Cartography in Switzerland
1991 – 1995

National Report for the ICA-Conference 1995 in Barcelona

CARTOGRAPHIC PUBLICATION SERIES NO.12

Published by the Swiss Society of Cartography
Zurich 1995
Cartography in Switzerland
1991 – 1995

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Preface

The Swiss Society of Cartography presents this report to the 10th General Assembly and the 16th International Conference on Cartography of the International Cartographic Association to be held in Barcelona in September 1995. It summarizes the cartographic activities in Switzerland during the period 1991–1995, both in the Swiss Society of Cartography and in Swiss cartography in general.

Those texts that have been provided to the committee by institutions and companies are given in full extent. In order to present an overall view of the actual situation this random image has been completed from different sources. The map samples enclosed to this report are certainly of special interest. They constitute an attractive visual material and a representative cross section on the status and tendencies of cartography in Switzerland.

By compiling this publication we have enjoyed broad support from our members, from official mapping agencies, universities and private companies. We especially thank all the contributors who provided free printed map samples and accompanying texts.

Zurich, August 1995

The President:
Prof. Dr. h.c. E. Spiess

Activities of the Swiss Society of Cartography

Goals of the Society

The Swiss Society of cartography (SSC) was founded in 1969. It evolved from the earlier Working Group for Cartography, that consisted of only institutions but no individual members. The present day Society of professionals and other persons interested in cartography aims at the development of theoretical and practical cartography, as well as at the posteducation of its members in this field. The intention is to exchange knowledge and experiences in map design and production, in map use and in history of maps with people that are active in this field in our country as well as abroad.

These goals are to be reached by seminars, workshops, excursions, map exhibitions and publications. The official bulletin of our Society is the «Kartographische Nachrichten». The latest news are announced in our internal newsletter. The Swiss Society of Cartography is the official representative for Swiss cartography in the International Cartographic Association (ICA), in the Association of Swiss Geographers (ASG) and in the recently founded Swiss Organisation for Geoinformation (SOGI).

Membership and Committee

At the beginning of the year 1995 the Swiss Society of Cartography has 223 individual members and 26 collective members. Professor Dr. h.c. Ernst Spiess carried on as presi-
dent of the Society. Clemens Maria Wäger, co-owner of a private cartographic company in Frauenfeld, acts as Secretary I. Bernhard Thomi, a private cartographer in Bülach, is our Secretary II and Claude Vez from Kümmery and Frey AG in Berne organizes the distribution of the «Kartographische Nachrichten», the official publication we share with the German and Austrian cartographers. Hanspeter Tschopp from the General Directorate of PTT in Berne is our Treasurer. Ulrich Baumgartner from the Swiss Federal Office of Topography in Wabern is mainly concerned with the organisation of meetings and with the apprenticeship for cartographers, and Professor Dr. Robert Weibel from the Department of Geography of the University of Zurich is responsible for the contacts to the geographers in our committee.

Professional Meetings
The Society organized for the period 1991–1995 the following meetings:

April 13, 1991
At this General Assembly in Lucerne the technical part was devoted to the large project of the Federal Directorate of Cadastral Surveys, called "Reform of the Official Cadastral Surveys". The participants in a pilot project presented the data base established over a region of several fully digitized communities and a range of manifold applications making use of these data. There was also an extensive discussion of the links between these cadastral data and large scale cartography.

October 19, 1991
The autumn meeting concentrated on «Map graphics from digital data». The main item was a contribution by Dipl. Ing. Herdeg «Official Cartography in between the analogue and digital map». There were another four contributions on generalization, on projects for entirely new vector data for a topographical information system, on the revision of topographical maps by digital procedures on the digital production of town plans and on problems with output from GIS.

April 25, 1992
The subject chosen for the afternoon of the general assembly in Kloten was «Cartography in the wake of politics». Representatives from the private cartographic companies and the editor of the Swiss school atlas discussed in their contributions the problems they encounter when searching for informations on new boundaries or changed names and the difficulties to ensure a correct presentation in their maps. On the other side, they mentioned that never before the public has shown so much interest in this aspect of cartography.

October 17, 1992
This meeting was devoted to the proposed establishment of digital data presented by the Swiss Federal Office of Topography, especially for the Topographic Information System, on the available pixel maps of the present map series and on the new digital height model. It included also a demonstration of 3D-presentations of pixel maps by geographers from the University of Zurich.
March 19, 1994
Prof. Dr.-Ing. Dieter Grothenn gave a lecture on the subject «Diversity or uniformity – some thoughts on the standardization of the symbols for topographical maps in Europe». He informed on the progress of data capture for the digital landscape models in the different German countries and presented some test results of their transformation into maps. As a second item the problems with topographical maps sheets crossing international boundaries were discussed.

November 5, 1994
The autumn meeting in Berne was attended by a record number of participants. It was titled «Farewell to Quality in Cartography !?» Its goal was to make the users of DTP techniques more sensitive to the aspects of quality. There has been too much disillusion and disappointment about databases and so-called «digital» maps flooding the market. Problems were recognized mainly on the graphic side and in generalization. This subject will be once again on the agenda on November 11, 1995.

March 25, 1995
The contributions in connection with the general assembly in Kloten were centered on the history of cartography. Prof. Arthur Dürst gave a summary on the numerous research activities in this field in Switzerland.

**Excursions**
- Swiss Meteorological Institute in Zurich on November 22, 1990
- Landesvermessungsamt Nordrhein-Westfalen in Bonn / Germany on June 11–14, 1992
- Technorama Winterthur on March 27, 1993
- Section on Land Use of the Swiss Federal Statistical Office in Berne on September 10, 1993
- Touring Club Italiano in Milan / Italy on October 22–23, 1993
- Thematic Cartography Unit of the Swiss Federal Statistical Office in Berne on June 10, 1994
- Swiss Alpine Museum in Berne on September 2, 1994

**Educational Courses**
In September 1992 a second workshop on information maps was organized by Kurt Bigler in Berne. 15 members participated in this course that offered an opportunity to work on some practical examples using FreeHand and Cart/o/grafix-software.

In September / October 1992 four courses with a total of 70 participants were organized at the Institute of Cartography of the ETH Zurich under the title «Integral Digital Work Flows in Cartography». The programme was structured in four parts: data capturing procedures, vector/raster conversion, editing maps in vector format, symbol specifications and plotting of the colour separation films on a laserplotter.

On two dates in June 1995 a total of 40 participants followed a course in topographical
rock drawing in Gimmelwald and Mürren. The traditional technique was introduced by Prof. Ernst Spiess and backed-up by everybody’s own sketches. Alternative representations that make use of computer techniques were discussed as well.

The Society has always shown great interest in the professional education of cartographers. The slight recession in the cartographic production during the last few years has had the serious effect that the number of young people who start their four years apprenticeship decreased from 8 to not more than 5 per year. Any further reduction endangers the existence of independent vocational classes for cartography.

International Congress for Cartography 1996 in Interlaken

Since 1970 the Cartographic Institutions of the German speaking countries have a tradition to organize in turn a congress for cartography to be held in German language. The next such event is planned for May 12–18, 1996 in Interlaken / Switzerland. For further information, for programmes and registration forms please contact the congress secretariat:
Sekretariat Kartographiekongress 96
Hardstrasse 73, CH-5430 Wettingen,
phone: ++4156 37 11 11
fax: ++4156 37 13 44
phone: ++4156 437 11 11 (after 5.11.1995)
fax: ++4156 437 13 44 (after 5.11.1995)
The Swiss Society has charged an organizing committee with all the preparations:

President: Prof.Dr. h.c. E.Spiess, ETH Zürich
Vice-president: Director F. Jeanrichard,
Swiss Federal Office of Topography,
Wabern
Honorary president: K. Ficker, Wohlen / BE
Congress director: Dipl. Geogr. R. Kuster,
NAGRA, Wettingen
Finances: K. Bigler, Stab GGST, Berne
Information: Dipl. Ing. M. Gurtner, Swiss
Federal Office of Topography, Wabern
Conference Programme: Dr. L. Hurni, Swiss
Federal Office of Topography, Wabern
Publications: H. U. Feldmann, Swiss
Federal Office of Topography, Wabern
Map Exhibition: F. Gut, Swiss Federal
Office of Topography, Wabern
Technical Exhibition: Prof. Dr. h. c. E. Spiess
Social and Touristic Programme:
Dr. R. Sieber, ETH Zurich

The official opening on May 13 will be honoured by the actual president of the Swiss Confederation Kaspar Villiger. The congress will take place at the Congresscenter Casino / Kursaal Interlaken, a famous «art nouveau»-building with a modern annex. The scientific programme will include four invited and 25 selected papers on a variety of subjects, as well as two poster sessions. The papers will be published in the Conference Proceedings. Two halls are reserved for a technical exhibition and a map exhibition. As many as 10 technical and 12 geographical and touristic excursions during and after the the official days can be booked. We hope to find a lot of interest in the cartographic community for this coming event.
List of Publications of the Swiss Society of Cartography

<table>
<thead>
<tr>
<th>Series-Nr.</th>
<th>Title</th>
<th>Price per copy</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Kartographische Generalisierung, <strong>Topographische Karten</strong>. 2.Aufl. 1980. 62 Seiten, 150 Abb., Format A 4, lose Blätter in Umschlag</td>
<td>SFr. 30.–</td>
</tr>
<tr>
<td>2</td>
<td><strong>Cartographic Generalisation, Topographic Maps.</strong> 2nd edition 1987. 62 pages, 150 fig., format 21 x 30 cm, loose sheets in envelope. [English translation of publication Nr.1]</td>
<td>35.–</td>
</tr>
<tr>
<td>3</td>
<td><strong>Thematische Kartographie – Graphik, Konzeption, Technik.</strong> Tagungsband zur 2.Dreiländertagung 1978 in Bern, mit allen Fachvorträgen, Kartenbeispielen und Ausstellungskatalog. Total 388 Seiten, Format 17 x 24 cm</td>
<td>30.–</td>
</tr>
<tr>
<td>5</td>
<td><strong>Cartography in Switzerland 1976–1980.</strong> National report for the ICA-Conference in Tokyo 1980, 91 pages, 25 map samples, 6 fig., format17 x 24 cm</td>
<td>20.–</td>
</tr>
<tr>
<td>7</td>
<td><strong>Cartography in Switzerland 1980–1984.</strong> National report to the ICA-Conference 1984 in Perth, 84 pages, 48 map samples, format 21 x 30 cm. [English translation of publication Nr.6]</td>
<td>30.–</td>
</tr>
</tbody>
</table>
National report to the ICA-Conference in Morelia 1987.
35 pages, 41 map samples, format 17 x 24 cm

9 Cartography in Switzerland 1987–1989,
National report [English/deutsch] to the ICA-Conference 1989 in
Budapest and to the Cartographic Congress in Vienna 1989.
49 pages, 56 map samples, format 17 x 24 cm

102 Seiten, zahlreiche Abb., 6 Kartenbeilagen, Format A4
(102 pages, numerous fig., 6 map samples, format 21 x 30 cm)

11 Cartography in Switzerland 1989–1991,
Supplement to Nr.9

National report to the ICA-General Assembly in Barcelona 1995
47 pages, 32 map samples, format 17 x 24 cm

Special offer: set of national reports (Nr.3, 5, 7, 8, 9 and 12) 75.–

These publications are for sale by: Kurt Bigler
SGK Publications
Stab GGST, Kartographie,
VZ EMD, Papiermühlestrasse 20
CH–3003 Berne
phone ++4131 324 52 59
fax ++4131 324 48 12
Commissions and Working Groups

ICA Standing Commission on Education and Training
Swiss representative:
Hans-Uli Feldmann, Wabern
In contrast to all earlier periods, the engagement of our country in this commission has been practically nil in recent years. We have neither been invited as lecturers for the seminar, nor have we been involved in the revision of the Basic Manual by the commission chairmen. Only recently we heard about an unofficial demand for authors for a chapter on generalization. We hope that by such a participation and with the nomination of a new representative, who personally is also involved in education, the mutual relations might be strengthened and improved again.

ICA Standing Commission on the History of Cartography
Swiss representative:
Prof. Arthur Dürst, Zurich
The Swiss Society has a working group on history in cartography that operates in parallel to the ICA commission. The biannual journal CARTOGRAPHICA HELVETICA, started in January 1990 by a small group of map historians, can look back on an extremely successful period. In July 1995 number 12 of this extraordinary well illustrated biannual series has already been published. Within a short time the journal with its attractive format and colour reproductions has found a large community of interested readers. The journal became popular also for foreign authors. A special issue has been published by A. Dürst et al. in connection with an exhibition, devoted to the «Work of early Map Makers in Eastern Switzerland», in the Swiss National Museum in Zurich in the last quarter of 1994. Another two map exhibitions were presented at the occasion of the 9th Conference of the Group of Map Curators of LIBER, September 26-30, 1994 at the ETH Zurich: «Eduard Imhof (1895–1986) – the Cartographic Work» and «From the Dufour Map to Digital maps». Several other exhibitions of old maps have been organized or supported by members of the working group. Every year a considerable number of facsimile editions of historic maps have been initiated or published by the editors. There was also an extremely active participation in several international conferences on map history.

ICA Standing Commission on Map Production
Swiss representative:
Prof. Dr. h. c. Ernst Spiess, Zurich
The Swiss Society invited the Commission to held a meeting in Zurich and Rapperswil on September 21–23, 1992. 11 participants discussed proposals for the standardization of flow diagrams and the revision of the Compendium on Cartographic Techniques. Furthermore regular member presented a report on technical achievements in their countries. The programme also included a visit at the Institute of Cartography of the ETH in Zurich. A special workshop of the Commission at the Conference in Cologne in 1993 was organized and chaired by Prof. E. Spiess.
The working group “History of Cartography” of the Swiss Society of Cartography publishes a journal – as a means of communication between map collectors, researchers and dealers. It aims to provide information on every aspect of early maps, their history and production methods. The contents of the journals should evolve into a valuable reference library.

The number of scientific and popular essays on the history of cartography is increasing constantly. Unfortunately, such papers are often published only in various non-scientific journals and newspapers. This journal aims to be a unique forum for such publications in order to give its readers as complete a range of information as possible.

Although CARTOGRAPHICA HELVETICA is a German language publication, the subject matter is international in scope, with feature articles about Swiss maps and cartographers as well as on foreign countries.

Contents of each issue:
- Feature articles written by leading experts on various subjects of the history of cartography.
- Summaries are provided in English and French.
- Information on present and future map facsimile projects.
- Book reviews.
- Information on forthcoming auctions, exhibitions and conferences.
- Dealer’s catalogues, market prices at auctions.
- Classified advertising section for map dealers and collectors on map sales and exchanges.

The editorial team is aware of the fact that the contents and the extent of such a journal improve with a growing number of readers. For this reason, we sincerely invite regular and occasional coauthors to submit manuscripts and illustrations (languages: German, English, French, Italian).

Format of CARTOGRAPHICA HELVETICA: 48–56 pages, some of them printed in colour. The publication format is A4, i.e. 21.0 x 29.7 cm. The journal is published bi-annually. The first issue appeared in January 1990. Subscription rate: Swiss Francs 38.00 per year (postage included). Advertising enquiries should be made to the address below.

For enquiries and subscriptions, please write to:
Verlag CARTOGRAPHICA HELVETICA, Untere Längmatt 9, CH-3280 Murten, Switzerland.
ICA Commission
on Spatial Data Quality
Swiss representative:
Prof. Dr. Kurt Brassel, Zurich
Our representative and one of his collaborators edited a chapter on «Completeness» for a publication which is prepared by the Commission on «Elements of Spatial Data Quality».

ICA Commission
on Thematic Cartography
from Satellite Imagery
Swiss representative:
Dr. Peter Schmid, Zurich
Our member was not able to participate at the meeting of the Commission held in Tunis. Therefore contacts with the group have been practically restricted on written correspondence.

ICA Working Group
on Generalization
Swiss representative:
Prof. Dr. Robert Weibel, Zurich
Since September 1992 Prof. Dr. R. Weibel is chairman of this working group. He organized a panel discussion on «Cartographic Generalization – Current Issues and Strategies» for the ICA Conference in Cologne in 1993, which was attended by 70 participants. The group prepares a special issue on generalization of the bulletin «Cartography and Geographic Information Systems» for 1996. It has set up contacts to a working group on Automated Generalization of the OEEPE and to a GIS project team of the European Science Foundation (ESF). Members of the group met in this context in a meeting of the U.S. National Center for Geographic Information and Analysis on «Formalizing Cartographic Knowledge» in October 1993 and in a specialist meeting on generalization of the ESF in Compiègne, France in December 1993. The chairman organizes also a workshop on «Progress of Automated Map Generalization» on September 1–3, 1995 in Spain. In view of the many unsolved problems in this field and and the very active and cooperative members of this group, an independent commission would be absolutely justified in our opinion.

ICA Working Group
on Digital Cartographic Database
Exchange Standards
Swiss representative:
Prof. Dr. Alessandro Carosio, Zurich
Due to the heavy work-load of our provisional member of the working group, Dipl. Ing. Ch. Eidenbenz, our participation became minimal after the meeting we had organized in 1990 at Rigi-Kaltbad. Only recently we were able to persuade a research group at the Department of Geodetic Sciences of the ETH Zurich to cooperate with the group. Our contribution to a publication in preparation by the commission would mainly consist of a description of the INTERLIS exchange format used in Switzerland.
Working Groups on Geographic Names
Swiss representative:
Prof. Dr. h. c. Ernst Spiess, Zurich

The Permanent Committee on Geographical Names (StAGN) is independent from the Swiss Society of Cartography. It was established on an initiative of the German Society and is concerned with the standardization of geographic names in the German language. Since its foundation a representative from the German speaking part of Switzerland was regularly invited to attend these meetings. In March 1995 the 97th meeting of this working group was held in Frankfurt. With the support of various members of the Committee Prof. E. Spiess has edited a publication «Selected Exonyms of the German Language – German Names of Geographical Objects of Countries or Regions where German is not an Official Language», published by the Permanent Committee on Geographical Names (StAGN), Frankfurt-on-the-Main in 1994.

The StAGN has also a liaison function to the Dutch-German speaking Division (DGSD) of the United Nations Group of Experts on Geographic Names (UNEGGN). UN-conferences of this group were held 1991 in Geneva, 1992 and 1994 in New York.

Summary Review of the Present Situation of Cartography in Switzerland

Continuity and modest growth in base map series
Cartography in Switzerland continues to follow its traditional trails. The official topographical maps are periodically up-dated, as illustrated and described on p.15–19. Our major cartographic publishing houses (Hallwag, Kümerly+Frey and Photoglob) provide steadily increasing collections of road maps, tourist maps, hiking maps, cycling maps etc.

The geological and soil maps series 1:25'000 grow very slowly, a few sheets per year only, due to the high costs of these technically quite demanding maps and to their dense content.

On the other hand we can notify an astonishing number of new inventory and suitability maps for local, regional and national planning purposes, for production management and scientific research. Examples for the whole country are:
- inventory of sights to be protected 1:5000 / 1:10'000
- inventory of landscapes and natural monuments of national importance 1:25'000 and other scales
- inventory of amphibians 1:25'000
- inventory of flora on wet and dry locations and of moors 1:25'000
- inventory of bird reserves 1:25'000
- inventory of historical trails 1:25'000
- geotechnical map 1:200'000
- inventory of natural dangers and risks 1:100'000
- inventories of various fauna species 1:25'000
- water protection maps 1:25'000
- water supply atlas of Switzerland 1:25'000
- national forest inventory 1:800'000
- suitability of climate for agriculture and temperature structure of Switzerland 1:200'000
- inventory of air photographs and satellite images of Switzerland 1:50'000/1:300'000
- suitability of soils and compression of soils in Switzerland 1:200'000
- inventory of noise pollution by railways and regional air fields 1:10’000 / 1:25'000

Examples for some Cantons are:
- cadastre of gravel sites 1:5000
- cadastre of waste disposal sites 1:5000
- ground water maps 1:25'000 / 1:100'000
- archeological sites 1:5000 / 1:50'000
- map on energy based on wood 1:300'000
- solar energy and climate 1:250'000
- various bird inventories 1:5000
- fruit tree inventory 1:5000
- reptile inventory 1:5000
- butterfly inventory 1:25'000

Distinct Move towards Digital Map Production

There are several reasons, why traditional map production in general is rather on a decline than increasing. Labour has become more and more expensive in this country. A considerable amount of cartographic work is therefore contracted to companies in foreign countries.

Another point may be seen in the fact, that digital techniques have finally become operational also for high quality products. Together with the potential of digital map data allowing for variable output forms, this should finally make digital map production economically feasible. Therefore we notice a steady trend towards digital production of maps, which have so far been produced by conventional means.

Except very few freelance cartographers all cartographic companies are nowadays equipped with graphic systems and offer computer-assisted map production services. Thus the market for cartographic hardware and software has been very busy, and it offers since short a broad palette of supplies, which meet most requirements cartographers might have.

The availability of digital cartographic data on the other side is still somewhat behind the expectations of all those involved in digital map production. While waiting for the completion of the official digital databases, many producers create their own digital base maps. However, quite a number of products are already available. They are summarized in a publication by the working group of map librarians:

The following list mentions some of the most important items:

Electronic navigation systems:
- CH-Atlas 4.0 (Amadeus Informatik AG)
- Finaroute navigation system (Finajour)
- Road 1.1 (Stäenz Informatik AG)

Digital databases by the Swiss Federal Office of Topography (details see p. 15–19):
- Pixel maps of the national map series
- VECTOR200, based on 1:200'000 map
- RIMINI, digital height model, 250 m res.
- DHM25, digital height model, 25 m res.
  (in production)
- Small scale base maps

Digital databases and geographic information systems by other Federal Offices:
- GEOSTAT database (details see p. 21)
- STATINF, statistical database
- BUWIN, GIS with all legal inventories
- GIS-LHG, hydrological information system
- LDB, database on landscape elements
- INFOPLAN, GIS for planning purposes
- RIS, GIS on spatial planning data
- Digital Traffic Network (1:100’000)
- STRADA-DB: road database
- SBB-Dfa: database of fix installations
- Digital Geological and Geotectonical Map of Switzerland 1:500'000 (in production)

Digital databases by private companies:
- CH-Atlas 2.0 (Amadeus Informatik)
- Once upon a time in Switzerland, multimedia CD-ROM (Bajka Media AG)
- Swiss Map, CD-ROM with pixel maps 1:100'000, 1:200'000 and 1:300'000, census data 1990, land use, toponymic data base (Symplan Map AG)

Most of the 26 Cantons have set-up their own GIS for a multitude of applications. Cantonal databases are usually based on the national ones and complemented by regional data.

The present Situation in Large-Scale Mapping
A new generation of official large-scale cadastral mapping has been started with the long-term perspective to have everywhere digital survey data. These activities are as always very much decentralized and mainly executed by some 280 private companies spread all over the country. In this context a new policy concerning the Topographical General Plans 1:5000 / 1:10’000 has been established. Today this base map covers approx. 97% of the territory. Up to now it has been conventionally updated in rather irregular periods. The general tendency now is to convert these plans into digital form and to revise them digitally in the future. In some Cantons the conversion of these analogue plans in pixel maps was the first step undertaken. Elsewhere a complete digitization of these plans was started. But where the digital cadastre already exists, the problem of transferring this basic information into a cartographic vector database for the editing of output of such plans had to be solved. This process involves some serious generalization problems (see p.39). This long-term solution has been envisaged by the new decree on the cadastral survey, hoping to save a considerable amount of credits. The reduced availability of credits from the Confederation is the main reason for a rather slow progress in this change to the digital world.
Summary Reports from Official and Private Mapping Organizations and Universities

Swiss
Federal Office of Topography
Seftigenstrasse 264, CH-3084 Wabern
Phone: ++4131 963 21 11
Fax: ++4131 963 24 59

Staff
The Swiss Federal Office of Topography in Switzerland is a part of the Ministry of Defense and consists of five different divisions:

– Geodetic Surveying
– Topographic Surveying
– Cartography and Reproduction
– Commercial Administration
– Informatics Center

The Swiss Federal Office of Topography employs a staff of 146 collaborators, of which 42 are engaged in the field of cartography. In addition there are 13 apprentices in cartography (approx. 3 per year) and two apprentices in offset printing.

Because personnel expansion has been restricted since 1974 by a parliamentary ordinance, production squeezes must be met through internal job rotation and personnel shifts.

Topographic maps
The principal task of the Office of Topography is maintaining the 6-year revision cycle of the approximately 350 National Maps at the following scales:

1:25 000 249 sheets (series completed in 1979)
1:50 000 78 sheets (1960)
1:100 000 22 1/2 sheets (1964)
1:200 000 4 sheets (1976)
1:300 000 1 sheet (photographic reduction of 1:200 000)
1:500 000 1 sheet (1964)
1:1 million 1 sheet (1994)
(see diagram on the opposite page)

Assembled maps
(map image = up to 100 x 72 cm)
1:25 000 14 sheets
1:50 000 23 sheets
1:100 000 10 sheets

Political boundary maps
1:200 000, 4 sheets
1:300 000
1:400 000

Illustration on the next page

Sheet index and revision cycle of the Swiss National Map Series
Every year an area of 1/6 of the country is covered by aerial photography and the corresponding maps are revised scale by scale.
Thematic maps
By order of the military and other federal offices, various thematic maps were produced and to some extent continually revised, as for example:
Aeronautical charts:
ICAO 1:500 000,
Chart of Air Navigation Obstacles, (ONAV) 1:300 000
Charts of Air Navigation Obstacles, 1:100 000, 22 sheets
Maps of castels: 1:1200 000, 4 sheets
Map of cultural objects: 1:300 000
Map of museums: 1:300 000
Hiking maps 1:50 000, 40 sheets, in co-operation with the Swiss Hiking Association
Ski route maps 1:50 000, 27 sheets, in co-operation with the Swiss Ski Federation
Road Map of Switzerland 1:200 000, 2 sheets, new edition 1993

Atlas of Switzerland
Editor from 1961 to 1978:
Prof. Dr. h.c. Eduard Imhof (9 deliveries)
Editor since 1978:
Prof. Dr. h.c. Ernst Spiess (3 deliveries)

New National Map 1:1 million
The general map of Switzerland 1:1 mio, engraved on lithographic stone (6 colours) was published for the first time in 1878 and revised until 1972. After several attempts, a new map compilation was started in 1985. The final map, which is available in two versions (normal edition and geophysical edition without cultural features and names) was printed in 1994.

Projection:
Conformal, oblique cylindrical projection
Map size:
121 x 81 cm (= approx. 980 100 km²)
Perimeter:
Paris to Bratislava, Prag to Marseille

Cartography:
Scribing on glass plates, hill shading as monochrome original with airbrush, hypsometric tints computer assisted with the Scitex system.
Printing colours: 8 (geophysical edition) 10 (normal edition)

Pixel maps
Since 1994, all existing topographical maps are available as pixel maps (codes PM25, PM50, PM100, PM200, PM500, PM1000). The pixel maps are scanned and delivered with a resolution of 20 l/mm (508 dpi). This means that the actual size of a pixel is 2.5m at the scale of 1:50 000.

The size of the pixel maps depends on the area represented on the printed map and the resolution. For a standard sheet of 700 x 480 mm, the exact dimensions are 14 000 x 9 000 pixels. It is possible to obtain rectangular sections parallel to the margins of assembled maps with a maximum of 32 000 pixels in the west-east direction. The position of each pixel can be calculated in the official Swiss coordinate system which is defined by the conformal, oblique cylindrical projection.
The pixel maps normally consist of the same colour layers as shown in the printed maps. An exception is the gray hill shading tint, which is usually not scanned because of storage capacity and technical reasons. The different colours are overlayed into one single coloured map following a standard hierarchy. However, they can also be obtained separately as binary images and combined by the user on his own system.

Map sections on the next pages

**General Map of Switzerland** 1:1 million
(previous edition, no longer available)
Publisher:
Swiss Federal Office of Topography,
CH-3084 Wabern, 1878
Contents: Roads, railways, towns, names, state boundaries, hydrographic features, hachuring (topography)
Reproduction:
Stone engraving by Rudolf Leuzinger
Lithographic printing in 6 colours,
15 editions until 1972 (offset printing)

**General Map of Switzerland and the Surrounding Countries,**
**standard edition** 1:1 million
Publisher:
Swiss Federal Office of Topography,
CH-3084 Wabern, 1994
Contents:
Highways, roads, railways, cities and important villages, state boundaries, hydrographic features, hillshading, hypsometric tints in 7 layers
Reproduction: Scribing on glass plates at scale, hypsometric tints with Scitex
Offset printing with 10 colours

**General Map of Switzerland and the Surrounding Countries,**
**geophysical edition** 1:1 million
Publisher:
Swiss Federal Office of Topography,
CH-3084 Wabern, 1994
Contents:
Hydrographic features, state boundaries, hillshading, hypsometric tints in 7 layers
Reproduction: Scribing on glass plates at scale, hypsometric tints with Scitex
offset printing with 8 colours

**Road Map of Switzerland** 1:200 000
Publisher:
Swiss Federal Office of Topography,
CH-3084 Wabern, 1995
Contents:
Base map:
National Map of Switzerland 1:200 000
Thematic overprint:
specified features for motoring
Special: edition in two sheets
(West- and East-part of Switzerland)
Sheet sizes: 89 x 117 cm
Reproduction: Conventional cartographic techniques, film processing
Offset printing in 8 colours
Scribing on glass plates, hypsometric tints with Scitex, in 10 colours.

1:1 million Edition
Office of Topography, Bern, 1994

1:200 000 Edition
Office of Topography, Bern, 1995

Conventional cartographic processing in 8 colours.

Features, state boundaries, hypsometric tints in 7 layers.

Print: For motoring in two sheets (East part of Switzerland)
9 x 117 cm
Digital Height Model DHM25

The Swiss Federal Office of Topography is in the process of establishing a digital height model DHM25 for Switzerland. The data set of the DHM25 is a representation of the topography of the earth's surface and was developed for high accuracy requirements. It replaces RIMINI, which has so far been the only height model covering all of Switzerland with a 250 meter grid.

The DHM25 is produced by the analogue/digital transformation of the height information of the Swiss National Map 1:25 000 (NM25). The topography of the complex map image is represented in three colours: brown (contours for the normal surface), black (contours for rock, scree and spot heights), and blue (contours for glaciers and lakes).

The first basic step is extracting the DHM basis model (vectorized contours on the terrain and in the lakes, digitized spot heights) from the NM25 by scanning at a resolution of 16 l/mm. The complete contour image is extracted from the pixel maps by using image processing methods. The margins to neighbouring maps are edited and the raster data is transformed into vector data.

In the second basic step, the basis model is interpolated with the programme CONGRID (written at the Swiss Federal Office of Topography) resulting in the DHM25 matrix model with a 25 meter grid. This grid of the height matrix corresponds to a mm-grid overlayed on a NM25. The complete matrix of an entire NM25 sheet contains 701 x 481 heights (a total of 337'181 values or 1600 values per km²). The DHM25, covering the entire perimeter of all NM25 sheets, should be completed by the beginning of 1996.

VECTOR200

VECTOR200 is a vector data set based on the content of the four sheets of the Swiss National Map 1:200 000 (NM200) and covering the whole of Switzerland. It consists of 11 object groups (roads, railroads, forests, buildings, hydrography, symbols, spot heights, control points, graticule, boundaries and text), which are divided into a total of 63 types of objects. It is delivered as .dgn, .sif or .dxr files.

VECTOR25

VECTOR25 is a new vector data set based on the Swiss National Map 1:25 000 (NM25). The production of VECTOR 25 just started recently, and it is planned to digitize 50 sheets (from a total of 249) of the Swiss plateau by 1997. Ultimately, VECTOR25 should cover all of Switzerland.

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Thematic Cartography and Desktop Mapping
In the early eighties, the Swiss Federal Statistical Office began producing small-scale statistical maps as supplements to publications of statistical findings. Initially, the changing thematic contents were produced as pixel plots in batch mode on a mainframe computer and inserted into conventionally produced base maps. Annual map production was, however, severely restricted as regards quality and quantity, because of matching problems caused by distortions of the plots, irregular densities due to electrostatic copying, time-consuming processes (information technology, reprography, photosetting, mounting, reproduction, discrete multicolour printing) and little flexibility in the form of presentation and design.

In the late eighties, the Swiss Federal Statistical Office decided to switch from mainframe applications to an interactive desktop mapping system, using Apple Macintosh hardware and Cart/o/grafix interactive map construction software, which can generate postscript data sets ready for direct film exposure. The main stages were:

1990: Conventional typesetting for text was replaced by editing using MacDraw.

1991: Rivers, lakes and the boundaries of districts and cantons were digitized in vector format and the first statistical maps of Switzerland at the scale 1: 2'000'000 were produced for these administrative units using the Cart/o/grafix-software.

1992: After the transfer of the square kilometer grids for each municipality from the mainframe to Cart/o/grafix on the Macintosh, the first municipality choropleth maps were produced in pixel mode on the desktop computer.

Maps on the next page

K1: Residential Population by Municipalities 1990
1 : 2 000 000
Contents:
Distribution of the residential population with a differenciation between urban and rural municipalities

K2: Population Density by Districts
approx. 1 : 4'000'000
Contents:
Population density by districts according to the censuses of 1900, 1930, 1960 and 1990
Produced 1994 by the Cartographic Unit of the Swiss Federal Statistical Office on Apple Macintosh
Published in «Statistisches Jahrbuch der Schweiz» 1995 by the Swiss Federal Statistical Office, Verlag NZZ, Zurich
K 2  Bevölkerungsdichte in den Bezirken
Densité de la population, dans les districts

1900
Schweiz: 107,8 Einw./km²
Suisse: 107,8 hab./km²

1930
Schweiz: 132,2 Einw./km²
Suisse: 132,2 hab./km²

1960
Schweiz: 176,5 Einw./km²
Suisse: 176,5 hab./km²

1990
Schweiz: 223,5 Einw./km²
Suisse: 223,5 hab./km²

Einwohner pro km² produktive Fläche, d.h. ohne die Gewässer,
die unproduktive Vegetation und die vegetationslosen Flächen (Schweiz: 30 753km²)
Habitants par km² de surface productive, c.-à-d. sans les lacs et riviers d'eau,
là végétation imprévisible ni les surfaces sans végétation (Suisse: 30 753km²)
Transition from printing with up to eleven printing colours to the standard four-colour process with colour separations according to the Euroscale.

1993: Production of the first municipality dot maps and elaboration of base maps with highly generalized administrative boundaries, which are particularly suitable for black-and-white maps, for coarse copying and for dissemination in newspapers.

1994: Providing generalized district maps 1:4'000'000 in a quadruple layout, which is appropriate for map sets with chronological comparisons as well as the combined presentation of absolute and relative values.

Expected further developments: Electronic transfer of maps for incorporation into full pages combining maps, text, tables and diagrams, including full-page editing with other software products. Elaboration of additional base map layers (motorways, names, relief shading, hypsometric layers, etc.) for different map scales and areas. Optimization of combined representation of absolute and relative values in maps at municipality level.

Development of additional modules for graphic representations.

Advantages and strong points of the desktop mapping system are:

- Efficient transfer of statistical data on various regional levels or statistical units for areal or point representation
- Bilingual text can be edited and laid out on the screen
- Inexpensive production process by using desktop computers and standard programmes with no need to develop own programmes
- Large variety of thematic representations with Cart/o/grafix
- Possibility of integrating different programmes and exchanging graphic objects between programmes such as Photoshop, Illustrator, FreeHand and Cart/o/grafix.

In addition to the thematic map production for the conventional publications, possibilities of using thematic maps in digital productions such as CD-ROM are also under study at the Swiss Federal Statistical Office. Besides the digital library containing the small-scale statistical maps of the Swiss Federal Statistical Office, some sets of animated maps were developed, which allow to visualize the chronological dimension of statistical phenomena by a sequence of thematic maps, as in a cartoon film.

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GEOSTAT
GEOSTAT is a project in the Spatial Data Section of the Swiss Federal Statistical Office operating and maintaining a Geographic
Information System (GIS), a GIS data pool and a user service. What was in 1976 a planning database has moved in the eighties into a nationwide GIS. Since then there has been a vast growth in the availability of data, in their processing and analysis and in the public demand for such data. By collecting spatial data of general interest covering the whole of Switzerland, GEOSTAT allows processing and analysis of various combinations of data layers. The basic scale for data compatibility is 1:25'000 or the basic grid unit of 1 hectare (100 x 100 m).

The main tasks can be summarized as follows:

- Compilation and administration of spatial data of public interest, collected from the federal administration and other organizations
- Data processing and analysis according to the specific needs of users
- Support and advisory services for users
- Advisory services for spatial data producers; coordination on a national basis with regard to data formats, collection and evaluation techniques.

The following datasets are available to users:

- Swiss administrative boundaries (communes, districts, cantons), polygon data, digitized from the Swiss national topographical maps 1:25'000, and generalized boundaries (up to 1:2'000'000)
- Digital terrain model of Switzerland; 100 m dot matrix, showing altitudes, inclinations and exposition
- Simplified geotechnical map of Switzerland 1:200'000 in 30 classes
- River network and lakes based on 1:200'000 maps
- Land use statistics 1972, predominant type per hectare
- Land use statistics 1979/85; actual land use at every point on a 100 x 100 m dot matrix identified on aerial photographs (24 types) and grid background data in 3 degrees of generalization (17 types)
- Federal censuses of population, buildings and housing; 100 m grid data:
  - 1970: 3 attributes (750 municipalities)
  - 1980: 54 attributes (620 municipalities)
  - 1990: 389 attributes (all municipalities)
- Legal construction zones 1975-1987
- Land suitability map; polygon data; content of survey map 1:200'000
- Federal inventories, protected areas; polygon data based on the Swiss national topographical maps 1:25'000:
  - Landscapes and natural monuments of national importance (BLN)
  - Game reserves
  - Upland and transitional moorlands
  - and meadowlands

Hans-Ulrich Zaugg

Publications
Swiss Federal Statistical Office:
GEOSTAT – Benützerhandbuch
[Comprehensive User Manual].

Swiss Federal Statistical Office:
Map: Land Use in Switzerland 1:300'000
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fax: ++411 256 92 78

Climatological Atlas of Switzerland
As part of the «Climatological Atlas of Switzerland» project, the Swiss Meteorological Institute will publish the results of climatic research in the form of climate maps. It is proposed to produce not only small-scale summary maps for individual climatic conditions over the country as a whole, but also larger-scale climatic investigations of typical regions. The aim of this project is to produce a climate atlas which does justice to its professional and methodical importance.

The atlas section, which will contain the climatic summary maps, will be made up of the following main topics: the overall weather situation, air pressure, wind, radiation, temperature, humidity, clouds, fog, precipitation, thunderstorms, evaporation, phenology and climatic history. The maps are predominantly analytical, containing mainly spatial analyses of each individual climatic element.

In recent times there has been a sharp increase in the requests for appropriate climate maps for applications. These are mostly synthetic maps which are virtually equivalent to the classification of the suitability of a climate for a particular application; in other words, they are drafted for various purposes and based on scientific criteria.

The Atlas project is a joint project, involving various federal and university institutions. Also involved, apart from the Swiss Meteorological Institute, are primarily the Department of Geography of the University of Berne and the Swiss Federal Office of Topography, who will be responsible for printing and publishing the atlas.

In a climate map, climatic relationships will be three-dimensionally portrayed. Climate data will be assigned to the entire area on the basis of individual measurement points and in relation to their heights. In other words, in a cartographic representation of climatic elements in the form of thematic maps, allowance is made for the topographical features that fundamentally affect the individual climatic elements. Thus the topographical map is the three-dimensional prerequisite and basic framework of each climatological map design.

Each climatological map content is thus embedded in a topographical framework. This basic information has to support at its best the data that is superimposed and to supplement it significantly. For the small-scale climate maps, a topographical base consisting of the hydrography and the symbols for the measuring stations, together with a simple hill shading should be sufficient. Such a relief increases the clarity by the three-dimensional structure and facilitates the understanding, not only of the orientation but also of climatological problems in general.
The first delivery was published in 1982 and consists of ten map sheets covering mean surface and upper pressure fields, a classification of typical weather situations, average yearly and monthly temperatures for all twelve months as well as lowest and highest average monthly temperatures.

The second delivery, published in 1984, contains twelve map sheets, with chapters on overall weather situations, on rainfall, on phenology and the history of the climate of Switzerland.

The third section, published in 1987, contains five large-scale climate maps specific to farming and winter tourism, namely «Regional studies on the suitability of climate for farming» and «Snow depths in the Swiss Prealps and Alps» for the months of December, January, February and March.

The fourth delivery, published in 1991, contains twelve map sheets, with chapters on overall weather situations, radiation, fog, precipitation and thunderstorms.

The fifth delivery, which appeared in the bookshops in 1995, contains ten map sheets, with chapters on overall weather situations, humidity and cloudiness.

Walter Kirchhofer

Publications


Maps on the next pages

Climatological Atlas of Switzerland
Vapour pressure, monthly mean for July 1:1'750'000

Cartographic design by the Editorial Group of the Climatological Atlas
Map production and reproduction:
Computer-assisted preparation by digitizing the isolines and screening the colour range, offset printing with 6 colours.
Published by the Swiss Meteorological Institute Zurich and the Swiss Federal Office of Topography, Wabern, 1995

Climatological Atlas of Switzerland
Relative Humidity, July mean at 13.30 hours 1:1'750'000

Cartographic design by the Editorial Group of the Climatological Atlas
Map production and reproduction:
Computer-assisted preparation by digitizing the isolines and screening the colour range, offset printing with 6 colours.
Published by the Swiss Meteorological Institute Zurich and the Swiss Federal Office of Topography, Wabern, 1995
Climatological Atlas of
2 map sheets.

Climatological Atlas of
3 map sheets.

Climatological Atlas of
2 map sheets.

Climatological Atlas of
10 map sheets.

Switzerland

for July

by the Editorial Group of

Production:
Preparation by digitizing
the colour range.

Swiss Federal Office of

Switzerland

mean at 13.30 hours

by the Editorial Group of

Production:
Preparation by digitizing
the colour range.

Swiss Meteorological

Office of Switzerland

1995

Dampfdruk
Julimittel

Klima atlas der Schweiz
Titel und Massstab der Karte
Klimaatlas der Schweiz,
5. Lieferung, 1995
Kartenblatt: Dampfdruck,
Julimittel
1:1 750 000

Herausgeber
Schweizerische Meteorologische Anstalt,
Zürich
Bundesamt für Landestopographie,
Wabern

Kartographische Gestaltung
Redaktionsgruppe Klimaatlas

Karteninhalt
Die Klimakarte zeigt die räumliche Ver-
teilung des Dampfdruckes des Juli-
mittels.

Kartenherstellung, Reproduktion
Computergestützte Bearbeitung:
Digitalisierung der Konturen, Rasterung
der Farbstufen.
Offsetdruck 6-farbig.

Title and Scale of the Map
Climatological Atlas of Switzerland,
5th issue, 1995
Map sheet: Vapour Pressure,
monthly mean for July
1:1 750 000

Publisher
Swiss Meteorological Institute,
Zurich
Federal Office of Topography,
Wabern

Cartographic Design
Editorial group of the Climatological Atlas

Map Contents
The climatic map shows the vapour pressure
distribution for the monthly mean values for
July.

Map Production and Reproduction
Computer-assisted preparation:
Digitization of the contour lines, scanning of
the colour range.
Offset printing with 6 colours.
Title and Scale of the Map
Climatological Atlas of Switzerland, 5th issue, 1995
Map sheet: Relative Humidity, July mean of the 1330 observations
1:1 750 000

Publisher
Swiss Meteorological Institute, Zurich
Federal Office of Topography, Wabern

Cartographic Design
Editorial group of the Climatological Atlas

Map Contents
The climatic map shows the relative humidity distribution for the July mean of the 1330 observations.

Map Production and Reproduction
Computer-assisted preparation:
Digitization of the contour lines, scanning of the colour range.
Offset printing with 6 colours.
Hydrological Atlas of Switzerland

Water is of primary importance for Switzerland, being the water reservoir of Europe. Hydrological elements such as rainfall and snow, rivers and glaciers formed and still form the Swiss landscapes. Mankind profits from the benefit of water, but they are also exposed to its dangers. Social activities influence the water and material balances in many ways.

In the Hydrological Atlas (HADeS) the present knowledge on the water resources are assembled in representations for the whole of Switzerland. Two instalments with a total of 23 tables and two overlay sheets have been published in 1992 and 1995 so far. The traditional medium map is central for putting into practice the results of regional hydrological research. Functioning as models of the real environment, maps can show spatial contexts precisely, quickly, unambiguously and easy to understand. Therefore they are in our visually-oriented world an important factor of a modern spatial science and this parallel to the potentials of the electronic media.

The idea to realize a Hydrological Atlas emerged in the late seventies as a result of manifold activities with hydrological problems. It became clear that not enough profit has been made of the potentials of regional hydrological analyses, which aim at a comprehension of the regional variability. These analyses are of fundamental importance for the assessment of hydrological factors in catchment basins without direct measurements of precipitation, discharge and other parameters.

An atlas is a coordinated sequence of map sheets, based on an ordering system. For the HADES the arrangement of the contents had to follow the elements of water circulation: precipitation, snow and glacier, rivers and lakes, soil- and groundwater. Each of these elements has a quantitative aspect (e.g. runoff) and a qualitative aspect (e.g. chemical condition of river water). The latter are summarized in the chapter «Material Balance». The analysis of the combination of several hydrological elements allows for statements on the water balance. On the whole the atlas is divided up into eight chapters (see table). This thematic order is supported by a colour-index and numbering system. Each atlas table contains several components. The central element is always the map. On the reverse side one finds comments in German, French, Italian and English, on the map contents, on the importance and on applications of the topic presented in the map. The map content is further consolidated by diagrams, graphs and tables.

From a scientific point of view the contents of the HADES can be structured as follows:

a) maps of measuring sites; maps that show at a first glance, where what kind of data for
which period is available from which institution (e.g. tables 2.1, 3.1, 5.1; see table)

b) hydrological informations of general interest; such informations are needed for (political) decisions in problems of water protection; they are the starting point of detailed scientific studies and may be applied on different educational levels (e.g. tables 5.3, 5.5, 7.2, 7.3; see table)

c) specific informations for dimensioning procedures; some maps contain the necessary means for the estimation of hydrological parameters. They are therefore of special importance for daily work (e.g. 2.4, 3.2, 3.5, 5.2; see table)

Swiss hydrology has received important impulses through the «Hydrological Atlas». Its rating in scientific, political and public life has been strengthened. There was a broad interest in this product, what is shown by the 1600 copies sold so far. The atlas is aimed at 40 to 50 tables. The next instalments are planned for 1997 and 1999.

Table of contents of the HADES
1. Fundamental Maps
   1.1 General Topographic Map
   1.2 Characteristics of Small Basins
   1.3 Index of Rivers and Lakes

2. Precipitation
   2.1 Precipitation Networks
   2.2 Mean Annual Corrected Precipitation Depths 1951–1980

3. Snow and Glaciers

2.3 Mean Annual Corrections of Measured Precipitation Depths 1951–1980
2.4 Extreme Point Rainfall of Varying Duration and Return Period 1901–1970

Map section on the next page

Hydrological Atlas of Switzerland
Table 5.3: Influence on Rivers by Water Power Stations and the Lake Control 1:500'000

The utilization of water for hydro-electric power, drinking and utilities, as well as the lake control, are the most important influences in the water balance. On this map the aspect of the influence of the water power stations is of primary importance: all reservoirs and equalizing basins are mapped and the water intakes and conduits of the hydropower stations are shown schematically. The main statement of the map refers to their influence on the discharge of rivers. Its degree is described in percent of the mean annual discharge. Through the regional arrangement of the power stations in the Alpine region one can understand the kind of impact on the river water: in summer water is removed high-up in the mountains, stored in reservoir basins and fed back to the lower courses of the rivers in winter – adapted to the seasonal changes in power consumption. In the river section in between flows a residual amount of water. Below the point of return of the water the power stations may be subject to major fluctuations.
The main rivers of Switzerland, as well as the important influences on their water. The map shows the aspect of hydro-electric power stations and reservoirs and the water of the hydropower dramatically. The main reservoirs to their influence rivers. Its degree is subject to major seasonal changes in the river section in the amount of water.
3.1 Snow Cover and Glacier Gauging Networks
3.2 Snow – Analysis of Extreme Events
3.3 Water Equivalent of the Snow Cover
3.4 Spatial and Temporal Variation of the Water Equivalent of the Snow Cover
3.5 Extreme Accretion of the Snow Cover

4. Evaporation

5. Rivers and lakes
5.1 Hydrometric Networks
5.2 Discharge Regime – the Basis for the Estimation of Average Flows
5.3 Influence on Rivers by Water Power Stations and the Lake Control
5.4 Natural Runoff 1961-1980
5.5 Influence of Civil Engineering on Rivers and Lakes
5.6 Flood Discharge

6. Water Balance
6.1 Water Balance of River Basins

7. Material Balance
7.1 Measuring Sites of Chemical and Physical Parameters of Surface Waters and Precipitation
7.2 Average Concentrations of Selected Chemical Parameters in Surface Waters
7.3 Temperature in Rivers and Lakes

8. Soil- and Groundwater
8.1 Geological, Hydrogeological and Pedological Basic Maps and Profiles

Overlay sheets

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Group for Development and Environment (GDE)
This group has been created in 1988 by merging a number of long-term programmes in the Southern countries supported by the Department of Geography of the University of Berne. The group is involved in applied and oriented research in the fields of development and environment in close cooperation with partner institutions in the Southern countries. The main activities are training and education, as well as in vocational posteducation of the project partners and target groups. Another activity concerns the support of project planning by consulting.

The branch of Geoinformatics and Geoprocessing, which has produced the map presented in the annex, is an area of main emphasis within the group. It focuses on the combination of geographical aspects, as e.g. sustainable utilization of resources, regional development, and data management concepts and technologies. Supporting the group's own programmes has priority. This includes the development of database concepts and database management. The map of Ethiopia presented here is based on the database Ethiopia (ETHIO-GIS), for which the most important natural parameters (topography, geology, soils, precipitation) are systematically captured in view of the erosion prob-
lems. Furthermore the database includes also basic socio-economic variables (land use, settlements and communications). The database is related to the Soil Conservation Research Project (SCRP), which since 1981 is carried out by the GDE together with different Ethiopian partners on the basis of a contract with the Swiss Development Cooperation (SDC). Similar databases exist for other regions, where the GDE is active (Kenya, Madagascar). Within these programmes various maps on different topics are produced, which are important for monitoring and planning aspects. This includes thematic base maps on climate (precipitation), soils and water. Land use and water resources management especially are other themes, that are cartographically treated. Furthermore models for soil and water conservation are developed and presented in maps, as e.g. in the project Natural Resources Monitoring, Modelling and Management for the region of Mount Kenya, or for the Watershed Classification project of the Mekong River Commission. Besides, often maps of more general content are produced. As an example we can mention the National Map of Eritrea at the scale 1:1'000'000 ordered by the SDC. 10'000 copies have been handed over to the Eritrean authorities in spring 1995.

Besides geoinformation and geoprocessing the GDE has three other main areas of activities, namely

- Sustainable utilization of natural resources, especially soil and water conservation.

Map section on the next page

**Ethiopia: Agroecological Belts**

(Southwestern Sheet) 1:1'000'000

Author: Hans Hurni, together with the editorial group in Ethiopia and Switzerland.

Cartography: Andreas Brodbeck

Publisher: Soil Conservation Research Project SCRP, Group for Development and Environment, University of Berne, together with the Ministry of Natural Resources Development and Environmental Protection of Ethiopia and the Ethiopian Mapping Authority, 1995

The map is funded by the Swiss Development Cooperation (SDC).

Contents:

The map shows the main agroecological belts of Ethiopia. Belts coloured in green are the most suitable cultivation zones at medium altitudes. Blue-greyish belts are at high altitudes and have temperature limitations for crop cultivation. Brown to yellow belts are in the lowlands and have problems of aridity, variability in rainfall, or drought conditions that affect crops. In reality, overlaps and site-specific variations in all belts may occur frequently. The map includes detailed areal statistics for each belt. Information on settlements, communications and on the main physical features (topography, hydrography) are included for easier reference.

Reproduction: The map is printed in 6 colours.

Printing: Kümmerly & Frey AG, Berne.
The agroecological belts printed in green are the ones at medium altitudes, those in red at high altitudes (medium altitudes). The limitations for crop growth belts are in the items of aridity, vegetation, and light conditions that may overlap and site-detailed areal statistics on settlement and on the main geographical, hydrographical, and topographical data are included.

Printed in 6 colours. Published by AG, Berne.
The group coordinates a global network, which aims at working up world-wide experiences in soil and water conservation.

- Regional development and regional environmental strategies, concentrating on the conflict between the potential of resources and the claim for the utilization of resources, which is increasing in many regions of the Southern countries (growth of population, modernization).

- Conceptional and policy consulting, as well as training in the environmental field, mainly for the SDC.

These activities include to establish concepts for the sustainable utilization of resources, to conduct a specific documentation on development and environment and to prepare a project for an autodidactical training of medium level staff, who is active in development projects in the environmental area.

The group concentrates regionally on the East African countries (Ethiopia, Kenya, Eritrea) and on Madagascar. It has mandates and consulting tasks in other regions and maintains a network with experts on sustainable development in more than 50 countries.

Thomas Kohler

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**Education**

The Department of Geography of the University of Zurich (GIUZ) maintains teaching and research programmes in spatial data handling (specifically geographical information systems, GIS) and remote sensing which have close links to cartography. Due to the proximity to the Department of Cartography of the ETH Zurich, the curriculum offered in cartography is, however, not a comprehensive one. Cartography is only taught at the basic level. For advanced cartography courses students are advised to participate in the educational programme of the Department of Cartography of the ETH Zurich. The focus of education at GIUZ is on GIS and statistics (three courses at the basic level, three at the advanced level) and remote sensing (one at the basic, three at the advanced level).

**Equipment**

The department is equipped with advanced computer facilities. Hardware available to GIS and remote sensing projects includes more than 30 workstations (Sun, Silicon Graphics, DEC), and many Apple Macintosh PCs as well as various specialized peripherals. There are a variety of commercial software products installed, including GIS software such as ARC/INFO, GRASS, MapInfo, and MAP II, visualization software such as IDL or Iris Performer,
and remote sensing products such as PCI, ER Mapper or Dipix. Substantial inhouse developments of experimental software are carried out as part of research projects.

Research

Research activities include projects of the department staff, Ph.D. and Master's theses, development contracts with international, national, and local organizations, and private companies. Research in remote sensing concentrates on landuse classification from digital optical imagery in rugged terrain, image spectrometry, remote sensing and hydrology, geometric correction of SAR radar imagery, SAR interferometry, methods for photorealistic rendering of landscapes supported by remote sensing imagery.

In the division of spatial data handling (Prof. K. Brassel and R. Weibel), more than 35 M.Sc. students and 10 Ph.D. students are currently pursuing their projects, many of which have a relation to cartography. The following cartography-related projects are being worked on:

- experimental assessment and extension of methods for analytical hillshading
- map generalization
- methods for computer-assisted terrain generalization
- extension of a general-purpose GIS for cartographic generalization
- methods for cartographic knowledge acquisition based on process tracing and inductive learning
- linking methods of quantitative and qualitative evaluation of generalization solutions
- assessment of alternative line representations for line generalization
- derivation of a generalized landuse map from a detailed raster database
- exploratory visualization
- methods and tools for exploratory visualization of environmental data
- interactive visualization of passenger frequency data on a train net-work
- perception studies
- optimal viewing parameters for perspective displays
- perception of area cartograms

Several of the above projects are also reported on at the International Cartographic Conference 1995 in Barcelona.

Kurt Brassel and Robert Weibel
Institute of Cartography, Swiss Federal Institute of Technology (ETH), Zurich

ETH-Hönggerberg, CH-8093 Zurich
phone: ++41 1 633 30 34
fax: ++41 1 633 11 53

The Institute has been founded in 1925 by Prof. Eduard Imhof. Since 1976 it is located on the ETH campus on the Hönggerberg. It has 12 staff members, diploma engineers and geographers and professional cartographers. Since 1965 it is directed by Prof. Ernst Spiess.

Education
Education in cartography is a side branch for 3 to 6 students in survey engineering and about 30 geographers each year. The majority of the latter are students in geography at the State University of Zurich. The curriculum offers the following courses (with total hours):
- Basic Cartography (60)
- Cartogr. Design and Production (60)
- Thematic Cartography (60)
- Cartogr. Reproduction Techniques(30)
- Computer-assisted Cartography (60)
- Map Compilation for Geographers (30)
- Cartographic Project (200)
and may conclude with 10 weeks for a cartographic diploma work. A series of practical exercises are included in the hours given above.

Equipment
The infrastructure of the Institute consists of a series of INTERGRAPH workstations, PCs and Macs, a HP inkjet plotter and a high resolution laser scanner / rasterplotter, all of them connected via Ethernet. The software concentrates on commercial products like INTERGRAPH’s MicroStation, MGE, I/RAS B and C, MGMT etc. and on graphic and multimedia packages for the Macs. Additional programme packages have been developed in-house for thematic mapping and map projections.

Atlas of Switzerland and Swiss School Atlases
Prof. E. Spiess is editor-in-chief of the Atlas of Switzerland and the Swiss School Atlases, which are published in a German, a French and an Italian version. In this function he is assisted in the editing process by his collaborators. In the design and production phase intensive use is made of the graphic system.

Research
Most of the research of the Institute is related to these two atlas projects, as e.g.
- map projections and coordinate transformations
- combination of vector and raster data in cartographic applications with a high quality level
- knowledge-based compilation and production of thematic maps with various modules e.g. for the construction of diagrams, mosaics, area patterns, grid maps etc.
- polychrome versions of photomaps from monochrome remote sensing imagery and frequency modulated screening
– digital 3D-modelling of topographical and geological maps
– theoretical and practical basis for the design and the production of small scale hill shading
– concepts for the production of large-scale maps from digital data bases
– concise gazetteer of Switzerland; list of exonyms (a joint project with the Swiss Federal Office of Topography)
– spatial data for regions and communities and their cartographic representation
– design of multimedia atlases
– graphic design in general

Ernst Spiess

Digital Topographical and Geological Maps and Three-dimensional Visualizations
Between 1991 and 1995, a large mapping project was carried out at the Institute of Cartography in close collaboration with the Institute of Mineralogy and Petrography. The topography and the geological features of Methana, a volcanic peninsula in Greece which covers an area of 55 km², were entirely surveyed und mapped at the scale of 1:25'000. In a PhD thesis based on this work, the techniques and requirements for a digital production of these map types are systematically examined. Exemplary workflows are presented. The same data is used to generate three-dimensional geological visualizations of Methana – and of the Matterhorn in Switzerland / Italy – by entirely digital methods. They allow a better understanding of the spatial geological and tectonic structures and situations.

Orthophotomap Thompson Glacier
1:5000
Air photography and restitution of contour lines by the CNR,
Orthophotoproduction by Prof. Dr. K.Kraus, Vienna
Laboratory work at the Intitute of Cartography of the ETH Zurich by a group of students under the direction of Prof. Ernst Spiess
Lithography: Franz Furrer
Contents:
The continuous-tone original of the ortho photo of this famous push moraine was subjected to a photoline process, which retains by a extremely fine grain the specific structures of their features. This image was masked with the contour lines.
As the cultural features of a map clearly show, the aspects of cartographic design and generalization play an important role in the transition from the digital landscape model (DLM) to the digital cartographic model (DCM). The process of generalization can be divided into the following functions: enlargement, selection, simplification, aggregation, displacement, accentuation and classification. Additional information not included in the map geometry is also very important. In most cases the cartographer must figure out this information during the process of designing the map. Thus, generalization and design functions interact closely. In the thesis, examples of such conflicts and digital, interactive workarounds are presented.

Thanks to image processing functions and modern reproduction technology, topographical area features such as different types of land use and geological units can be included in the map. These methods are also used to generate analytical hill shading from digital height models and integrate them in the map image.

This project introduces a computer programme with which simplified cliff drawing can be generated using ridge lines. The upper and lower edges of a cliff are digitized manually from sketches. This is the programme input. The digitized vertices are used to create a framework of ridge lines. The programme defines the line widths according to an illumination model. The rough appearance is

On the colour plate on the right-hand side the following map extracts and illustrations are shown:

Upper left: 
**Section of the Digital Topographical Map of Methana** 1:25’000
containing situation, map text, contour lines, hydrography, digital cliff drawing, land use and analytical shading.

Upper right: 
**Section of the Digital Geological Map of Methana** 1:25’000
with elements of the topographical base map, geological surface information and special symbols.

Center: 
**Three-dimensional visualization of Methana peninsula**
View form the west. The geological surface data has been draped over a digital elevation model and shaded as a perspective view.

Lower left: 
**Three-dimensional Visualization of the Matterhorn with Geological Surface Data.**
View from the northwest.
Colour plate  (FM-Screened)


Upper right: Extract from the digital geological map.

Center: Three-dimensional visualization of Methana peninsula. View from west. The geological surface information has been draped over a digital elevation model and is displayed as a shaded perspective.

Left: Three-dimensional visualization of the Matterhorn with geological surface information. (Northwest).
Titel der Karten und 3D-Visualisierungen
- Methana 1:25'000 (Topographie)
- Methana – Geology 1:25'000
- Dreidimensionale geologische Visualisierung der Halbinsel Methana (GR)
- Dreidimensionale geologische Visualisierung des Matterhorns (CH)

Herausgeber
Stiftung «Vulkaninstitut Immanuel Friedländer» am Institut für Mineralogie und Petrographie, ETH Zürich zusammen mit:
Institut für Kartographie, ETH Zürich

Projekt

Karteninhalt
Topographische Karte:
Situation, Tiefenstufen, flächenhafte Landnutzungsdarstellung, Höhenkurven, analytische Schattierung, digitale Felszeichnung.

Geologische Karte:

Kartographie und Produktion
Lorenz Hurni, Institut für Kartographie, ETH Zürich, CH-8093 Zürich

Offsetdruck
Bundesamt für Landestopographie, CH-3084 Wabern

Title of Maps and 3D-Visualizations
- Methana 1:25’000 (Topography)
- Methana – Geology 1:25’000
- Threedimensional Geological Visualization of Methana Peninsula (GR)
- Threedimensional Geological Visualization of the Matterhorn (CH)

Publisher
Foundation «Vulkaninstitut Immanuel Friedländer» at the Institute of Mineralogy and Petrography, ETH Zurich together with:
Institute of Cartography, ETH Zurich

Project
Joint project of both institutes. Complete topographical and geological survey of Methana peninsula in Greece and entirely digital, cartographic production on an Intergraph-System including own software. Geological surface information and digital elevation models have been used for the production of 3-dimensional visualizations of Methana and the Matterhorn in Switzerland. This color plate has been screened using frequency modulated screens.

Map Contents
Topographical map:
Situation, bathymetry, land use, contour lines, analytical shading, digital cliff drawing.

Geological map:
Basic map containing situation, bathymetry, contour lines, analytical shading and digital cliff drawing. Geological formations and special symbols.

Cartography and Production
Lorenz Hurni, Institute of Cartography, ETH Zurich, CH-8093 Zurich

Offset Printing
Swiss Federal Office of Topography, CH-3084 Wabern
simulated by a local variation of the widths and the position of the lines using a random function. It is possible to simulate round (concave and convex) rock shapes (cavities). The programme can be fine-tuned with about 50 parameters. In order to solve complex cartographic problems, the possibilities of such a ‘Cartographic Software Tuning’ by an experienced operator (cartographer) is important for the development and successful application of the programmes.

Finally, the work describes the possibility of generating three-dimensional geological surface visualizations based on the same cartographic data. Area polygons of the geological formations are merged with a digital height model resulting in surface facettes which are coloured according to these features. This surface model can be shaded and visualized from different angles using a standard rendering software. These visualizations offer the user of two-dimensional geological maps additional possibilities for interpretation and they can even be used interactively during the map modelling process.

All maps and visualizations were produced using Intergraph hardware and software and own programme developments. The map was printed in six colours (CMYK+Brown+Grey). For the colour plate presented here, only the CMYK colours were used. The analytical shading is integrated in the black plate, the contour lines in the CMY-plates. The screening was carried out 'on the fly' while plotting, using frequency modulated, stochastic screens by OPRONICS / INTERGRAPH.

Lorenz Hurni

Publications


Summary Reports from Private Cartographic Companies

Kümmerly+Frey AG, Bern
Hallerstrasse 10, CH-3001 Berne
phone: ++4131 301 51 11
fax: ++4131 302 59 03

The company has been founded in 1852 by Gottfried Kümmerly. Therefore this publishing house can shortly look back on 150 years of activities in the cartographic field.

In 1989 the firm has undergone a restructuring in connection with the leaving of the family Kümmerly and members of the family Frey. The syndicate under the directorate of Walter Frey consists of the following partners:

- Kümmerly+Frey AG, Bern
- Blay-Foldex SA, Montreuil, France
- Kümmerly+Frey Deutschland
- Kümmerly+Frey Verlags GmbH, Wien
- K+F-Consulting AG, Horw, Schweiz

The existing broad range of maps has been enlarged in the period 1991-1995 by a considerable number of new maps and atlases:

- Baltic States at 1:1 mio.
- Poland / Czech Republic / Slovak Republic / Hungary at 1:500'000
- Germany in 3 sheets at 1:250'000 (new «Länder»)
- Denmark at 1:300'000
- Spain in 3 sheets at 1:500'000
- Spain in 3 sheets at 1:250'000
- United States in 10 sheets at 1:350'000 / 1:700'000 / 1:1 mio.
- 10 city maps (city map series)
- 25 hiking maps at 1:60'000 for Switzerland
- 12 cycling maps at 1:60'000 for Switzerland
- 4 holiday maps at 1:120'000 for Switzerland (excursion maps)
- various road atlases
- various leisure and hiking guides with numerous map sections

Map section on the next page

Road Map Costa Blanca 1:250'000
Published by Kümmerly+Frey AG, Berne 1994
Contents:
Road map of the region of the Costa del Azahar and Costa Blanca with 7 road classes, with kilometer indications, with woodland and relief representation, 32 different point symbols, picturesque routes and recommended beaches.
This map was produced with normal conventional techniques and printed in 6 colours.
Maps at 1:350’000 / series)
Maps at 1:250’000 for Switzerland
for
for
(roads maps)

Guides with nu-

ge

rey AG, Berne

the Costa del Aza-

Road classes ,

woodland and

different point sym-

and recommended

with normal conven-

6 colours.
The conventional techniques for the production or revision of these maps have not changed substantially in the last four years. The production of maps by computer-assisted systems, implemented as early as 1979, has seen a consistent development. The SCITEX system used at the beginning and applied for a variety of tasks has soon shown its limitations, which could not be overcome, as their producers gave up its further development. Kümmerly+Frey Digital Cartography integrated therefore the RASCON system, which was compatible on both the input and the output side. Still today it covers a considerable part of capacity in the field of computer-assisted cartography in the firm. The RASCON system allows for the handling of raster and vector data and is therefore well suited for the production and updating of plans and maps that do not rely on a data bank.

In order to complement its range of services Kümmerly+Frey has decided to acquire a LÜSCHER scanner/plotter which scans maps and manuscripts and plots films up to a format of 120 by 180 cm. Two Macintosh workstations are used for the execution of less demanding cartographic tasks.

To be prepared for the future Kümmerly+Frey has developed a database-oriented system, that is based on the AIX operating system and uses IBM RS/6000 RISC-hardware.

The system consists of the components «Cartographic Information System (CIS)». With the DCS existing maps and other data are vectorized, to a great extent automatically. The CIS is the core with a whole range of programmes and leaves nothing to wish for the production of plans and maps. The LÜSCHER scanner/plotter can be used as well for the output from this system. Data capture of the existing maps and related data has been started some time ago.

The parent company in Berne will move to a new building in the suburbs of Berne around mid 1996.

Claude Vez
Map sections on the next pages

**Hiking Map Series 1:60'000**

**Sheet: Val d'Anniviers — Val d'Hérens — Montagna**

Published by Kümmerly+Frey AG, Berne 1995

Contents:
Tourist map in the topographical scale range with special topics for the hikers. The hiking network was compiled on the basis of manuscripts by the «Hiking Trail Organization Wallis».

Only routes that are marked in the terrain are indicated. The hiking networks differentiates between main hiking routes and connection paths. In addition there is a difference between normal hiking routes and mountain paths. The roads marked in yellow indicate bus routes that are regularly served.
This map has been produced conventionally by scribing, stick-up lettering, strip-masking and manual hill shading and printed in 6 colours.

**Map of Alpine Roads 1:500'000**

Published by Kümmerly+Frey AG, Berne 1995

Contents:
Road map with 6 road classes, with kilometer indications, picturesque routes, natural reserves, with relief representation and 25 different point symbols.
This map was produced with the usual conventional techniques and printed in 6 colours.
Orell Füssli Kartographie AG
Dietzingerstrasse 3, CH-8036 Zürich
phone: ++41 1 451 20 40
fax: ++41 1 451 20 45

Orell Füssli Kartographie AG is a company for cartographic services with tradition. Based on several years of experience in digital cartography all specialized cartographic activities are performed according to the customary high quality standards. The company believes that it can be regarded as one of the leading users of the new digital techniques in Europe. It is able to cover a large range of cartographic services and works:

With its powerful INTERGRAPH system and a high-resolution MapSetter scanner/plotter Orell Füssli Kartographie AG offers scanning and plotting services to customers who have high quality requirements. Binary and monochrome or polychrome continuous-tone raster data can be classified, vectorized or converted to other data formats according to given specifications. In order to guarantee optimal output results, image processing of these raster data is a matter of course within the services offered. Most of their own map publications are updated in hybrid techniques and outputted by the MapSetter on the respective films for printing. The production consists of school maps (including wall maps, especially in relief shading combined with hypsometric colours), of atlas maps (among others for the new «Swiss World Atlas» 1993 for secondary and high schools and for the actualised issue of 1994), of geological and hydrogeological maps, soil maps, linguistic atlases, town plans, hiking maps and a variety of products for commercial publicity. The own publishing products with more than 80 town plans and other maps are mostly produced by digital techniques.

Following the preparation of analogue proofs, Orell Füssli Kartographie AG offers also its services as general contractor for printing, binding, packing and forwarding. Co-operations with powerful companies in the field of photogrammetry and surveying support these general services.

Gottfried Borys

Map section on the next map page

School Map of Switzerland 1:500'000
Published by the Lehrmittelverlag of the Canton of Zurich
Cartographic Design by Orell Füssli Kartographie AG, Zürich
Contents and production:
This school map dates back to the sixties. It has been continuously updated with conventional methods. We might emphasize the relief, reproduced in five colours, including the hypsometric tints, and additional colours for the rock skeleton drawing and the contour lines. The map is published in the three national languages German, French and Italian. Printing in 8 colours: black, brown, red, blue, light brown, grey, yellow and violet.
Legends for the map sections on the next pages (continued):

Road Map of Switzerland 1:303'000
Published by Photoglob AG, Zurich, a daughter company of Orell Füssli Graphische Betriebe AG
Cartographic Design by
Orell Füssli Kartographie AG, Zurich
Contents and production:
All the existing conventional originals, linear elements and masks at the scale 1:350'000, have been scanned with high resolution. The binary raster data have been subjected to an affine transformation and scaled to 1:303'000 for better legibility. The existing hill shading at the scale 1:500'000 has been scanned as well into a continuous-tone file, transformed and scaled to the above binary files. After specification of all the files, the final films for printing were plotted.
Printed in 6 colours: Euros scale, brown, grey.

School Wall Map of the Cantons of Basle-Town and Basle-Country
1:25'000
Published by the Departments for Education of both Cantons
Cartographic Design by
Orell Füssli Kartographie AG, Zurich
The existing school map at the scale 1:50'000 had to be extended at the western border due to the change in subordination of the Laufental from the Canton of Berne to the Canton Basle-Country.
The publisher attached great importance to a new edition with unchanged colours. It was decided therefore to realize this map by computer-assisted methods. All linear elements and masks have been scanned with high resolution. The binary raster data have been subjected to an affine transformation. The existing conventional hill shading was supplemented and scanned with low resolution into a continuous-tone file, transformed and scaled to the above binary files. Making use of digital image processing five different colour separation files of the relief have been prepared and combined at plotting with the hypsometric tints.
The school wall map at the scale 1:25'000 presented here has been extracted from the files at 1:50'000 in four parts. As the scale change was done only in the plotting stage, a screen frequency of 60 dots/cm could be realized, resulting in a high quality.
Printing in 11 colours: black, brown, blue, red, green, light brown, grey, light blue, violet, rose, yellow.

Map on p.39

General Topographic Map 1:10'000
Diploma project by Urs Schor at the Institute of Cartography of the ETH Zurich 1994
Contents:
The upper part of the illustration shows the total contents of the database of the numerical cadastre survey according to the new data catalogue. The lower part is a conversion of a selected part of these data into a topographical map 1:10'000. The comparison shows a considerable amount of generalization, which was done here partly programme-controlled, partly interactively.
this map by com- 
posing all linear elements 
combined with high re-
data have been 
transformation. The 
was supple- 
ow resolution into 
transformed and 
files. Making use 
stronger five different 
relief have been 
plotting with the 

The scale 1:25'000 
extracted from the 
parts. As the scale 
plotting stage, a 
dots/cm could be 
quality.

brown, blue, red, 
light blue, violet,

1:10'000 
Zurich 1994

The comparison 
partly programmed.
Übersichtsplan 1 : 10000

RAV-Grunddatensatz dargestellt als Übersichtsplan 1 : 10000
Map sections on the next pages

Traffic Map of the Canton of Zurich
in two parts 1:50'000
Published by Orell Füssli Graphische Betriebe AG, Zurich
Cartographic Design by Orell Füssli Kartographie AG, Zurich
Contents and Production:
In the nineties Zurich opened a new era for the public traffic with the introduction of the traffic compound. In order to represent the new traffic system cartographically, Orell Füssli decided to produce a map of the whole Canton of Zurich in two parts. Based on the National Topographical Map 1:50'000, the network of the express railway, buses and tramways as well as the hiking trails and other important information were superposed. These new elements have been produced conventionally and reproduced via astralon copies up to films ready for printing.
Printed in 8 colours: Euroscale, violet, green, grey and red.

City Plan of St. Gall 1:12'500
Published by Photoglob AG, Zurich, a daughter company of Orell Füssli Graphische Betriebe AG
Cartographic Design by Orell Füssli Kartographie AG, Zurich
Contents and Production:
All map elements have been manually digitized from the Large-Scale Topographical Map 1:5000. Every element was converted separately from vector to raster. Following the generation of the four plot files, film output was made on a high resolution laserplotter. Printed in 4 colours: Euroscale.

City Plan Locarno-Ascona 1:10'000
Published by Photoglob AG, Zurich, a daughter company of Orell Füssli Graphische Betriebe AG
Cartographic Design by Orell Füssli Kartographie AG, Zurich
Contents and Production:
All the existing conventional originals, linear elements and masks have been scanned individually. The binary raster data have been subjected to an affine transformation and registered to control points. Up-dating was done in a combined vector/raster mode. The few elements in vector format were automatically rasterized and integrated in the new binary raster data. Following the generation of the four plot files, film output was made on a high resolution laserplotter. Printed in 4 colours: Euroscale.
The Topographical series was converted 1:10'000. Following the film output, data have been scanned and laser plotter output was made on the laser plotter.

Up-dating was automated in the new master mode. The generation was automated in the new master mode.
Karto-Atelier Arne Rohweder
Forchstrasse 101, CH-8127 Forch
phone and fax: ++411 980 24 54

This Carto Studio has been established as an independent servicing firm by Arne Rohweder in 1992. His main activity covers the production of panoramas for tourist supporting and information offices and publishing houses. The topographic accuracy of his art work, which is very much appreciated by the users, reflects his experience as a cartographer.

In 1994 the publishing house Karto-Atelier was founded with the intention to produce panorama and tourist maps according to its own concepts.

Since 1992 as many as 35 panorama originals have been painted as well as 25 coloured sketches as a basis for painting exhibition charts.

Map sections on the next pages

Panorama Map Klosters
Cartographic design:
Production of a sketch, construction and painting of the panorama, drafting and mounting the text overlay by Arne Rohweder.

Map content:
The map section shows the hiking area around Klosters. The terrain is depicted with remarkable topographic accuracy in spite of its idealization.

Map production and reproduction:
The original has been painted in a hybrid guache and acryl technique using brush and air-brush. To increase legibility of some lettering the background has been cleared-up using a softdrawing outline as a mask.
The printing films were produced with frequency modulated (FM) screens.

Lithography:
Offset Repro AG Franz Hörburger, Zurich
Printing in four colours (Euroscale) by Neidhart und Schön Druck AG, Zurich
**Panorama Map Karpathos (Greece)**
approx. 1:150’000

Map publisher: Carto Studio Arne Rohweder
Cartographic design:
Field checks, map design and painting of the panorama by Arne Rohweder

Map content:
This map section shows a 3D-aspect of the tourist island of Karpathos with its settlements and road network.

Map production and reproduction:
The panorama original has been painted in a hybrid gouache and acryl technique using brush and air-brush. The names have been placed digitally on the basis of scanned raw data by Armin Waldhauser, Zurich.
Lithography:
Offset Repro AG Franz Hörburger, Zurich
Printing in four colours (Euroscale) by René Linder AG, Adliswil

**Road Map Karpathos (Greece)**
1:100’000, first edition 1995

Map publisher: Carto Studio Arne Rohweder
With the intention to give the hiker or mountain-biker with an impression about the rapidly changing conditions of the terrain and vegetation, traditional map design and modern technical procedures have been combined.
The map includes vegetation layers, hill shading and rock drawing, roads and hiking trails, hints for tourists.
The map is based on satellite imagery SPOT IMAGE P and EURIMAGE PA. Field checks, satellite image restitution, map editing, hill shading, rock drawing and scribing of all the linear elements have been executed by Arne Rohweder. Orell Füssli Kartographie AG did the subsequent digital handling on the INTERGRAPH system, namely scanning of all linear elements and of the continuous-tone hill shading, interactive editing and logical operations by MapPublisher as well as plotting the colour-separated films with the MapSetter 4000 in 2032 dpi.
Printing in six colours (Euroscale) by René Linder AG, Adliswil
Wäger + Partner
Juchstrasse 27, CH-8500 Frauenfeld
phone and fax: ++4154 22 27 90

This collective company, which was founded in 1990, is a modern enterprise for cartographic services in the city of Frauenfeld in Eastern Switzerland close to the Lake of Constance.

At its foundation in 1990 their main orders covered the production and correction of official maps, making use of all common analogue techniques and procedures. Nowadays the official maps in Switzerland are subject to enormous technical changes. Their final goals are not yet clearly recognizable from a cartographic point of view. In this connection consulting activities for the conservation of the quality of the General Topographic Plan have recently considerably increased.

The main fields of activity of the company are graphic design and cartography for exhibitions in museums as well as atlas and school map cartography. Wäger + Partner is one of the few companies that specialize in hill shading, black-and-white as well as multicoloured originals.

Five years after its foundation Wäger + Partner can already offer the whole range of services for plan and map production. They also offer to function as general contractors. They cover the whole range from monochrome prospectus maps with local or regional character for companies, authorities, societies or clubs up to comprehensive maps for industry, economy and science. The working team consists of five licenced professional cartographers and a secretary. Training in computer-assisted cartography for the staff is considered to be very important and is supported by the company. Being a cartography company and at the same time heavily involved in contracts with official survey organizations, it is difficult to have the ideal graphic system with allround hard- and software. The firm has decided to concentrate internally for the time being on design and drafting programmes. For computer-assisted work in the field of surveying it forms occasionally a working group with a neighbouring engineering company.

Clemens Maria Wäger
Addresses of Freelance Cartographers in Switzerland

Beat Baeriswyl
Buristrasse 18
CH-3006 Bern
phone:  ++4131 352 74 35
Analogue and digital production of town maps, official large scale topographical maps, road maps and thematic maps, technical illustrations

Hans Betschart
Haldenstrasse 28
CH-4806 Wikon
phone and fax: ++4162 52 28 49
Analogue and digital production of town maps, official large scale topographical maps, atlas maps, road and thematic maps

Joachim Föhse
Meisenweg 8
CH-3506 Grosshöchstetten
phone:  ++4131 711 21 95
Production of town maps, official large scale topographical maps, atlas maps, road maps and thematic maps

GEO-Atelier
Lätti 441
CH-3053 Münchenbuchsee
phone:  ++4131 869 25 25
fax:  ++4131 869 53 25
Analogue and digital production of town maps, official large scale topographical and thematic maps, hiking and cycling maps

Jean-Martin Herrmann
Tecchermannhaus
CH-3182 Ueberstorf
phone:  ++4131 741 03 54
fax:  ++4131 741 33 37
Analogue and digital production of town maps, official large scale topographical maps, thematic maps and infographics

Map sections on the next pages

Frauenfeld City 1:3750
Cartography by Wäger+Partner and Vermessungsamt Stadt Frauenfeld
Published and distributed free of cost by the municipality and the tourist office of Frauenfeld 1992
Reproduction:
Conventional production, s therefore that for individual thematic mapping tasks of the community each overlay sheet may be combined with any other, also in small numbers by gelatine printing.
Printed with four Pantone colours

Stettfurt 1:5000
Cartography by Wäger + Partner
Published and distributed free of cost by the municipality and the tourist office of Stettfurt 1995
Reproduction:
Conventional production, multicoloured hill shading painting by Regula Spiess, scanned and integrated in the colour separation films.
Printed with 5 colours (Euroscale and Pantone grey)
Camillo Kohli  
Zähringerstrasse 66  
CH-3012 Bern  
phone: ++4131 301 50 56  
fax: ++4131 302 00 96  
Digital production of town maps, road maps and thematic maps

Peer Messerli  
Pfaffächerstrasse 23a  
CH-8913 Ottenbach  
phone: ++411 761 38 14  
fax: ++411 761 39 58  
Corporate identities, commercials

Felix Neukom  
Stockenstrasse 72  
CH-8405 Winterthur  
phone: ++4152 233 65 85  
Analogue production of town maps and official large scale topographical maps

Richard Ritschel  
Alte Landstrasse 203  
CH-8800 Thalwil  
phone: ++411 720 27 75  
Analogue and digital production of atlas maps

Arne Rohweder  
Forchstrasse 101  
CH-8127 Forch  
phone and fax: ++411980 24 54  
Analogue production of relief maps, tourist maps and panoramas

Urs Rudolf  
Unterdorstrasse 7a  
CH-9507 Stettfurt  
phone: ++4154 53 25 11  
Analogue production of town maps, large scale topographical maps, atlas maps and thematic maps

Atelier Schönì  
Thorbergstrasse 6  
CH-3326 Krauchthal  
phone and fax: ++4134 51 16 26  
Analogue and digital production of town maps, official large scale topographical maps, road maps and thematic maps

Bernhard Thomi  
Hintergasse 14  
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Analogue and digital production of town maps, atlas maps and thematic maps

Claudia A. Trochslér  
Reuss-Strasse 1  
CH-5642 Mühlau  
phone: ++4157 48 22 10  
fax: ++4157 48 21 05  
Digital production of town maps, thematic maps and commercials

Frank Weber  
Blés d’Or 280  
CH-1760 Courgevaux  
phone: ++4137 71 17 71  
Analogue and digital production of large-scale topographical maps and town maps
Addresses of Private Cartographic Companies

Anderhub AG
Feldhaus 9
CH-6274 Eschenbach-Luzern
phone: ++4141 89 22 48
fax: ++4141 89 28 20
Analogue and digital production of town maps, official large scale topographical and thematic maps, road maps, GIS applications

GeoMap AG
Zelgstrasse 71
CH-3138 Uetendorf
phone and fax: ++4133 45 70 78
Digital production of town maps, topographical and thematic maps, road maps, plotter services

Hallwag AG
Nordring 4
CH-3001 Bern
phone: ++4131 332 31 31
fax: ++4131 331 41 33
Analogue and digital production of town maps, relief maps and thematic maps; book, journal and map publishers

Kümmerly+Frey AG
Hallerstrasse 6-10
CH-3001 Bern
phone: ++4131 301 51 11
fax: ++4131 302 59 03
Analogue and digital production of town maps, atlas maps, relief maps, road maps and thematic maps

Orell Füssli Kartographie AG
Dietzingerstrasse 3
CH-8036 Zürich
phone: ++411 451 20 24
fax: ++411 451 20 45
Analogue and digital production of town maps, atlas maps, road maps and thematic maps, scanner and plotter services

Schad + Frey AG
Stöckackerstrasse 37
CH-3018 Bern
phone: ++4131 991 02 55
fax: ++4131 991 02 56
Analogue production of town maps, relief maps, official large scale topographical maps and thematic maps, multimedia products, digital photography

Swissair Photo + Vermessungen AG
Dorfrstrasse 53
CH-8105 Regensdorf
phone: ++411 871 22 22
fax: ++411 871 22 00
Photogrammetric and cartographic production of official large scale topographical maps and topographical maps

Wäger + Partner
Juchstrasse 27
CH-8500 Frauenfeld
phone and fax: ++4154 22 27 90
Analogue and digital production of town maps, atlas maps, relief maps, official large scale topographical and thematic maps and map graphics for exhibitions
List of inserted map samples

Swiss Federal Office of Topography, Wabern:
- Sheet index and revision cycle of the Swiss National Map Series
- General Map of Switzerland 1:1'000'000 as of 1878
- General Map of Switzerland and the Surrounding Countries, standard edition 1:1'000'000
- General Map of Switzerland and the Surrounding Countries, geophysical edition 1:1'000'000
- Road Map of Switzerland 1:200'000

Swiss Federal Statistical Office, Berne:
- Residential Population by Municipalities 1:2'000'000
- Population Density by Districts approx. 1:4'000'000

Swiss Meteorological Institute, Zurich:
- Vapour pressure, monthly mean for July 1:1'750'000
- Relative Humidity, July mean at 13.30 hours 1:1'750'000

Department of Geography, Berne University:
- Influence on Rivers by Water Power Stations and the Lake Control 1:500'000
- Ethiopia: Agroecological Belts 1:1'000'000

Institute of Cartography, ETH Zurich:
- Orthophotomap Thompson Glacier 1:5000
- Digital Topographical Map of Methana 1:25'000

Digital Geological Map of Methana 1:25'000
- Three-dimensional visualization of Methana peninsula
- Three-dimensional visualization of the Matterhorn with Geological Surface
- General Topographic Map 1:10'000, derived from digital cadastral database

Kümmerly+Frey AG, Berne:
- Road Map Costa Blanca 1:250'000
- Hiking Map Series 1:60'000, Sheet Val d'Anniviers- Val d'Hérens-Montana
- Holiday Map Wallis 1:120'000
- Map of the Alpine Roads 1:500'000

Orell Füssli Kartographie AG, Zurich:
- School Map of Switzerland 1:500'000
- Road Map of Switzerland 1:303'000
- School Wall Map of the Cantons of Basle-Town and Basle-Country 1:25'000
- Traffic Map of the Canton of Zurich 1:50'000
- City Plan of St.Gall 1:12'500
- City Plan Locarno-Ascona 1:10'000

Karto-Atelier Arne Rohweder:
- Panorama Map Klosters
- Panorama Map Karpathos
- Road Map Karpathos 1:100'000

Wäger+Partner, Frauenfeld:
- Frauenfeld City 1:3750
- Stettfurt 1:5000