	HEDBOM	PAR	SWEDEN	SWEDISH GEOGRAPHIC SOCIETY
180	MARIANNE ELVAD	HENRIKSEN	DEL	DENMARK	GEODAETIS INSTITUT
181	BO SEIDLER	HENRIKSEN	ACC	DENMARK	
491	HERBERT	HERNANDEZ ARANA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
496	ARTURO	HERNANDEZ MONTES	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
54	ANTONIO	HERNANDEZ NAVARRO	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
578	HORACIO	HERNANDEZ SANCHEZ	PAR	MEXICO	PETROLEOS MEXICANO
680	LISBETH	HEUSE	PAR	CANADA	MACDONALD DETTWILER
433	DAVID	HILLER	PAR	U.S.A.	
685	CUPERTINO	HINOJOSA GONZALEZ	PAR	MEXICO	COLEGIO MEXIQUENSE
269	DAVID R.	HOCKING	PAR	AUSTRALIA	ASS. OF AERIAL SURVEYORS
270	IRIS	HOCKING	ACC	AUSTRALIA	
342	MUTSUKO	HOYA	PAR	JAPAN	
360	MEI-LING	HSU	PAR	U.S.A.	UNIVERSITY OF MINNESOTA
541	YUJU	HU	ICA	PEOPLE'S REPUBLIC OF CHINA	WUHAN TEC.UNIV.OF SURV.& MAPP
290	MARY FRANCIS	HUTCHINSON	PAR	AUSTRALIA	MELDRUM BURROWS & PARTNERS
89	GERARDO	IBARRA CONTRERAS	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
245	ANDREAS	ILLERT	PAR	FEDERAL REPUBLIC OF GERMANY	UNIVERSITY OF HANNOVER
503	JUAN A.	IRURETAGOYENA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
356	TIM	JACKSON	PAR	UNITED KINGDOM	BRITISH PETROLEUM
458	MIKE	JACKSON	PAR	UNITED KINGDOM	LASER-SCAN LABORATORIES L.
248	ERNST	JAGER	PAR	FEDERAL REPUBLIC OF GERMANY	UNIVERSITY OF HANNOVER
694	JOSE LUIS	JASPEADO SOLIS	PAR	MEXICO	TESORERIA DEL D.D.F.
75	ZEFERIN	JUAREZ SORIANO	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
276	NAFTALI	KADMON	PAR	ISRAEL	THE HEBREW UNIVERSITY
277	SHOSHANA	KADMON	ACC	ISRAEL	
599	DENNY Z.	KALENSKY	VIP	ITALY	FAO
343	TOSITOMO	KANAKUBO	DEL	JAPAN	THE JAPAN MAP CENTER
485	KEI	KANASAWA	PAR	JAPAN	NATIONAL COMM. OF CARTOGRAPHY
381	TOSHIKAZU	KATOH	PAR	JAPAN	NIPPON LIGHTHOUSE,WELFARE C.
238	IB RONNE	KEJLBO	DEL	DENMARK	DANISH CARTOGRAPHIC SOCIETY
210	HANS F.	KERN	PAR	FEDERAL REPUBLIC OF GERMANY	FACHHOCHSCHULE KARLSRUHE
211	CHRISTINA	KERN	ACC	FEDERAL REPUBLIC OF GERMANY	
162	ARIE	KERS	PAR	NETHERLANDS	I.T.C.
163	ELIZABETH	KERS-TEN HAVE	ACC	NETHERLANDS	
118	A. JON	KIMERLING	DEL	U.S.A.	OREGON STETE UNIVERSITY
122	MASAMI	KOMIYA	PAR	JAPAN	TEIKOKU-SHOIN CO. LTD.
350	KICHISHIGE	KON	PAR	JAPAN	KOKUSAI KOGYO CO.,LTD
101	GOTTFRIED	KONECNY	VIP	FEDERAL REPUBLIC OF GERMANY	INST. FOR PHOTOGRAMMETRY
581	MILAN	KONECNY	INV	CZECHOSLOVAKIA	UNIV.OF BRNO DEP.GEOGR.
687	JORGE BERNARDO	KONIG	DEL	ARGENTINA	INSTITUTO GEOGRAFICO MILITAR
391	JORMA	KORHONEN	PAR	SWEDEN	UNIVERSITY OF GOTHENBURG
466	LESZEK A.	KOSINSKI	VIP	CANADA	INTERNAT. GEOGRAPHICAL UNION
616	CONRADO	LABRA LOZA	PAR	MEXICO	I.N.E.G.I. REGIONAL OAXACA
575	OMAR	LAKHIAR	DEL	MOROCCO	MAROC

LISTADO DE PARTICIPANTES REGISTRADOS AL 10-19-87
(HASTA ANTES DE LAS 10:00 HORAS)

No DE REG.	N O M B R E		CONDICION	P A I S	ORGANIZACION QUE REPRESENTAN
387	RAGNAR	LARSSON	PAR	SWEDEN	NAT. LAND SURVEY OF SWEDEN
457	DONALD T.	LAUER	PAR	U.S.A.	UNITED STATES GEOLOGICAL SURV
591	YEONG-WOO	LEE	PAR	REPUBLIC OF KOREA	NATIONAL GEOGRAPHY INS.
505	MA. DEL PILAR	LEGARREA M.	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
501	JUAN C.	LEON MARTINEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
371	KENNETH J.	LESTER	DEL	SOUTH AFRICA	SURVEYS AND MAPPING
400	PUI LAM	LEUNG	PAR	HONG KONG	SURVEY AND MAPPING OFFICE
239	HAG	LEWIS	DEL	UNITED KINGDOM	
240	DOREEN	LEWIS	ACC	UNITED KINGDOM	
262	KE	LIAO	PAR	PEOPLE'S REPUBLIC OF CHINA	INST. OF GEOGRAPHY OF CHINES
175	WERNER	LICHTNER	DEL	FEDERAL REPUBLIC OF GERMANY	UNIVERSITY OF HANNOVER
590	SUN-HO	LIM	DEL	REPUBLIC OF KOREA	NATIONAL GEOGRAPHY INST.
312	ARNE EDWARD	LINDBERG	PAR	SWEDEN	ESKILSTUNA KOMMUN
477	RONALD H.W	LINTON	ICA	U.S.A.	UNIVERSITY OF MARYLAND
261	YUE	LIU	PAR	PEOPLE'S REPUBLIC OF CHINA	INST. OF GEOGRAPHY OF CHINES
286	ALFREDO	LLANOS VINA	PAR	SPAIN	INSTITUTO GEOGRAFICO NACIONAL
83	JAVIER	LOPEZ CALOCA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
115	WILLIAM GEORGE	LOY	PAR	U.S.A.	UNIVERSITY OF OREGON
542	YONGSEN	LU	PAR	PEOPLE'S REPUBLIC OF CHINA	CHINESE CARTOGRAPHIC P. HOUSE
729	CLAUDIO	LUCAREVSCHI	DEL	BRAZIL	SOCIEDADE BRASILEIRA DE CART.
95	ROSA MARIA	LUNA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
363	MIGUEL	LUNA PARRA	PAR	MEXICO	NACIONAL FINANCIERA, SCN
456	EDEL HELEN	LUNDEMO	PAR	NORWAY	NORWEGIAN ASS.FOR CARTOGRAPHY
612	NOE	MAGAÑA ECHEVERRIA	PAR	MEXICO	COM.FEDERAL DE ELECTRICIDAD
273	ANDRZEJ	MAKOWSKI	PAR	POLAND	POLITECHNIKA WARSZAWSKA
361	DAVID	MARK	PAR	U.S.A.	STATE UNIVERSITY OF NEW YORK
462	ARACELI	MARTIN DOMINGO	ACC	SPAIN	
204	MARIA MARGARITA	MARTIN GONZALEZ	ACC	SPAIN	
203	ANTONIO	MARTIN SANCHEZ	DEL	SPAIN	SERV. GEOGRAFICO DEL EJERCITO
712	EDUARDO	MARTINEZ RODRIGUEZ	PAR	MEXICO	INST. MEXICANO DEL PETROLEO
144	ROBERT W.	MARX	ICA	U.S.A.	U.S. CENSUS BUREAU
145	JANET	MARX	ACC	U.S.A.	
406	GERALD	MCGRATH	ICA	CANADA	QUEEN'S UNIVERSITY
407	JOAN MARGARET	MCGRATH	ACC	CANADA	
217	PETER	MCMASTER	PAR	UNITED KINGDOM	ORDNANCE SURVEY
354	GABRIELA DEL S.	MENA MANRIQUE	PAR	MEXICO	COLEGIO DE GEOGRAFIA U.N.A.M.
677	DANIEL	MENDOZA ARAIZA	PAR	MEXICO	UNIV. AUT. DE SINALOA
355	HECTOR	MENDOZA VARGAS	PAR	MEXICO	GEOGRAPHY COLLEGE-U.N.A.M.
292	EDGAR	MERCADO PONCE	PAR	MEXICO	UNIVERSIDAD MICHOACANA
604	FRANCOIS-GUY	MEUNIER	DEL	FRANCE	ORSTOM
707	ANNA	MEUNIER	ACC	FRANCE	
249	UWE	MEYER	PAR	FEDERAL REPUBLIC OF GERMANY	UNIVERSITY OF HANNOVER
535	NICOLAY	MEZHELOVSKY	DEL	U.S.S.R.	MINISTRY OF GEOLOGY USSR
432	PAUL REDFERN	MIDDLETON	PAR	UNITED KINGDOM	TIMES BOOKS LIMITED
453	TORMOD	MIDTTUN	PAR	NORWAY	NATIONAL SURVEY OF NORWAY
125	MIROSLAV	MIKSOVSKY	DEL	CZECHOSLOVAKIA	CZACHOSLOVAK COMMITTE ON CART
399	MONICA	MILAM	PAR	U.S.A.	DEFENSE MAPPING AGENCY INT.
422	DIMITAR	MILENKOV	DEL	BULGARIA	COMITE D'ARRANGEMENT TERIT.
592	TAE-JUNG	MIN	DEL	REPUBLIC OF KOREA	NAT.GEOGRAPHY INSTITUTE
335	ANTONIO	MIRANDA GARCIA	PAR	MEXICO	ESTADIGRAFIA S.A.
121	CHOZO	MIYAKAWA	PAR	JAPAN	TEIKOKU-SHOIN CO. LTD.

LISTADO DE PARTICIPANTES REGISTRADOS AL 10-19-87
(HASTA ANTES DE LAS 10:00 HORAS)

No DE REG.	N O M B R E		CONDICION	P A I S	ORGANIZACION QUE REPRESENTAN
584	JOSE MANUEL	MIRANO LINDE	PAR	SPAIN	EMPRESA MUNICIPAL DE INF.
143	HAROLD	MOELLERING	PAR	U.S.A.	OHIO STATE UNIVERSITY
202	JOSE OMAR	MONCADA	PAR	MEXICO	INST. DE GEOGRAFIA U.N.A.M.
420	DANIEL CESAR	MONTEIRO	PAR	BRAZIL	DIR.DE HIDROGRAFIA BRASILIAN
58	CRISTOBAL	MORALES BEJAR	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
196	LUIS MIGUEL	MORALES MANILLA	PAR	MEXICO	INST. DE GEOGRAFIA U.N.A.M.
695	RAFAEL	MORANCHEL	PAR	MEXICO	TESORERIA DEL D.D.F.
417	TAKASHI	MORITA	PAR	JAPAN	KOKUSAI KOGYO
474	TOSHIHIRO	MORITA	PAR	JAPAN	TAIKI SOKURYO CO. LTD.
228	JOEL L.	MORRISON	ICA	U.S.A.	
229	BEVERLY A.	MORRISON	ACC	U.S.A.	
448	WIESKAWA	MOZOLEWSKA	ACC	POLAND	
165	J.C.	MULLER	PAR	NETHERLANDS	I.T.C.
390	JOSEPH K.W.	MUSABULA	DEL	ZAMBIA	SURVEY DEPARTMENT
571	ALAIN JEAN	MUSSET	PAR	MEXICO	
170	JOCELYNE	MYRE	ACC	CANADA	
233	MICHAEL P.	McDERMOTT	DEL	U.S.A.	U.S. GEOLOGICAL SURVEY
280	ROBERT B.	McMASTER	PAR	U.S.A.	UNIV.CALIFORNIA,LOS ANGELES
467	B.	NAERT	PAR	FRANCE	INST. NATIONAL DE LA RECHERCE
159	NOBUO	NAGAI	PAR	JAPAN	GEOGRAPHICAL SURVEY INSTITUTE
339	SYLVIA	NAYOAN	PAR	INDONESIA	INDONESIAN SURVEYOR ASS.
376	JOACHIM	NEUMANN	ICA	FEDERAL REPUBLIC OF GERMANY	FACHHOCHSCHULE KARLSRUHE
588	MANUEL	NIETO SALVATIERRA	PAR	SPAIN	DIPUTACION DE VALENCIA
374	ORLANDO	NINO FLUCK	VIP	COLOMBIA	PANAM INST.OF GEOGRAPHY HIST.
140	KEIJI	NISHIMURA	PAR	JAPAN	JAPANESE ASS. OF SURVEYORS
383	STURE	NORBERG	DEL	SWEDEN	NAT. LAND SURVEY OF SWEDEN
120	GORAN	NORDSTROM	PAR	SWEDEN	HYDROGRAPHIC DEPARTMENT
293	RODOLFO	NUNEZ DE LAS CUEVAS	DEL	SPAIN	INSTITUTO GEOGRAFICO NACIONAL
294	PATRICIA	NUNEZ DE LAS CUEVAS	ACC	SPAIN	
216	ERIC ARTHUR	OBERG MATS	PAR	SWEDEN	HAGCONSULT AB
287	PETER GREGORY	OCHMAN	PAR	AUSTRALIA	THE UNIVERSITY OF MELBOURNE
377	JUDY M.	OLSON	DEL	U.S.A.	MICHIGAN STATE UNIVERSITY
213	ALEJANDRO	ORDAZ MASCORRO	PAR	MEXICO	FERTILIZANTES MEXICANOS
141	FERJAN	ORMELING	ICA	NETHERLANDS	UTRECHT UNIVERSITY
495	FRANCISCO	OROZCO CHAVEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
243	ROBIN	ORR	PAR	UNITED KINGDOM	JOHN BARTHOLOMEW AND SON LTD
244	KATHLEEN	ORR	ACC	UNITED KINGDOM	
84	ANTONIO	ORTIZ MORALES	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
449	HIROSHI	OTA	PAR	JAPAN	KEIO GIJYUKU FUTSUBU SCHOOL
384	LARS	OTTOSON	DEL	SWEDEN	NAT. LAND SURVEY OF SWEDEN
450	DAVID HUW	OWEN	PAR	UNITED KINGDOM	THE NATIONAL LIBRARY OF WALES
183	JOAQUIN	PALACIOS ROJI	PAR	MEXICO	GUIA ROJI S.A. DE C.V.
182	AGUSTIN	PALACIOS ROJI GARCIA	PAR	MEXICO	GUIA ROJI S.A. DE C.V.
189	CHRISTER	PALM	PAR	SWEDEN	ROYAL INSTITUTE OF TECHNOLOGY
190	INGEBORG	PALM	ACC	SWEDEN	
388	OWE	PALMER	PAR	SWEDEN	NAT. LAND SURVEY OF SWEDEN
492	UBERTINO	PANTOJA GUZMAN	PAR	MEXICO	DIRECCION GBAL. DE GEOGRAFIA
133	ARPAD	PAPP-VARY	DEL	HUNGARY	NAT. OFFICE OF LANDS MAPPING
283	CARLOS FCO.	PAREDES VARGAS	PAR	MEXICO	INST. MEXICANO DEL PETROLEO
296	BRUNO	PASQUIER	PAR	FRANCE	INST. GEOGRAPHIQUE NATIONAL
690	CHRISTINE	PASQUIER	ACC	FRANCE	

10/19/87

LISTADO DE PARTICIPANTES REGISTRADOS AL 10-19-87
(HASTA ANTES DE LAS 10:00 HORAS)

No DE REG.	N O M B R E		CONDICION	P A I S	ORGANIZACION QUE REPRESENTAN
605	BERNARD	PATERNAULT	PAR	FRANCE	MICHELIN
378	DONALD TREVOR	PEARCE	ICA	AUSTRALIA	INTERNAL. CARTOGRAPHIC ASSN.
379	PAMELA	PEARCE	ACC	AUSTRALIA	
253	MONIQUE	PELLETIER	PAR	FRANCE	BIBLIOTHEQUE NATIONALE
688	H.OSCAR JOSE	PENA	DEL	ARGENTINA	INSTITUTO GEOGRAFICO MILITAR
185	OMAR	PEREZ GALINDO	PAR	MEXICO	S.A.R.H.
617	LUIS CARLOS	PEREZ MUÑOZ	PAR	MEXICO	I.N.E.G.I. REGIONAL OCCIDENTE
671	RANDOLPH A.	PEREZ NEGRON	PAR	VENEZUELA	MARAVEN S.A.
405	GOSTA	PERSSON	PAR	SWEDEN	GEOLOGICAL SURVEY OF SWEDEN
60	JOSE LUIS	PEÑA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
274	MIKLOS	PINTHER	PAR	U.S.A.	UNITED NATIONS
672	ISABEL CECILIA	PIÑATE DE ROLLA	ACC	VENEZUELA	
212	WOLFRAM	POBANZ	PAR	FEDERAL REPUBLIC OF GERMANY	FREIE UNIVERSITAET BERLIN
177	EDWIN	PODSCHADLI	PAR	FEDERAL REPUBLIC OF GERMANY	
582	EDWIN	PODSCHADLI	PAR	FEDERAL REPUBLIC OF GERMANY	GERMAN SOCIETY OF CART.
583	HERTA	PODSCHADLI	ACC	FEDERAL REPUBLIC OF GERMANY	
98	JOSE ANTONIO	PONCELIS GASCA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
308	MICHEL	PORTAIS	PAR	MEXICO	ORSTOM
470	DOMINGO	POZOS	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
258	APORN	PROMPRASIT	PAR	THAILAND	LAND DEVELOPMENT DEPARTMENT
728	PAUL	PUGLIESE	PAR	U.S.A.	TIME MAGAZINE
78	SOFIA	QUIROZ HERNANDEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
714	HUBERTO	QUIÑONES G.	PAR	MEXICO	D.G.G.
577	AMADEO	RADILLO DIAZ	PAR	MEXICO	PETROLEOS MEXICANOS
221	ANA MARIA	RALHETA BARREIRO G.	ACC	PORTUGAL	
353	JORGE	RAMIREZ BECERRIL	PAR	MEXICO	COLEGIO DE GEOGRAFIA U.N.A.M.
73	ALFONSO	RAMIREZ GONZALEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
735	GERARDO	RAMIREZ MARES	PAR	MEXICO	I.N.E.G.I. REG. DE OCCIDENTE
597	HUMBERTO	RAMOS MORENO	PAR	MEXICO	COLEGIO DE LA FRONTERA NORTE
726	JEAN	RAVENEAU	PAR	CANADA	UNIV. LAVAL QUEBEC CANADA
184	ARILD	REITE	DEL	NORWAY	STATENS KARTVERK
424	NICHOLAS A.	RENZETTI	PAR	U.S.A.	JET PROPULSION LABORATORY
710	JUAN	REYES ALCANTARA	PAR	MEXICO	GOB. DEL ESTADO S.L.P.
619	M. ALBERTO	REYES IBARRA	PAR	MEXICO	I.N.E.G.I.REGIONAL CENTRO-SUR
430	DAVID	RHIND	ICA	UNITED KINGDOM	GEOGRAPHY DEPT.BIRKBECK C.
431	CHRISTINE	RHIND	ACC	UNITED KINGDOM	
589	MIGUEL ANGEL	RINCON ARGUDIN	PAR	MEXICO	INST. NACIONAL INDIGENISTA
188	DAVID	RIVAS JUAREZ	PAR	MEXICO	S.A.R.H.
613	MIGUEL ANGEL	RIVERA FIGUEROA	PAR	MEXICO	I.N.E.G.G.I.REGIONAL NOROESTE
507	JUAN FERNANDO	RIVERA LUGO	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
178	LEOPOLDO F.	RODRIGUEZ	PAR	MEXICO	INSTITUTO PANAMERICANO
52	FRANCISCO J.	RODRIGUEZ A.	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
364	CARLOS	RODRIGUEZ ROBLES	PAR	MEXICO	ARQ.CARLOS RODRIGUEZ Y ASOCS.
586	JOAQUIN	RODRIGUEZ RODRIGUEZ	PAR	SPAIN	EMPRESA MUNICIPAL DE INF.
394	MAX RICARDO	ROLLA FONT	PAR	VENEZUELA	MARAVEN S.A.
72	GERARDO DE J.	ROMERO	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
96	ROSA MARIA	RON PEREZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
193	BERNARD	ROULEAU	PAR	FRANCE	UNIVERSITE DE PAIRS
194	MARIE-ODILE	ROULEAU	ACC	FRANCE	
572	RICARDO	RUBALCAVA AYALA	PAR	MEXICO	SARH DGPES
207	LARS	RUBENSSON	DEL	SWEDEN	SRENSKA CELLULOSA AB

LISTADO DE PARTICIPANTES REGISTRADOS AL 10-19-87
(HASTA ANTES DE LAS 10:00 HORAS)

No DE REG.	N O M B R E		CONDICION	P A I S	ORGANIZACION QUE REPRESENTAN
208	OLLE	RUBENSSON	ACC	SWEDEN	
471	RICHARD I.	RUGGLES	PAR	CANADA	QUEEN'S UNIVERSITY
544	CARLOS ALBERTO	RUIZ BASTIEM	PAR	MEXICO	UNIVERSIDAD MICHOACANA
76	HECTOR	RUIZ HERREJON	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
386	BENGT	RYSTEDT	PAR	SWEDEN	NATIONAL LAND SURVEY
268	BENJAMI	SABIRON HERRERO	PAR	SPAIN	INST.CARTOGRAFIC DE CATALUNYA
509	MANUEL	SAENZ DE MIERA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
254	ABBAS	SAHAB	PAR	IRAN	SAHAB GEOGRAPHIC & DRAFTING
732	JEAN LOUIS	SAINT-JOAN	PAR	FRANCE	ELF-AQUITAINE
733	NICOLE	SAINT-JOAN	ACC	FRANCE	
534	THADA	SAISA-NGUAN	PAR	THAILAND	TOPOGRAPICAL SURVEY DIV.R.I.D
437	THADA	SAISANGUAN	PAR	THAILAND	ROYAL IRRIGATION DEPARTMENT
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90	ENRIQUE	SALAZAR	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
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595	MILTON	SANCHES	ACC	BRAZIL	
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64	ARMANDO	SANCHEZ ENRIQUEZ	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
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295	DIETER	SCHMID	PAR	FEDERAL REPUBLIC OF GERMANY	STATE SURV.OFFICE BADEN-WURTT
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285	MARTHI	SENN	ACC	SWITZERLAND	
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348	KUNIHIKO	SHIND	PAR	JAPAN	AERO ASAHI CORPORATION
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156	RICHARD M.	SMITH	PAR	U.S.A.	UNIV. OF ARKANSAS GEOGRAPHY
370	KEITH HOWARD	SMITH	DEL	AUSTRALIA	QUEENSLAND DEPT.OF MAP.& S.
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452	SIGRID	SOLBERG	ACC	NORWAY	
574	TRYGVE	SOLBERG	PAR	JAPAN	
678	MARC	SOURIS	PAR	FRANCE	ORSTOM
288	ERNST	SPIESS	DEL	SWITZERLAND	EIDG.TECHN. HOCHSCHULE ZURICH
289	URSULA	SPIESS	ACC	SWITZERLAND	
230	LOWELL E.	STARR	PAR	U.S.A.	U.S. GEOLOGICAL SURVEY
266	BANCHONG	SUBSANDEE	PAR	THAILAND	HYDROGRAPHIC DEPARTMENT ROYAL
435	PRIDI	SUMPURANABHAND	DEL	THAILAND	ROYAL THAI SURVEY DEPARTMENT
389	OVE	SUNDSTROM	PAR	SWEDEN	NAT. LAND SURVEY OF SWEDEN
487	RICARDO DANIEL	SYKES	DEL	ARGENTINA	FUERZA AEREA ARGENTINA
409	JANOS	SZEGO	PAR	SWEDEN	C.BOARD FOR REAL ESTATES DATA

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344	MASAYOSHI	TAKASAKI	PAR	JAPAN	THE JAPAN MAP CENTER
345	KAZUKO	TAKASAKI	ACC	JAPAN	
472	TAKAYUKI	TANAKA	PAR	JAPAN	CHUO CHIZU CO.LTD.
460	CHAMNAN	TANAKORN	PAR	THAILAND	AUTHORITY ELECTRICITY OF THAI
537	CHAMNAN	TANAKORN	PAR	THAILAND	SURVEY DIVISION EGAT
738	JOHN BUTED	TAYAMEN	DEL	PHILIPPINES	PHILIPPINE ARMY
114	FRASER	TAYLOR	ICA	CANADA	CARLETON UNIVERSITY
382	MARIE MADELEINE	THOMASSIN	DEL	FRANCE	OFF.DE LA RECHERCHE S.ET TECH
263	NORMANY J.W.	THROWER	PAR	U.S.A.	UNIVERSITY OF CALIFORNIA UCLA
264	ELIZABETH Mc.P	THROWER	ACC	U.S.A.	
372	WALDO	TOBLER	PAR	U.S.A.	UNIVERSITY OF CALIFORNIA
436	UDOM	TOPHUANG	DEL	THAILAND	ROYAL THAI SURVEY DEPARTMENT
402	KENNERT	TORLEGARD	VIP	SWEDEN	DEPT. OF PHOTOGRAMMETRY
731	EDGAR	TORRES TREJO	PAR	MEXICO	UNIVERSIDAD AUT.DE PUEBLA
136	TIMOTHY	TRAINOR	PAR	U.S.A.	U.S. BUREAU OF THE CENSUS
94	JAVIER	TREJO SALINAS	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
205	TIMO SAKARI	TUHKANEN	DEL	FINLAND	NATIONAL BOARD OF SURVEY
393	MARIA ALEJANDRA	URQUIOLA	PAR	VENEZUELA	MARAVEN S.A.
614	VICENTE	VALDEZ TAMEZ	PAR	MEXICO	I.N.E.G.I REGIONAL MONTERREY
421	JORDAN	VALKOV	DEL	BULGARIA	INSTITOUT PO KARTOGRAPHIA
532	GUILLERMO	VARGAS	PAR	MEXICO	UNIVERSIDAD MICHOACANA
693	GONZALO	VARGAS LOPEZ	PAR	MEXICO	TESORERIA DEL D.D.F.
93	ANTONIO	VAZQUEZ ECHAVARRIA	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
88	MIGUEL ANGEL	VIZCONDE	PAR	MEXICO	DIRECCION GRAL. DE GEOGRAFIA
130	PETER JAMES	WALBY	PAR	AUSTRALIA	MINES DEPT OF W. AUSTRALIA
131	INGEBORG	WALBY	ACC	AUSTRALIA	
176	HELEN MARGARET	WALLIS	ICA	UNITED KINGDOM	
139	RUILIN	WANG	DEL	PEOPLE'S REPUBLIC OF CHINA	NANJING UNIV.DEPT.GEOGRAPHY
539	JIAYAO	WANG	PAR	PEOPLE'S REPUBLIC OF CHINA	ZHENGZHOU COLL.OF SURV.& MAPP
473	HIROTAKA	WATANABE	PAR	JAPAN	TAIKI SOKURYO CO. LTD.
107	WIGAND	WEBER	PAR	FEDERAL REPUBLIC OF GERMANY	INST.FUR ANGEWANDTE GEODASIE
164	HENK	WEINREICH	PAR	NETHERLANDS	I.T.C.
251	CHARLES H.	WEIR	VIP	CANADA	INT. FEDERATION OF SURVEYORS
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298	JIM	WIDMARK	PAR	SWEDEN	NATIONAL LAND SURV. OF SWEDEN
171	JOSEPH W.	WIEDEL	PAR	U.S.A.	UNIVERSITY OF MARYLAND
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102	CLIFFORD H.	WOOD	DEL	CANADA	MEMORIAL UNIVERSITY
103	ALBERTA A.	WOOD	PAR	CANADA	AMERICAN CONGRESS ON S. & MAP
573	MASAI	YASUO	ICA	JAPAN	RISSHO UNIV.
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385	HAKAN	ZETTERBERG	PAR	SWEDEN	OVERKABTNATARNTNDICHETEN
404	STAFFAN	ZETTERLUND	PAR	SWEDEN	GEOLOGICAL SURVEY OF SWEDEN
538	QINGPU	ZHANG	DEL	PEOPLE'S REPUBLIC OF CHINA	RESEARCH INST.OF SURV. & MAP.
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691	URSULA MARIA	ZITNIK YANISCELLI	PAR	ARGENTINA	MINISTERIO DE RELACIONES EXT.

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209	RENATE	ZYLKA	PAR	FEDERAL REPUBLIC OF GERMANY	FREIE UNIVERSITAET BERLIN

VEDLEGG 2: Temakart i Valencia-regionen

GEOSCIENTIFIC MAP OF THE PROVINCE OF VALENCIA.

A new methodology of territorial analysis.

PROVINCIAL DIPUTATION OF VALENCIA.

Service of Geological Resources.

G. M. of P. of V. (Scale 1:200.000).

1. What is it?

The geoscientific cartograph is a group of maps which reflect the different units composing the environment in the Province of Valencia, taking into account the geological, geomorphological, edaphological, climatical, botanical and ecological elements, allowing an adequate group vision of the territory and its potentialities to be obtained.

The basic scientific information is integrated, interpreted and presented - in a way that is usable for non-specialists, amounting to a series of maps and undex cards, on which characteristics and qualities of the territory of direct interest for planning its use, are represented.

The qualities and variables of most importance to the environment have been selected for the Geoscientific Map of the Province of Valencia allowing the evaluation of the potencial and the limitations of the territory for different human activities, as well as the conservation quality of the different areas.

It constitutes a generalized methodological contribution that could be used as a model for realization in other areas as it provides a useful tool for recognition and territorial planning and the management of natural resources.

2. What is it for?

It is also an indispensable instrument when taking decisions in territorial planning of matters affecting the environmental use, based on its qualities aptitudes and limitations.

It guides the territorial planner on areas where certain types of use should be restricted, due to the unsuitable qualities presented and also in areas which should preferably be reserved for certain activities.

The guides are based on the quality and potentiality of the environment and the most important hazards affecting the different regions, such as foods, contamination of aquiphers, landshide and collapse, seismic activity and erosion.

It is also an indispensible resource for defining and representing the different environmental units, which assumes a first class cultural and educational scientific contribution providing the society with accurate information on this aspect.

3. Who is directed at?

This work should be used by:

- Technicians whose professional activity is related to the management of natural resources and territorial arrangement, geologists, architects, urbanists, forestry experts, agriculturists, Civil engineers, Cartographers

botanists, biologists, topographers, zoologists, mining engineers, civil - protection engineers, geographers, and environmentalists in general.
- State Public Administration, Self-governing, Provincial and Local Administrations, and self-governed organisations of Public, Urban and Agriculture Works.
- Natural Science teachers in primary and secondary education and department related to the environment in unniversities and research centres.
- Cultural centres libraries, newspaper libraries, for their spreading of - the natural heritage of the Province of Valencia.
- Naturalists, group ecologists and anyone interested in the environment.

4. The information it contains.

The final set of documents includes seven maps to scale 1:200.000, an explicative memory and an annex with index cards of the 791 units that form the - Valencian territory.

The map content is as follows:

1. Basic Map of geo-environmental units.
   The Provincial territory can be divided into seven environments, twenty-two systems and 79 morphodynamic units that try to show the objective features of the land and the parameters that characterize the environment. - On the index cards of the 79 units the following 44 parameters are analysed:
   - Material: type of rock, portant capacity, excavational facility, permeability, corrosiveness, slope stability and conservation interest.
   - Soils: FAO denomination, effective depth, organic matter, texture, stoniness, salinity, carbonates, structural stability and conservation --- practice.
   - Hydrology: System of rivers and water availability.
   - Hydrogeology: Type of aquipher and water availability.
   - Gradient relief: Rugosity and 5 classes of gradient.
   - Processes and Hazards: Risk of collapse, vulnerability to underground - water, type of erosion, potential and present degree, risk of fooding - and handslide.
   - Biotic factors: Vegetation and fauna.
   - Guides and limitations of use: Showing the recommended land use and most important limitations of its use conditions for laying foundations, degree of hillside stability, conservation interest, foods, soil preservation and underground water contamination.

2. Map of vulnerability to water contamination and risk of landslide.
   In terms of degree and type of permeability of the geological materials - that make up the Provincial territory, the courses and masses of surface water are cartographed and four categories of potential risk of contamination of underground water are marked out, non-vulnerable areas and areas of average or variable permeability. As to landslide risk, on a lithology and gradient basis, areas of hierarchized landslide risk in five categories of growing risk are shown.

3. Map of flood, subsidance and collapse, and seismic risks.
   On a basis of historical data, geology, sedimentology of recent deposits and studies about the probability of occurrance and size of the different hazards are reflected in a hierarchic form in categories of increasing - greatness, are cartographed, showing the great cavity collapses that have occurred in historical times.

4. Map of present degree at erosion.
   Made from a study of soil factors, torrentiality, slope, lithology and vegetation, reflecting the qualitative form of the erosional degree in the provincial territory, according to a hierarchic scale of five values.

5. Map of potencial erosion hazard.
   With the same criteria folowed in the previous map, the Provincial territory is divided in five classes of potential erosion risk, taking in account the supposts of vegetal couer disapparition and soil degradation. This supposts are considered only when slopes are greater then 25%.

6. Map of conservation quality.
   The conservational value of the 791 cartographed units, by the deliberated aggregation of the quality value corresponding to the five natural - environmental elements, vegetation, fauna, geology-geomophology-edapholo gy, protection of aquiphers and sceneryis determined. The landscape is - judged at the same time in terms of topographical and relief complexity, uneveness, vegetation and soil use, mass water presence, human actions, accesibility and visual incidence. The valuation results are placed on - the corresponding index cards and map, which includes five kinds of conservation interest, besides showing zones of high agricultural capacity, with the intention of preserving them from non-agricultural use.

7. Map of guides and limitations of use.
   This last map is of normative or vocational character of the natural environment. Including basis of the other maps, the areas where there should be restriction of certain types of use, dire to the characteristics and qualities not suitable for them that are presented, and also the areas that should be preferably reserved for certain activities.

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ENVIRONMENTAL CARTOGRAPHY AND MANAGEMENT OF NATURAL RESOURCES

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1. SUMMARY

The possibilities of applying the "environmental cartographic" techniques to the management of natural resources are analysed, the viability and limitations on different planning scales and application in the initial stages to a specific use assignment (location of waste processing systems) are tried out, at the same time tackling the subject of representation systems in this kind of cartography and offering an easily intelligible design and symbol system, through a specific production to a scale 1:200.000 : The Geoscientific Map of the Province of Valencia (Spain).

2. INTRODUCTION

In the last decade general social concern has arisen about the negative consequences of human actions on the environment and on human beings themselves. There is a social demand for such actions to be taken in accordance with aptitudes and limitations of the environment in each zone, and with concern for the careful use of natural resources. An adequate and accurate knowledge of the most significant variables is vital and also an accurate analysis of the existing relations between these variables.

Over the last few years a great quantity of scientific and technical work has been carried out to satisfy the social demand. The geoscientific cartograph has been pointed out for its advantages in cartographic representation, relative objectivity and integrative vocation. This technique is fundamentally based on existing relations in most of the zones above sea level on the Planet, between the rock or sediment type, the geomorphological characters of the surface, the soil that develops and the vegetation which appears. The contact between the different geological formations is the base of the most stable and exact cartographical delimitation.

The geo-environmental techiques and methodologies are to cartograph homogenous units and units of similar behaviour in aptitude and limitation use, allowing, on one hand, definition and charac-

terization of territory (through an analysis of the more significant variables) and on the other, provinding a criteria with which it is possible to design rational strategies for use of soil and its resources. As principal bibliographic reference, refer to the works of AMMER et al 1.981, CENDRERO 1.975 and 82, CENDRERO et al 1.980 and 86, CHRISTIAN 1.957, FISHER et al 1.972, 73, 74, LUTTIG 1.971, 72, 79, LUTTIG et al 1.974, URGOITI AND NIETO 1.980.

The aptitudes refer to territorial vocation to protect certain activities (agricultural, forestal, urban, ecological, industrial, infrastructural, etc) and the limitations refer to existing hazards to human activities (floods, soil erosion, contamination of aquifers, earthquakes, landslides, cyclones, volcanic activity and sinking and collapsing of land.

There are two classic methodological lines in making this kind of document-one, the direct cartography of defined homogeneous units, later described by a heterogeneous group of characteristics that are common to any part of the unit (morphology, climate, lithology, active processes, soil, vegetation, etc) and the other, making thematic maps of different significant features and their later combination by simple superposition manually or automatically, to obtain homogeneous units.

3. THE GEOSCIENTIFIC MAP OF THE PROVINCE OF VALENCIA

The last procedure has been used in the making of the Geoscientific Map of The Province of Valencia (Spain) to a scale of 1: 200.000, which has been made by the Service of Geological Resources of the Provincial Diputation and the Unniversities of Valencia and Cantabria. (CENDRERO et al 1.986)

The Province of Valencia is situated in the extreme Eastern centre of Spanish territory and has an unever topography of a surface area of 10.763 Km. square, its economy sustained by its agricultural and industrial regions and equally by its services. It has a population of 2.125.800 among the city of Valencia (30%) and the 263 local councils.

A documentation that reflects the exact and intergrated way the different units make up the natural environment of the Province of Valencia is what was aimed at with the stated cartograph, taking into account geological, geomorphical, climatic, botanical, and ecological factors. It should also show the relevant qualities and variables as conditioning the use of the environment by Mankind and evaluate the potential and limitations of the territory for the different activities, such as the conservation quality of the different regions.

The end result of this descriptive documentation is a cartographic document of a synthesis which gives a guide to the advisable use of the different zones of the Province and the restrictions that should be established in the necessary regions.

The basic scientific information has been put together and presented in a way usable to non-specialists through a series of maps and index cards of the characteristics and qualities of the land of immediate interest in planning its use.

At the same time it forms a generalised methodological contribution that could be used as a model in the realization of other areas, and is seen as a useful tool in the initial stages of land planning and the management of natural resources.

Previous geological cartography is a fundamental need, given that the geological contact to different types of rock and sediments is what allows the making of an exact cartographic delimitation and as demonstrated in most other countries, it shows the existing relation between the lithological groups, the surface geomorphology, the soil that develops and de vegetation.

The cartographic expression of this relation, that forms the geoenvironmental units presents difficulties in the symbolic representation on maps in aneasily generizable way, a problem solved on geological and topographical maps. It is both necessary and possible to define adequate symbol representation, of easy reading, along the lines used in the Geoscientific Map of the Province of Valencia.

For example, imagine the illegibility of this work if it had been compiled using documents made up through alphanumeric symbols alone.

The documental group (CENDRERO et al 1986) includes seven maps to a scale of 1:200.000 (geo-environmental units; vulnerability to water pollution and risk of landslide; the risks of flood, subsidance and collapse and seismic danger; degree of present erosion; risk of potential erosion; conservation capacity; and orientation and limitation of use) an explicative memory and annexe with descriptive index cards and valuation of the 791 units that make up the Valencian territory. These describe 44 different features that characterize each unit and form an authentic provincial data bank. The chosen cartographical scale is 1:200.000 has imposed to a general level of potential evaluation by the method used and by a group vision of the provincial territory.

As a previous and necessary step, a good geological cartograph was promoted by the Provincial Diputation of Valencia, which was made jointly with the Unniversity of Valencia and the Geological and Mining Institute of Spain (GUTIERREZ et al 1.984).

The final Map of the land-use recommendations is a synthesis of thematic maps, which translates the information contained in these maps in a way that is comprehensible to the non-specialist, and guides to the most convenient use for each zone in the province, if a reduction in the environmental potentiality is not wanted. It is not a map of use assignment. Use assignment has to take into account factors of other nature. Among the

recommended uses-protection, intensive and moderately intensive agriculture, restocking, reservation in industrial rock explotation are mentioned.

The territorial limitations for certain use are equally reflected by the natural hazards to which they are subjected, and finally there are collective white zones which correspond to provincial territorial areas where there is no definite natural vocation nor any important limitations. They are areas most suitable to constructive use (urban, industrial, etc) from the point of view of natural environmental potential.

Lastly, perhaps one achievment pointed out this work is the plastic and editorial result of this work, which consists in a memory of easy assimilation for the non-specialist, including seven maps on which colours and coloured symbols have been combined making it easily intelligible and attractive to the eye, and the index cards of the 791 units allowing a high level of information transmission and at the same time establishing the analysis and results obtained.

4. USE OF THE GEO-ENVIRONMENTAL TECHNIQUE FOR THE LOCATION OF CONCRETE ACTIVITY: THE SITING OF SOLID RESIDUE PROCESSING SYSTEM

The selective system of sites suitable for installing Controlled Solid Residue Refuse Disposals proposed by NIETO, M. et al (1.985 and 87) and NIETO (1.983 and 1.987) is based on the geo-environmental technique of superposition of thematic maps of significative variables with subject incidence duly adapted to the solid residue theme.

The superposition of variables allows rejection of areas not suitable for refuse dumping arriving in the end to the map of residue suitability.

In short, not wanting to be exhausting, the map-making, the studied variables and their deliberation are as follows:

. Hydrogeological or hidrological map, fundamentally taking into account the permeability that can be catalogued high, medium and low, the depth of the water and the proximity of soundings for urban provision. Also, the presence of streams and mass surface water must be analysed.

. Zones of high permeability and/or with the presence of surface water must be rejected for the locating of processing installations whereas zones of low permeability are favourable, leaving the medium permeability areas and reservation of other parameters.

. Ripability (excavation facility) and Topographic Map, studying ripability, land morphology and the existence of mines and quarries. The only existing limitation in this case is the non-existence of ripability when dealing with controlled refuse disposals of low density. The other characteristics whether favouring or not the system instalation will be considered but not excluded.

. Hazard Map, including hazards such as landslides, flooding, seismicity, cavity collapse. The existence of any of these phenomen invalidates the installing of processing systems, except when the said phenomenon can be resolved by corresponding engineering work at a reasonable cost.
. Meteorological study, includes and will eventually cartograph the following aspects: zones of thermal inversion, direction and velocity of wind, quantity and intensity of rainfall, average, maximum and minimum temperatures. The study may be carried out in zones that have already had other criteria solved.
. Vegetation and crops. Basically this has to take into account the mass tree covered areas and the ecological value of the vegetation. The types of crop will agree the price of soil and this is to be greatly considered, as in certain cases it could be as much as 50% of the investment.
. Urbanistic and infrastructural catalogning. The urbanistic catalogning decides the possibility of occupying soil except when this qualification is modified for this purpose. On rustic land it is possible to install refuse disposals if they are 2.000 metres away from inhabited areas. If they have the relevent control operation this distance could be reduced to 500 metres.

The existence of infrastructural tracks nearby will considerably reduce the expense of access construction.

Obviously, any existence of places of historical-artistic, archeological and natural interest must be taken into account at the time of locating the refuse disposal area.

5. GEO-ENVIRONMENTAL CARTOGRAPHY AND MANAGEMENT OF NATURAL RESOURCES: POSSIBILITIES AND LIMITATIONS

Given that it represents an effort in synthesis and deliberation in the different attributes that characterize the natural environment, the geo-environmental cartography forms a useful and objective tool in territorial classification in the initial studies of rational management of resources and territorial use.

Its range of applications is very well defined on lesser scales because a group vision of the territorial hierarchization and the landscape can be achieved, also pointing out areas of great natural quality that due to their fragility are incompatible to a purely productive use. This level of work can definitely define the territorial vocation to a very generic range of uses. It is the adequate frame for supramunicipal studies with surfaces greater than 2.500 or 3.000 Kms square and scales 1:100.000 or 1:200.000 or more.

On more detailed scales and especially in municipal and regional planning and management, the referred technique is not sufficient and must be completed with management techniques particular to each resource and quantification of each natural hazard.

Until now and apart from certain exceptions, it is a fact that integrated territorial studies do not meet all the protagonism they should in management decisions.

Perhaps one of the causes stems from the generality (not vagueness) of planning. The management of natural resources is more exacting than planning territorial use, except when dealing with a territory whose soil appears to be urban soil. So, the management of a determined resource, for example, water, must be shown on a geoscientific cartograph not only for the availability of the element and its vulnerability in certain units (which is in itself invaluable information) but for hydrological plans in force to be contemplated and proposing to the resource management modifications considered being adequate.

If it is the aim to achieve greater influence in political and administrative decisions, it is necessary to include other environmental aspects that are not directly obtained through the interpration of geological, vegetal and edaphological, topographical cartographs, etc.

A planning scale and municipal management where a more exact definition is required is even more evident and complex, obviously substancially increasing the economical expense of necessary studies.

As an illustrative example of what an environmental study on a detailed scale can be, the plan followed by the Service of Geological Resources of the Diputation of Valencia is summed up below. On the Valencian territorial surface the management unit most indicated of the natural resources is the region - (1.000 - 3.000 Km^2 surface) which reflects social-economic, cultural and historical reality of the territory and has a marked natural difference to the administrative reality; each region brackets a group of town councils frequently joined together in the managing of certain services.

This circunstance has led to taking the region as a nucleus in use planning and natural resource management and also keeps to a close agreement with geoenvironmental units (environmental and sub-environmental) of great hierarchy, defined in the Geoscientific Cartograph presented above.

This is how one of the greater dynamic social-economic regions of Provincial territory has been selected as a sample for methodological testing with the objective of optimizing territorial planning and natural resource management.

The thematic information is at the compiling stage moving, briefly to the study of the demand of different uses and resources and finishing with alternative management simulation through optimization techniques, according to objective funtions. The requests are based on and under restrictions that inpose the geo-environmental conditioning.

To sun up and not be exhausting, some aspects that are being tackled on a regional level are as follows:

a) Basic information of territory. This will consist in a detailed study of variables that contribute to environmental knowledge and that can enumerated as follows: Lithology, Geological Structure, Geomorphology, Soils, Vegetation and Fauna, Hydrology (surface and underground), Geological Resources. Their development will be carried out by this Service to a detailed scale of 1:25.000 and duly contrasted with existing information on much larger scales where they exist.

b) Evaluation of demands of natural resources and analysis of territorial occupation. In this section present, historical and potential stages of territorial occupation by mankind and activities will be tackled. The points to develop are: Demography, Uses of soil, Water demand, Mining demand, Infrastructural drainage, Present soil qualification.

c) Evaluation of natural resources. After analysing the first section the evaluation of characteristics and availability of geological resources in the region will be tackled together with other environmental resources. This way the following resources will be contemplated: vegetation, edaphological resources (soil potentiality) industrial and mining rocks, surface and underground water, scenery and ecological resources.

d) Development possibility of natural resources. Group analysis of the existing requests and lack or availability of resources in the region will enable knowing the present state of advantage and future tendency. The existing possibilities can be duly contemplated to make possible certain types of resources or attitudes in function, naturally from other analyses about extra-regional demands. In the same way, present and future importation needs will be contemplated.

e) Incidence of the exploitation of the natural environment and analysis of natural resources. All aspects whether positively or negatively effecting the natural surrounding must be equally contemplated, paying special attention to the following aspects: Real and potential contamination, Vulnerability of soil to contamination, Flood possibility, Seismic risk, Processes and risks in establishing the land (collapse, subsidence, landslide, etc).

f) Criteria of use of synthesis maps. Integration and group processing of all knowledge and information obtained will be used as a base for the development of the necessary documents to synthesize and clearly and intelligibly expose the present state and possibilities of future development of the region, which will allow making the guidelines for the action and making more adequate decisions.

All this information will be subsequently treated and analyzed to simulate under different conditions (demographic, economic, social, etc), which will be the most favourable (more productive

and less impacting) in the function of resources and existing limitations for the adequate development in the region.

6. CONCLUSION

It can be concluded from what has been previously exposed that the geo-enviromental map represents a useful instrument of work and, if the mentioned cartographical techiques are correctly followed, a series of objectives that can be covered, with difficulty, with other cartographical representation modalities of the actual territory can be reached. Among the advantages it presents these are the most important:

a) It represents an effort in synthesis and deliberation of the different attributes that characterize the natural environment.

b) It is a versatile technique that can be adapted to the peculiarities of different territories.

c) It constitutes a basic instrument for classifying territory and effects a successive hierarchization of the same function as the contemplated parameters, obtaining an authentic territorial and landscape taxonomy (environmental, subenvironmental, systems, units, etc.)

d) It provides a very wide territorial information demand that is not confined to the environment of the group of professionals that take part in the said work, but also it is requested and used by wide social sectors such as: cultural associations, Public Administration organizations, contractors, naturalists and professors, etc.

e) It is a very useful instrument for activities for "Intermediate technology" which do not justify the realization of specific environmental impact studies, especially indicated for all work that implies territorial transformation at a reduced size or of little impact. This quality makes it especially useful in areas which are experimenting an intense and diversified territorial demand by wide social sectors.

The Geo-environmental Cartograph has a very well defined field of application obtaining a group vision of a determined territory, that is an insubstitutable instrument on scales 1:200.000 and minor. Its application of more detailed scales can induce distortions but has previously defined a rank of analyzed variables on a larger scale that at the same time includes a wider territorial reality.

In the field of managment of natural resources or in quantification of natural hazards when working on larger scales studies must be nessarily completed with managment and quantification techniques particular to each resource or evolucion of each hazard for which the Geo-environmental Cartograph constitutes

a complementary element but not an absolute element for tackling the said managment. It is especially significative in the case of natural resources that, like water, have no reason to attribute to a concrete territorial point, but can be transported or applied in different places. For natural resources situated in concrete territory the geo-environmental techniques have a wider rank of application, being able to reach relatively detaited scales. In synthesis, it is fundamental to apply the technology or technologies most adequate in each case.

As a fundamental recommendation the need to generalise this type of cartograph is deduced as the relation between the expense derived from its elaboration and the benefits that can be obtained are extraordinarily favourable.

If the Geo-environmental Cartograph is versatile or adaptable at any territorial reality, necessary efforts to normalize the cartographical documents produced for the sake of a better quality and to make maps comparable to any territory in the world, the same that happens with other kinds of map, fundamentally geological and topographical, must be made. It can be used in this respect by the Scientific and Technical Community represented in the Geoscientific Map Congress that the Service of Geological Resources of the Provincial Diputation of Valencia and the Unniversities of Valencia and Cantabria have carried out on the Valencian territory.

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VEDLEGG 3: Artikkel/foredrag om NGUs kartproduksjons-system

THE MANUAL MAP PRODUCTION SYSTEM AT NGU - The Geological Survey of Norway

Arne P. Haugan - Section Leader, NGU

1. INTRODUCTION

Several useful flow diagrams for manual map production have been launched. From my point of view their greatest advantages lie in the planning phase. In some cases they may also be used in carrying out the production.

The NGU map production unit has not existed for so very long, actually only since 1967. We had to build the production system from scratch, including education of personell along with development of the system.

Visits to producers of maps in Switzerland, France and England, as well as our Norwegian Geographical Survey, during the years 1968-71, gave us ideas of how to define processes fitted for our production.

It was imperative to us to break down all processes to a level where they could be understood and learned by "anyone".

In order to have complete freedom in combining diverse foils by exposure, and to be quite free to make changes without too much work, the whole system is based on using negative materials. All positives are turned to negatives before processing.

From start (manuscript map) to finish (printing films) all foils are kept in register by a punch/pin system (PROTOCOL).

What about "automated" production systems? NGU uses line plotters (HP) for the production of map series with a relatively simple message in black and white, and ink-jet colour plotter (APPLICON) for geochemical and geophysical maps.

Automated production of digitalized complex thematic maps has developed rapidly in the last 5 years. Raster scanner/plotters have had an evolution which now makes them suitable for thematic map production (especially the SCITEX system). These systems involve such large investments however, both in equipment and personell, that only the "big" map producers can justify introducing them in to their production systems.

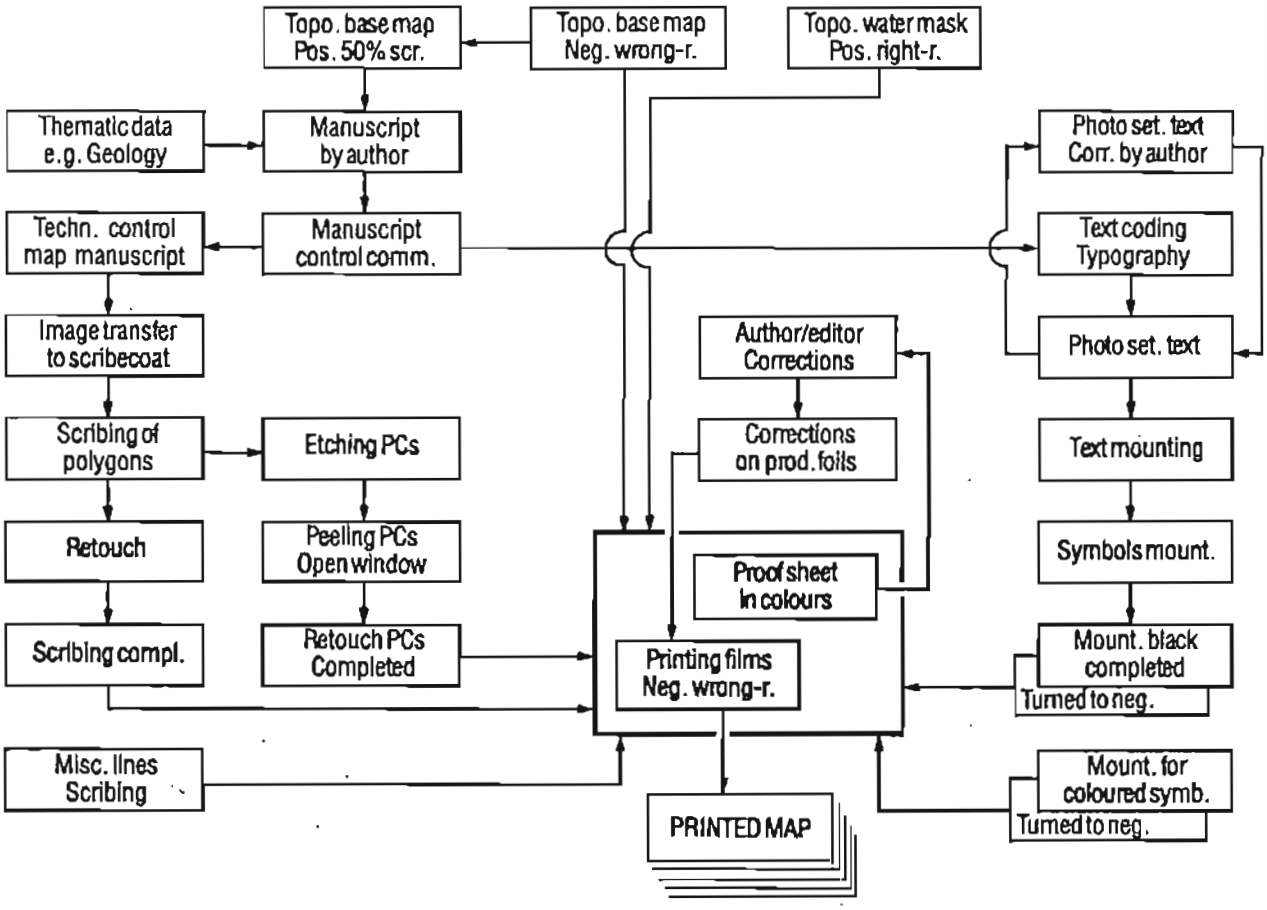
For the time being "small" producers have to use the simple and inexpensive - but still very satisfying - manual map production system.

2. DESCRIPTION OF THE SYSTEM

Below you will find a simplified flow diagram (Fig. 1) showing the production of a (geological) thematic map, starting with the topographic base map and the geological map manuscript and ending with the printed map.

NORGES GEOLOGISKE UNDERSØKELSE

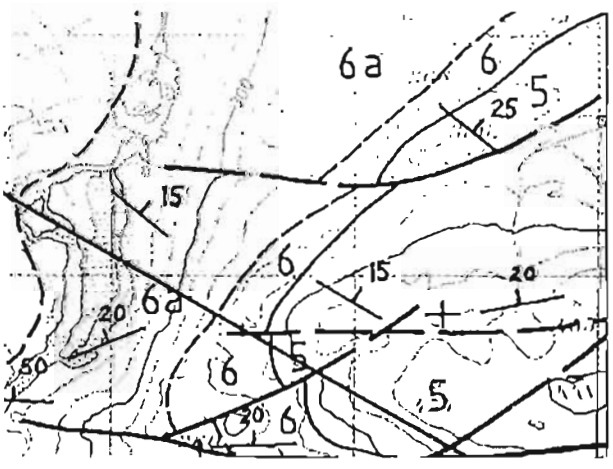
THEMATIC MAP PRODUCTION – SIMPLIFIED FLOW DIAGRAM



2.1. Topography

Negative right-reading film and positive right-reading water mask (full tone) are supplied by the Geographical Survey.

2.2. Manuscripts



The manuscript map is draughted by the author on a positive film copy of the topographic map, where the topography has been "reduced" by a 50% bi-angle screen. (150 l(inch) (Fig. 2). The author also compiles the legend, which is subsequently put into an automated text processing system.

Fig. 2. Manuscript draughted on a screened film of topographic map.

This makes it easy to make corrections. The author also colours a copy of the manuscript. (In some cases a draughtsman is used for this purpose, but many hidden faults can be found at this early stage if the author does this job himself.)

2.3. Control of manuscript

A control committee has been appointed for each map series. Once they have approved the manuscript, it is forwarded to the production unit.
Here there will be a technical control of the manuscript map, whether or not it is suited for the production procedures.

2.4. Image transfer to scribecoat, and scribing

The manuscript map is transferred to a scribecoat foil through a diazo process (Fig. 3a,b,c).

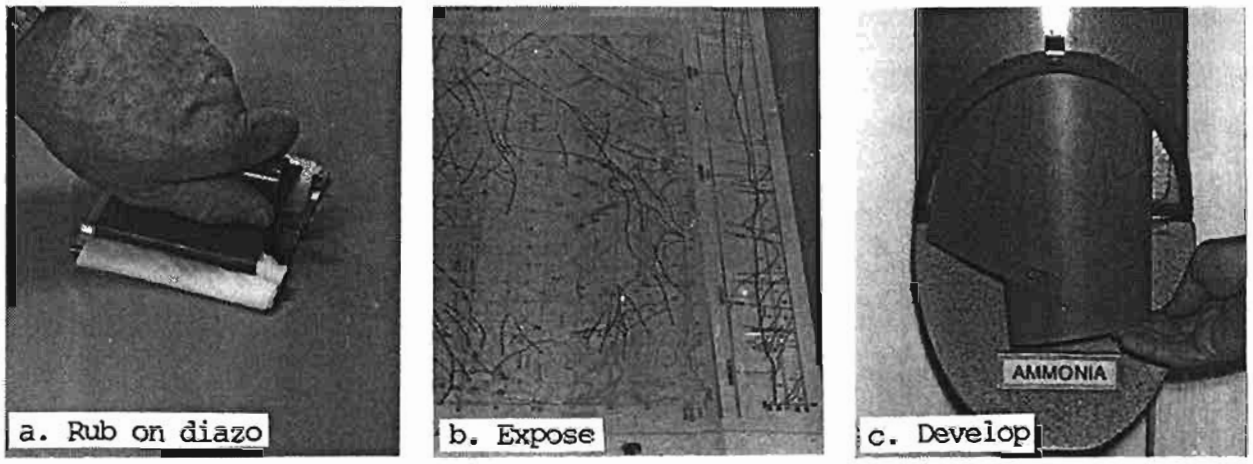


Fig. 3. Transfer of manuscript image to scribecoat

Scribing of polygons are now done (Fig. 4). All polygons are closed. If they are limited by areas of water, the bordering lines of the polygons are scribed into the water area and then back on land where the other side the polygon crosses the beachline.
(Excessive lines in water areas will be left out by exposure, using the positive water mask as hold-out mask).
Lines that should be seen in water areas are scribed on separate foils, and the water mask is not used during exposure.

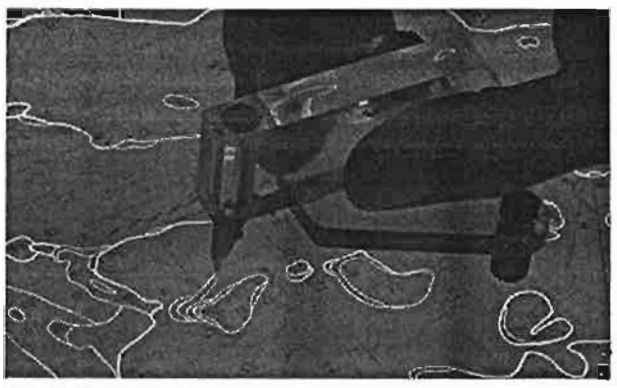


Fig. 4. Scribing of polygons

Retouching of scribecoats, sometimes by hatching lines, is the last sequence in scribing.

2.5. Masks

Peel-coat masks are etched photochemically, using the scribed original for polygons as a master (Fig. 5).

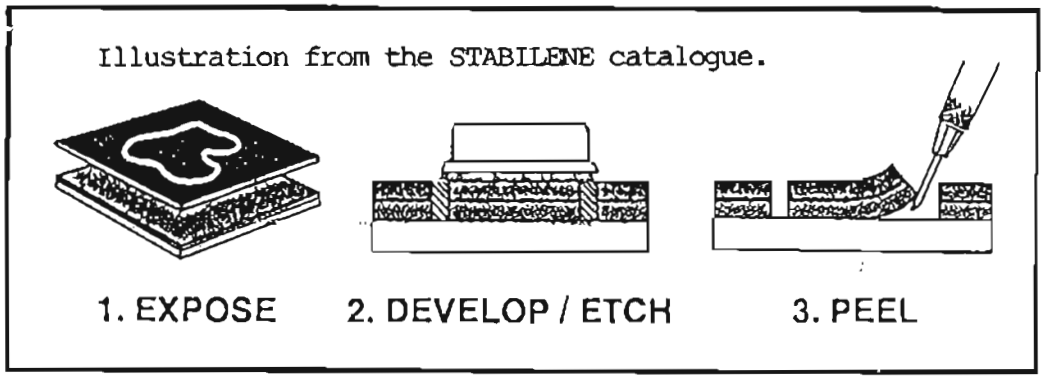


Fig. 5. Exposure, etching and peeling of masks

The number of peeled masks will be according to the number of colour hues needed to produce the map.

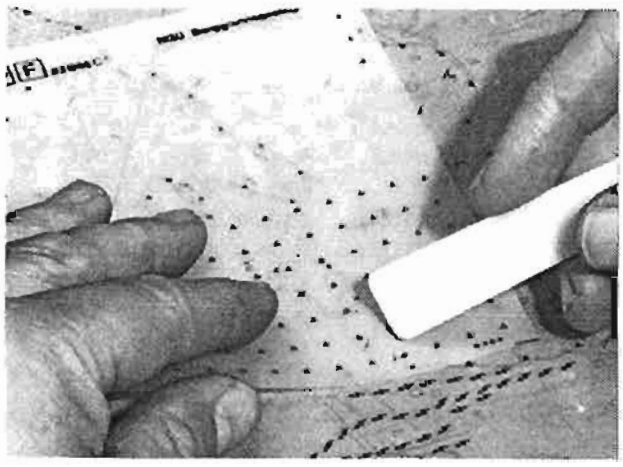
The masks are peeled (Fig. 5) as "open window" masks, separated in the peeling by the colour hues in the coded manuscript. (The coding of the manuscript is dealt with under 2.8. Colour coding).

2.6. Text and symbols

The manuscript for the legend and other texts are passed through the same control channels as described for the map manuscript.

The production unit gives the texts a coding before they are photo-set. After one or two corrections the photo-set text is mounted and photographed, and then put in its proper place on the mounting foil for black colour.

Symbols used in the map series have been draughted at a large scale, mounted for a sheet assembly and then photographed to the desired scale.



The film is then sent to Belgium (ALFAC) for the production of transfer symbols. Each symbol is supported by a very thin carrier film, which makes it possible to deal with very intricate symbols when needed. NGU has around 200 different symbols presented on 40 separate sheets.

Fig. 6. Transfer symbols (ALFAC, Belgium)

When the mountings for the map are made, the symbols are mounted on sheets separated according to the colour the symbols will have when printed.

2.7. Composition of colour hues using the NGU colour chart

Easy choice of colour hues has been facilitated by using the NGU colour chart.
The colour chart is based on 6 standard printing colours: black, blue, red, citrus yellow, chromium yellow and brown. These colours are close to the following PMS colours: Process black, Process blue, PMS 185, PMS 102, PMS 109 and PMS 168 (NGU Farge-plansje, A. Haugan 1981). The choice of red instead of magenta is essential for printing red symbols (more suited than magenta), and the red colour give warmer orange hues in combination with the yellows.
Two yellow printing colours are used in order to widen the green scale and yellow and yellowish hues, also in combination with brown and/or red.

Brown has been included as a printing colour because it is often used as a symbol colour, and also to provide a wide scale of brown in combination with the two yellows and red.

One can say that the colour chart has been taylored to fit the construction of geological bedrock maps in Norway.

It has been an aim to compose most of the colour hues by means of only two printing colours, so that as many of the colour hues as possible appear bright and clear.

This page will be printed at this scale in three colours.

NGU Colour Chart

Chosen colour hues are indicated by letter and number, e.g. E8, B4, a.s.o.

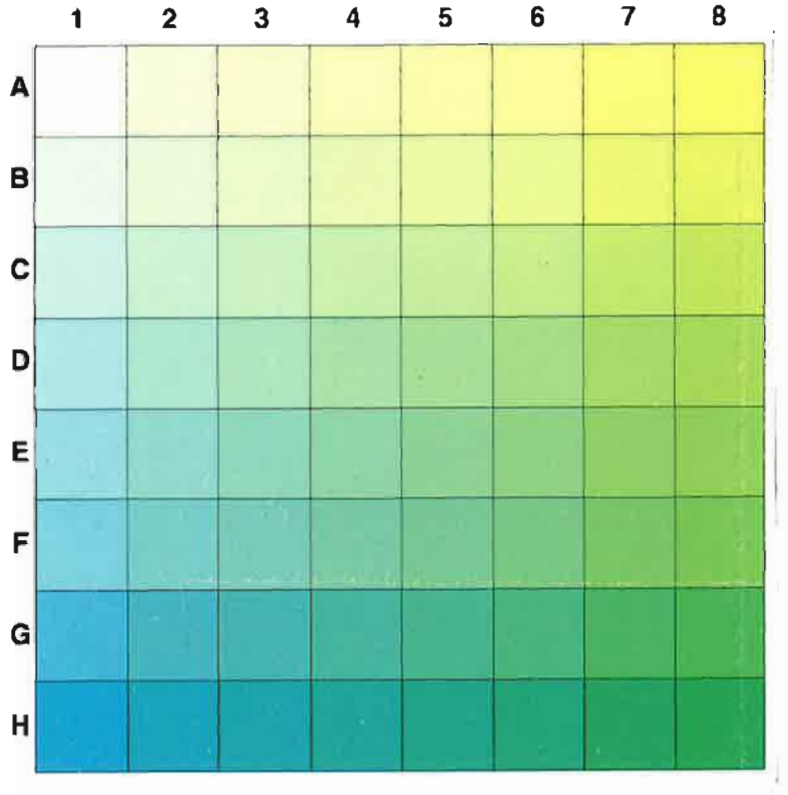


Fig. 7. A part (1/16) of NGU Colour Chart, composed of citrus yellow and blue.

A1:	5S/ 5B	B1:	5S/ 10B
A2:	10S/ 5B	B2:	10S/ 10B
A3:	20S/ 5B	B3:	20S/ 10B
A4:	30S/ 5B	B4:	30S/ 10B
A5:	40S/ 5B	B5:	40S/ 10B
A6:	50S/ 5B	B6:	50S/ 10B
A7:	70S/ 5B	B7:	70S/ 10B
A8:	100S/ 5B	B8:	100S/ 10B

Fig. 8. A part of the list.
S=Citrus yellow
B=Blue

The choice of colour hue is indicated by a letter and a number (Fig. 7, separate print in colours of 1/16 of colour chart).
The printing colours and the tint screens needed to produce the chosen tone in each case are then given. A list showing printing colours and tint screen combinations used in all colour chart positions is also available (Fig. 8).

2.8. Choosing map colouring hues

The Quaternary geology maps have a standardised colouring set, defined in a printed standard for Quaternary maps at NGU (Kvartærgeologiske kart. - Tegnforklaring og generell beskrivelse. - NGU-1987).

This standard contains the colours and symbols that are authorized for use, also a specified legend and a general discription of the map type and its purpose.

One sample of this standard is left with the map manuscript, and those parts of the theme which are dealt with in that specific map sheet are marked in the legend and description.

The complete standard legend and description are stored digitally in a diskette. No corrections should therefore be necessary, other than to ensure that all marked units have been photoset. This is of course very timesaving for the geologist (author) and for the production unit as well.

The bedrock geology maps have certain basic rules for both colouring and nomenclature. However, the colour hues must be selected for each map sheet.

This takes place in a dialogue between the geologist (author) and a competent person from the production unit.

As the colour hues are selected from the NGU colour chart, the code for each (e.g. B6) is written at its proper place in the legend manuscript (Fig. 9).
All positions in the legend are numbered sequentially. These position numbers are written at the selected colour hue squares in the colour chart, and this marked colour chart is enclosed with the map manuscript.

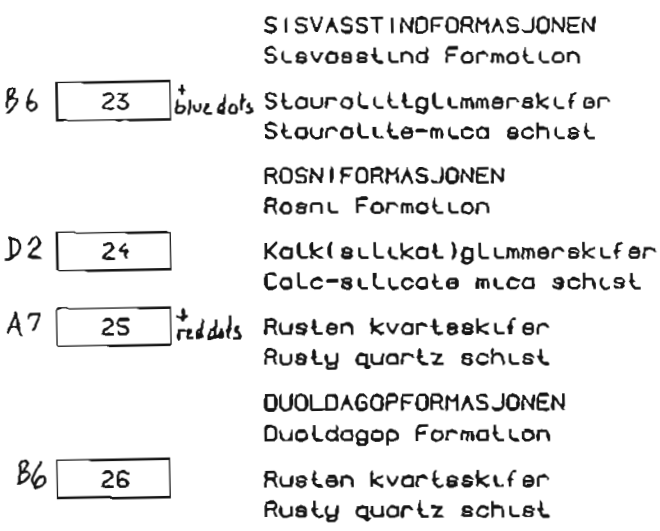


Fig. 9. Part of a legend manuscript

During this dialogue, dots, circles, lines etc. in different colours for further distinction of bedrock types, are specified at their position in the legend manuscript.

This manuscript, together with the enclosed (marked) colour chart, now gives a precise connection between the numbers and colouring of the manuscript, and the colouring to be used for the printing of the map.

3. REPRODUCTION

3.1. Map production foils

Map production foils is the first form to be used in the map production at NGU. All production foils are given an identification number (Fig. 10).

GEOLOGICAL SURVEY OF NORWAY

Production foils

Map sheet ARSTADDAL Scale 1:50.000 Sheet size (ntb) 640×725 mm

Foil no.	Pos. no.	Contents	Material	Code	Colour Compos.	Remarks
1	—	Topography	Neg.		Black – Tp.50	
2	—	Water mask	Pos.		— — —	
3	—	Rock boundaries	Scribe		Black – 100	
4	—	Lines of cross sections	— " —		Black – 100	
5	—	Printing marks	— " —		All colours	
6	—	Mountings (black)	Pos.		Black – 100	
7	—	Mountings (red)	— " —		Red – 100	
8	1	Moraine, gravel, sand	Peel coat		Black – 5	
9	2	Porphyritic granite	— " —	G.43	Chrome – 20 Red – 70	
10	3	Granodiorite	— " —	F.43	Chrome – 20 Red – 50	
11	4	Tonalite	— " —		Red – – – 50	
					– – – – – – –	

Fig. 10. Registration form for map production foils

The first foils will always be the base map material, purchased from the Geographical Survey. (Foil 1: Topography, foil 2: Water hold out mask).

The registration of the following foils will describe:
a: What position in the legend is concerned
b: What the contents of the foil illustrate
c: What kind of material is dealt with (scribing, PC mask, positive or negative film, etc.)
d: Colour chart code given for the relevant position in the legend manuscript
e: Colour composition according to the colour chart code, separated into percentages of the printing colours involved. This information is given in a printed table (Fig. 8).

3.2. Exposure plan for printing films

The form has been developed to give the reprographic personnel a simple tool in assembling the pile of foils firstly to a coloured proof sheet, and finally to make the printing films.

GEOLOGICAL SURVEY OF NORWAY

Exposure plan for printing films

Map sheet ARSTADDAL (bedrock) Scale 1:50.000 Sheet size (mlo.) 640x725 mm

Printing film No.	Colour	Production foils and screen tints to be used for exposure assemblies: Exp. 1, 6, a.s.o.	Exp. 2, 7, a.s.o.	Exp. 3, 8, a.s.o.	Exp. 4, 9, a.s.o.	Exp. 5, 10, a.s.o.	No. of exp.	Remarks
I	black	Tp50+1+30	3+2	4	6	AA+8+2		
		AA+15+2	AA+23+2				7	Screen 45°
II	brown	E+13+2					1	Screen 165°
III	blue	C+14+2	C+15+2	A+16+2	A+17+2	C+19+2		
		E+20+2	C+21+2	E+23+2	C+25+2	A+28+2		
		TP50+1+29					11	Screen 135°
IV	citrus	G+16+2	18+2	E+21+2	E+22+2	24+2		
		25+2	B+26+2	D+27+2			8	Screen 15°
V	red	7	G+9+2	E+10+2	E+11+2	C+12+2		
		D+24+2	C+27+2				7	Screen 75°

Production foils and screen tints are listed according to the position they should have in relation to the printing film when exposures are done, starting from the film surface and up towards the light.
Numbermarks on the foils show the reading side.
The printing films must be marked with number and printing colour according to this plan.

Fig. 11. Exposure plan for printing films, with examples

In this form the following information is given:
a: Printing film number
b: Printing colour (black, brown, blue, red, citrus yellow, chromium yellow)
c: The foils and tint screens to be used at each exposure, and in which order they are to be placed upon the printing film. The same procedure is used to produce the proof sheet in colour for correction purposes.
The information needed to fill in this form comes from each position in the first form: "Production foils".
d: When all exposures concerning one printing colour have been gathered from the form "Production foils", the number of exposures are added up. This is done to give the reprographic personnel an idea of the amount of work needed for the map reproduction.
e: Under "Remarks" the correct angle for each printing colour set of screen tints is given. Though this has been standardized it is written as an added insurance against mistakes in the darkroom.

3.3. Map printing plan

This form (Fig. 12) is filled in at the same time as the previous form.
Information about the map sheet in question, what kind of theme, scale, format, impression, folding, etc. is given.

Map printing plan

Map sheet ARSTADDAL | Map type Bedrock geology |

Scale 1:50.000 | Sheet size (clean cut) 640x725 mm |

Impression (total) 2150 | Impression (folded) 1150 | (128x5/242X3) |

Printing			Densito-	Contents	Remarks
Plate	Colour	Col. ident.	meter		
I	black	T.8830	1,4	Topography, text, symbols	
II	brown	T.7710	0,9	Bedrock hues	Sensing area:"red"
III	blue	T.5540	0,9	" "	
IV	citrus	T.1110	0,45	" "	
V	red	T.3330	0,9	" "	
VI	chrome	T.1140	0,7	" "	

Proof sheet in colours show the complete map, but the appearence of the colours are not always quite correct.
The printing films are numbered according to this plan.
Number marks show the reading side.
Colour identification numbers are according to manufacturing numbers by TORDA (T) standard colours.
Rarely PMS-colours may be listet for special effects.
The densitometer reading is for reflection densitometer on 100% colour.

Fig. 12. Map printing plan, with examples

Further information for the printing plant is then given as follows:

a: Printing plate number, which corresponds to the printing film number in "Exposure plan for printing films"
b: Printing colour
c: Printing colour number, which is a product number for a standard printing colour from TORDA printing colour manufacturers (Norway)
d: Density reading, full range colour. Measured by reflection densitometer at printing plant
e: Key words for general contents in each printing plate
f: Remarks, e.g. that densitometer reading for the brown printing colour should be measured at the sensing area for magenta (or red) in the densitometer.

3.4. Production of coloured proof sheet and printing films

All mountings in positive (text, symbols) are turned to negatives. The production is based on negatives all the way through. The form "Exposure plan for printing films" is used to make the exposure assemblies properly. Making of proof sheet or printing films is in principle the same procedure.

The tint screens used to represent the colours, are line tints, 133 l/inch.
6 sets of tints with a 30° angle between them to avoid moiré are used. Each set consist of 7 tints of nominal 5-10-20-30-40-50 and 70% negative opening. The tints are named respectively AA-A-B-C-D-E and G. The angles are: 15-45-75-105-135 and 165°.

In the "Exposure plan" the tints are denoted as described above.

Additionally NGU has constructed a small number of tints for special effects, named NGU1, NGU2, a.s.o.

In the darkroom area the information in the "Exposure plan" is used step by step to make the proof sheet or printing films.

In order to make the production system easy to handle all the way through, we have built a set of shelves (Fig. 13), specially designed to contain:

a: All tint screens which are used in our map production
b: All production foils for each map

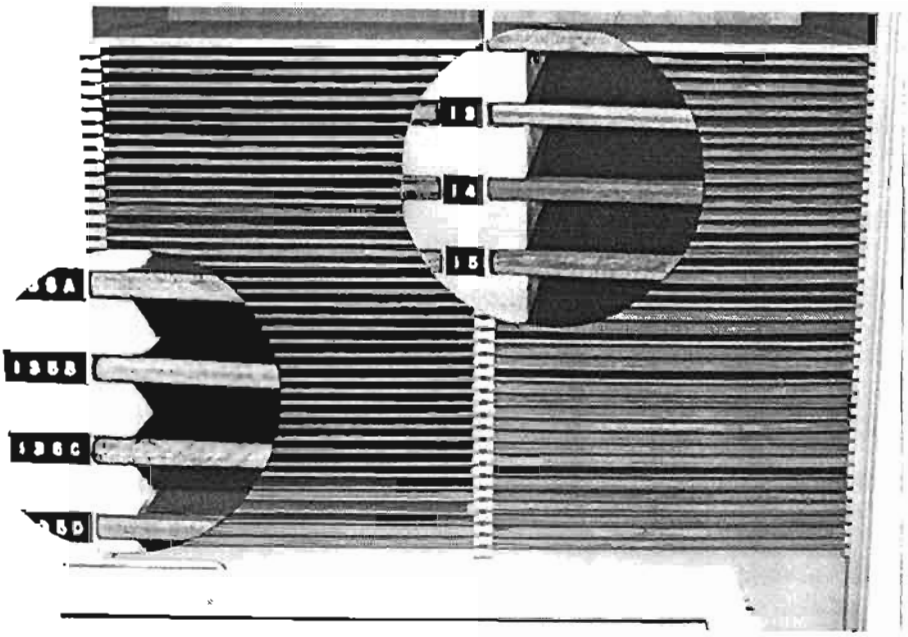


Fig. 13. Set of shelves for tint screens and production foils

A parallel beam light source is used for exposures on film, while a metal halogen light source is used for exposures on coloured proof sheet.

The procedure at the vacuum frame is as follows:
- Film is cut in format in automated film dispenser with cutter
- Register holes are punched
- Film is placed at vacuum frame with face up, on register pins
- The adequate tint screen is picked out of the shelf and placed in contact with the film (face to face) (Fig. 14a)
- The adequate mask is picked out of the shelf and placed over the tint (face down, since the mask is right reading) - (Fig. 14b)
- The water mask (pos. "hold-out") is also picked out of the shelf and placed on top of the pile (face down, since the water mask is right reading also) (Fig. 14c)
- The frame is closed, and put into operation
- The concluded exposure is crossed in the "Exposure plan", and subsequently the next exposure is made, and so on.

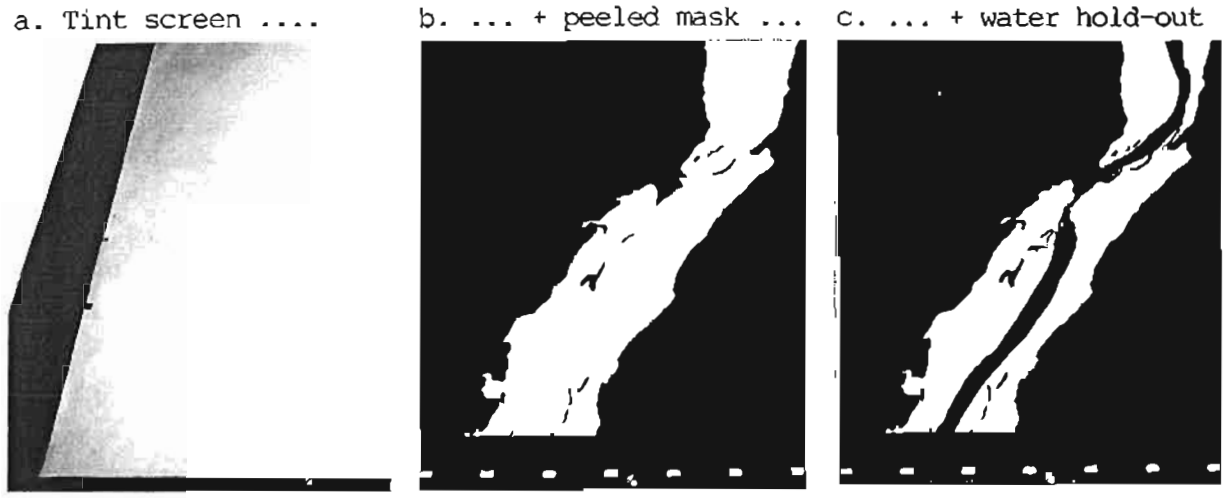


Fig. 14. The procedure at the vacuum frame

Because the entire procedure is expressed in plain words, and labelling of production foils and tints is systematically used together with register punching of all material, the system can be operated easily and at a rather high speed. Very few errors arise from the handling of the material in the darkroom area.

Changes of colour hues after corrections by the author can be done simply by typewriter in the "Exposure plan". (Fig. 15) The result of the changes will appear later during the exposures at the printing film .
This simplification is possible because all final materials are negatives.

Exposure plan for printing films

Map sheet ARSTADDAL (bedrock) Scale 1:50.000 Sheet size (nto.) 640x725 mm

Printing film		Production foils and screen tints to be used for exposure assemblies					No. of	Remarks
No.	Colour	Exp. 1, 6, a.s.o.	Exp. 2, 7, a.s.o.	Exp. 3, 8, a.s.o.	Exp. 4, 9, a.s.o.	Exp. 5, 10, a.s.o.	exp.	
I	black	Tp50+1+30	3+2	4	6	AA+8+2		
		AA+15+2	AA+23+2				7	Screen 45°
II	brown	E+13+2					1	Screen 165°
III	blue	C+14+2	C+15+2	A+16+2	A+17+2	C+19+2		
		E+20+2	C+21+2	E+23+2	C+25+2	A+28+2		

No.	Colour	Exp. 1, 6, a.s.o.	Exp. 2, 7, a.s.o.	Exp. 3, 8, a.s.o.	Exp. 4, 9, a.s.o.	Exp. 5, 10, a.s.o.	exp.	
I	black	Tp50+1+30	3+2	4	6	AA+8+2		
		A+15+2	AA+23+2				7	Screen 45°
II	brown	E+13+2					1	Screen 165°
III	blue	C+14+2	B+15+2	A+16+2	A+17+2	C+19+2		
		E+20+2	C+21+2	G+23+2	C+25+2	A+28+2		

Fig. 15. Changing of colour hues by typewriter

4. MARKING OF CORRECTIONS AT COLOURED PROOF SHEET

Once the coloured proof sheet has been made, it is forwarded to the map author/editor. All manuscripts used to produce the map are enclosed. A form for registration of all errors found is also enclosed. Errors are marked on an overlay to the proof sheet with permanent ink writer, and subsequently noted in the registration form for correction.

When the production unit receives the marked proof sheet together with the errors registered, the draughtsman who is responsible for that map sheet will make corrections on all production foils involved.

Remarks demanding colour changes are discussed with the map editor and the control commission. Agreed changes will be made in the "Exposure plan". The final printing films are now produced using the corrected production foils and eventual corrected "Exposure plan".

5. PRINTING OF THE MAP

Maps from NGU are printed at offset printing plants in Trondheim (where NGU is located).
We try to keep all maps within the paper format 72x102 cm, which is the limit for offset machines in Trondheim.
Most of our maps are printed in 5-colour presses, a few in 2-colour presses.

In those rare cases where the map format exceeds 72x102 cm, the printing is done in Oslo or in Uppsala (Sweden).

In all cases a representative of NGU is present at the printing plant for control and approval of the colour density and the accuracy of the print. The normal number of impressions is 2000. Printing colours are mentioned under pt. 2.7, NGU colour chart.

6. CHOICE OF MATERIALS

The following types of materials are used in NGU's map production system:

- Film for screened base map (manuscript)	: DU PONT, Germany
- Scribe coat film	: STABILENE, USA
- Mounting film, single matte	: STABILENE, USA
- Presensitized peel coat film	: STABILENE, USA
- Symbols (NGU designed), "rub on"	: ALFAC, Belgium
- Photo set text	: BJÆRUM grafiske, Trondheim, Norway
- Coloured proof sheet (photosensitive colours)	: KWIK PROOF, USA
- Printing films	: DU PONT, Germany
- Map printing paper, wet strengthened	: SIHL, Switzerland T. RUSSEL, Scotland BUSKERUD, Norway

Of course there are other products than those mentioned which could be used. What should be imperative for the choice of materials are the following criteria:

- The materials must have excellent dimensional stability
- They must give first class reprographic results
- Symbols must have sharp edges and high density and be free of "pinholes"
- The proofing system should preferably be of low capital cost and give easy-to-read and easy-to-correct proof sheets
- The map printing paper must have high dimensional stability, be resistant to to tearing and folding, and also have wet strength (because geological maps are often used under harsh conditions)
- Last but not least: all products must be easy to obtain and have a good service system as a backing.
  Unfortunately you will then find that there are really few competitors in the market.

7. TIME CONSUMPTION

To produce a geological map (or any thematic map) will demand more or less time, depending on how complicated the map contents is. We may give the following approximate figures for some of the NGU geological maps:

Type of map	Scale	Area covered	Man-days	Material cost
Quaternary geology	1: 50.000	600 km^2	~~45~~ 35	NOK 15.000
Bedrock geology	1: 50.000	600 km^2	45	NOK 20.000
Bedrock geology	1:250.000	15.000 km^2	85	NOK 25.000

About 90% of the working time is spent in the production phase, and about 10% in the repro phase. The number of foils/films used to produce a map will vary from 15-90, and of course this must influence the time- and material consumption in both directions, Roughly estimated, the Quaternary maps consist of 25 foils/films and bedrock maps of 35 foils/films, the printing films included. (Referring to scale 1:50.000).

8. CONCLUSIONS

The manual map production system at NGU - The Geological Survey of Norway, has proved its simplicity and functionality through 20 years of development and daily use.

The architecture of the system invites to a dialogue between the scientists who collect and compile the thematic data, and the craftsmen who take the map from manuscript to impression.

This has proved to be advantageous for both groups.

The system is quite inexpensive in operation, and there are moderate demands for education of personnel. The system appears to be suitable for organizations of varying size, from small to medium.

Large producers of maps will today have additional possibilities for a rational map production, by using digital technology in a raster scanner/plotter system.