National Report to the ICA
14th General Assembly, Moscow, 2007

Cartography in Croatia
2003 – 2007

Prepared by Miljenko Lapaine
Croatian Cartographic Society
www.kartografija.hr
mlapaine@geof.hr
Cartography in Croatia 2003–2007
National Report to the ICA
14th General Assembly, Moscow, 2007

Prepared by Miljenko Lapaine
Croatian Cartographic Society
mlapaine@geof.hr

Assistant Vesna Poslončec Petrić

CD layout by Dražen Tutić

Translator and Proof Reader Valentin Lapaine

Reviewer
Prof. Emeritus Nedjelko Frančula

Sponsored by
State Geodetic Administration of the Republic of Croatia

Published on CD by Croatian Cartographic Society

Zagreb, August 2007
## Contents

| 1. Introduction | 4 |
| 2. Official Cartography | 5 |
| State Geodetic Administration | 5 |
| Croatian Geodetic Institute | 7 |
| Ministry of Defence of the Republic of Croatia | 10 |
| Hydrographic Institute of the Republic of Croatia | 11 |
| National and University Library | 13 |
| Lexicographic Institute “Miroslav Krleža” | 16 |
| Institute of Social Sciences “Ivo Pilar” | 17 |
| Institute of Migrations and Nationalities | 17 |
| Croatian Institute for History | 17 |
| 3. Academic Cartography | 18 |
| Centre for Geoinformation and Cartography of the Croatian Academy of Engineering | 18 |
| Faculty of Geodesy of the University of Zagreb | 19 |
| Geographic Department of the Faculty of Science of the University of Zagreb | 22 |
| Department of Geography of the University of Zadar | 24 |
| Soil Science Department at the Faculty of Agriculture, University of Zagreb | 25 |
| Department for History of the University of Zadar | 26 |
| Faculty of Civil Engineering of the J. J. Strossmayer University in Osijek | 26 |
| Scientific Projects Financed by the Ministry of Science, Education and Sport | 26 |
| 4. Commercial Cartography | 28 |
| Geofoto Ltd. | 28 |
| Company for Photogrammetry, Zagreb | 31 |
| Geodetic Company Split | 32 |
| Geodetic Company Osijek | 34 |
| Gisdata Ltd. | 35 |
| GEOdata Ltd. | 37 |
| galaGIS Ltd. | 39 |
| Croatian Air Navigation Services Ltd. | 40 |
| Croatian School Cartography | 41 |
| Studio Bregant Ltd. | 44 |
| STEF Ltd. | 45 |
| VA-COPY multimedia | 45 |
| 5. Other Activities | 47 |
| Croatian Cartographic Society | 47 |
| Croatian Geographic Society – Zadar | 49 |
| Zagreb Astronomical Observatory | 49 |
| Exhibitions | 50 |
| 6. Acknowledgements | 52 |
| 7. References | 53 |
1. Introduction

Croatia was admitted to the International Cartographic Association at its 10th General Assembly held in Barcelona in 1995. On that occasion, the national report was presented with data about maps Croatia had at its disposal, cartographic institutions and their activities during the period 1991-1995. The report featured data about official topographic maps, maritime charts and thematic maps and databases and geoinformation systems. It also listed activities in the field of commercial and academic cartography, publishing activities and a brief description of map exhibitions. The report was published in Croatian and English (Frančula et al., 1996a,b).

A new national report, which encompassed the period of Croatian cartography after the Barcelona conference, i.e. from 1995 to the summer of 1999, was produced for the 11th General Assembly of the International Cartographic Association held in Ottawa in 1999. Basic chapters of that report are official cartography, commercial cartography, academic cartography, Section for Cartography of the Croatian Geodetic Society and other activities (Frančula, Lapaine, 1999).

Croatian cartography during the period 1991-1999 was described in the yearbook of the Croatian Academy of Engineering (Lapaine, Frančula 2000).

The next report was prepared for the 12th General Assembly of the International Cartographic Association, which was held in the 21st International Cartographic Conference in Durban, South Africa, August 10-16, 2003 (Lapaine, Frančula 2003a,b,c).

The report for the period 2003-2007 follows.

The author is aware of the incompleteness of the following report, caused by some institutions and individuals not replying to the invitation for collaboration. Nevertheless, due to a large number of colleagues who did reply and who are given my special acknowledgement at the end of the report, I find this report giving a very good picture of the development of cartography in Croatia during the period 2003-2007.
2. Official Cartography

State Geodetic Administration (SGA)

The State Geodetic Administration is a state administrative organisation which carries out administrative and professional works from the field of geodesy, cartography, cadastre and photogrammetry, and also deals with cadastre and geodetic-spatial system informatisation, official state cartography (1:5000, 1:25 000, 1:50 000, 1:100 000, 1:200 000), geodetic documentation, real estate cadastre statistic data, spatial units and line networks cadastar and geodetic-cadastral works for the state border.

The new law about state survey and real estate cadastre, which was adopted on January 26, 2007, has regulated state survey, real estate cadastre, spatial unit registry, national spatial data infrastructure, geodetic works in local self-government, geodetic works for special purposes, authority over works of spatial survey and real estate cadastre and execution of those works, structure and scope over works of state survey and real estate cadastre and execution of those works, structure and scope of the SGA and Croatian Geodetic Institute, storage and usage of data and authority over works of state survey and real estate cadastre.

Works of state survey and real estate cadastre are executed on the basis of five-year and annual programs. Programs determine the areas on which basic geodetic works are going to be carried out, as well as topographic surveys and state map production, state border survey and marking, real estate cadastre production and funding sources for the execution of the Program. Five-year programs are formed by Croatian Parliament, and annual programs by the Government of the Republic of Croatia.

The SGA carries out work from its field at the Central Office in Zagreb and 20 regional offices throughout the Republic of Croatia. One exception to this is the area of the City of Zagreb, where administrative and professional works legally under the scope of regional office are done by the office of the City of Zagreb.

Following internal structural units were formed to execute works within the scope of the Central Office in Zagreb:

1. Director's Office
2. Sector for Legal, Accounting and Inspection Works
3. Sector for Topographic Survey and State Maps
4. Sector for Cadastral System
5. Sector for State Survey
6. Sector for Information System.
Sectors are managed by director’s assistants. The sectors are further divided into departments run by chiefs, departments into sections run by section leaders. Sector for topographic survey and state maps consists of two departments, and each of them consists of two sections: Department for Photogrammetry and Remote Sensing (Section for Photogrammetric Surveys and Section for Photogrammetric Databases) and the Department for Topographic Survey and Cartography (Section for Topographic Survey and Section for Cartography).

Production of topographic map 1: 25 000 (TK25) is in progress according to the plan and Program, so 192 sheets have been made since 2003, and 109 more sheets are being produced. Contracts have been made to produce 521 out of 594 sheets of the topographic map at the scale of 1:25 000. At the same time, the new digital topographic map and topological processing are being done of the topographic data comprising the fundamental topographic base CROTIS, established in 2003. 363 sheets of TK25 have been topologically processed so far; topographic data for 113 sheets of TK25 are in the topographic base.

A 25×25 m resolution digital relief model was produced by means of photogrammetric restitution for 412 sheets.

Production of the Croatian Base Map 1:5000 in the area of the Republic of Croatia is nearing the end. In fact, sheets of the Croatian Base Map cover approximately 98% of the territory of Croatia (9598 out of 9802 sheets). Sheets of newer editions for areas of larger cities were produced by digital procedures. 1185 sheets of the Croatian Base Map have been made official and produced since 2003.

During 2003, within the scope of the project CRONO GIP I, the SGA has, in cooperation with consultants from Norway, developed and produced a program for vectorisation of analogously produced sheets of the Croatian Base Map 1: 5000. The TopoCap program has led to vectorisation of 418 sheets of the Croatian Base Map, separated by layers for contour lines, situation and waters.

Digital orthophotomaps at the scale 1:5000 have been produced since 2001, so contracts for 5375 black-white and 5795 colour sheets of digital orthophotomaps have been made so far. Since the current trend is producing colour digital orthophotomaps, 1389 sheets have been made in both variants. Contracts for about 40 sheets in the area of the country haven’t been made yet.

Cyclic survey of the Republic of Croatia was continued at the scale 1:20 000, so 55-60% of the territory of the Republic of Croatia was surveyed since 2003 (3 tasks, each about 20% of the territory of the Republic of Croatia). Therefore, almost the whole area of the Republic of Croatia was covered by the second cyclic survey. In 2005, the first contract was made for GPS-supported colour survey, so about 40% of the territory of the Republic of Croatia was surveyed by that method. An independent company produced an aerotriangulation report with report on achieved quality of cyclic survey for cyclic survey tasks contracted in 2005.

In the middle of 2004, the SGA published the third Product Catalogue, which contains technical descriptions and prices of following products: aerophotogrammetric images, digital orthophotomap, Croatian Base Map, digital relief model, topographic maps at the scales 1:25 000, 1:100 000, 1:200 000, Euro Global Map at the scale 1:1 000 000, cadastral plans at the scales 1:1000, 1:2000, 1:2880 and 1:2904, cadastral plans in digital form and data from graphic base of spatial unit registry. The fourth edition of the Product Catalogue was published in the middle of 2005, and the fifth edition at the end of 2006, which featured additional technical descriptions and prices for GIS application of protected coastal area of the sea, permanent point of geodetic basis and the program for using geodetic data and coordinate transformation between HDKS and ETRS.

During 2003, a scientific-professional project Study of Aerotriangulation and Aeroimage Block Adjustment published by the SGA. Within the scope of the project CRONO-GIP I, the SGA, together with consultants from Norway, defined and developed seven product specifications (aerotriangulation, aerial images and orientation points, scanned images, digital relief models, digital orthophoto,
topographic map 1: 25 000 and topographic data) which describe in detail the production processes and standardised characteristics of particular products of the SGA. *Dictionary of Croatian Geodetic Terminology* was completed for the needs of the SGA in 2003.

Scientific project *Terminology in CROTIS* was produced in 2004.

Scientific project *Production of Object-Oriented Conceptual Data Model of CROTIS, and Production of GML Application Scheme* was produced in the middle of 2006.

More data about the activities of the State Geodetic Administration can be found at the Internet address http://www.dgu.hr

**Croatian Geodetic Institute (CGI)**

The Institute deals with professional, research and development operations of state survey and real estate cadastre for the State Geodetic Administration (SGA) according to annual programs from paragraph 5 of the Law About State Survey and Real Estate Cadastre (NN 16/07), and especially:

- Participates in planning and execution of basic geodetic operations,
- Conducts developmental-research projects,
- Monitors quality of collected and processes spatial data and product making of SGA,
- Offers professional help in establishing spatial databases of SGA,
- Establishes and runs a registry of geographic names,
- Works on standardization of geodetic operations and procedures.

CGI informs SGA about operations executed during the year.

Internal structure of CGI is based on type and extent of geodetic operations and state survey operations it is supposed to execute within the frame of its activities.

*Department for Topographic Survey* participates in developmental-research projects within the area of topographic survey, works on standardization of geodetic operations and procedures in the field of topographic survey and cartography, carries out operations of quality control of geodetic products and other operations related to topographic survey and participates in the structure of geographic names registry.

*Department for Basic Geodetic Operations* plans and executes basic geodetic operations, carries out developmental-research projects in the field of basic geodetic operations, works on standardization of operations and procedures from the field of basic geodetic operations and does other work related to basic geodetic operations.

*Department for Geoinformation Systems and Databases* participates in the structure of topographic, cartographic and cadastral database, establishes and runs the geographic names registry, leads developmental-research projects in the field of geoinformation systems and geodetic databases, works on standardization and of operations and procedures in the field of geoinformation systems and geodetic databases and does other work related to geoinformation systems and geodetic databases.

*Department for Legal and Financial Operations* is concerned with all legal, financial, accounting, administrative, personnel and general operations essential for independent activities and work of CGI. This Department also does other work not specified for any of the other structural units of the Institute.
A presentation of projects related to cartography, photogrammetry and geoinformation follows.

**Quality Control of Topographic Map 1:25 000 and Digital Orthophoto**

During the period from 2003 to 2007, quality control was done by the Department for Topographic Survey and Supervising. In addition, the Department for Basic Geodetic Operations offered professional help for quality control of certain control phases (review of orientation points determination report).

Quality control is done for following products:
- Topographic map at the scale 1:25 000
- Topographic vector data
- Digital orthophotomap at the scale 1:5000 (DOF5)
- Digital orthophotoplan at the scale 1:2000 (DOF2)
- Cyclic aerial survey (project creation and quality control)
- Aerial survey for needs of cadastral surveys and maritime goods registry

Quality control operations finished during the period 2003-2007:

**2003**
- Topographic map at the scale 1:25 000
  - Sheet review of topographic map 1:25 000 – 20 sheets
  - Repeated sheet review of topographic map 1:25 000 – 35
  - Review of reproduction originals and test prints – 34
- Topographic vector data
  - Review of data structure and topology – 43 sheets of topographic map 1:25 000
- Digital orthophotomap at the scale 1:5000
  - Sheet review of digital orthophotomap 1:5000 – 606 sheets
  - Repeated review – 593 sheets
- Cyclic aerial survey
  - Project creation (Istria and the area of Gorski kotar, Zagreb and surroundings)
  - Survey control (East Slavonia, Northwest Croatia)

**2004**
- Topographic map at the scale 1:25 000
  - Sheet review of topographic map 1:25 000 – 16 sheets
  - Repeated sheet review of topographic map 1:25 000 – 10
  - Review of reproduction originals and test prints – 42
- Topographic vector data
  - Review of data structure and topology – 25 sheets of topographic map 1:25 000
  - Repeated review – 45 sheets
- Digital orthophotomap at the scale 1:5000
  - Sheet review of digital orthophotomap 1:5000 – 490 sheets
  - Repeated review – 787 sheets
- Digital orthophotoplan at the scale 1:2000
  - Sheet review of digital orthophotoplan – area of six cadastral districts
- Cyclic aerial survey
  - Project creation (South Croatia)

**2005**
- Topographic map at the scale 1:25 000
  - Sheet review of topographic map 1:25 000 – 88 sheets
  - Repeated sheet review of topographic map 1:25 000 – 39
  - Review of reproduction originals and test prints – 19
Digital orthophotomap at the scale 1:5000
  Sheet review of digital orthophotomap – 2192 sheets
  Repeated review – 1676 sheets
Digital orthophotoplan at the scale 1:2000
  Sheet review of digital orthophotoplan – area of 10 cadastral districts (1 task maritime goods)
  Repeated review – area of 15 cadastral districts

2006
Topographic map at the scale 1:25 000
  Sheet review of topographic map 1:25 000 – 67 sheets
  Repeated sheet review of topographic map 1:25 000 – 57
  Review of reproduction originals and test prints – 35
Topographic vector data
  Review of data structure and topology – 60 sheets of topographic map 1:25 000
  Repeated review – 12 sheets
Digital orthophotomap at the scale 1:5000 (DOF5)
  Sheet review of digital orthophotomap – 1540 sheets
  Repeated review – 2075 sheets
Digital orthophotoplan at the scale 1:2000
  Sheet review of digital orthophotoplan – area of 16 cadastral districts (2 tasks maritime good)
  Repeated review – area of 7 cadastral districts
Cyclic aerial survey
  Project creation (Karlovac, Sisak)

2007
Topographic map at the scale 1:25 000
  Sheet review of topographic map 1:25 000 – 100 sheets
  Repeated sheet review of topographic map 1:25 000 – 46
  Review of reproduction originals and test prints – 32
Topographic vector data
  Review of data structure and topology – 90 sheets of topographic map 1: 25 000
  Repeated review – 46 sheets
Digital orthophotomap at the scale 1:5000
  Sheet review of digital orthophotomap – 1435 sheets
  Repeated review – 1111 sheets
Digital orthophotoplan at the scale 1:2000
  Sheet review of digital orthophotoplan – area of 2 cadastral districts and 2 tasks of maritime
good
  Repeated review – area of 7 cadastral districts

CRONO GIP I and II

2004 saw the completion of the Croatian-Norwegian geoinformation project (CRONO GIP I and II),
on the basis of which a new quality control system based on ISO standards was modified and
established. The project included product specifications (Aerial Images and Orientation Points,
Scanned Images, Aerial Triangulation, Digital Relief Model, Digital Orthophoto, Topographic Data
and Topographic Map at the Scale 1:25 000) and establishment of the Topographic Database. Quality
control documentation consists of general documents, quality element and subelement definitions and
quality control execution tables.

CRONO GIP III

According to the Law About State Survey and Real Estate Cadastre (NN 16/2007), CGI is in charge of
founding and managing a base of geographic names (paragraph 132 of the Law). The Croatian-
Norwegian Geoinformation Project (CRONO GIP III) was started in 2006, and is related to the
establishment of a geographic name database. During 2006, a review was published of activities done during the previous period (creation of a database of geographic names on the basis of general topographic map at the scale of 1:300 000, contact was made with other institutions involved in the project, project task was defined, project team was established, descriptions of existing databases were created, data of those databases are going to be included into the database of geographic names and a model of the database was made). A competition for database implementation was held during the next phase of the project. Acquisition of hardware and software is in progress, i.e. infrastructure on which the database is going to be implemented.

Geographic names contained in the database are required to pass the standardization phase according to UNGEGN’s recommendations (United Nations Group of Experts on Geographical Names). In addition, production of the document *Toponymic Directions* was also foreseen. At the 9th UNGEGN Conference (New York, August 2007), the National Report about the condition of geographic name standardization is going to be presented by Croatian representatives Dr. Dunja Brozović Rončević (Institute for Croatian Language and Linguistics) and Dr. Željko Hećimović (Croatian Geodetic Institute).

**Project of Official Division into Sheets of Croatian Base Map and Topographic Maps According to the New Datum**

A continuation to the project made by the Faculty of Geodesy of the University of Zagreb, at the Department for Geoinformation Systems and Databases, according to the request of the SGA, a project was started to officially establish the sheets division of the Croatian Base Map at the scales of 1:5000 and 1:10 000, and topographic maps at the scales of 1:25 000, 1:50 000, 1:100 000 and 1:250 000.

**Introduction of Process and Quality Document Management System**

At the end of 2006, CGI started, and at the beginning of 2007 realized the project of introducing a system for process (SPM+) and quality documents (SQM) management. Considering the amount of documents and numerous quality control processes, both systems represent a general improvement of quality control systems (TK25 and DOF), but also of the business of CGI. SPM+ is a system for managing documents, projects and processes in electronic form, and SQM is a system for managing quality documents and contains all valid quality documents (laws, rules, specifications, working directions) and enables the production of new documents.

More data about the activities of the Croatian Geodetic Institute can be found at the Internet address http://www.cgi.hr

**Ministry of Defence of the Republic of Croatia**

In 2004, the Ministry of Defence of the Republic of Croatia has started constructing the Military Geoinformation System, based on official civilian topographic databases of the State Geodetic Administration, adjusted to international civilian and NATO standards. The basic principle of the system is taking over the official database from the State Geodetic Administration which corresponds to the 1:25 000 scale, its updating and creation of a new topographic and cartographic database in scales 1:50 000 and 1:250 000. Among the products of those databases are standardized maps of adequate scales. It is planned the work is going to be over at the beginning of 2011.

The Ministry produced 14 sheets of the map “Joint Operations Graphic Series 1501-Air“ at the scale 1:250 000 (JOG/A) for the area of the Republic of Croatia.
The Ministry published the digital Catalogue of Trigonometric Points with Maps at the scale 1:50 000.

More data about the activities of the Ministry of Defence of the Republic of Croatia can be found at the Internet address http://www.morh.hr

**Hydrographic Institute of the Republic of Croatia (HHI)**

Hydrographic Institute of the Republic of Croatia in Split carries out scientific-research, developmental and professional operations related to navigation security in the Adriatic, hydrographic-geodetic survey of the Adriatic, maritime geodesy, design and production of maritime charts and other maps and nautical publications and devices, oceanological research, underwater geology research, development of information systems and publishing-printing operations.

During the period 2003–2007, the following projects were finished at the Cartographic Department of HHI:

Chart nr. 16, Omišalj Gulf, 1:10 000, with additional plan
Tankerski vez Omišalj, 1:3500, June 2003

Chart nr. 15, Rijeka, 1:10 000, with additional plans:

- Rijeka Port, 1:5000,
- Rijeka – Torpedo Port, 1:1500,
- Petrolejska Port, 1:2500,
- Rijeka – Brajdica, container terminal, 1:5000, March 2004

Chart nr. 37, Middle Adriatic, (plans of ports and passages) at various scales:

- Ždrelac Port, 1:7500,
- Mali Ždrelac Passage, 1:2000,
- Pašman Strait, 1:30 000,
- Telašćica Port, 1:25 000,
- Mala Proversa Passage, 1:2000,
- Vela Proversa Passage, 1:5000, May 2004

Chart nr. 17, Bakar Bay, 1:10 000, with additional plans:

- Bakar – Goranin, 1:2000,
- Pristan Podbok, 1:2500, July 2004

101 INFO – informative maritime chart, 1:900 000, March 2005

HI-N-10 List of lights and fog signals, Adriatic Sea – Ionian Sea – Maltese's Islands, new supplemented edition 2005

HI-N-49, radio service, new supplemented edition 2003

Kozličić, M.: East Adriatic in the work of Beautemps-Beaupré, HHI, Split, 2006

Zadar Archipelago – nautical manual with port plans, edition 2005

During 2007, following operations are in progress or almost finished at the Cartographic Department of HHI:

Production of coastal navigation charts at the scale of 1:100 000 (Small charts) in digital form (they are going to be printed at the end of 2007) is almost finished. Also, the new chart nr. 50 – Pakleni kanal was finished, at the scale of 1:18 000 and is going to be printed in September of 2007. Besides producing new charts, all editions of charts are regularly updated each month through Oglas za pomorce. Production of the new publication Peljar – Jadransko more (encompasses the whole Adriatic with plans of larger ports) is almost finished, it is going to be printed at end of 2007.
The Cartographic Department actively and constructively participates in production of special publications for the Ministry of Defence of the Republic of Croatia, and provides full technical support to the Government of the Republic of Croatia in demarcation proposals.

In collaboration with the foreign specialized company for production of electronic navigation charts (ENC), HHI finished producing, and the Cartographic Department verifying quality for 112 ENC cells of the Croatian part of the Adriatic, of various scales and navigation purposes. 36 ENC cells are already in distribution (75 Croatian ENC's are going to be in distribution at the end of 2007, and all other produced ENC's at the middle of 2008) via distribution centre Primar – Stavanger (Norway). At the same time, 10 ENC cells for port and docking purposes have been produced at HHI.

**MBS VRENC (MBS Virtual Regional ENC Centre)**

Started in 2004, Virtual RENC for the MBS (Mediterranean and Black Sea) region is an international project with participation by hydrographic offices of Mediterranean countries, and the goal of the project is to advance ENC production and distribution for the area of the Mediterranean. ENC production for Italy, Slovenia, Croatia and Greece has been finished so far. Another part of the project is MEDCHARTNET (Digital maps for the Mediterranean coasts), EC Project code 217. Overall Objectives: Marketing of official Electronic Navigation Cartography to the advantage of the international maritime community. Specific Objectives: Creation of a dedicated Network; Production of Electronic Navigational Charts and Hydrographic Offices Personnel Training. Project coordinator IMO-IMA Trieste (http://www.eumedis.net/en/project/7).

**Modern Marine Cartography**

Started in 2007, this project suggests the production and distribution of electronic nautical charts (ENC) as a digital nautical chart according to International Hydrographic Organization (IHO) specifications S-57 Edition 3.1. The production of ENCs is based on the theory of multiscale data management (usage bands). Multiple representations of ENC data are controlled by scale minimum (SCAMIN) attributes. A solution to the problem of multiscale data management as a part of ENC data production for archipelagic sea areas, using the East Adriatic Coast as an example, will be discussed. This solution is based on a long-standing experience in the production of paper charts and recent ENC production for the eastern coast of the Adriatic Sea, which is the second largest archipelagic area in the Mediterranean. Finally, a new usage band scale range, compilation scale for all navigational purposes and method of using SCAMIN attributes for archipelagic seas will be proposed. Furthermore the project will propose the new definitions of geodetic and hydrographic datums, as well as coastline definition for the purposes of Croatian legislation.

**ESEAS-RI The European Sea-Level Service Research Infrastructure**

Project supported by the European Commission under the contract number EVR1-2001-00042. Task: CGPS Station located at Split tide gauge (Croatia), started in 2004. Leader: Dr. Nenad Leder. Split tide gauge is located in the town’s port, on a small peer near Harbour-Master building. The TGBM (PN-165) was installed on the Master’s building, which had been erected on the bedrock near a city centre. There is also an auxiliary benchmark (R-1) on the tide gauge edifice. Historical precise levelling that took place during last 50 years did not show any significant changes in height between Harbour-Master’s TGBM and tide-gauge auxiliary benchmark. It is also important to emphasize that during CROREP96-CRODYN96 GPS campaign new benchmark was established on the concrete roof of the tide gauge, and precise levelling was done. This benchmark was used to determine the height of Antenna Reference Point (ARP) above the national datum.

Ashtech Micro-Z CGRS receiver with Dorne-Margolin antenna was an optimal choice for tide gauge, which was installed in the tide gauge building powered by batteries and equipped with GSM modem for communication with the instrument and downloading the data. CGPS station was installed on 5 May 2004, and daily files (station name SPLT) are available starting from 6 May 2004 (day 126).
Batteries are being replaced on weekly basis, and RINEX files obtained from the instruments are compressed using Hatanaka compression software, version 2.4.

**Scan Centre**

Scan Centre is part of CRONO HIP (Croatian-Norwegian Hydrographic Information Project) donated by the Norwegian government. The project was started in 2005, with Dr. Nenad Leder as the project leader.

System for scanning and vectorizing of hydrographic fairsheets is delivered and implemented on the base of the Technical Offer by Geofoto and Contract between Geofoto and HHI. The complete solution for scanning and vectorizing hydrographic fairsheets includes:

- Scanner and other hardware
- Software for converting raster files (fairsheets) to vector data (lines and objects) including pattern recognition
- Applications for data transformation in UTM projection and conversion to DAF format.

You can find more about the activities of the Hydrographic Institute of the Republic of Croatia at the Internet address http://www.hhi.hr

**Croatian Geological Survey**

The description of activities of the Croatian Geological Survey is available at the Internet address http://www.hgi-cgs.hr

**National and University Library (NUL), Zagreb**

The Maps and Atlases Collection of the National and University Library is a department where all kinds of geographic and thematic maps, atlases and other cartographic material are collected, processed, stored and provided for use. It is the largest collection of cartographic materials in Croatia. It was formed in 1945, as a separate department of NUL.

The entire cartographic fund of the Collection was catalogued according to ISBD(CM) (International Standard Bibliographic Description of Cartographic Material) and is available via web catalogue of NUL (see: http://www.nsk.hr/opac-crolist/crolist.html). One exception are maps and atlases (from 16th, 17th and 18th century) and manuscript maps, which is in a transitional phase, browsable via digitised catalogues on paper, also via web pages of NUL (see: http://www.nsk.hr/zem/). Within the catalogues mentioned, materials were also processed according to ISBD(CM). Data from these catalogues are gradually being entered into the web catalogue of NUL. At the beginning of 2007, NUL began working with the Voyager library program for processing all types of materials.

Digitising the valuable fund of the cartographic collection was started several years ago. The digitising is going to enable a larger number of remote users to access valuable originals via web pages of NUL, enable the presentation of Croatian cultural heritage over the Internet and at the same time protect it from material damage and destruction by storing digital copies into newest media. About 300 units of cartographic materials were digitised to the beginning of 2007. Some of them were published on web pages of NUL: Old maps of Croatia, http://www.nsk.hr/HeritageDetails.aspx?id=152. 2007 marked the 400th anniversary of NUL and there was a series of activities related to the occasion.
During the period from 2003 to 2007, about 800 map sheets and 250 atlases were included into NUL’s fund. Acquisition of a series of very valuable copies of old and manuscript maps was realized, with some of the most important being:

**Nova Disseggno Della Dalmatia et Crovatia / F. Bertelli, 1566.**

**La nueva e fidele discrittione di tutto il Contado di Zara et Sebenico / P. Forlani, 1570.**

**Dalmacia Nova Tabula / Giacomo Gastaldi. Venezia, 1548.**

**Istria olim Iapidia / Giovanni Antonio Magini. Venezia, 1620.**

**Veteris Pannoniae utrisque nec non Illyrici descriptio geographica. [Amsterdam, ca 1630]**

**Tafel der Staette und Herschaften Zara und Sebenico... [Frankfurt am Main, ca 1647]**

**Illyricum Hodiernum ... / I. Blaeu. [Amsterdam, 1669]**

**L’Istrie / M. Blaeu. Amsterdam, 1676.**

**Dalmatia maritima occidentale e Dalmatia maritima orientale / Cantelli da Vignola. Roma, 1689.**

**Veuve de Sebenico. Plan de Sebenico. Port de Sebenico. / Pierre Mortier. Amsterdam, [1704]**

**Buccari samt dessen Seehafen und derer... / G. Bodenehr. [Augsburg, 1730]**

**Istria olim Iapidia / Giovanni Antonio Magini. Venezia, 1620.**

**Tabula Europae V / [Sebastian Muenster]. [Basel : Heinrich Petri, 1540]**

**Istria sub dominio Venetorum / [Jakob von Sandrart]. [S. l. : s. n., 1686]**

**Liesena Isola / [Alphonsus Lasor a Varea]. [Padov : Frambotti e Conzatti, 1713]**

**Les isles et coste de la Dalmatie ou se trouvent la Republique de Raguse, et partie de la Servie & c. / chez Iacq. Chiquet. Paris : [s. n.], 1719.**

**Nouvelle carte du royaume de Dalmatie divise en ses comtes, etc la Morlaquie, la Bosnie, et la Servie, partie de la Hongrie, Croatie, Albanie... / par G. de L’Issle, Coronelli, G. I. Rossi, I. Nolin. A Amsterdam : R. & I. Ottens, [ca 1740].**
Employees of the Maps and Atlases Collection of NUL participated in the workgroup for education LIBER GdC (Ligue des Bibliothèques Européennes de Recherche, Groupe des Cartothècaires) on preparation, translation and distribution of a survey questionnaire about map use and user habits in Europe in 2003 (see: http://www.maps.ethz.ch/gdc-education.html#questionnaire), and on preparation and set-up of the list of Croatian literature in the field of history of cartography, GIS, cartographic librarianship and cartography onto the Workgroup’s web pages (see: http://www.maps.ethz.ch/gdc-education2CR.html).

Guidelines for Using the Unimarc Format for Processing Cartographic Material were made (see: http://www.nsk.hr/e-izdanja/kartografija.pdf).

The Maps and Atlases Collection of NUL hosted the exhibition Vincentius Demetrius Volcius – Portolans (from September 16, 2004) by Drago Novak, on the occasion of scientific congress Cartography and Geoinformation (September 16-17, 2004), organized by the Croatian Cartographic Society.

Employees of the Maps and Atlases Collection of NUL actively participated in the LIDA conference (Libraries in Digital Age) in Dubrovnik and on Mljet, May 23–29, 2004, with a poster New trends in production, publishing and access of cartographic material.

The National Report about cartographic activities in Croatia for the period 2002-2004 was presented at the conference LIBER GdC (Ligue des Bibliothèques Européennes de Recherche, Groupe des Cartothécaires), held in 2004 in Cambridge, UK.

A presentation titled Auhu75 Topographic Maps of the Austrian-Hungarian Monarchy at the scale 1:75 000: Establishment of a Distributed System of Historical Maps was held at the 8th seminar Archives, Libraries, Museums, in the workshop: From a Project to a Digital Library.

A poster titled Map library usage survey: a mandate for change? was exhibited at the LIDA conference 2005 in Dubrovnik and on Mljet, May 29 – June 4, 2005.

A poster titled Mapping the Austrian-Hungarian Empire – contribution of Croatian and Slovenian cartographers in the 19th century was exhibited at the International Conference on the History of Cartography in Budapest held from July 18 to July 22, 2005.

A poster titled International Projects of Digitising Cartographic Materials: Potentials of Creating Geoinformation Systems Based on Various Cartographic Materials Collections was exhibited at the 9th seminar Archives, Libraries, Museums held in Poreč from November 22 to November 26, 2005.

The National Report about cartographic activities in Croatia for the period 2004-2006 was presented at the conference LIBER GdC (Ligue des Bibliothèques Européennes de Recherche, Groupe des Cartothécaires), held in Paris, France, in September 2006.
A poster titled *Collections of Older Cartographic Materials in Croatian Archives, Libraries and Museums* was exhibited at the 10th seminar *Archives, Libraries, Museums* in Poreč, November 2006.

The Head of the Maps and Atlases Collection of NUL is Mira Miletić Drder, MSc, and a list of her published papers in the period 2003-2007 is given in the chapter References.

You can find more about the activities of the Maps and Atlases Collection of the National and University Library at the Internet address http://www.nsk.hr

**Lexicographic Institute “Miroslav Krleža“**

Lexicographic Institute "Miroslav Krleža" is the central Croatian lexicographic institution. It was established on October 5, 1950 by incentive of writer and erudite Miroslav Krleža. Since then, the releases of the Lexicographic Institute have been an important contribution to the preservation and boost of Croatian intellectual standard. Encyclopaedia, atlases, dictionaries, lexicons and bibliographies of the Lexicographic Institute are traditionally reliable and explain facts from Croatian heritage and social reality in a recognizable way.

On May 29, 2003, the Croatian Parliament enacted the Law about the Lexicographic Institute, which regulated the legal status, activities and structure of the Lexicographic Institute "Miroslav Krleža". This Law defined the Institute as a "public institution of special interest to the Republic of Croatia". The Republic of Croatia is the founder of the Institute, and the rights and duties of the founder are executed by the Ministry of Science, Education and Sport.

Basic activities of the Institute include gathering, processing and control of data, which become databases for production of various releases, with some additional fundamental research (in order to develop a scientific-professional basis). Additional activities of the Institute are related to scientific improvement in cooperation with university institutions, exchange of lexicographically verified data with related foreign institutions and determination of general lexicographic-encyclopaedic standards.

During half a century of its activities, the Lexicographic Institute has published more than 250 different encyclopaedias, dictionaries, lexicons and other releases. Fundamental releases of the Lexicographic Institute are the multi-volume *Croatian Encyclopaedia* and *Croatian Biographic Lexicon*. More recently, the stress has been on single-volume releases that seek to meet actual cultural and social needs.

Cartographic department of the Lexicographic Institute "Miroslav Krleža" is the bearer of the entire cartographic production of the institution. It is concerned with the production of geographic, topographic and thematic maps for most of Institute's releases. Representation of cartographic supplements in individual releases of the Institute varies from edition to edition. The most comprehensive cartographic product of the Institute is arguably the *World Atlas*, the seventh edition of which was published in 2006. Five cartographers and four geographers-lexicographers distributed among individual editorial boards work at the cartographic department. Maps are produced by computer program OCAD. During the period 2003-2007, the Cartographic Department of the Lexicographic Institute contributed with following releases:
- *Croatian Encyclopaedia*, 5th to 9th volume (thematic black and white maps and colour maps, geographic maps of Croatia 1:300 000 and geographic maps of the countries of the world),
- *Croatian Historical Atlas*, 2003 (250 historical maps),
- *Encyclopaedia of Istria*, 2005 (130 maps, mostly thematic and situational (?)),
- *Zagreb Lexicon* (in cooperation with Masmedia), 2006 (2 geographic and 28 thematic maps and plans),
- *One Hundred Croatian Archaeological Sites*, 2006 (maps of all counties at 1:300 000),
- *Nautical Guide to Croatian Adriatic*, 2007 (202 maps; general, maps of all port authorities, port and marina plans).

You can find more about the activities of the Lexicographic Institute "Miroslav Krleža" and its former, as well as planned releases at the Internet address http://www.lzmk.hr

**Institute of Social Sciences "Ivo Pilar"**

Dr. Mirela Slukan Altić works at the Institute of Social Sciences "Ivo Pilar". She was the leader of the scientific project *Historical Atlas of Cities* from 2002 to 2006. She has been the leader of the scientific project *Historical Atlas of Cities – Historical Identity and Contemporary Research* since 2007. A list of her published papers from the period 2003-2007 can be found in the chapter References. She lectures *Introduction to Reading Old Maps* and *Cartographic Sources for Croatian History* at the Department of History of the Faculty of Philosophy of the University of Zagreb.

**Institute of Migrations and Nationalities**

Dr. Dubravka Mlinarić works at the Institute of Migrations and Nationalities. A list of her published papers from the period 2003-2007 can be found in the chapter References.

**Croatian Institute for History**

You can find about the activities of the Croatian Institute for History at the Internet address http://www.isp.hr
3. Academic Cartography

Centre for Geoinformation and Cartography of the Croatian Academy of Engineering

The Croatian Academy of Engineering (HATZ) is a non-profit association of selected prominent scientists in the fields of engineering and biotechnical sciences which promotes these sciences, brings together and stimulates co-operation of scientists of various engineering, biotechnical and other professions in order to support effective scientific and economic development of Croatia.

Activities of the Academy are public. The public character of the Academy’s activities is effectuated by its engagement in the scientific and professional public, by public gatherings at sessions, by scientific conferences, by publishing results of the activities of the Academy, by public issuing of the papers, as well as by other types of public activity.

The activities of the Academy include:
- Fundamental, applied and experimental research
- Research and development in engineering and biotechnical sciences
- Technical testing and analyses
- Activities of professional organisations
- Stimulation and organisation of scientific work
- Publishing results of scientific research
- Producing scientific studies, expertises, surveys and projects
- Discussing and putting forward statements on current scientific and economic issues
- Organising scientific and professional gatherings
- Issuing publications
- Cooperation with other academies, domestic and from abroad.

Aims of the Academy include:
- Achieving a leading status as a creative and multidisciplinary association of scientists in engineers’ professions
- Making excellent and active contribution to the development of engineering and biotechnical sciences and to the transfer of engineering knowledge, which is important for the benefit and progress of Croatian economy and for welfare of people
- Advocating a safe and useful employment of technologies and protection of the environment and people from its inappropriate application
- Promoting professionalism and responsible conduct, pursuing high ethical standards.
The Academy has following categories of membership:

- Full Member
- Associate Member
- Collaborating Member
- Member Emeritus
- Honorary Member
- Correspondent Member
- Member Amicus and
- Supporting Member.

Bearers of the Academy’s duties are Departments, Centres and Standing Committees and other forms of organisation. A Centre is a scientific and research unit of the Academy, established for a particular scientific field, with the aim to promote scientific research for direct application in economy. It is established on the grounds of the Bylaws on Organisation and Activities of the Centres of HATZ. Its members are organised within it according to a particular project. The following six Centres operate within the Academy:

- Centre for Development Studies and Projects
- Biotechnical Centre
- Centre for Geoinformation and Cartography
- Centre for Environmental Protection and Development of Sustainable Technology
- Centre for Lifetime Education
- Centre for Graphical Engineering.

The Centre for Geoinformation and Cartography was founded at the 19th HATZ General Assembly on November 5, 2004. Prof. Dr. Nedjeljko Frančula, a regular member of HATZ, was elected the head of the Centre.

The Centre for Geoinformation and Cartography is therefore a scientific-research unit of HATZ founded for fields of geoinformatics and cartography with the aim of promoting scientific research and direct application in society, administration and industry. It especially deals with technical testing and analyses, writing scientific studies, expertises, reviews, reports and projects, giving opinions and taking stands about issues from its area of operation.

You can find more information about the Croatian Academy of Engineering at the Internet address http://www.hatz.hr.

Faculty of Geodesy of the University of Zagreb (FoG)

For years, the Institute for Cartography had been one of five institutes of the Faculty of Geodesy of the University of Zagreb. It was founded in 1956, however it did not reach its fiftieth anniversary. At end of 2005, two former institutes (Institute for Cartography and Institute for Photogrammetry) merged into the new Institute for Cartography and Photogrammetry of FoG. According to the new organization, the Institute consists of three departments: Department for Cartography (head Prof. Dr. S. Frangeš), Department for Geoinformation (head Prof. Dr. M. Lapaine) and Department for Photogrammetry and Remote Sensing (head Prof. Dr. T. Fiedler). The departments are fundamental structural units of education, scientific research and highly professional work at the Faculty.

Up to academic year 2004/05, students could enrol the study of geodesy according to the curriculum from 1994, according to which they could choose Photogrammetry and Cartography as one of three orientations on one (last) year after first six shared semesters. During the first semester, all students
had Geodetic Drawing (0+2); during the fourth all had Introduction to Geoinformation Systems (2+2), during the fifth semester General Cartography (2+2) and during the sixth semester Map Projections (2+2). The Photogrammetry and Cartography orientation has a compulsory course Digital Cartography (2+2) during the seventh semester, and Cartographic Visualization (2+2) during the eighth semester. Following cartographic and GIS courses are also available for that orientation: Topographic Mapping, Map Generalization, Geoinformation Systems, Multimedia Cartography, Thematic Cartography, Cartographic Transformations, Cartography and GIS, Map Reproduction, as well as two seminars, Cartography and GIS and Practical Cartography.

In 2005, FoG entered the Bologna process by establishing the bachelor and master studies of geodesy and geoinformatics with a new curriculum. During the bachelor study, which lasts three years according to the curriculum, during the first two years of the Bologna process, students have Basics of Geoinformatics (2+2) in the first semester, and Cartography and Geoinformation Manipulation (2+2) in the fourth semester. According to this new curriculum, it is stipulated that students have Map Projections (2+2) in the sixth semester. Besides these courses, students could choose Topographic Mapping (2+1) in the fifth semester, and Web Cartography (1+1) in the sixth semester. The beginning of Master studies is planned for academic year 2008/09 and is going to last six semesters.

Up to 2006, postgraduate scientific study of geodesy at FoG was structured and executed as a study for achieving the academic degree of MSc from geodesy and PhD from geodesy. Educational responsibilities of this study consisted of optional and facultative courses. Optional courses were divided into general courses and study orientation courses. All postgraduate students had general courses. Optional courses of the Photogrammetry and Cartography were: Computer Graphics in Geodesy, Map Facsimiles, Official Topographic-Cartographic Information System of the Republic of Croatia, Geodetic Cartography, Cartographic Heritage, Remote Sensing, Automatization in Photogrammetry, GIS Design and Digital Relief Models.

In 2006, the new postgraduate scientific study of geodesy and geoinformatics was established. It is carried out as study for achieving the academic degree of doctor of technical sciences, field geodesy. According to the adopted curriculum, study education lasts six semesters. Cartography and geoinformation are represented in the course/project Cartography and New Technologies, which was supplemented by Cartography of the Adriatic.

Postgraduate specialist study of geodesy and geoinformation, which lasts two semesters, was established the same year. By finishing it, one achieves the academic title geodesy and geoinformatics specialist. The program foresees the study every year in one of three planned cycles (Implementation of New Official Geodetic Datums and Map Projections in the Republic of Croatia, New Geodetic Survey Instruments and Methods, Geoinformation Systems – Practical Applications).

During the period 2003-2007, two master theses (Župan 2003, Tutić 2005) and two doctoral theses (Duplancić Leder 2006, Kljajić 2006) from the field of cartography were defended.

**Cartography and New Technologies**

From August 2002 to December 2006, research in the field of cartography and GIS at the Institute for Cartography and Photogrammetry (former Institute for Cartography) were conducted within the scope of scientific project Cartography and New Technologies, financed by the Ministry of Science, Education and Sport of the Republic of Croatia. M. Lapaine was project leader. The general goal of that scientific project was to research and advance the application of new technologies in Croatian cartography.

During the period from signing the contract to the end of 2006, research on the project was conducted according to plan. 3 books were published, 17 chapters in books, 5 textbooks and scripts, 9 papers in journals listed in Regulations from NN 2/97, 193 papers in other journals, 16 papers in proceedings with international reviews, 18 papers in other proceedings, 19 summaries and 36 papers classified as
other. 34 diploma theses were made, 4 master theses and 2 dissertations defended, and three more dissertations are underway.

Of special notice is work on the World Atlas for the 21st Century, on which numerous project collaborators participated, and which was successfully finished by publishing this encyclopaedia-format atlas. In addition, there is a monograph Five centuries of Maps and Charts of Croatia, which was published in Croatian and English by Školska knjiga.

The chapter References features a selection of published papers on this project. All published papers are entered into the Croatian Scientific Bibliography (http://bib.irb.hr).

**Cartography of the Adriatic**

Scientific and research work on this project financed by the Ministry of Science, Education and Sport of the Republic of Croatia started in January 2007. M. Lapaine is the project leader. It is anticipated that research results are going to give an overview of existing cartography of the Adriatic and suggest a series of ways to improve it. A hypothesis of this scientific research assumes the existence of a certain method and procedures in the planning process that would enable quality and self-sustainable preservation of identity of „built environment” of any place, settlement or space regardless of planning level. Furthermore, the subject is topographic and thematic cartography, with special stress on maritime cartography. In a certain way, this project continues the activities of the previous project Cartography and New Technologies financed by the same Ministry. The project Cartography of the Adriatic is exceptionally interdisciplinary. It primarily consists of geodesists and cartographers, but it also encompass a mathematician, electrical engineer, urban planner, ethnologist and historical geographer, librarian and computer scientist, hydrographer and foreign language and literature professor. Another argument to expect good results is interregional collaboration. Collaborators on the project are mostly from Zagreb, but some of them live and work in Split, Osijek and abroad in Italy, Austria and Germany. It is assumed that five doctor theses are going to be created and defended and the same number of monographs published.

**Oldest Croatian Geodetic Textbook**

In the middle of 2007, the Ministry of Science, Education and Sport of the Republic of Croatia authorized the bilateral Hungarian-Croatian project Oldest Croatian Geodetic Textbook. M. Lapaine is the project leader from the Croatian side.

The oldest known book on land surveying in Croatian was written by Matija Petar Katančić at the end of the 18th century. It is kept as a manuscript in the archive of the Franciscan monastery in Budapest. The manuscript is a translation of the book Elementa Geometriae Practicae in Usum Gymnasiorn, et Scholarum Grammaticarum per regnum Hungarie et Provincias eidem adnexas written in Latin by Paulus Makó de Kerek-Gede. The first step in the project is to find out Katančić's manuscript and Makó's book. The second step will be to translate both of the texts to standard Croatian language. Furthermore, one has to prepare an appropriate text about M. P. Katančić and his stay in Hungary, about Paulus Makó de Kerek-Gede, as well as on the status of land surveying and geometry in Hungary and Croatia of that time. These texts should be translated to English, as well. Finally, the goal of the project is to produce a book consisting of all mentioned materials.

**Projects for the State Geodetic Administration**

Following projects were finished for the State Geodetic Administration during the period 2003-2007:

- Making of documentation required for adopting the proposal of the official map projections of the Republic of Croatia
- Terminology in CROTIS
- Croatian cartography and international cartographic community
- New map projection of the Republic of Croatia – HTRS96/TM, Guidelines for practical application

**Professional and social activities**

Numerous complex thematic maps of various themes from fields of nature and human activities were produced at the Institute for Cartography and Photogrammetry. More recently, new maps were produced:
- Maps of national parks: Mljet, Kornati, Plitvice Lakes, …
- City plans: Zagreb, Rovinj, Dubrovnik, …
- General maps of national parks and nature parks
- Old map facsimiles
- Bicycle routes of Zagrebačka county, etc.

The **Croatian Cartographic Society** was founded in 2001. Its first president was M. Lapaine, and S. Frangeš has been on that position since 2005. Croatian Cartographic Society publishes the *Cartography and Geoinformation* journal, which had been published annually to 2005, and has been published twice a year since 2006. The journal is bilingual, all the papers are in Croatian and English. M. Lapaine is the editor in chief. Issues 2-7 and one special issue were published during the period 2003-2007.

*Geodetski list* of the **Croatian Geodetic Society** is the only continual geodetic journal in Croatia. It is published four times a year. S. Frangeš was the editor in chief from 2000 to April 2004.

M. Lapaine was a corresponding member of the **ICA Commission on Spatial Data Standards**, and is also a member of the **International Map Collectors’ Society**.

N. Frančula and M. Lapaine are full members of the **Croatian Academy of Engineering**. M. Lapaine was the secretary general of the Academy during the period 2003-2005. In 2004, N. Frančula was awarded the lifetime reward *Power of Knowledge* of the Academy.

N. Frančula, retired since October 1, 2006, became an honorary member of the Croatian Cartographic Society in 2007. The Senate of the University of Zagreb granted him the honorary title professor emeritus in 2007. On the occasion of his 70th birthday, a special issue of the *Cartography and Geoinformation* journal was dedicated to him. The issue features a list of all his works and papers.

Past 50 years of cartographic activities at the Faculty of Geodesy of the University of Zagreb were described in detail by Frangeš, Lapaine, Vučetić and Frančula (2006).

You can find more information about the Faculty of Geodesy of the University of Zagreb at the Internet address http://www.geof.hr.

**Geographic Department of the Faculty of Science of the University of Zagreb**

The Geographic Department is one of seven departments of the Faculty of Science of the University of Zagreb. Until academic year 2005/2006, *Cartography* was lectured as one of fundamental courses of the first study year of three teacher orientations at the Geographic Department. The program was adjusted to a particular teacher orientation: orientation geography professor (2+2, 2+2), geology-geography professor (2+1, 2+1), and geography-history professor (2+1, 2+1). The program was conceived to enable the students to gain basic knowledge and skills required for proper reading and interpretation of topographic and thematic map content.
According to new curricula at the Geographic Department which are the result of changes implemented as defined by the Bologna process, there is considerably more cartographic and geoinformation content within various courses at the bachelor and master studies of geography. This content is especially represented in the orientation Geographic Information Systems (profession: GIS analyst). Students are going to take following mandatory courses on bachelor studies of all research orientations (Physical Geography with Geocology, Spatial Planning and Regional Development, Heritage and Tourism, Geographic Information Systems): Cartography I and II, Geoinformatics I and II. Following courses related to cartography and GIS are offered to students at master studies, as mandatory or optional, according to the orientation: Analyses in GIS, Spatial Data Visualization in GIS, Digital Relief Analysis, Cultural Landscape GIS Analysis, and Real Estate Cadastre and Remote Sensing, lectured by teachers from the Faculty of Geodesy in Zagreb.

Within the scope of the new postgraduate (doctoral) studies of geography at the Geographic Department, the program of which is still being reviewed, there is probably going to be a course GIS in Spatial Planning.

Scientific work was done within five scientific projects:
- Geographic Research of Borderline Areas of Croatia (leader Ivan Crkvenčić)
- Geographic Aspect of Tourist Development of Croatia (leader Dane Pejnović)
- Geomorphologic Mapping of the Republic of Croatia (leader Andrija Bognar)
- Regional-Geographic Research of Croatia (leader Dragutin Feletar)
- Urban System and Spatial Organization of Croatia (leader Miroslav Sič)

A series of thematic maps within scientific papers whose goal was to explain relevant spatial structures and processes were published within the scope of scientific projects. Some of the maps were made in GIS as results of spatial analyses. Part of content of thematic maps was obtained by field mapping on the basis of which separate thematic maps were made (Geomorphologic Map of the Upper Part of the Una River Valley Between Martin Brod and Pritoka) within the scope of the project Geomorphologic Mapping of the Republic of Croatia (Bognar, 2005).

2003 saw the publishing of the Ethnic Map of the Pannonian Area of Croatia, which was done in cooperation with Hungarian colleague Prof. Dr. Karoly Kocsis by Prof. Dr. Andrija Bognar from the Geographic Department of the Faculty of Science and was published by the Hungarian Academy of Science (Geographic Research Institute of the Centre for Geoscientific Research and the Institute for Minority Research).

Employees of the Geographic Department were actively involved as editors and reviewers into various publishing projects related to school cartography (school atlases and maps).

Members of the Geographic Department participated at the 20th International Conference on the History of Cartography in Boston (Fürst-Bjeliš, Lozić, 2003). Scientific journals featured geographic scientific papers with application of GIS in spatial analyses and thematic map production (Toskić, Njegač, 2003, Ilić, Toskić, 2004), and papers from the field of historical geography and cartography (Fürst-Bjeliš et al., 2003, Fürst-Bjeliš, 2003).

B. Fürst-Bjeliš and S. Lozić participated at the 20th International Conference on the History of Cartography, 14-21 June 2003, Harvard University, Cambridge-Boston and University of Southern Maine, Portland with the poster The Grimani Cadastral Survey (18th Century): Tracing the Environmental Change in Central Dalmatia, Croatia.

Data about published papers from the field of cartography by the employees of the Geographic Department of the Faculty of Science of the University of Zagreb can be found in the chapter References.
More data about the Geographic Department of the Faculty of Science of the University of Zagreb can be found at the address http://www.geog.pmf.hr

Department of Geography of the University of Zadar (DoG)

During the period from 2003 to 2007, the Department of Geography of the University of Zadar and the Croatian Geographic Society – Zadar paid attention to cartographic activities, within the scope of their activities. A good deal of those activities was realized in cooperation with the Croatian Cartographic Society, Faculty of Geodesy of the University of Zagreb and the Hydrographic Institute of the Republic of Croatia in Split. Considerable work was done (education, scientific research of cartographic heritage, occasional popular-science lectures, exhibitions, thematic map production, etc.), although even more could have been done. Since there is not a lot of professional staff and there is a lack of adequate infrastructure, digital cartography and its theoretic and application components haven't yet been developed to a required extent.

Cartographic activities of DoG have been carried out by educational, scientific and professional plans. Ending with 2005, the two-orientation study of geography featured lectures from the course Basics of Cartography (bearer A. Kalogjera), and the postgraduate studies Geographic Basic of Littoralization of Croatia featured the course Application of Digital Cartography in Littoral Geography (bearer M. Lapaine). In 2004 and 2005, new curricula were prepared for one-orientation scientific and two-orientation professor bachelor and master studies of geography within the scope of which position of cartography and geoinformation sciences was defined much better. These curricula have been in use since academic year 2005/2006. Cartography and geoinformation subjects are carried out (or are going to be carried out in following higher study years) within the scope of following courses: Introduction to Cartography, Applied Cartography, Geoinformatics, Multimedia Geography, Digital Cartography, GIScience – Science of Geospatial Information and Geomathematics. It was planned, considering actual needs, to develop an additional geoinformation module within the existing master scientific study of geography which would enabled the acquisition of geoinformation knowledge, especially GIS and remote sensing, and developing skills of operative work with basic computer applications which enable production of thematic maps and digital spatial databases.

Quite a lot was done on scientific research of cartographic heritage, and to a certain extent on production of thematic maps which accompany numerous scientific and professional geographic papers. Results of those research projects and other professional papers were published in Croatian and foreign journals (Geoadria, Cartography and Geoinformation, Agricultural History, etc.) and other publications (Toponimija otoka Pašmana, Luke istočnog Jadran, etc.), and were in part used for popular-science lectures and old map and chart exhibitions.

Exhibitions Cartography of Zadar (Zadar, 2003), Old Geographic Maps and Atlases from the Fund of the Scientific Library Zadar (Zadar, 2005) and Maritime Cartography (Zadar, 2007) originated as a result of collaboration with numerous scientific and professional institutions: Croatian Cartographic Society, Hydrographic Institute of the Republic of Croatia in Split, Scientific Library Zadar, State Archive in Zadar, etc.

In collaboration with the Croatian Geographic Society Zadar, DoG organized several popular-science lectures and book presentations. On these occasions, special attention was paid to cartography, primarily cartographic heritage. Of special mention are lectures Old Globuses – Mirrors of Geographic Knowledge about the Earth (2004) and Geopolitics and Media (D. Purcell, 2005) and book presentations Croatian Cities on Old Plans and Views (author M. Marković, D. Magaš and M. Kozličić, 2004), Five Centuries of Geographic Maps and Maritime Charts of Croatia (presenters

In 2007, DoG and the Croatian Geographic Society – Zadar participated in organization of scientific conference Cartography, Geoinformation and Sea, which was held in Zadar in June 2007. Almost 250 participants from all parts of Croatia and neighbouring countries actively participated in the conference and visited the Kornati National Park and the Telaščica Nature Park. On that occasion, an exhibition was prepared, titled Maritime Cartography, by J. Faričić and M. Lapaine, and artistically designed by V. Zrnić. It can be said the conference was very successful.

You can find more about the Department for Geography of the University of Zadar at the Internet address http://www.unizd.hr

**Soil Science Department at the Faculty of Agriculture, University of Zagreb**

The employees of the Soil Science Department at the Faculty of Agriculture, University of Zagreb have continued with their intensive cartographic activities during the period 2003-2007, within the scope of which they apply modern GIS technology. From 2003 until the end of 2005, several geoinformation projects have been completed on the basis of which a great number of various specified and/or thematic maps for different users have been produced.

During the period mentioned above, three very significant projects were completed in the form of Geographical and Land Information System. The first completed project was Geographical and Land Information System of the Virovitičko-podravska County at the scale of 1:100 000. The second completed project was Hydropedological Map of Croatia at the scale of 1:300 000. The third project was Regionalisation of Agricultural production in Zagrebačka County at the scale of 1:100 000. Their usage enables the production of a great number of thematic maps for various users; therefore they are basic documents for the development of agriculture, spatial planning, environmental protection, water supply, forestry, etc.

In addition to the above-mentioned projects, some others were also completed during the period 2003-2007. Related to those projects, more thematic maps in digital and printed form in different scales were made. Here are some of the more important ones:

- Basic Pedological Map of Međimurska County at the scale of 1:50 000
- Map of Soil Suitability for Irrigation Purposes of Međimurska County at the scale of 1:50 000
- Basic Pedological Map of Osječko-baranjska County at the scale of 1:100 000
- Map of Soil Suitability for Irrigation Purposes of Osječko-baranjska County at the scale of 1:100 000
- Basic Pedological Map of Virovitičko-podravska County at the scale of 1:100 000
- Map of Soil Suitability for Irrigation Purposes of Virovitičko-podravska County at the scale of 1:100 000
- Basic Pedological Map of Zadarska County at the scale of 1:100 000
- Map of Soil Suitability for Irrigation Purposes of Zadarska County at the scale of 1:100 000
- Basic Pedological Map of Dubrovačko-neretvanska County at the scale of 1:100 000
- Map of Soil Suitability for Irrigation Purposes of Dubrovačko-neretvanska County at the scale of 1:100 000
- Map of Soil Suitability for Irrigation Purposes of Croatia at the scale of 1:500 000
- Map of Priority Area for Irrigation Purposes of Croatia at the scale of 1:500 000

More data about the activities of the Soil Science Department at the Faculty of Agriculture, University of Zagreb can be found at the Internet address http://www.agr.hr.
**Department for History of the University of Zadar**

A selection of published papers by M. Kozličić, M. Pavić and M. Bratanić from the period 2003-2007 can be found in the chapter References.

You can find more about the Department for History of the University of Zadar at the Internet address http://www.unizd.hr

**Faculty of Civil Engineering of the J. J. Strossmayer University in Osijek**

B. Malić works at the Institute for Geotechnics, Geodesy and Traffic Lines of the J. J. Strossmayer University in Osijek. A selection of her published papers from the field of cartography from the period 2003-2007 can be found in the chapter References.

You can find more about the Faculty of Civil Engineering of the J. J. Strossmayer University in Osijek at the Internet address http://www.gfos.hr

**Scientific Projects Financed by the Ministry of Science, Education and Sport of the Republic of Croatia**

Data about scientific projects financed by the Ministry of Science, Education and Sport of the Republic of Croatia can be found at the Internet address of the Croatian Scientific Bibliography http://bib.irb.hr/. The following projects can be entirely or partially classified into the field of cartography. Their titles, official project codes, first and last names of the leader and the institution where the execution of the project takes places are given. Projects are arranged by project code number and were mostly carried out during the period 2002-2006.

**Cartography and New Technologies (0007011)**
Miljenko Lapaine, Faculty of Geodesy, Zagreb

**Borders of the Republic of Croatia in the Adriatic and Economic Relations Connected to the Sea (0018002)**
Davorin Rudolf, Faculty of Law, Split

**Description of Lands of the Kingdom of Croatia on Military Maps of the 18th and 19th Centuries (0019021)**
Mirko Valtentić, Croatian Institute of History, Zagreb

**History of Navigation of the Croatian part of the Adriatic (0070003)**
Mithad Kozličić, University of Zadar

**Geographic Bases of Development of Small Croatian Islands (0070005)**
Damir Magaš, University of Zadar

**Croatian Historical Toponymy (0101004)**
Dunja Brozović Rončević, Croatian Academy of Sciences and Arts, Zagreb
General-Slavic Linguistic Atlas and European Linguistic Atlas (0101006)
Dalibor Brozović, Croatian Academy of Sciences and Arts, Zagreb

Urban System and Spatial Organization of Croatia (0119551)
Miroslav Sić, Faculty of Science, Zagreb

Geomorphological Mapping of the Republic of Croatia (0119552)
Andrija Bognar, Faculty of Science, Zagreb

Geographic Aspect of Tourist Development of Croatia (0119553)
Dane Pejnović, Faculty of Science, Zagreb

Regional-Geographic Research of Croatia (0119554)
Dragutin Feletar, Faculty of Science, Zagreb

Geographic Research of Borderline Areas of Croatia (0119555)
Ivan Crkvenačić, Faculty of Science, Zagreb

Triplex Confinium (0130823)
Drago Roksandić, Faculty of Philosophy, Zagreb

Basic Geological Map of the Republic of Croatia 1:50 000 (0181001)
Marko Šparica, Croatian Geological Survey

Basic Hydrogeological Map of the Republic of Croatia (0181002)
Ante Pavićić, Croatian Geological Survey

Basic Engineering-Geological Map of the Republic of Croatia (0181003)
Renato Buljan, Croatian Geological Survey

Map of Mineral Resources of the Republic of Croatia (0181004)
Josip Benić, Croatian Geological Survey

Geothermal Map of the Republic of Croatia – Northwestern Croatia (0181005)
Antun Šimunić, Croatian Geological Survey

Basic Geochemical Map of the Republic of Croatia (0181006)
Josip Halamić, Croatian Geological Survey

Structural-Geomorphological Map of the Republic of Croatia 1:100 000 (0181007)
Ivan Hećimović, Croatian Geological Survey

Tectonic Map of the Republic of Croatia 1:300 000 (0181008)
Domagoj Jamčić, Croatian Geological Institute

Historical Atlas of Cities (0205002)
Mirela Slukan Altči, Institute of Social Sciences "Ivo Pilar", Zagreb

Croatian Linguistic Atlas (0212003)
Mijo Lončarić, Institute of Croatian Language and Linguistics, Zagreb

Onomastic Research in Croatia (0212104)
Petar Šimunović, Institute of Croatian Language and Linguistics, Zagreb
4. Commercial Cartography

Geofoto Ltd.

Geofoto Ltd. is a Croatian company dealing with photogrammetric-geoinformatic-cartographic-cadastral activities. The company has started working on September 1, 1993, with headquarters in Zagreb.

Its main activities include aerial survey, design and creation of geoinformation systems and solutions, digital cartography, analytical and digital photogrammetry, cadastral survey and production of topographic and cadastral databases.

Geofoto's services are characterized by high quality and a fair and transparent relationship with clients, powerful informatics orientation, quality control and many years of international experience.

Today, Geofoto mostly provides services to institutions in Europe, but also to African (several projects in Ivory Coast) and Asian ones (United Arab Emirates and Saudi Arabia). In Europe, alongside Croatian national institutions (State Geodetic Administration, Ministry of Defence, Ministry of Environmental Protection, Urban Planning and Civil Engineering...), the company also works for foreign governments (Switzerland, Belarus, Ukraine, Hungary, Italy, Serbia and Montenegro, Bosnia and Herzegovina, Albania, Moldova,...), municipalities (City of Zagreb, City of Rijeka, etc.), agencies (Croatian Mine Action Center, Croatian Roads, PlinaCRO, INA) and other contractors.

Geofoto employs about ninety highly educated and specialized employees on contemporary equipment. The company is a member of numerous societies and associations, such as the Croatian Geodetic Society, Croatian Cartographic Society, Section for Photogrammetry and Remote Sensing of the Croatian Geodetic Society, Croatian Chamber of Architects and Engineers in Civil Engineering, Croatian Standards Institute, American Chamber of Commerce, American Association for Photogrammetry and Remote Sensing, Scandinavian Commerce Association and others.

Since 2003, the company has been working on following:

**Maps and plans of larger scale**

<table>
<thead>
<tr>
<th>Location</th>
<th>Sheets</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plano-Prgomet</td>
<td>16</td>
<td>M 1:1000</td>
</tr>
<tr>
<td>Vrnik</td>
<td>1</td>
<td>M 1:5000</td>
</tr>
<tr>
<td>Rijeka DOF 1</td>
<td>162</td>
<td>M 1:1000</td>
</tr>
<tr>
<td>DC Stobreć-Omiš</td>
<td>36</td>
<td>M 1:1000</td>
</tr>
<tr>
<td>Barutana 1000-City of Sisak</td>
<td>1</td>
<td>M 1:1000</td>
</tr>
<tr>
<td>Savska 1000-City of Sisak</td>
<td>3</td>
<td>M 1:1000</td>
</tr>
</tbody>
</table>
Stari grad 500-City of Sisak 8 sheets M 1:500
Istrian Y 109 sheets M 1:1000
Bale 1 sheet M 1:2000
Novo Pračno 1000 - City of Sisak 8 sheets M 1:1000
Sisak - purifier 5 sheets M 1:1000
Ružići-Kupres DOF2-TP 2000-cadastre 2 sheets M 1:2000
Capraške poljane 5 sheets M 1:1000
Dumače 10 sheets M 1:500

**Topographic map TK25**

Ivanić-grad 4 sheets
Zagreb 2 3 sheets
Samobor 3 sheets
Islands of northern Adriatic 19 sheets
Islands of Splitsko-dalmatinska county 18 sheets
Islands of Šibensko-kninska county 11 sheets
Sisačko-moslavačka county 28 sheets
Dubrovačko-neretvanska county 38 sheets
Karlovac county 24 sheets

Topological processing of altitude representation data and photogrammetric mapping data (according to TK25 sheets) cca 147 000 ha.

**Digital orthophoto DOF**

<table>
<thead>
<tr>
<th>Location</th>
<th>Scale</th>
<th>Sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bihać</td>
<td>Colour 1:5000</td>
<td>51 DOF</td>
</tr>
<tr>
<td></td>
<td>Colour 1:2500</td>
<td>28 DOF</td>
</tr>
<tr>
<td>Mljet</td>
<td>Colour 1:10000</td>
<td>1 Photomosaic</td>
</tr>
<tr>
<td>Buje</td>
<td>Colour 1:2500</td>
<td>1 DOF</td>
</tr>
<tr>
<td>HCR (Zagora)</td>
<td>b/w 1:5000</td>
<td>332 DOF</td>
</tr>
<tr>
<td>Zagreb</td>
<td>Colour 1:5000</td>
<td>55 DOF</td>
</tr>
<tr>
<td>Plinovod</td>
<td>Colour 1:5000</td>
<td>250 DOF</td>
</tr>
<tr>
<td>Bjelovarsko-bilogorska county</td>
<td>b/w 1:5000</td>
<td>36 DOF</td>
</tr>
<tr>
<td>Ozalj</td>
<td>b/w 1:5000</td>
<td>43 DOF</td>
</tr>
<tr>
<td>Virovitica</td>
<td>b/w 1:5000</td>
<td>35 DOF</td>
</tr>
<tr>
<td>Sveta Nedelja</td>
<td>b/w 1:5000</td>
<td>24 DOF</td>
</tr>
<tr>
<td>ITF-HCR</td>
<td>b/w 1:5000</td>
<td>168 DOF</td>
</tr>
<tr>
<td>Bajer-Lepenice</td>
<td>Colour 1:2000</td>
<td>6 DOF</td>
</tr>
<tr>
<td>Motovun – golf course</td>
<td>Colour 1:2000</td>
<td>10 DOF</td>
</tr>
<tr>
<td>Slavonski brod</td>
<td>b/w 1:5000</td>
<td>12 DOF</td>
</tr>
<tr>
<td>Sisak – cadastre</td>
<td>Colour 1:2000</td>
<td>110 DOF</td>
</tr>
<tr>
<td>Bol</td>
<td>b/w 1:5000</td>
<td>10 DOF</td>
</tr>
<tr>
<td>Sava</td>
<td>Colour 1:5000</td>
<td>253 DOF</td>
</tr>
<tr>
<td>Konzum</td>
<td>Colour 1:1000000</td>
<td>1 Photomap</td>
</tr>
<tr>
<td>Zagreb sesvete GUP</td>
<td>Colour 1:5000</td>
<td>57 DOF</td>
</tr>
<tr>
<td>Ogulin, Goljak, Sabljaki</td>
<td>Colour 1:5000</td>
<td>2 Photomosaic</td>
</tr>
<tr>
<td>Jezerane (Lika-Kapela)</td>
<td>Colour 1:5000</td>
<td>4 Photomosaic</td>
</tr>
<tr>
<td>Lepenice</td>
<td>Colour 1:5000</td>
<td>2 Photomosaic</td>
</tr>
<tr>
<td>Tourist settlements</td>
<td>Colour 1:5000</td>
<td>3 DOF</td>
</tr>
<tr>
<td>Krapinsko–zagorska county</td>
<td>Colour 1:5000</td>
<td>193 DOF</td>
</tr>
<tr>
<td>Plano – Prgomet</td>
<td>Colour 1:2000</td>
<td>16 DOF</td>
</tr>
<tr>
<td>Krk</td>
<td>Colour 1:5000</td>
<td>112 DOF</td>
</tr>
<tr>
<td>Čačinci</td>
<td>Colour 1:2000</td>
<td>127 DOF</td>
</tr>
<tr>
<td>Plinovod 2004</td>
<td>Colour 1:1000</td>
<td>172 DOF</td>
</tr>
</tbody>
</table>
Cartography in Croatia 2003-2007, National Report to the ICA

Bukovnik Colour 1:1000 5 DOF
K.O. Karlovac I Colour 1:1000 105 DOF
MP Vrbovsko Split Colour 1:2000 331 DOF
            Colour 1:5000 212 DOF
Istarska county Colour 1:5000 498 DOF
BC Vrbovec – Bjelovar Colour 1:5000 21 DOF
CARDS b/w 1:5000 1145 DOF
GUP Šibenik Colour 1:5000 11 DOF
MP Slavonski Brod – Boksici Colour 1:1000 209 DOF
Projekt Međimurje Colour 1:2000 131 DOF
Zagreb 2005 Colour 1:5000 55 DOF
Rijeka Colour 1:1000 162 DOF
DC8 section Stobreč – Omiš Colour 1:1000 35 DOF
Draškovec Colour 1:1000 6 DOF
Plinovod 2005 Colour 1:1000 1717 DOF
District Kali Colour 1:5000 5 DOF
District Okrug Colour 1:5000 3 DOF
Primorsko-goranska county Colour 1:5000 642 DOF
Tourist. settlement Vrtoji sunca Colour 1:2000 13 DOF
Island of Vir Colour 1:2000 29 DOF
Primošten – Rogoznica Colour 1:2000 24 DOF
KO Gola Colour 1:2000 26 DOF
Dusina Colour 1:2000 118 DOF
Savska1000 – Grad Sisak Colour 1:1000 3 DOF
            Colour 1:2000 9 DOF
Oil field Žutica Colour 1:2000 48 DOF
Oil fields Colour 1:2000 96 DOF
JANAF Colour 1:1000 1029 DOF
CROMAC Colour 1:2000 3696 DOF
Istrian Y Colour 1:1000 109 DOF
Špačva i Lika Infra 1:5000 63 DOF infrared
NK Okoli i Stružec Colour 1:2000 33 DOF
Bale Colour 1:2000 8 DOF
            Colour 1:5000 21 DOF
Zagreb Colour 1:5000 55 DOF
NP of the Slavonija county Colour 1:2000 241 DOF
Posedarje district Colour 1:5000 23 DOF
Bihać GIS Colour 1:2000 21 DOF
Ružičić-Kupres Colour 1:2000 7 DOF
Gašinci – poligon Colour 1:5000 13 DOF
Šibenik Colour 1:1000 2 DOF
            Colour 1:2000 7 DOF
Knin Colour 1:2000 21 DOF
Sisak – civil engineering areas Colour 1:2000 50 DOF
City of Kaštela Colour 1:5000 13 DOF
            Colour 1:1000 101 DOF
            Colour 1:2000 33 DOF
Zagreb Airport Colour 1:2000 4 DOF
Island of Šipan Colour 1:2000 4 DOF
Albanija Colour 1:1000 4063 DOF
            Colour 1:2000 9569 DOF
            Colour 1:5000 2716 DOF


Cadastral survey and revision

K.O. Sisak Stari – technical revision
K.O. Karlovac I – technical revision
K.O. Rabac and parts of K.O. Novi Labin – technical revision
New survey of parts of K.O. Ripenda, Nedešćina and Cere

Geofoto also participated in registration of Maritime Property in the areas of Istrian and Primorsko- goranska county, survey and production of report of line cadastre of water economy in the area of the whole City of Petrinja, vectorization of cadastral plans in the area od 1200 km of gas pipeline route in order to establish the spatial information system PLINACRO. It also provided consultation services on the project CRONOZIP III – specifying procedures and quality control in procedures of new surveys and technical revisions.

You can find more about the activities of Geofoto Ltd. at the Internet address http://www.geofoto.hr

Company for Photogrammetry (Zavod za fotogrametriju d.d.), Zagreb

Company for Photogrammetry’s staff and equipment practice all works in the field of geodetic activities, applying – besides classical geodetic procedures – aerial survey, geodetic photogrammetry and technology of satellite global positioning by using instruments of top global producers. Data are processed digitally, and the production of plans and maps is executed in highly automated processes. By keeping up with technological development and scientific achievements and systematically qualifying young engineering staff, the Company for Photogrammetry is prepared for future challenges.

The Company for Photogrammetry demonstrates its competence in the field of geodetic activities with numerous operations done in the past 45 years, and abundant experience which relies on excellent professional and technological basis.

During the period 2003-2007, the Company for Photogrammetry worked on following cartographic operations:

1. Topographic cartography
   a. Topographic map 1:25 000
   b. Digital orthophoto
      1. About 1300 sheets at 1:5000 of various areas within the Land Registry and Cadastre Assortment Project (2005–2006)
      2. Several digital orthophoto tasks at various scales
         - Bridge Pelješac scale 1:1000 (2004)
         - AC Zagreb – Sisak scale 1:1000 (2005)
- And other…
  c. Hydrographic Atlas of the Drava River at the border with Slovenia at the scale 1:10 000 (2006–2007)

2. Thematic cartography
   b. Thematic maps for the needs of Hrvatske autoceste Ltd. (2003–2006)

3. Projects and other
   b. Production of project of spatial foundations with representation of protected coastal sea area (ZOP – 2005)
   c. Work on Eurogeographics project Euro Global Map (EGM – 2006)

Quality control system ISO 9001:2000 was introduced at the beginning of 2005. The number of digital photogrammetric stations was increased to 10, likewise for GPS devices. More than 20 Bentley PowerMap – program for cartographic processing licences were obtained, as well as ArcGIS 9, new versions of programs for AT, DMR and DOF.

The Company for Photogrammetry has access to two HP plotters and one large-format scanner. Besides mentioned cartographic operations, the Company for Photogrammetry carried out numerous geodetic, engineering and cadastral operations for various investors.

You can find more about the activities of the Company for Photogrammetry at the Internet address http://www.zzf.hr

---

**Geodetic Company Split (Geodetski zavod d.d. Split)**

Geodetic Company Split is a company with a long tradition of producing various geodetic, and therefore cartographic products. It was founded at end of April 1946 with the name Regional Geodetic Company of Dalmatia (Oblasni geodetski zavod Dalmacije). The company had 10 employees at the time. At the beginning of 1950, its name was changed to Survey, Company for Geodetic Works (Izmjera, poduzeće za geodetske radove). Due to large needs for various geodetic services, it was expanded and had 25 employees. From a cartographic point of view, an interesting project from that period was the production of the economic map Sinjsko polje, scale 1:5000. It is a testament to the significance of Geodetic Company Split in the field of Croatian cartography from the Company's very beginnings.

At the beginning of 1952, it started working as an institution of the Government of National Republic of Croatia as Office for New Land Survey (Ured za novu izmjeru). At end of 1961, it became an independent company and changed its name to Company for Land Survey – Split (Zavod za izmjeru zemljišta – Split). At the time, it already had 36 employees. It worked under that name until its transformation. At end of 1989, the Company's status became company with special responsibility.

In 1994, proprietary company entirely owned by its employees and got the present name Geodetic Company Split (Geodetski zavod d.d. Split). It is worth noting that in spite of the changes in its name, the company has preserved its basic activities and is among the oldest companies in Dalmatia.
Today, the Geodetic Company Split is a contemporary company in technologic and personnel sense. An ideal blend of youth and experience contributes to quality participation in realization of mostly national projects. The company employs one MSc, 24 graduate engineers, 6 engineers, 24 technicians and 6 technical staff employees, a total of 61 employees and is the largest geodetic company in Dalmatia.

Six of its employees are chartered geodetic engineers and members of the Croatian Chamber of Architects and Engineers in Civil Engineering. Last year the company became an owner of the quality control certificate ISO 9001:2000. The acquisition of the certificate is just one in the series of acknowledgments of the quality of the Company's work.

The company consists of Management, Technical and Financial-General Departments. The Technical Department is divided into Processing Sector and Survey Sector. Processing Sector is interesting from a cartographic point of view. It consists of about 15 employees which collect and analyze spatial data for needs of production of various cartographic representations.

Geodetic operations in the Company are carried out using the most contemporary equipment: specialist software, digital workstations, electric-optical levelings, GPS devices, etc. The Company operates on the entire territory of Croatia.

Activities of the Company include design and execution of geodetic operations, which includes basic geodetic operations, production of geodetic documentation, real estate cadastre, parcel reports, thematic and topographic maps, digital relief models, digital orthophotoplans, monitoring construction objects, etc.

For a long time, the company has been involved with collecting and processing spatial data for needs of production of analogue and digital maps and plans. Cartographic products that emerged from the Geodetic Company Split are: topographic maps, Croatian basic maps, data for topographic database CROTIS, digital orthophoto, and various thematic maps.

During the last four-year period (2003-2007), the Geodetic Company Split participated in production of a series of cartographic products:

**Topographic map 1:25 000**

1. Bjelovarsko-bilogorska county: 8 sheets, finished in 2004
2. Splitsko-dalmatinska county: 30 sheets, completion near the end of 2007.

Topological processing for the topographic database 1:25 000 within the CROTIS project is done or is being done for these areas.

**Croatian Base Map 1:5000**

1. National parks:
   Mljet: 14 sheets
   Brijuni: 7 sheets
   Plitvice Lakes: 4 sheets

**Digital orthophotoplans**

3. Šolta 1:5000, 23 sheets (2005)

Thematic Maps

Tourist map National Park Risnjak 1:23000

You can find more about the Geodetic Company Split at the Internet address http://www.geozavod-st.hr.

Geodetic Company Osijek (Geodetski zavod d.d. Osijek)

Geodetic Company Osijek is a company with long tradition. It was founded in 1947 with the name Geopremjer. During the years, it changed its name and finally got its present name Geodetic Company Osijek (Geodetski zavod d.d. Osijek) in 1993. It is one of Croatia’s leading companies concerned with a wide spectrum of operations: aerial survey, cadastral report production, topographic map production, production of various thematic maps of various scales and content, GIS production, production of 3D terrain models, etc.

Today, the Company employs 57 professionals, 6 certified graduate engineers, 7 graduate engineers, 9 engineers, 21 technicians, and 14 employees that comprise complementary services such as pilots, mechanics and administration.

These professionals possess great knowledge and plentiful experience required to solve even the most demanding tasks. In order to provide clients and business partners with insight into service quality, the ISO 9001 quality control system was introduced.

Since 2003, the Geodetic Company Osijek has produced following sheets of topographic map at the scale of 1:25 000 (TK25):

3 sheets – area of the city of Karlovac – in print
5 sheets – area of the city of Osijek – printed
10 sheets – area of Gorski kotar in cooperation with Geodetic Company Rijeka – sent for a second review before printing
3 sheets – area of the city of Vukovar – corrections after first review
5 sheets – area of Slavonski Brod – sent for a second review before printing
8 sheets – area of Međimurska county – corrections are being done after first review
4 sheets of Splitsko-dalmatinska county in cooperation with Geodetic Company Split – sent for first review
28 sheets of Vukovarsko-srijemska county – in production – time limit is end of 2008

You can find more about the activities of Geodetic Company Osijek at the Internet address http://www.gzo.hr
Gisdata Ltd.

Gisdata Ltd. is a part of an international Gisdata Group. Gisdata Group has offices in Croatia, Slovenia, Bosnia and Herzegovina, Serbia, Macedonia and Hungary along with representative offices in Kosovo and Great Britain.

Gisdata Ltd. is a privately owned company, founded in 1989. Since then the company, as a part of a Gisdata Group, has developed into a leading company for implementing information systems, technologies and services in South-eastern Europe.

Primary activities include design, development and maintenance of information systems, creation and maintenance of digital databases, working with GPS technology, remote sensing (satellite and aerial images), technical and business consulting, education and distribution of products of leading world software suppliers.

Gisdata Ltd. is a healthy, financially stable company with 52 employees, with its own business office space of approximately 1800 m² and continued growth.

Gisdata Ltd. covers all segments of planning and designing of optimal business processes and IT systems, ranging from sales of software from principals, production of databases and various software solutions, designing, implementing and maintenance of the IT systems, all the way to the education of end users. Gisdata Ltd. is organized in six main segments including local, regional and national government, natural resources and environmental protection, energy and utility sector, telecom, transport and logistics and private commercial sector. The list of users in Croatia, Europe and worldwide has reached the number of more than 2000.

In technical terms Gisdata Ltd. is organized in several expert groups that include business and technical consultants, application programmers, specialists for creation and maintenance of geographic data and others.

In the period 2003-2007 Gisdata Ltd. produced a large number of analogue and digital maps and atlases.

<table>
<thead>
<tr>
<th>Map title</th>
<th>Publisher</th>
<th>Published</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue maps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maps of bird distribution</td>
<td>Eko centre Caput Insulae Beli</td>
<td>2007</td>
</tr>
<tr>
<td>Overview maps of bivalve mariculture sites</td>
<td>Ministry of Agriculture, Forestry and Water Management – Department for Veterinary Science</td>
<td>2007</td>
</tr>
<tr>
<td>Maps of entrance border crossings, offices and regional units of phytosanitary inspection.</td>
<td>Ministry of Agriculture, Forestry and Water Management – Department of Agriculture</td>
<td>2007</td>
</tr>
<tr>
<td>Description</td>
<td>Publisher/Date</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td>PZ Auto – Business Network in Croatia 1:390 000</td>
<td>PZ Auto</td>
<td>2007</td>
</tr>
<tr>
<td>Thematic maps for geography textbook and workbook for the 6th grade elementary school</td>
<td>Ljevak Editions</td>
<td>2006</td>
</tr>
<tr>
<td>Vehicle Centre of Croatia – Business Network in Croatia 1:200 000</td>
<td>Vehicle Centre of Croatia</td>
<td>2004, 2006</td>
</tr>
<tr>
<td>General maps of Croatian regions (Zagreb and Zagreb region, Istria, Northern Dalmatia, Southern Dalmatia, Continental Croatia) and selected cities (Zagreb, Split, Rijeka, Osijek, Dubrovnik, Pula, Varaždin, Zadar) for publication Good Croatian Restaurants</td>
<td>Večernji list</td>
<td>2006</td>
</tr>
<tr>
<td>Europe April 6, 1941 – History map</td>
<td>Public Institution Memorial Area Jasenovac</td>
<td>2006</td>
</tr>
<tr>
<td>Territorial split of Yugoslavia 1941-1945</td>
<td>Public Institution Memorial Area Jasenovac</td>
<td>2006</td>
</tr>
<tr>
<td>Viticultural atlas of Croatia 1:200 000</td>
<td>Springer Business Media</td>
<td>2006</td>
</tr>
<tr>
<td>General map of traffic routes in Croatia</td>
<td>Bruketa Žinić</td>
<td>2006</td>
</tr>
<tr>
<td>Gas transport network in Croatia 1:200 000</td>
<td>Plinacro</td>
<td>2006</td>
</tr>
<tr>
<td>Mining atlas of Croatia 1:200 000</td>
<td>Springer Business Media</td>
<td>2005</td>
</tr>
<tr>
<td>Maps of Croatian coastal area, Publication Population of Islands in Croatia</td>
<td>Public Health Department of Splitsko-Dalmatinska County</td>
<td>2005</td>
</tr>
<tr>
<td>Tourist Map of Varaždin County 1:100 000</td>
<td>Tourist office of Varaždin County</td>
<td>2005</td>
</tr>
<tr>
<td>Tourist map of island Krk 1:50 000</td>
<td>Bar d.o.o.</td>
<td>2005</td>
</tr>
<tr>
<td>Tourist map of Kvarner 1:200 000</td>
<td>Bar d.o.o.</td>
<td>2005</td>
</tr>
<tr>
<td>General plans of County centres in various scales for Croatian Telecom Telephone Book -Yellow Pages</td>
<td>Croatian telecom</td>
<td>2005</td>
</tr>
<tr>
<td>Tourist map of Haloze municipality 1:40 000</td>
<td>Tourist office of Haloze municipality, Slovenia</td>
<td>2003</td>
</tr>
<tr>
<td>Tourist map of Medvednica</td>
<td>Public Institution Nature Park Medvednica</td>
<td>2002</td>
</tr>
</tbody>
</table>

**Digital maps**

<table>
<thead>
<tr>
<th>Description</th>
<th>Publisher/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vip Navigator</td>
<td>Vipnet</td>
</tr>
<tr>
<td>Nearest kiosk, Interactive map service</td>
<td>Tisak</td>
</tr>
<tr>
<td>Interactive map service <a href="http://www.izaberi.hr">www.izaberi.hr</a></td>
<td>Ideamarket</td>
</tr>
<tr>
<td>Interactive map service Real estate bourse</td>
<td>Real estate bourse</td>
</tr>
</tbody>
</table>

**Digital atlases**

<table>
<thead>
<tr>
<th>Description</th>
<th>Publisher/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital road atlas of Croatia</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Digital elevation model of Bosnia and Herzegovina 1:25 000</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Digital atlas of Bosnia and Herzegovina 1:25 000</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Land use/land cover – Bosnia and Herzegovina</td>
<td>Gisdata</td>
</tr>
<tr>
<td>3D buildings model of Sarajevo and Mostar</td>
<td>Gisdata</td>
</tr>
<tr>
<td>3D elevation model of Sarajevo and Mostar</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Land use/land cover – Sarajevo and Mostar</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Digital elevation model of Serbia 1:50 000</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Digital atlas of Serbia 1:50 000</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Land use/land cover – Serbia</td>
<td>Gisdata</td>
</tr>
<tr>
<td>Digital atlas of Belgrade, Niš, Kragujevc and Novi Sad</td>
<td>Gisdata</td>
</tr>
</tbody>
</table>
Digital elevation model of Belgrade, Niš, Kragujevac and Novi Sad    | Gisdata    | 2007
---|---|---
Land use/land cover – Belgrade, Niš, Kragujevac and Novi Sad    | Gisdata    | 2007

Further detailed information can be found on Gisdata Group corporate web site at http://www.gisdata.com and on a localized web site http://www.gisdata.hr

**GEOdata Ltd., Split**

GEOdata was established in 1993 as a company for the new and growing market of geoinformation service. Since then, GEOdata has developed services from the field of geoinformation systems, geoposition services, geodetic survey and engineering geodesy, spatial planning, civil engineering and architectural design.

GEOdata is a limited liability proprietary company in private property of four equal partners. The company is independent of producers and suppliers and is not associated with any interests that could affect its professional work. GEOdata has done numerous specialist projects from the field of geoinformation and related technical disciplines, oftentimes supporting wider multidisciplinary projects.

GEOdata is organized into five departments:

- Geoinformation systems
- Geopositioning systems
- Architectural and geodetic surveys
- Architectural design and urban planning
- Administration, accounting and management

Cartographic activities of GEOdata for the period 2003-2007:

**Aeronavigation Charts**

- Aerodrome obstacle chart – ICAO – type A: Dubrovnik airport (2007, in production)

- Aircraft parking/docking chart – ICAO: Dubrovnik airport (2007)
- Aircraft parking/docking chart – ICAO: Brač airport (2007, in production)

- Aerodrome chart – ICAO: Dubrovnik airport (2007)
- Aerodrome chart – ICAO: Brač airport (2007, in production)


City Plans and Excursion Maps

Plan of the City of Dubrovnik (2005)
Plan of the City of Split (2004, 2005)
Plan of the City of Cavtat (2005)
Plan of the City of Korčula (2005)
Plan of Ston and Mali Ston (2005)
Web GIS Plan of the City of Split, interactive thematic maps www.split.hr, connection on GIS for citizens (2006)

Tourist map of Dubrovačko-neretvanska county (2005)
Tourist map of Park Forest Marjan (2005)
Tourist 3D representation of Makarska Riviera (2006)
Tourist map of Okrug district (2007)

Set of maps of protected nature sites in Splitsko-dalmatinska county (2005)
Digital maps for web of protected nature in Splitsko-dalmatinska county (2005)

Other Thematic Maps

Administrative division of Dubrovačko-neretvanska county (2003)
Administrative division of the City of Dubrovnik (2003)

Map of southeast Europe (2006)


Programs of managing forest units Hartić, Promina and Prominski plateau: GIS base production, spatial analyses, cartographic representation production (2003)

Responsible tourism and ecoregional protection of middle and south Dalmatia: GIS base production, spatial analyses, cartographic representation production (2004)

Programs of sustainable development of islands for seven island groups: GIS base production, spatial analyses, cartographic representation production (2004-2005)

3D study of sea visibility: GIS base production, spatial analyses, cartographic representation production (2007)

Spatial Plans

Several years worth of participating in production of county spatial plan of the Dubrovačko-neretvanska county – GIS base production, spatial analyses, cartographic representation production (1998-2005)

Production of several detailed design plans (Moćni laz, Vela Luka; Zgon and Mezanovac, Solin; Murvica south, Poličnik; ferry port Stari Grad, modifications and supplements)

You can find more about the activities of the GEOdata company from Split at the Internet address http://www.geodata.hr
galaGIS Ltd.

galaGIS Ltd. is an internationally oriented company established at the end of 2000 to offer specialized solutions and services for geoinformation systems applying leading-edge geoinformation technology. galaGIS is the first Croatian company that implemented the complete WebGIS solution for distribution of geospatial data over the Internet. In the area of business and technology, the company has very strong cooperation with company GISquadrat Ltd. (Vienna, Austria), one of the leading GIS companies in Europe. With over 80 employees and many references in cities/municipalities, engineering companies, electric-power industry and ministries in Central and Eastern Europe, GISquadrat and galaGIS make strong and competent providers of GIS services and solutions.

The company is the official Intergraph Team GeoMedia Registered Solutions Provider for Croatia and Bosnia and Herzegovina, and it delivers software solutions, based on Intergraph GeoMedia technology, integrating existing engineering, geospatial, and corporate information permitting a corporate-wide access via company Intranets and the Internet. galaGIS develops and implements applications for land information systems, electric networks, gas networks, telecommunication networks, traffic networks, water and wastewater networks, corporate data management, location based services, etc.

Two flagship products: WebSolutions and ResPublica provide access to geospatial data directly over World Wide Web, and thanks to revolutionary Data Warehouse technology they fulfill complex requests of integration and connectivity with other data formats and applications and ensure access to different data sources on regular PC platforms. ResPublica solution is designed for city administration and utilities, and it consists of cadastre module, spatial planning module, infrastructure, object, nature condition, and water and wastewater module. Besides mentioned products, the company also offers services for complete development and professional work with geoinformation system: technical support, education, training and consulting.

galaGIS has very strong GIS know-how for land information systems, i.e. cadastre: maintenance of geometry and attribute data in a unique database with simple access from any part of organization and over the Internet, retention of the complete history of all land information edits, long-term transaction management, versioning and temporal data management for the GeoMedia Professional/Oracle10g™ environment.

During the period 2003-2007, cartographic activities were primarily done in the field of geospatial data visualization on the web, i.e. within the scope of following projects:

WebKIS – Distribution of cadastral data in regional office for cadastre in Sisak  
Client: State Geodetic Administration of the Republic of Croatia

Interoperable XML/GML geoid of the Republic of Croatia  
Client: Ministry of Science of the Republic of Croatia

GIS NP Kornati  
Client: State Geodetic Administration of the Republic of Croatia and the Kornati National Park

WebGIS – Communal Information System of the City of Labin  
Client: City of Labin

KGIS – Communal information system of the city of Crikvenica  
Client: City of Crikvenica
NSDI Croatia – IDP (Interoperability Demonstrator Project)  
Client: State Geodetic Administration of the Republic of Croatia

CRONOGIP III – Establishment of a geographic names base of the Republic of Croatia  
Client: Croatian Geodetic Institute

Use of leading-edge geoinformation technologies, technical know-how, real-world experience, and strategic partnerships with leading companies in GIS technologies make galaGIS a unique company in Croatian GIS market.

More details about the activities of the galaGIS company can be found at the Internet addresses http://www.galagis.com and http://www.galagis.hr

**Croatian Air Navigation Services Ltd. (Croatia Control Ltd.)**

Croatian Air Navigation Services Ltd. (Croatia Control Ltd.) is a limited liability company responsible for provision of air navigation services in the Republic of Croatia. The Company's business is of interest to the Republic of Croatia.

The Company is responsible for:

- Provision of air navigation services
- Provision of operational air navigation services – air traffic control, alerting service, provision of pre-flight and flight information services to enable safe, orderly and expeditious air traffic flow; processing and retention of flight data; forwarding of information significant to air traffic safety; management of air traffic flow and airspace use
- Collection, processing and promulgation of aeronautical information, including issuance of specific publications
- Identification of operational demands for air traffic control systems, surveillance systems, equipment and infrastructure
- Planning of airspace structure and flying procedures taking into account interests of civil and military users, as well as environmental requirements
- Development, construction, maintenance, monitoring and verification of good working order of the facilities, systems and equipment used in the provision of air navigation and aviation meteorological services
- Meteorological observations and monitoring of airport climatology; making and exchange of aviation weather reports
- Making of aviation weather forecasts, and issuance of special warnings for airports and airways
- Implementation and harmonization of operational, developmental and international tasks and duties with international organizations, especially ICAO (International Civil Aviation Organization) and EUROCONTROL (European Organisation for the Safety of Air Navigation);
- Staff training and other responsibilities.

Aeronautical information is collected, processed and disseminated in the form of text and graphical displays. The data are published in the Aeronautical Information Publication in regular, pre-determined cycles. Various types of thematic maps are published for all airports in the Republic of Croatia, including the whole area of Croatia's Flight Information Region. These maps are created in different scales and are available in analogue and digital form.
Cartography in Croatia 2003-2007, National Report to the ICA

Various types of charts published for the Aeronautical Information Publication include:

- VFR Charts with recommended VFR routes 1:500 000 made in TM projection with updated topographic background and aeronautical data
- Aerodrome Charts – ICAO 1:10 000 – 1:20 000 for all Croatian aerodromes
- Aircraft Parking/Docking Charts – ICAO
- Aerodrome Obstacle Charts Type A – ICAO, 1:10 000 – 1:20 000
- Precision Approach Terrain Charts – ICAO
- Instrument Approach Charts – ICAO, 1:100 000 – 1:500 000
- Visual Approach (Circling) Charts (IFR)
- Area Charts
- Standard Instrument Departure Charts (SID) – ICAO
- Standard Arrival Charts – Instrument (STAR) – ICAO
- Enroute Charts – ICAO, 1:1 000 000
- VFR Charts for Airports and Landing Sites, 1:200 000

Many other types of thematic maps are created for operational purposes of Croatia Control Ltd. and the Aviation Sector of the Croatian Ministry of Defence. These include Anti-Hail Rocketing chart for Croatia and part of Bosnia and Herzegovina at the scale of 1:500 000, Radar Minimum Altitude Charts, Charts of Aerial Sporting and Recreational Activities, Charts of Military Operations Area, etc.

All charts are made according to standards and recommendations contained in ICAO Annex 4 and are published every time when there is a safety-critical change in aeronautical data – usually once or several times a year. Charts employ the Transverse Mercator projection with the central meridian along 16°30' east of Greenwich and linear scale factor along the central meridian 0.9997. The reference ellipsoid is Bessel 1841. The coordinate system is based on the WGS-84 geodetic datum as recommended by ICAO. Official state maps – scale 1:25 000 to 1:200 000 - are used as topographic background in thematic mapping. These are updated with available new data and data obtained through geodetic measurements.

All required measurements and transformations are made using EUROCONTROL’s software EUROTOOL Data Quality Tool Set V.4.04, Dat_Abmo, IHGR 2000, GAUSSHR and other associated programmes.

Charts are made using a number of software products such as Autodesk AutoCAD Map, Autodesk Raster Design, Global Mapper, Adobe Photoshop, Adobe Acrobat, Ilwis, Surfer, IrfanView, etc.

In addition to the production of various charts, Croatia Control is also involved in ongoing projects aimed at the establishment of geoinformation systems:

- Establishment and updating of EAD database (European AIS database) within EUROCONTROL
- Production of electronic Aeronautical Information Publication (eAIP)

More details about the activities of the Croatia Control Ltd. can be found at the Internet address http://www.crocontrol.hr

Croatian School Cartography

The period 2003-2007 marked the gradual transition to computer processing of cartographic bases, as permitted by introduction to technique and acquisition of computer equipment. Following maps were printed using the old technique in 2003:
South America – geographic wall map in one sheet at the scale 1:10 000 000
- World – geographic wall map in four sheets at the scale 1:20 000 000
- Republic of Croatia – geographic wall map in four sheets at the scale 1:300 000
- Asia – geographic wall map in two sheets at the scale 1:10 000 000

Following titles were produced using the same technique:

- Geographic Atlas for High Schools – atlas with 79 pages of thematic and geographic maps to help learning certain units
- Croatian Historical Maps – historical atlas with 88 pages of maps and texts explaining events that occurred in the historical area of Croatia
- Geographic Atlas for Elementary School – atlas with 72 pages of geographic and thematic maps required for needs of elementary school curriculum.

All these titles were made by the following team: Snježana Haiman, Maja Dožić, Bara Mesner, Krunoslav Popović, Miroslav Rapo, Đurđica Sporiš and Vladimir Vuković. There are also external collaborators, reviewers, readers: Mirko Brazda, Mate Matas, late Zlatko Pepeonik, late Božidar Feldbauer, Velimir Rogić, Agneza Szabo, Ljubomir Antić, Franjo Šanjek, Josip Kolanović, Andelko Mijatović, Dragica Husanović Pejnović, Nenad Lovrec, Mario Mimica, Milka Tica, etc. Vera Müller was the director of the institution.

At the same time, the same team was working on the Geographic Atlas for Elementary School using computers.

Following titles were published in 2004:

- World – geographic hand map in one sheet at the scale 1:40 000 000, new. Produced by using computer.
- World – political hand map in one sheet at the scale 1:45 000 000, new. Produced by using computer. Features data for 235 countries with basic numerical data and flags
- Development of Roman Nation – historical wall map, new
- Australia and Oceania – geographic wall map in one sheet at the scale 1:10 000 000
- North America – geographic wall map in one sheet at the scale 1:10 000 000
- North Croatian Littoral – regional map of part of Croatia for needs of pupils in elementary school education
- Geographic Atlas for Elementary School
- Geographic Atlas for High Schools
- Croatian Historical Map

Following titles were printed in 2005:

- Africa – geographic wall map in one sheet at the scale 1:10 000 000
- North Croatian Littoral and Mountain Croatia – regional map of part of Croatia for needs of pupils in elementary school education
- South Croatian Littoral – regional map of part of Croatia for needs of pupils in elementary school education
- Geographic Atlas for Elementary School
- Geographic Atlas for High School

42
Cartography in Croatia 2003-2007, National Report to the ICA

- Croatian Historical Maps.

Following titles were printed using the old technique in 2006:

- World War I, historical wall map
- Europe, geographic wall map, 1:3 000 000
- Croatian Historical Maps, Atlas
- South Croatian Littoral, regional map
- Rijeka and Wider Surroundings, regional map

Following releases were produced using computer and printed:

- Republic of Croatia, map for the 4th elementary school grade, 1:900 000
- Republic of Croatia, map for the 4th elementary school grade, 1:1 400 000 plast.
- Republic of Croatia, map for the 8th elementary school grade, 1:900 000

Each of these maps is related to learning within age group the map was made for. There is a spatial plastic edition on which pupils can notice particular content.

Historical Atlas for Elementary School, printing continuation

Geographic Atlas for Elementary School, 1st edition. This is a new edition of Croatian School Cartography, produced using computer technique. It features 72 pages of content according to the geography curriculum for elementary schools, with strict reviewing of the curriculum and respect to requirements of the Croatian National Educational Standard.

Geographic Atlas for High Schools, 11th modified and supplemented edition. It features 79 pages of content according to the geography curriculum for high schools, but the atlas was partially produced in old technique, and partially using a computer, so it was printed as a modified and supplemented edition.

Supplements: transparencies. They help professors during the educational process, and their content is related to basic school programs. Content of transparencies: maps of continents according to particular content layers.

During 2006, work was continued on certain editions that are still being published according to possibilities. They are:

- Mediterranean – geographic wall map
- Mountain Croatia – geographic wall map
- World War II – historical wall map

At the end of 2006, Vera Müller, director of Croatian School Cartography, deservedly retired. She was replaced as a director by Krunoslav Popović.

Following titles were realized in 2007:

- World War II – historical wall map
- Republic of Croatia – geographic wall map 1:300 000

Geographic Atlas for High and Professional Schools was prepared with entire content produced using a computer. The first edition should come out this year. The reviewers are: Dr. Mirko Brazda, Dr. Mate Matas and Josipa Rodić, proof-reader Milka Tica, cartographers employees of Croatian School
Cartography in Croatia 2003-2007, National Report to the ICA

Cartography: Krunoslav Popović, Miroslav Rapo, Maja Dožić, Bara Mesner, Đurđica Sporiš and Snježana Haiman as editor in chief and author of certain maps.

All titles related to atlases were produced in cooperation with Školska knjiga, except the Historical Atlas for Elementary School, which is an independent edition of Croatian School Cartography.

**Studio Bregant Ltd.**

More significant cartographic projects during the period 2003-2007:

2003

- Plan of Educational Institutions in the City of Zagreb, publisher City of Zagreb, City Office for Education and Sport
- Plan of the City of Zagreb, publisher Studio Bregant Ltd., Zagreb
- Traffic and Travel Map of Croatia, publisher HAK Usluge Ltd.
- Auto Map of Croatia, publisher HAK Usluge Ltd.
- Auto Map of Croatia (4 editions), publisher Jutarnji list
- Wine Map of Croatia, publisher Jutarnji list

2004

- Auto Atlas and Guide to Croatia, publisher HAK Usluge Ltd.
- Traffic, Travel and Touristic Map of Croatia, publisher Hrvatski autoklub
- Auto Map of Croatia, publisher MasterCard
- Auto Map of Croatia, publisher HAK Usluge Ltd.
- Auto Map of Croatia (2 editions), publisher Jutarnji list

2005

- Guide to the Republic of Croatia, publisher HAK Usluge Ltd.
- Road and Tourist Map of Croatia, publisher HAK Usluge Ltd.
- Ski Map ALPA, publisher Studio Bregant Ltd., Zagreb

2006

- Road map of the Republic of Croatia with Routesa, publisher HAK Usluge Ltd.
- Map of Historical Sites of Croatia, publisher 24sata
- Natural-Science Map of Croatia, publisher 24sata
- Plan of the City of Zagreb – Pilgrimage of Trust on the Earth, publisher Taizé
- Plan of the City of Zagreb, publisher Studio Bregant Ltd., Zagreb
- Auto Map of Croatia, 10th edition, publisher Studio Bregant Ltd., Zagreb

44
• Auto and Touristic Map of the Zagrebačka County, 2nd edition, publisher Studio Bregant Ltd., Zagreb
• Tourist Map of Croatia 2nd edition, publisher Studio Bregant Ltd., Zagreb
• Auto Map of Germany, publisher Studio Bregant Ltd., Zagreb

2007

• Auto Atlas of the City of Zagreb “APLAUZ”, 12th edition, publisher Studio Bregant Ltd., Zagreb
• Auto Atlas of Croatia and the City of Zagreb, publisher Cartographia Kft., Budapest
• Auto Atlas of Slovenia and the City of Ljubljana, publisher Cartographia Kft., Budapest
• Manual for Drivers with Atlas of Croatia and Highway Routes, publisher Hrvatski autoklub

You can find more about the activities of the company Studio Bregant Ltd. at the Internet address http://www.studio-bregant.hr

STEF Ltd.

The company STEF Ltd. was published in 1993. Its basic activities include publication, cartography, graphic design and tourist promotion.

During the period 2003-2007, panorama-tourist maps for following areas were made: Pitomača, Sljeme - ski routes, Zaprešić, Desinić, Ljubuški (Bosnia and Herzegovina), Gospić, Primošten, Pirovac, Žirje, Lovinac, Petrova gora.

You can find more about the activities of the company STEF Ltd. at the Internet address http://www.stef.hr

VA-COPY multimedia

The company was established in 1994 by professionals from the fields of informatics, design and marketing in order to unite mentioned areas in the direction of developing new communication technologies in Croatia. As time passed, new technologies and knowledge were adopted, breaking through to the best in Croatia. Global companies do part of their business online, and there are numerous which do business exclusively over the Internet. The success of such companies didn’t emerge just from high-quality supply of products or services, but thanks to numerous other reasons. The most distinctive and important factors affecting on quality and success on the market are adequate presentation of the company, its products and services to potential users, marketing, recognizable and easy to remember visual identity, lots of useful contents, the so-called “value added content” and other.

Through its activities related to cartography, VA-COPY multimedia obtains, adapts, stores and uses spatial information, and especially their visualization as cartographic representations. Digital maps are plotted in vector format, which enables top quality of enlarging and are suitable for printing.

Flash interactive maps represent selected objects and are the result of creativity and selection of VA-COPY multimedia as the author, and are designed to be used where spatial relations are of utmost importance. VA-COPY multimedia cartographic products are mostly intended by including the
cartographic dimension into the user’s information system, board-plan of the city, printing of various brochures, etc.

2005 saw the launching of the CroMaps portal that contains 68 city plans, an automap of the Republic of Croatia, two island maps and six county maps. The address is http://www.cromaps.com. CroMaps navigator consists of interactive maps and a browsing and automatic street, city and economic subject positioning system.

The Economic Plan of the City has been produced since 2007. It is a plan of the city that represents in detail all more important information required for everyday life. Complimentary copies are being distributed to households in an area of a particularly city and business subjects.

You can find more about the activities of the company VA-COPY multimedia at the Internet address http://www.va-copy.com
5. Other Activities

Croatian Cartographic Society (CCS)

Croatian Cartographic Society was founded in 2001. M. Lapaine was its president from 2001 to 2004, and S. Frangeš has been on that position since 2005.

CCS represents Croatia in the International Cartographic Association (ICA). It also publishes a journal, *Cartography and Geoinformation*, and organized several exhibitions, conferences and lectures during the period 2003-2007.

**The Journal**

CCS publishes the journal *Cartography and Geoinformation*, ISSN 1333-896X, which was published annually up to 2005, and has been published twice a year since 2006. The journal is bilingual, all papers are in Croatian and English. M. Lapaine is the editor in chief. Issues 2-7 and a special issue were published during the period 2003-2007. The journal is available in digital form at the Internet address http://hrcak.srce.hr.

**Lectures and Ceremonies**

Lapaine, M.: Croatian Cartography 1999-2003, lecture organized by CCS, held in the Council Hall of the Faculty of Architecture, Civil Engineering and Geodesy in Zagreb, July 9, 2003

Hasegawa, K.: The History of Urban Mapping in Japan, Between Picture and Survey, lecture organized by CCS, held in the Council Hall of the Faculty of Architecture, Civil Engineering and Geodesy in Zagreb, September 15, 2003


Prof. emeritus Nedjeljko Frančula celebrated his birthday on June 25, 2007. On that occasion, there was a ceremony at the Faculty of Geodesy of the University of Zagreb and a promotion of a special issue of the *Cartography and Geoinformation* journal dedicated to Prof. Frančula.
Exhibitions

CCS was a co-organizer of the exhibition Split – Centre of Adriatic Hydrography – Significant Anniversaries of Sea and Undersea Research, April 24 – May 3, 2003, Glpiptoteka HAZU, Zagreb.

On the occasion of the 3rd Croatian Geographic Congress in Zadar, CCS, the Croatian Geographic Society and the Croatian Geographic Society – Zadar organized the map exhibition Cartography of Zadar on September 24-25, 2003. The exhibition was set at the City Watch of the National Square in Zadar. 93 map reproductions of Zadar and Zadar area from various periods and of various purposes were presented at the exhibition. A CD with pictures and descriptions of the exhibits was prepared for the exhibition.

A map exhibition titled Cartography of European Cities was held at the Museum of Contemporary Art in Zagreb from October 27 to November 5, 2003. The exhibition was organized by CCS and HIZ – GIS Forum, and 46 maps of Polish and 48 maps of Croatian cities were exhibited.

Within the scope of the conference Cartography, Geoinformation and New Technologies held in September 2004, CCS prepared a map exhibition titled Cartography of Lika, which was set in the new gallery space of the Faculty of Geodesy of the University of Zagreb on the 1st floor. The exhibition featured 32 maps of Lika from 16th century to one of the latest maps of that area from 2003.

Within the scope of the same conference, the exhibition titled Vincentius Demetrius Volcius Raguseus (1563-1607), a Portolan Maker from Dubrovnik - Portolans by Drago Novak was set in the Collection of Maps and Atlases of the National and University Library in Zagreb.

On the occasion of the scientific conference Croatian Natural Scientists 13 in October 2004, there was an exhibition Cartography of Lika at the High Teachers' School in Gospić. 36 maps from various periods and authors representing Lika were exhibited.

CCS organized the exhibition Cadastral Plans with 16 exhibits set in the gallery space of the Faculty of Geodesy in March 2005, on the occasion of the 3rd Croatian Congress on Cadastre.

Within the scope of the conference Geoinformation and Cartography in Education in September 2005, CCS organized an exhibition in the gallery space of the Faculty of Geodesy of the University of Zagreb titled Croatian Cartography at the 22nd International Cartographic Conference in A Coruña in 2005.

Within the scope of the conference Cartography, Geoinformation and Spatial Data Visualization held in September 2006, CCS organized the exhibition Spatial Data Visualization. The exhibition was set in the gallery space of the Faculty of Geodesy of the University of Zagreb on the 1st floor.

The Croatian Cartographic Society organized an exhibition in the gallery space of the Faculty of Geodesy of the University of Zagreb titled Croatian Cartography at the 23rd International Cartographic Conference in Moscow in 2007. The exhibition was set in June 2007.

Within the scope of the conference Cartography, Geoinformation and Sea, CCS organized an exhibition in the exhibition space of the State Archive in Zadar titled Maritime Cartography. The exhibition was held from June 15 to June 30, 2007. There were old charts from the fund of the State Archive in Zadar and the Scientific Library in Zadar and charts from the archive and own production of the Hydrographic Institute of the Republic of Croatia. A catalogue of the same name was prepared for the exhibition, in Croatian and English.
Conferences

CCS organized the conference *Cartography, Geoinformation and New Technologies* in Zagreb from September 16 to September 18, 2004. The Hydrographic Institute of the Republic of Croatia from Split, the National and University Library from Zagreb and the State Geodetic Administration were the coorganizers. About 75 people participated. A field trip to the Medvednica Mountain was organized. *Book of Abstracts* was published. A promotion of the book *Electronic Charts and Systems, Dictionary* by Ivana Racetin was held within the context of the conference.

CCS organized the conference *Geoinformation and Cartography in Education* on September 23 and 24, 2005. The Hydrographic Institute of the Republic of Croatia from Split and the Faculty of Geodesy of the University of Zagreb were the coorganizers. *Book of Abstracts* was published. A promotion of the book *Five Centuries of Geographic Maps and Charts of Croatia* edited by D. Novak, M. Lapaine and D. Mlinarić, published by Školska knjiga, was held within the context of the conference. The conference ended with a professional trip to the Medvednica Mountain.

The conference *Cartography, Geoinformation and Spatial Data Visualization* was organized at the Faculty of Geodesy of the University of Zadar. CCS was the organizer, and the Faculty of Geodesy of the University of Zagreb and the Hydrographic Institute of the Republic of Croatia from Split were the coorganizers. About 70 people participated. *Book of Abstracts* was published. The conference program, lecture abstracts and presentations were published on a CD.

The conference *Cartography, Geoinformation and Sea* was held at the Department for Geography of the University of Zadar on June 15 and 16, 2007. CCS was the organizer, and the Faculty of Geodesy of the University of Zagreb and the Hydrographic Institute of the Republic of Croatia from Split were the coorganizers. 250 people participated. A booklet titled *Program* contains conference program and lecture abstracts. A CD was also published. The exhibition *Maritime Cartography* was opened in the evening of the first day of the conference. A full day professional trip to the Kornati National Park and the Telašćica Park of Nature was organized on the second day of the conference.

You can find more about the activities of the Croatian Cartographic Society at the Internet address http://www.kartografija.hr

**Croatian Geographic Society – Zadar**

You can learn about the activities of the Croatian Geographic Society – Zadar in the common report of the Department for Geography of the University of Zadar.

**Zagreb Astronomical Observatory**

The Astronomical Observatory on Popov toranj in Zagreb’s Gornji grad was established on the incentive of Croatian Society of Natural Sciences, and the municipality handed over rooms in Popov toranj, authorized funds for engineering adaptation, setup of astronomical dome and telescope. It was opened on December 5, 1903. The first manager of the Observatory was the famous promoter of natural sciences and techniques, Oton Kučera.

Heidelberg astronomer August Kopff contributed to international reputation and affirmation of the first city astronomical observatory in this part of Europe by naming planetoid nr. 589 (discovered in 1906) Croatia, in honour of the new observatory.
Besides scientific work, the observatory has promoted science from its very beginning. The prolific period of promotion started in the middle of the 20th century, when the Observatory became world-famous via its Esperanto releases. Higher quality work was enabled in the 1960’s, when a new electronic telescope was acquired. Large cultural contribution of the Observatory and the Croatian Society of Natural Sciences was the acquisition of a planetarium (in 1963), which was donated to the Technical Museum, where it is still in function.

During the middle of the 1980’s, the building complex the Observatory belongs to was extensively reorganized. In 1992, a new dome was set, the space temporarily equipped, and the activities modernized. The Observatory still attracts many astronomy and natural sciences admirers. By traditional programs for citizens (lectures, sky observation and other), the Observatory confirmed its cultural contribution to life in the city of Zagreb.

Today, the Observatory is present in all more significant projects and programs of astronomical education, and scientific work in the field of physics of the Sun is done in cooperation with the Hvar Observatory.

During the period 2003-2007, the Observatory participated in these cartographic editions:

*Map of the Moon*
Central European Edition. Lambert Transversal Equivalent Azimuthal Projection, 1:12 800 000. Shade relief base map. Cartographers: L. S. Oreshina, L. Yu. Baeva. Editors: B. V. Krasnopevtseva, K. B. Shingareva, Moscow State University for Geodesy and Cartography (MIIGAiK). This map was made in cooperation between the Cosmic Material Space Research Group of Eötvös Loránd University, Budapest (Henrik Hargitai, editor, map layout), and the Moscow State University for Geodesy and Cartography (MIIGAiK – K. B. Shingareva, original Multilingual Map of Mars concept); N. Copernicus Observatory and planetarium in Brno (Pavel Gabzdyl, Czech translation), Zagreb Astronomical Observatory (Dragan Roša, Croatian translation), Jagiellonian University Observatory, Krakow (Tomasz Kundera, Polish translation), Tectonics and Geological Cartography Section, Faculty of Geology, Warsaw University (Wojciech Ozimkowski), and the University of Architecture, Civil Engineering and Geodesy, Faculty of Geodesy Sofia (Elena Peneva) under support of ICA Commission on Planetary Cartography. ISBN 953-98493-3-0, published in Croatia, 2005.

*Map of the Stellar Sky*
Author Damir Hržina, Zagreb, Zagreb Observatory, Zagreb Astronomical Association, cca 2003, colour astronomical map, 90 × 65 cm, ISBN 953-98493-0-6

*Rotating Map: Appearance of Stellar Sky in Any Moment in a Year*

You can find more about the work of the Zagreb Observatory at the Internet address http://www.zvjezdarnica.hr

*Exhibitions*
Besides previously mentioned map exhibitions organized by the Croatian Cartographic Society, several more exhibitions that partially or fully belong to the field of cartography were set during the period 2003-2007.
Following exhibitions were held in the exhibition area of the State Archive in Zadar during the period 2003-2007: Grimani Cadastral Collection, Imotski Border on Maps and Cadastral Plans of the State Archive in Zadar, Knin Area on Maps and Cadastral Plans of the State Archive in Zadar and Zagora on Maps and Cadastral Plans of the State Archive in Zadar. A catalogue was printed for each of the exhibitions.


Olga Magaš and Željko Škalamera prepared an exhibition with catalogue Volosko and Opatija on Old Cartographic Representations at the State Archive in Rijeka in 2004.

The exhibition Historische Grenzen des Königreichs Kroatien in den Internationalen Verträgen 1666-1791 (Historical Borders of the Croatian Kingdom in International Contracts 1606-1791) was held at the Austrian State Archive (Österreichisches Staatsarchiv) in Vienna in the middle of September 2004. There were about 100 exhibits – reports, letters, original interstate contracts, images of areas, cities and forts, characters participants of military operations and peace negotiations and an especially rich selection of original historical maps representing in detail the historical borderlines of Croatian Kingdom with adjacent areas. The exhibition was prepared by the Croatian Institute for History and the Croatian State Archive from Zagreb and the Austrian State Archive, Embassy of the Republic of Croatia and the Croatian Scientific Institute from Vienna. A catalogue was published for the exhibition – Historische Grenzen des Königreichs Kroatien 1606-1719 with an introductory historical study and a list of exhibits in Croatian and German edited by Milan Kruhek.

Nada Premerl prepared an exhibition with a catalogue – Stream in the Heart of Zagreb: Along the Medveščak Stream – From the Spring to the Mouth at the Zagreb Municipal Museum from July 2005 to January 2006. The exhibition featured, among other, several cartographic representations of the Medveščak stream. Life and urban development along the Medveščak stream from prehistory to the present days were presented through about 20 themes.

An exhibition with a catalogue of the same name: Cimelia Croatica – From Ivo Dubravčić’s Collection by Josip Bratulić was held at the Historical Museum in Zagreb from November 10, 2005 to January 9, 2006. 75 books, 15 maps and 10 graphics were exhibited.


Ante Grubišić prepared an exhibition with a catalogue of the same name Vukovar Landownership on Old Maps from 1773 at the Vukovar City Museum. The exhibition was opened and lasted for a month, organized by the Museum of Slavonia in Osijek. There were 35 maps representing Vukovar landownership. They were produced by Philipp Frast. A facsimile edition of the Atlas of the Vukovar Landownership from 1773 was published to go with the exhibition.
6. Acknowledgements

The author would like to thank the persons who had helped in collecting the data for this report, listed hereunder in alphabetical order: Martina Baučić, MSc from GEOdata Ltd., Dr. Zvonko Biljecki, from Geofoto Ltd., Robert Bregant from Studio Bregant Ltd., Pejo Bročić, BSc from the Hydrographic Institute of the Republic of Croatia, Dr. Tea Dušančić Leder, from the Hydrographic Institute of the Republic of Croatia, Dr. Josip Faričić, from the Department of Geography at the University of Zadar, Prof. Dr. Borna Fürst-Bjeliš from the Geographic Department at the Faculty of Sciences and Mathematics, University of Zagreb, Prof. Dr. Zdravko Galić from galaGIS Ltd., Snježana Haiman, BSc from the Croatian School Cartography, Prof. Dr. Stjepan Husnjak from the Soil Science Department at the Faculty of Agriculture, University of Zagreb, Marija Jandriš Sačer, BSc from the Ministry of Defence of the Republic of Croatia, Dr. Ivka Kljajić, from the Faculty of Geodesy, University of Zagreb, Ivan Landek, BSc from the State Geodetic Administration, Slavko Lemarić, BSc from the Croatian Geodetic Institute, Sandra Lovrić Lončarić, BSc from Gisdata Ltd., Mira Miletić-Dred, MSc, from the National and University Library in Zagreb, Robert Paj, BSc from the Company for Photogrammetry, Zagreb, Branka Poljak from VA-COPY multimedia, Vesna Poslončec Petrić, MSc from Faculty of Geodesy, University of Zagreb, Blaženka Preradović, BSc from Croatian Air Navigation Services Ltd., Ivana Racetin, MSc from Geodetic Company Split, Ivan Remeta, BSc from the Company for Photogrammetry, Zagreb, Željka Richter Novosel, BSc from Lexicographic Institute “Miroslav Krleža”, Dražen Tutić, MSc from Faculty of Geodesy, University of Zagreb, Igor Vilus, BSc from the State Geodetic Administration, Prof. Dr. Nada Vučetić from Faculty of Geodesy, University of Zagreb, Željko Železnjak from the Ministry of Defence of the Republic of Croatia.

The author would like to thank the State Geodetic Administration for financial support by means of which the work on this report has been successfully finished.
7. References


Cvetnić, V. (2003): Prof. Dr. Drago Novak, On the occasion of his 70th birthday / Prof. dr. med. Drago Novak, U povodu 70. rođendana, Kartografija i Geoinformacije 2, 198-205.


Frangeš, S., Frančula, N. (2003a): Location of the higher education institutions and other institutions of the University of Zagreb – 2003, Sveučilište u Zagrebu.
Vodič za buduće studente, akademska godina 2003./04., Sveučilište u Zagrebu.
Vodič za buduće studente, akademska godina 2004./05., Sveučilište u Zagrebu.


Frangeš, S., Lapaine, M., Frančula, N. (2003a): A Promotion of Masters of Sciences at the Faculty of Geodesy, University of Zagreb; Promocija magistrica i magistara znanosti na Geodetskem fakultetu Sveučilišta u Zagrebu, Kartografija i geoinformacije, 2, 128-131.


Frangeš, S., Rizvić, T., Đumić, Ž. (2005a): Kamp Slatina u mjerilu 1:600, Geo-Teo i LaPer, Cres.

Frangeš, S., Rizvić, T., Đumić, Ž. (2005b): Luka Cres u mjerilu 1:210, Županijska lučka uprava Cres, Geo-Teo i LaPer, Cres.

Frangeš, S., Rizvić, T., Đumić, Ž. (2005c): Luka Martinšćica u mjerilu 1:210, Županijska lučka uprava Cres, Geo-Teo i LaPer, Cres.

Frangeš, S., Rizvić, T., Đumić, Ž. (2005d): Trajektno pristanište Porozina u mjerilu 1:210, Županijska lučka uprava Cres, Geo-Teo i LaPer, Cres.

Frangeš, S., Rizvić, T., Đumić, Ž. (2005e): Trajektno pristanište Merag u mjerilu 1:210, Županijska lučka uprava Cres, Geo-Teo i LaPer, Cres.


Galić, Z. (2004): Very Large DataBases, Kartografija i Geoinformacije 3, 146-149.


Geoinformatička obrada podataka za bonitiranje zemljišta kulture vinograda na području općine Lepoglava, Kartografija i Geoinformacije 3, 52-59.


Kljačić, I. (2005): Historical Cartography – Cartographic Sources in Historical Sciences / Povijesna kartografija – Kartografski izvori u povijesnim znanostima, Kartografija i Geoinformacije 4, 135-137.


Klajić, I., Lapaine, M. (2007): Dragutin Gorjanović Kramberger, 150 Years After his Birth, 70 Years After his Death / Dragutin Gorjanović Kramberger, 150 godina od njegova rođenja, 70 godina od smrti, Kartografija i Geoinformacije 7, 128-129.


Kozlič, M., Faričić, J. (2004): The Significance of Sv. Andrija Island on a Sailing Route across the Adriatic Presented on Old Geographical Maps, Geoadria. 9, 1; 33-49.


Lapaine, M. (2005m, pripremio): Tomislav Ciceli, MSc in Technical Sciences / Tomislav Ciceli, magistar tehničkih znanosti, Kartografija i Geoinformacije 4, 118-121.


1:250 000, uključujući nomenklaturu i izradu preglednih karata, Državna geodetska uprava, Geodetski fakultet Sveučilišta u Zagrebu, Zagreb, 64 str.


MORH (2007): Godišnje izvješće o spremnosti obrambenog sustava, provođenju kadrovske politike i ukupnom stanju u oružanim snagama Republike Hrvatske s izvješćem o stanju obrambenih priprema u Republici Hrvatskoj, Zagreb - http://www.morh.hr/katalog/documents/Godi%9anje%20izvje%9a%e6%20za%202006.pdf


