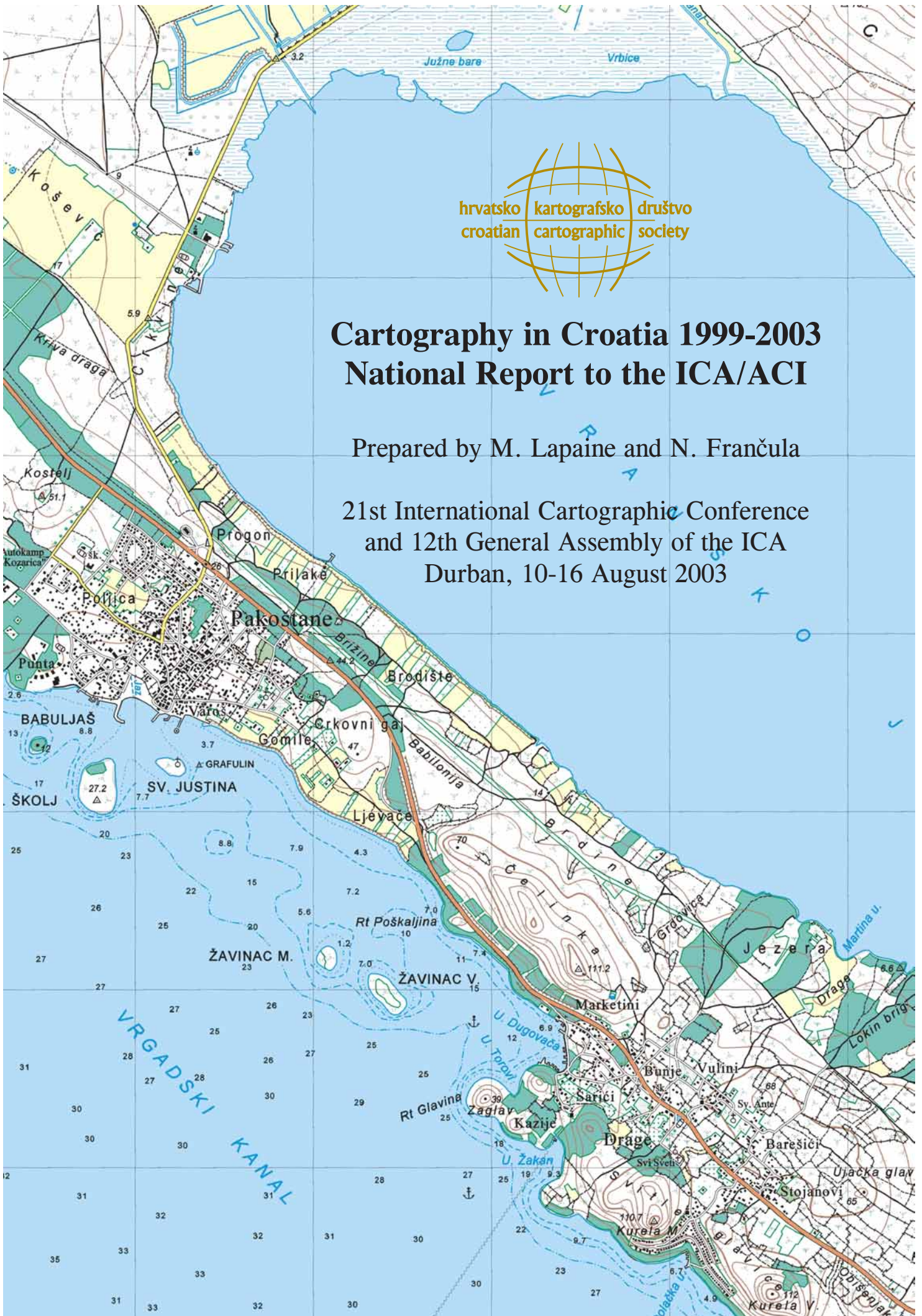




Cartography in Croatia 1999-2003 National Report to the ICA/ACI

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Cartography in Croatia 1999–2003

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1 Introduction

Croatia became a member of the International Cartographic Association (ICA) at its 10th General Assembly held in Barcelona in 1995. On this occasion, a national report was submitted with the data about the maps that Croatia had at its disposal, with cartographic institutions and their activities during the period 1991–95. The report was published in Croatian and English (Frančula et al., 1996a,b).

For the 11th General Assembly of the ICA held in Ottawa in 1999, a new national report was compiled, encompassing the period of Croatian cartography after the conference in Barcelona, i.e. from 1995 till the summer in 1999 (Frančula, Lapaine, 1999a).

This national report was prepared for the 12th ICA General Assembly and the 21st International Cartographic Conference in Durban in 2003, and it will be available in Croatian and English at the Internet site <http://www.kartografija.hr>.

The authors are 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 our special acknowledgement at the end of the report, we find this report giving a very good picture of the development of cartography in Croatia during the period 1999–2003.

2 Official Cartography

2.1 State Geodetic Administration

State Geodetic Administration (SGA) is a state organization dealing with administrative and professional work in the field of geodesy, cartography, cadastre and photogrammetry and taking care of computerisation of cadastre and geodetic spatial system, state official cartography (1:5000, 1:25 000, 1:50 000, 1:100 000, 1:200 000), geodetic documentation, statistical data on real estate cadastre, spatial units and lines, geodetic and cadastral works relating to the state border.

State survey, real estate cadastre, register of spatial units, line cadastre, geodetic works for special purposes, competence and performance of state survey and real estate cadastre work, as well as the constitution of SGA, are regulated under the Law on State Survey and Real Estate Cadastre.

The work relating to state survey and real estate cadastre is carried out on the basis of one year programs or several years programs. The programs define the area where fundamental geodetic works,

topographic surveys and the production of official maps, survey and marking of state boundaries will be carried out, and also the establishment of real estate cadastre and financial sources for program implementation. Several-years long programs are passed by the Croatian National Parliament and annual programs by the Government of the Republic of Croatia.

SGA is working in the Central Office in Zagreb and in its branch offices. As an exception, the administrative and professional jobs in the area of the City of Zagreb classified by law as belonging to the scope of branch office are carried out by the Office of the City of Zagreb.

The following constitutional units are responsible for the activities of the SGA Central Office in Zagreb:

1. Director Office
2. Department for Legal and Accountancy Jobs and Information System
3. Department for Topographic Survey and State Maps
4. Department for Cadastral System
5. Department for State Survey

Departments are run by assistant directors and are divided into units run by appointed heads. The *Department for Topographic Survey and State Maps* consists of two parts: *Unit for Photogrammetry and Remote Sensing* and *Unit for Cartography* (Krpeljević, 2001, 2002).

SGA initiated and completed the production of photoplans (format 30×50 cm) at the scale of 1:100 000 needed in the Unit for State Borders for the border area with the Republic Bosnia and Herzegovina at the beginning of the year 2000. The photoplans were produced for the border area at the distance of 100 km, from Bihać to Kamensko (near Imotski) for the purpose of identifying the state area since there was no Croatian Base Map at the scale of 1:5000 produced for this part of Croatia.

Upon the decision of the director of the SGA the Commission for Production of Books of Ordinances on Topographic Survey and State Map Production Manner was constituted on 8 December 1999. The Book of Ordinances was finished in the given period and published in Narodne novine No. 64/2001.

A cartographic key for the mapping of Croatian Base Map at the scale 1:5000 (HOK) and of topographic map at the scale 1:25 000 (TK 25) were also produced (DGU, 2001).

Work on the creation of digital TK 25 was continued. 62 sheets out of total 594 were produced (Landek, 2003a).

The works have been agreed upon on the production of (DOF) for the area of Zadar (30 sheets), the area of Koprivnica (16 sheets), and the reconstruction of DOF for the area of Zagreb (55 sheets, production of digital orthophoto plans).

Cyclical aerial photography of the Republic of Croatia at the scale of 1:20 000 has been continued, so during the period 1999–2000 about 40% of the territory of Croatia was photographed, and the cycle of aerial photography was finished with that action, i.e. the entire territory of Croatia was photographed for the first time (beginning was in 1966). During the period 2001–2003 the cyclical surveying at the same scale of 1:20 000 was continued, so most of the territory of Croatia was surveyed for the second time.

The production of the digital terrain model DMR 5/0 was continued. All topographic maps at the scale 1:25 000 and 1:100 000 were transformed from the PDF format into TIF.

The SGA published its first publication in 2001, the translation of the book *Elements of Spatial Data Quality*. The editors are S. C. Guptill and J. L. Morrison, and the book was translated by D. Tutić and M. Lapaine (Lapaine, 2001).

At the end of 2001, SGA published the *Catalogue of Products* (Landek, 2001a) with the technical description and prices of the following products stated: aerial photographs, digital orthophoto map, Croatian Base Map, digital terrain model, topographic maps at the scales 1:25 000, 1:100 000, 1:200 000, cadastral plans at the scales 1:1000, 1:2000, 1:2880, and 1:2904, cadastral plans in digital form and the data from the graphic register base of spatial units. A second edition of the *Catalog* was published at the beginning of 2003 (Landek, 2003a).

In 2000, a scientific-professional project *New Map Graphics of Official Maps Published by the State Geodetic Administration* was finished (Frangeš, 2001). In 2001, several scientific-professional projects from the field of cartography were made for the SGA: *The Evaluation of the Accuracy of DMR 5.0* (Pleško, Biljecki 2003), *The Creation of Cartographic Data Model* (Biljecki et al., 2003a), *The Establishment of Topographic and Cartographic Databases* (Biljecki et al., 2003b), *Graphical and Alphanumeric Code System of State Topographic Maps* (Paj, 2003), *Map Generalization with the Standardization for State Maps* (Paj et al., 2003), *Labels and Names of State Topographic Map Sheets and Their Division* (Frangeš, 2003a), *Toponymes – Names, Phase I* (Frangeš, 2003b), *The Printing of State Maps* (Frangeš, 2003c). One can find out more about aforementioned and all other scientific-professional projects financed by the SGA in published reports (Landek, 2001b, 2003b).

The recommendation for the new official Croatian map projection was finished (Lapaine, 2000), and the project *The Creation of the Documentation Essential to the Adoption of the Recommendation of Official Croatian Map Projections* is in progress.

The CROTIS Topographic Data Model and *The Labels and Names of State Topographic Map Sheets and Their Division* were made available for official use at the beginning of 2002.

More details about the activity of the State Geodetic Administration can be found at the Internet address <http://www.dgu.tel.hr/dgu>

2.2 Croatian Geodetic Institute

Croatian Geodetic Institute (CGI) is a state non-profit institution founded for the purpose of performing works of state survey and real estate cadastre being of interest for the Republic of Croatia. The activity of the Institute is financed from the state budgeted funds. CGI consists of four departments:

1. Department for legal, bookkeeping and financial affairs,
2. Department for fundamental geodetic works,
3. Department for topographic survey and surveillance,
4. Department for geoinformation systems and databases.

CGI was founded on the basis of the Law of State Survey and Real Estate Cadastre as a state institution with public work that should carry out the following works within the frame of its regular activities:

- run fundamental geodetic works
- establish topographic, cartographic and cadastral databases
- run topographic survey
- run the survey and designation of state borders
- run developing and researching projects
- work on the standardization of geodetic works and procedures
- conceptualize and run the evidence of geographic names.

The bearer of the above-stated activities (apart from the last one) is the State Geodetic Administration (SGA). Since its formal and legal foundation (February 2001), CGI has been working on the following activities in the field of cartography on the basis of annual plans (for 2002 and 2003) pursuant to the working plans and programs of the SGA and in accordance with the authorities resulting from the Law:

1. Checking of the sheets of the topographic map at the scale of 1:25 000 (TK25) that is produced within the frame of office and field works.
2. Checking of digital orthophoto plans at the scale of 1:5000 (DOF) that is done within the frame of office works.
3. Checking of the feasibility study of photo-signalling of orientation points for cyclical aerial photographs of the parts of the state territory.
4. Quality improvement of the cartographic standards in the form of making a proposal for the improvement of the existing standards.
5. Participating in the Croatian-Norwegian Geoinformation Project (CRONO-GIP) within the component b– establishment of digital base of topographic data and the component c– establishment of the capacity for quality control of topographic data.
6. Establishment of Internet databases for the purpose of high quality performance of works stated under items 1 and 2. So far, the following items have been installed: base of trigonometric points, base of the division into the sheets of topographic maps, the base of georeferenced sheets of the TK 25 and the registry base of spatial units.
7. Preparation for establishing the toponym records.

More details about the activities of the Croatian Geodetic Institute can be found at the Internet address <http://www.hinet.hr/hgi>

2.3 City Institute for Cadastre and Geodetic Work, Zagreb

The city of Zagreb has noticed the value of geodetic and cadastral data through its dynamic development, and especially for the purposes of optimal economic development of the city, and in 1991 it supported the initiative of the City Institute for Cadastre and Geodetic Jobs on its continuous work on establishing modern geodetic and cadastral information system base on book and graphic data of cadastral registers.

The project *Digital Cadastre Model of the City of Zagreb* has been initiated and resulted with the establishment of digital database of graphic cadastre part in its first realization phase that was based upon the data of cadastral plans at the scale of 1:1000 (1337 sheets), 1:2000 (62 sheets) and 1:2500 (14 sheets for land consolidated area) made in Gauss-Krüger co-ordinate system.

Since new cadastral surveys did not include the entire area of the City of Zagreb, there are still

plans at the scale of 1:2880, altogether 263 sheets used on approximately 37% of the entire area with 118 057 cadastral plots that were obtained by the first cadastral survey (graphic survey) during the period 1853–1913. In order to transform all analogous data from the existing cadastral records into digital form it was also necessary to include “old” plans at the scale of 1:2880 into the Project.

The realization of the project *GPS Network of the City of Zagreb* has created the preconditions for the establishment of geodetic cadastral information system on the entire territory of the City of Zagreb within a unique co-ordinate system.

The work on similar projects connected with creating digital databases yielded the experience in the field of informatics in the sense of using various GIS tools, and also by analysing the existing geodetic cadastral registers in the sense of their creation, applied geodetic methods, contents, accuracy and the quality of the media they are kept by. All this is applied in the process of implementing the project *Transformation of analogous cadastral plans at the scale of 1:2880 into digital form*.

Technical solutions have been chosen in accordance with the present level of technology and the quality of data to be processed, and thus, photogrammetric method has been chosen as the basic one along with necessary terrestrial measurements.

In order to improve the quality of data, to make them homogeneous and transform the plan contents of the “old” graphic surveys into a new co-ordinate system, a sufficient number of points and plot boundaries – geometric elements of the plan, have been taken as the basis. The experiences have shown that the optimal number of common (identical) points of a cadastral plan and real space would be 15 for each sheet of the cadastral plan at the scale of 1:1000.

The production of digital orthophoto of 20 cm resolution and its georeferencing into the same system has made possible the choice of a sufficient number of identical points and elements of “local” transformation by which the errors of cadastral plans of systematic and non-systematic character will be reduced in the most optimal way.

The existing old survey cadastral plans at the scale of 1:2880 have been transformed into a unique paper medium by means of copying procedure, then scanned and transformed into the Gauss-Krüger co-ordinate system in accordance with the known transformation parameters. The plans have been transformed into digital form by vectorisation and as such they are the basis on which their improvement will be carried out using the above stated methods, as well as the most optimal connection with the old space.

The realization of the project *Transformation of analogous cadastral plans at the scale of 1:2880 into digital form*, apart from forming cadastral digital graphic databases, represents and opens new possibilities for the reconstruction of old survey maps.

It is to be expected that proprietary relationships will be much more successfully resolved on thus reconstructed cartographic presentations through the connections of the old state with records.

2.4 Geodetic and Cartographic Service of the Ministry of Defence of the Republic of Croatia

The Ministry of Defence of the Republic of Croatia (MORH) has continued the procedure of modernising military maps of earlier editions for the purpose of raising their usable value by additional printing of UTM projection network according to the WGS 84 data, and by the new lettering in Croatian and English.

MORH has started to update the existing navigation manual by publishing a new digital version every three months, and by publishing the analogous form every month.

MORH produced a new air navigation map at the scale of 1:500 000 in the Lambert conformal conical projection in analogous and digital form.

There are 18 sheets of the map at the scale of 1:25 000 being compiled, and the compilation of four sheets at the scale of 1:50 000 started in UTM projection according to WGS 84 data in analogous and digital form.

The production of the four sheets of the map JOG/A (Joint Operations Graphic/Air) at the scale of 1:250 000 is in the initial phase.

The production of the first edition of the Catalogue of trigonometric points in digital form is at the end.

The improvement of Croatian Army GIS has been continued by producing new military thematic databases.

2.5 Hydrographic Institute of the Republic of Croatia

The Hydrographic Institute of the Republic of Croatia deals with scientific research, development and professional works connected with the safety of navigation in the Adriatic Sea, with hydrography and geodetic survey of the Adriatic, maritime geodesy, the design and the production of sea navigation and other maps and nautical publications and tools, ocean research, the research of subma-

rine geology, development of information system, and with publication and printing works.

During the period 1999–2003 the following projects were completed at the Hydrographic Institute in Split:

1. Peljar – eastern coast of the Adriatic Sea
2. Plan 14, Harbour of Plomin at the scale of 1:7500
3. Map 401, the Adriatic Sea, northern and central part, and map 402 the Adriatic Sea, central and southern part at the scale of 1:400 000
4. Plan 16, Podurinj at the scale of 1:3000
5. Map 102, the Ionian Sea at the scale of 1:850 000
6. Plan 83 Dubrovnik at the scale of 1:10 000
7. Two versions of the Sea Navigation Maps Catalogue and navigation publications
8. Living Archipelago in Croatia, part I, II and III.
9. INT 301, 302 at the scale of 1:2 250 000
10. Plan 47, Split – The Bay of Kaštela at the scale of 1:15 000
11. Pilot for small ships
12. Signs and abbreviations in Croatian on sea navigation charts
13. Split – the Centre of the Adriatic Hydrography and Maritime Cartography, exhibition with catalogue
14. Kozličić, M.: Panoramas of Dalmatia by Giuseppe Rieger
15. Pilot for small ships, the second part.

Additional projects that were initiated, but have not been completed due to the extent of works are as follows: transformation of the existing maps and publications into digital form, the works on the maps and publications made for the Ministry of Defence, and the works on raster and vector electronic navigation maps.

The head of the Cartographic Department at the Hydrographic Institute, Tea Duplančić Leder, MSc is a member of the Commission on Marine Cartography of the ICA.

More data on the activities of the Hydrographic Institute of the Republic of Croatia can be found at the Internet address <http://www.dhi.tel.hr>

2.6 Geological Research Institute

The Geological Research Institute in Zagreb was founded in 1909 titled *Geologijsko povjerenstvo za Kraljevine Hrvatsku i Slavoniju (Geologic Commission for the Kingdoms of Croatia and Slavonia)*. Today, the Institute has 120 scientists, engineers

and technical staff, and it is constituted in three institutes: Institute for Geology and Palaeontology, Institute for Hydrogeology and Engineering Geology, and the Institute for Mineral Raw Material.

The first geological maps of Croatian areas existed as early as the beginning of the 19th century. In 1958, work started on the production of the Base Geological Map at the scale of 1:100 000 with unique technology used and having quality and processing level for the entire territory of the Republic of Croatia. At the moment this map is the base for the projects being worked on.

Cartographic activities of the Geological Research Institute in the period 1999–2001 are as follows:

1. *Base Geological Map of the Republic of Croatia* at the scale of 1:50 000 – the map Dugi otok is finished. Cres, Hvar and Brač are in the process of production. At the scale of 1:100 000, the following sheets have been made by means of vectorization and by adding adequate lithostratigraphic data: Čakovec, Novo Mesto, Daruvar, Orahovica, Našice, Sisak, Kostajnica, Gradiška, Nova Kapela, SlavonSKI Brod, Vinkovci, Vukovar (Bačka Palanka before), Brčko, Bjeljina, Crikvenica, Delnice, Črnomelj, Rab, Otočac, Gospić, Bihać, Udbina, Obrovac, Knin, Drniš, Imotski and Metković. So far, 59 out of 72 sheets covering the territory of the Republic of Croatia have been completed.
2. *Base Hydrogeological Map of the Republic of Croatia* at the scale of 1:100 000, the following maps are completed: Sisak, Crikvenica, Delnice, Rab, Otočac, Gospić, Bihać and Udbina. The sheet Mostar has been made at the scale of 1:200 000.
3. *Base Engineering Geological Map of the Republic of Croatia* at the scale of 1:100 000, the following maps were completed: Ivanić Grad, Varaždin, Trieste, Rovinj, Ilirska Bistrica (Rijeka), Pula, Labin, Cres and Crikvenica.
4. *The Map of Mineral Raw Material and Forecast Map of the Republic of Croatia* at the scale of 1:100 000/1:200 000, the following maps were completed (30'×30'): Požega, Šibenik, Gračac, Varaždin, Pula, Cres, Drvar, Split and Ptuj.
5. *Geochemical Map of the Republic of Croatia* at the scale of 1:100 000, the production of the Geochemical Atlas of the Republic of Croatia is carried out within the scope of the project *Base Geochemical Map of the Republic of Croatia*. The working versions of geochemical atlases for the Western and North-Western Croatia were completed, as well as for the central and southern Dalmatia.

Geothermal Map of the Republic of Croatia at the scale of 1:100 000 and *Structural-geomorphological Map of the Republic of Croatia* at the same scale are also being worked on.

Along with the base maps, many other treatises and projects are finished in the Institute resulting in map presentations with digital data storage. Thus, the projects have been completed for tunnels and highways (Beograd–Zagreb, Dubrovnik, Adriatic Highway (JAC), meander of Plitvice Lakes, Slunj etc.) at the scales of 1:1000 and 1:5000 (1997–2001), Hydrological and Engineering and Geological Documentation for GUP of the City of Rijeka, Engineering and Geological Documentation for the Spatial Plan of the County of Zagreb. There was also GIS Jadro and Žrnovnica made with the belonging cartography, the hydrogeological map of the island Vis at the scale of 1:25 000, and GIS of the upper flow of the river Kupa with printed maps at the scale of 1:50 000.

More data on the activities of the Geological Research Institute can be found at the Internet address <http://www.igi.hr>

2.7 Croatian State Archives, Zagreb

Croatian State Archives (CSA) is a central registry state archives. CSA keeps, protects, professional processes and allows using of archive and registry material of state bodies, state and public institutions and legal persons, families and individuals whose activity is spreading, or was spreading all over the territory of the Republic of Croatia, i.e. which is of significance for the entire Republic of Croatia. Trying to make the memory of the Croatian people as much available for the entire public as possible, CSA provides the usage of the material to all researchers under equal terms.

The cadastral material was made in the period between 1847 and 1963 constituting the fund of the State Geodetic Administration within the frame of the Department for the Material of the State Geodetic Administration. The fund has been processed and it is available to all users. The inventory of the fund has been printed (Slukan-Altić, 2000).

The information database of the CSA *Map Collection* has been made with the data for about 5000 cartographic units in the program Microsoft Access. The base encompasses all cartographic units of the Map Collection in the period from the 15th to 20th centuries. All maps have been processed in accordance with the international standard ISBD(CM), International Standard Bibliographic Description for Cartographic Materials.

CSA regularly performs protective recording of cartographic material. In this respect, one starts with the digitising of old cadastral plans of the first

survey and the revision. The cartographic material for about 100 cadastral municipalities has been digitised.

CSA systematically gathers and records the cartographic material that is referring to the Croatian lands and is located outside of Croatia. The cadastral material of Istria that is kept in the State Archives of Trieste (Archivio di Stato) started to be recorded for 60 cadastral municipalities in 1998. The maps have been stored on CD, and the written material was recorded on microfilms.

The project financed by the Ministry of Science and Technology *The First Systematic Cadastral Survey and its Value as Croatian Historical Source* is going on at CSD with the leadership of M. Slukan-Altić. It is a part of the main project *Sources for Croatian History* with J. Kolanović as its head.

The project *Historical Town Atlas* is one of the projects of the Ministry of Science and Technology of the Republic of Croatia realized by the Institute for Archive Administration, Auxiliary Historical Sciences and Filmology at the CSA. The Project is run by the head of the Institute, M. Slukan-Altić. It deals with capturing, scientific processing and publishing of cartographic sources for the history of Croatian towns. It is based on archival material kept in archive and museum institutions the publishing and interpretation of which would advance so far acquired knowledge of the spatial development of Croatian towns and make the scientists and professional public pay more attention to the cartographic sources as the sources of Croatian history. The Historical Town Atlas is conceived as a collections of plans and maps of Croatian towns with each volume dedicated to one town, and it will consist, as every other atlas, of cartographic and textual parts. In this way, all cartographic sources relevant for the history of a town could be found on one place. The analysis and interpretation of the stated cartographic sources in the textual part will bring new light onto the spatial development of Croatian towns, as well as the comprehension of the development of Croatian towns in European context. The towns have been selected by the principle of “case study”. The characteristic historical and geographic models of towns have been selected with the emphasis on those among them that have been less adequately researched in cartographic and Eco-historical sense. The first period of research includes the processing of the following towns: Bjelovar, Sisak, Varaždin, Karlovac and Zagreb. Each volume will present the development of a selected town in historical, urban, economic, demographic, political and cultural context applying thereby an interdisciplinary approach. The project is realized in collaboration with other state archives and museum institutions in Croatia.

On the occasion of the 300 anniversary of the Karlovac Piece, the Institute for Croatian History at the Department for History, Faculty of Philosophy in Zagreb organized a scientific colloquium and occasional exhibition *Cartographic Sources for the History of Triplex Confinium* together with the Croatian State Archives in Zagreb. It is of special importance that there was a publication with the same name published containing the study by the author and the exhibition catalogue in Croatian, English and German (Slukan-Altić, 1999b).

The Head of the CSA Map Collection, M. Slukan-Altić is a member of the ICA Commission on the History of Cartography.

More data on the activities of the Croatian State Archives can be found at the Internet address <http://www.arhiv.hr>

2.8 National and University Library, Zagreb

The Collection of Geographic Maps and Atlases was founded in 1945 in Zagreb as a separate division of the National and University Library (NSK) in Zagreb by selecting the cartographic material from the stock of Library, through donations and inheritance of prominent individuals and numerous institutions.

The stock of the Collection has all types of maps – general, thematic, topographic at all scales, sea navigation charts, astronomic, old geographic and manuscript maps, plans and all types of atlases. The Collection systematically produces and equally fills up its stock in all geographic fields. The largest part of the stock refers to the area of Central, Southern and South-Eastern Europe with the majority of maps presenting Croatia. There are manuals and reference material from the field of cartography and specialized librarianship in the reading room of the Library. Within the scope of the stock, there are about 33 000 sheets of geographic maps, about 900 volumes of atlases, about 1000 sheets of old maps and about one hundred atlases of special value (made in 16th, 17th and 18th centuries) and about 500 manuscript maps.

The users of the Library can take a look at the catalogues made for the entire stock of the Collection, and these are: professional (regional), local and alphabetical catalogues. The cartographic material has been processed since 1991 by means of computers and it is available online, locally (OPAC) and through Internet WebPAC.

In 1999 the Collection got the Topographic Map of Croatia at the scale of 1:25 000, in two bound volumes, as a gift. In 2001, the material belonging to old and valuable cartographic items (five

maps from the 16th century, two maps from the 17th century and one manuscript map from the 19th century) was selected and prepared within the frame of the pilot project of digitising the material of NSK. The following maps have been digitised: *Histria tabula* / Pietro Coppo, 1575. From the atlas: *Theatrum orbis terrarum*, A. Ortelius; *Zarae et Sebenici descriptio* / Natale Bonifacio, about 1575. From the atlas: *Theatrum orbis terrarum*, A. Ortelius; *Sclavonia, Croatiae, Carniae, Iстриae, Bosniae finitimarumque regionum nova descriptio* / Augustino Hirsvogelio, 1573. From *Theatrum orbis terrarum*, A. Ortelius; *Descrittione dell'Istria* / Tomaso Porcacchi, about 1590. From: *L'isole piu famose del Mondo* (1600), T. Porcacchi; *Sclavonia oder Windisch Mark (Bossen) Crabatzen* / Sebastian Münster, about 1550. From: *Geography*, Ptolemy, ed. S. Münster; *Sclavonia, Croatia, Bosnia cum Dalmatiae parte* / Gerard Mercator, about 1630. From: *Atlas novus I. Iansonnius*; *Statt Ragusa ... Catara* / A. Merian, 1665. From: *Theatrum Europeum* vol. 10, A. Merian; *Situs particularis Comitatus Sebeniciani ...* / Merian, Teodoro de Bry, M. Zeiller, about 1650. From: *Theatrum Europeum* vol. 10, A. Merian; *Ideal Plan der Zenger, Modruser, ...* / M. Zergollern, 1814.

During the years 2002 and 2003, the material bibliographically processed in online catalogue of NSK was digitised, and it will soon be available on the web pages of the Library as well.

Some very rare and very valuable copper plate maps by W. Lazius have been provided: *Ducatus Carnioliae et Histriae ...*, 1563, as well as four very valuable copper plate maps of the territory of Croatia: *Plan des Environs De Ragusa*, 1809, *Nova Disegno Della Dalmatia et Croatia/F. Bertelli*, 1566, *La nueva e fidele discriptione di tutto il Contado di Zara et Sebenico/P. Forlani*, 1570, *Corso del Fiume Narenta Dalla Citta di ciclut/V.M. Coronelli*, 1699.

More details about the Collection of geographic maps and atlases of the National and University Library in Zagreb can be found at the Internet address: http://www.nsk.hr/usluge/-citaonice_i_zbirke.html

2.9 Croatian Institute for History

The research of historical geography at the Croatian Institute for History is encompassed by the project *Description of the lands of the Kingdom of Croatia on Military Maps from the 18th and the 19th centuries*. Until the year 2002, this topic had been researched within the frame of the project *Military Border-Land – material and studies*, and it is considered an independent project from that year on. The head of the project is M. Valentić, the collaborators on the project are I. Horbec and I. Jukić.

The basic research guidelines of this project are oriented towards gathering and publishing the archive material connected with the description and map presentations of Croatia in the 18th and 19th centuries. The focus is thereby oriented towards the research activities of state institutions in mapping and describing these areas for military purposes, especially the activities of the General Headquarters and later on, Military and Geographic Institute in Vienna (Militärgeographisches Institut). The larger part of the research is therefore carried out in the War Archives in Vienna which has the map collections with a great variety of descriptions, maps, plans and sketches of the area of Croatia.

In 1999, the Croatian Institute for History started publishing *Croatia on Secret Maps in 18th and 19th Centuries* series of books. The sections of Joseph II Land Survey in Austro-Hungarian Monarchy done for territory of Civil Croatia and Slavonia, and of Military Frontier are published in the series with all accompanying descriptions kept in the Map Collection in the War Archives in Vienna. The survey was conducted by the Headquarters of Directorship from 1763 till 1787 whereby the territory of Croatia was mapped according to the following schedule: *Banska Military Frontier 1774–1775*, *Generalat of Karlovac 1775–1777*, *Generalat of Slavonija 1780–1781*, *Generalat of Varaždin 1781–1782*, *Civil Slavonia 1781–1783*, and *Civil Croatia 1783–1784*. Individual books of the series deal with one administrative area (regiment or county), and it encompasses the reproduction of survey sections of this area at the scale of 1:28 800, modern topographic map of the entire area at the scale of 1:192 000 and the description accompanying individual sections – in transliteration from German Gothic characters and in Croatian translation. The description is enriched with the papers by M. Slukan-Altić from the Croatian State Archives, R. Rill, the head of the Map Collection in the War Archives in Vienna, A. Buczynski, M. Kruhek and M. Valentić. The book is furnished with toponymes from individual sections and with the glossary of toponymes from the descriptions.

The following volumes of this series have been published so far:

- Vol. 1.: *Gradiška Regiment* (Zagreb, 1999, prepared by A. Buczynski, M. Kruhek and M. Valentić)
- Vol. 2.: *Brod Regiment* (Zagreb, 1999, prepared by A. Buczynski, M. Kruhek and M. Valentić)
- Vol. 3.: *Petrovaradin Regiment* (Zagreb, 2000, prepared by A. Buczynski, M. Kruhek and M. Valentić)
- Vol. 4.: *Srijem County* (Zagreb, 2001, prepared by I. Horbec)
- Vol. 5.: *Virovitica County* (Zagreb, 2002, prepared by I. Horbec, I. Jukić)

Vol. 6.: Požega County (Zagreb, 2002, prepared by I. Horbec, I. Jukić)

Vol. 7. Križevac Regiment and Vol. 8. Đurđevac Regiment are in preparation.

Since the Joseph II Land Survey did not include the areas of Istria and Dalmatia that were the parts of Venice at that time, this area will be covered in this series with the sections of Francis Land Survey of Habsburg Monarchy that was carried out by the Headquarters of directorship and by the Military and Geographic Institute in Vienna. Within the scope of this survey, the area of Istria was mapped during the period 1825–1835, and the area of Dalmatia from 1851 to 1854. The sections of this survey are also kept in the Map Collection of the War Archive in Vienna.

The whole project *Croatia on Secret Maps in 18th and 19th Centuries* will encompass more than 20 volumes of encyclopaedia format. The realization of the project is planned for the next five years, and the time of realization depends very much on the financial possibilities.

More data about the activities of the Croatian Institute for History can be found at the Internet address <http://misp.isp.hr>

3 Academic Cartography

3.1 Institute for Cartography at the Faculty of Geodesy, University of Zagreb

The Institute for Cartography is one of five institutes at the Faculty of Geodesy, University of Zagreb. According to the new Curricula from 1994, the students can choose *Photogrammetry and Cartography* in the seventh and eighth semester as one of the three subject-oriented courses after finishing the first six common semesters. All students attend the subjects *Geodetic Drawing* (0+2) in the first semester, and in the fifth semester they all attend the courses on *General Cartography* (2+2).

Within the scope of the subject-oriented courses *Photogrammetry and Cartography* in the seventh semester, *Digital Cartography* (2+2) is an obligatory subject, and in the eight semester (2+2) *Map Visualisation* is obligatory. In this program the students can also choose other cartographic subjects: *Geoinformation Systems, Multimedia Cartography, Cartography and GIS, Map Generalisation, Topographic Cartography, Thematic Cartography, Transformations in Cartography, Map Reproduction* and two seminars in *Cartography and GIS*, and *Practical Cartography*.

During the period 1999–2003, the teachers of the Institute for Cartography made lecture notes for the subjects *Digital Cartography* (Frančula, 2001), *Map Projections* (Frančula 2000a), *Map Generalisation* (Frančula, 2000b) as well as the manuals *Cartography and AutoCAD Map* (Lapaine et al. 1999, 2001), and *Introduction to GIS* (Tutić et al. 2002).

The postgraduate scientific studies of geodesy at the Faculty of Geodesy, University of Zagreb are the studies for acquiring the academic title of master of science, or the academic title of doctor of science in geodesy.

The postgraduate studies consist of optional and facultative subjects. The optional subjects are divided into two groups: general subjects and subject oriented courses. The group of general subjects is common to all subject-oriented programs. Students select one of the three subject-oriented programs on their own. Optional subjects in the program *Photogrammetry and Cartography* are: *Computer Graphics in Geodesy, Map Facsimiles, Official Topographic and Cartographic Information System of the Republic of Croatia, Geodetic Cartography, Cartographic Heritage, Remote Sensing, Automation in Photogrammetry, Modelling in GIS and Digital Terrain Modelling*.

During the period 1999–2003 five master theses in the field of cartography (Duplančić-Leder 2000, Kljajić 2001, Javorović 2001, Racetin 2002, Poslončec-Petrić 2002) and one doctoral thesis (Vučetić 2001) were defended at the Faculty of Geodesy, University of Zagreb.

In 1999 and 2000, seminars were organised for people coming from practice activities. The following seminars were held three times:

1. *Introduction into Digital Cartography and GIS*, intended for all who had no chance to get acquainted with these new areas of cartographic activity (15 lecture hours)
2. *Digital Cartography and AutoCAD Map* intended for experts who want to deepen their knowledge of digital cartography and learn the basics of AutoCAD Map (10 hours of lectures and 20 hours of exercises with computers).

Projects

Croatian Cartography – Scientific Bases

From 1996 till 2002 the cartographic research at the Institute for Cartography was carried out within the *Croatian Cartography – Scientific Bases* project, financed by the Ministry of Science and Technology of the Republic of Croatia. The head of the project was N. Frančula. The common goal of this scientific project was to improve the scientific

bases of the cartographic development in Croatia. It was therefore necessary to research the contribution of Croatian cartographers to the development of cartography in the world. The goal of the project was also to supplement the Croatian scientific terminology in the field of cartography and related sciences with modern terms and concepts. The goal was also to give contributions to the field of digital cartography: in research of local and global distortions, map generalization and map graphics.

The details about the project can be found at the Internet address <http://www.mzt.hr/projekti/9699/2/007001.htm>.

Cartography and New Technologies

The work on the project started in August 2002, and the project leader is M. Lapaine. The application of new technologies (geoinformation systems, geomatics, geomeia, Internet, multimedia, expert systems, artificial intelligence etc.) in Croatian cartography will be researched and developed further on. Cartographic presentations will be made adequately to up-to-date digital mapping procedures, modern communication and space visualization. The contributions to the research in the field of digital mapping are expected, especially in the fields of map graphics, map projections and transformations, and map generalization. Croatian cartographic heritage is very rich, but insufficiently known and insufficiently protected. Hence, the biographic and bibliographic material about Croatian cartographers will continue to be systematically gathered and processed. Special attention will be paid to modern Croatian scientific terminology in the field of cartography and related areas.

Projects for the SGA

The following projects were finished for the State Geodetic Administration during the period 1999–2003:

- *Croatian Cartographers* (Lapaine et al., 1995; Kljajić, 2001; Frančula et al., 2001)
- *Croatian Geodetic Terminology* (Frančula, Lapaine, 2003)
- *Proposal for the Official Map Projections of the Republic of Croatia* (Lapaine, 2000)
- *New Map Graphics of Official Maps Published by the State Geodetic Administration* (DGU 2001; Frangeš, 2001)
- *Labels and Names of State Topographic Map Sheets and Their Division* (Frangeš, 2003a)
- *Toponymes – Names, Phase I* (Frangeš, 2003b)
- *The Printing of State Maps* (Frangeš, 2003c).

Professional and social activity

The following was made: the tourist map of Croatia – Slovenia – Bosnia and Herzegovina (authors I. Birin and S. Štefanec), National Park Mljet, a new edition of the map (authors S. Frangeš, P. Lovrić and Z. Križovan), plans of the towns of Rovinj, Cres and Dubrovnik (authors S. Frangeš and R. Župan), facsimiles of old maps of Zadar and Split (editor S. Frangeš), general maps of national parks and nature parks (authors S. Frangeš, R. Župan, D. Tutić and M. Lapaine), a thematic map of the positions of faculties and other institutions 1999, 2000, 2001, 2002 and 2003 for the Guide of future students at the University of Zagreb (authors S. Frangeš and N. Frančula).

The *Croatian Cartographic Society* was founded in October 2001 with M. Lapaine being its president, and S. Frangeš one of the deputy presidents. The Croatian Cartographic Society publishes the *Cartography and Geoinformatics* journal. M. Lapaine is the chief editor. The first issue was published in 2002.

M. Lapaine is a member of ICA Commission on Spatial Data Standards and a member of the International Map Collector's Society (IMCoS). N. Frančula is a full member of the Croatian Academy of Engineering, and M. Lapaine has been its member collaborator and the Secretary General since 2003.

Geodetski list is the only geodetic journal in Croatia. It has been published as a quarterly continuously ever since 1947. However, geodetic bulletins appeared in this area much earlier. The first issue of *Glasillo geometara* was issued in Zagreb in 1919, and its chief editor was Vladimir Filkuka, professor at the Royal High Technical School of that time. The present *Geodetski list* is the bulletin of the Croatian Geodetic Society, and scientific and professional papers, terminology papers, book reviews and news are published in it. The papers published in *Geodetski list* are referred to in a few secondary publications and databases. A long-time chief editor of *Geodetski list* was N. Frančula, and now it is S. Frangeš, both of them from the Institute for Cartography.

More details about the Institute for Cartography at the Faculty of Geodesy, University of Zagreb can be found at the Internet address <http://www.geof.hr>

3.2 Geographic Department at the Faculty of Sciences, University of Zagreb

Geographic Department is one of seven departments that constitute the Faculty of Sciences.

Within the frame of three teaching programs at the Geographic Department *Cartography* is also lectured as one of the basic courses in the first year of studies. The program of the *Cartography* course is adapted to each single teaching direction where it is present under the same name but with various number of teaching hours: the direction for geography teacher (2+2, 2+2), for geology and geography teacher (2+1, 2+1) and for geography–history (2+1, 2+1).

The program of *Cartography* is conceived with the aim to get acquainted with the geographic map and enable the students to use geographic maps correctly in geography courses. Special attention is paid to topographic maps as tools that geographic scientific and research work cannot be imagined without. The role of topographic works in the preparation and execution of fieldwork is pointed out.

Lectures are accompanied by exercises (reading and interpreting of topographic maps, cartometric procedures, profile production, construction of usual projections etc.) as well as with field work (usage of topographic maps in the field work, comparison of geographic contents on the map and in the nature, orientation, standpoint determination, moving by azimuth etc.).

At the Geographic Department two more courses in the first year should be pointed out within the frame of the undergraduate studies that deal with cartographic topics mostly in the field of thematic mapping: Basic of Statistics with Geographic Graphic Methods (2+2, 2+2) and Geographic Information Systems (0+0, 0+2). Special efforts are invested in order to furnish computer classroom that would provide the extension of teaching the elements of GIS to all teaching programs, but also to the future professional studies.

The members of the Geographic Department have initiated the establishment of professional geographic program (engineer of geography) in which cartographic courses should be much more present, especially Thematic Mapping and GIS. Cartography is also lectured at the postgraduate studies within the Geographic department in the course *Thematic Presentations in Spatial Planning and Development*.

Apart from their teaching activities, the members of the Geographic Department are actively involved as editors and reviewers in various publishing cartographic projects, especially those connected with school cartography (school atlases and maps). Within the scope of their scientific activities, the members of the Geographic Department have participated at scientific gatherings at home and abroad (Fürst-Bjeliš, 1999, 2001b) and have published a number of scientific works especially in

the field of history of Croatian geography and history of cartography (Fürst-Bjeliš, 1999/2000, 2000; Fürst-Bjeliš, D'Alessio, Diklić, 2000) and the application of GIS in spatial analyses and production of thematic maps (Njegač, Toskić 1999; Toskić, 1999; Nejašmić, Toskić, 2000; Ilić, 2000; Orešić, 2000; Ilić, 2001). One of thematic maps (Njegač, Toskić 1999) was published on the cover page of well known geographic journal *GeoJournal*.

More data about the activity of the Geographic Department at the Faculty of Sciences, University of Zagreb can be found at the Internet address <http://www.pmf.hr>

3.3 Geological Department of the Faculty of Sciences at the University of Zagreb

Geological Department is one of seven departments at the Faculty of Sciences, University of Zagreb. At this Department, there are teaching activities in various courses carried out that contain cartographic material. These are e.g. Geological Mapping, Geological Maps, Sea Geology etc. The courses are held for the students attending the program for qualified engineers of geology and teachers of geology and geography. The graduates in these programs make their diploma theses with topographic maps serving for orientation in the field and as the basis for the production of various specialist geological maps. It should also be mentioned that the teachers of the Geological Department work as leaders or collaborators on various scientific topics. In almost all research connected with the mentioned scientific topics the fieldwork is necessary, and topographic maps at various scales are used as the basic documentation.

Since 1990, various fields of Croatian External (or Karst) Dinaric Alps have been researched within the scope of the project of the Ministry of Science and Technology of the Republic of Croatia. Although the purpose and the goal of the project is not geological mapping itself, it is an indispensable fundamental step in each geological research. Various topographic documents are used, mostly 1:25 000 or larger, if possible supplemented with photograms. Although many obtained data can serve as the basis for detailed lithostratigraphic (formation) mapping, they are presented as sketches of single selected areas with the emphasis on the character of geological contacts (faults, discordances, etc.), faeces (lateral vertical) changes and similar, and most often in the form of geological pillars that enable visual correlation.

Geological research within the frame of scientific projects 119303 and 0119401 financed by the Ministry of Science and Technology of the Repub-

lic of Croatia encompass geological mapping for the purpose of producing lithostratigraphic maps connected with detailed observation presented on a large number of detailed sedimentological pillars. The mapping is carried out at the scale of 1:5000 and 1:12 500 whereby the existing topographic maps HOK 1:5000 and topographic maps at the scale of 1:25 000 are used. So far the detailed research has encompassed the areas of Split and Kaštela, the Lopar peninsula on Rab, the area of Veliki Rujan on Velebit and the island of Krk. One of the important components in that research is the analysis of the relief that is carried out by producing digital relief model on the basis of digitised topographic maps at various scales.

In the research for the purposes of oil industry, the digital maps of depth are produced showing the arrangement of reserve, i.e. isolation layers, and digital model of paleorelief. Digital models of depth paleorelief made on the basis of the data from oil rigs are made for the central and northern part of the Northern Sea (UK and Norway sector) and for the area of Belarus depression.

Within the frame of the project *Sediments of the Adriatic Submarine and Coastal Area* financed by the Ministry of Science and Technology of the Republic of Croatia, the sediments and the sedimentation in the sea are researched. On the basis of so far obtained data, the map of sea bottom sediments in the area of Kvarner has been made at the scale of 1:500 000 (Juračić et al., 1999; Benac et al., 2000). As the basis for this map, the bathymetric or hydrographic maps were used.

Within the scope of the scientific project *Paleostudies and reconstructions of dinosaur populations and their environments in Istria and adjacent islands (Croatia) during the Upper Jurassic and Cretaceous periods (170 – 90 Mya)* financed by the Swiss National Science Foundation within the scope of the project *Scientific Cooperation between Eastern Europe and Switzerland (SCOPES 2001–2003)*, the scientists at the Geological Department use for their research the topographic maps at the scale of 1:25 000, 1:50 000 and 1:100 000, as well as the existing maps (Basic Geological Map at the scale of 1:100 000) – referring to the area of Istria with the islands.

More data about the activities of the Geological Department at the Faculty of Science, University of Zagreb can be found at the Internet address <http://www.pmf.hr>

3.4 Department of Geography at the University of Zadar

In 1994, the *Department for Geography* was founded at the Faculty of Philosophy in Zadar

where the courses at the undergraduate studies of geography are held among other things. The Department for Geography at the Faculty of Philosophy in Zadar used to realize a successful planned curriculum and scientific and research work during the period from 1999 to 2003 as well. Since the foundation of the Department, the development of geography in Croatia has been initiated and improved, supplementing the Geographic Department of the Faculty of Sciences and Mathematics in Zagreb. The results of the work are reflected in a great number of graduated students that are employed in schools in the Southern Croatia and at faculties, and then in the publishing activity (scientific journal *Geoadria*, *Geographic Dictionary*, special issues), scientific and research activity of professors and assistants (publishing of scientific and professional papers, participating of the members of the Department at numerous conferences, successful activity on three scientific projects approved by the Ministry of Science and Technology, etc.). The scientific projects are *Geographic Bases of the Development of Small Croatian Islands*, the head is D. Magaš, *Movements of Population, the Settlements of Dalmatinska Zagora*, the head is M. Glamuzina and *Geographic Conditions of the Development of Eco-agriculture in Croatia*, the head is Ž. Šiljković.

In 2003, after reconstructing the University in Zadar that inherited six centuries of university tradition, the Department for Geography was constituted as the university department. Within the scope of the studies at the Department for Geography there is also a separate course called *Elements of Cartography* being one of the most important (obligatory) subjects at the studies. The curriculum of lectures and exercises corresponds a great deal to the curriculum for the two-subject studies of geography at the Faculty of Sciences and Mathematics in Zagreb. In 2003, the curriculum of courses was partly changed and supplemented, and the number of periods was increased, which makes an essential basis for further improvement in teaching cartography.

Cabinet teaching is supplemented with practical aspects. One should first point out the working visits to the Hydrographic Institute of the Republic of Croatia, the Map Collection of the State Archive in Zadar, and field work (orientation and mapping, determination of urban base of Zadar on the basis of surveying activities in the prehistoric time /cardo maximus and decumanus maximus, centuriation/ and similar). Unfortunately, the lack of adequate information equipment is reflected in weaker processing of, even though only introductory, contents from the modern digital cartography, but for the academic year 2003/2004, the implementation of more important chapter about single topics from modern cartographic science is planned. Cartogra-

phy is also promoted in teaching of other courses at the studies of geography in Zadar.

From the very first moment of the foundation of the Department for Geography, the Map Collection was also established. During the period 1999–2003, the Collection was supplemented with maps, first of all the donation of sea navigation charts of the Hydrographic Institute in Split, and of the Croatian Base Map.

Since February 2001 the Department has been operating in new premises in the reconstructed building of former military barracks in Dr. Franjo Tuđman Street bb. The credit for reconstructing new premises goes mostly to the rector of the University of Zadar and the founder of the Department, D. Magaš.

Since 2002/03, the postgraduate studies *Geographic Bases of Littoralization of Croatia* was constituted at the Department for Geography. One of the fundamental courses at these studies is the *Application of Digital Cartography in Geography of Littorals*. The bearer of the course is M. Lapaine.

More data about the activity of the Department of Geography University of Zadar, can be found at the Internet address <http://www.unizd.hr>

The activity of the *Croatian Geographic Society – Zadar* is directly connected with the Department of Geography at the University of Zadar.

3.5 Institute for Pedology at the Faculty of Agriculture, University of Zagreb

The employees of the Institute for Pedology at the Faculty of Agriculture, University of Zagreb have continued with their intensive cartographic activity during the period 1999–2003 as well, within the scope of which they apply modern GIS technology. From 1999 till the present day 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.

In the period mentioned above there were four very significant projects completed in the form of *Geographic and Land Information Systems*, and that is for Karlovac, Brod-Posavina, Sisak-Moslavina and Virovitica-Podravina counties. These information systems were made on the basis of criteria and standards for map production at the scale of 1:50 000. Their usage enables the production of a great number of thematic maps for various users, and they are therefore the basic documents for the development of agriculture, spatial planning, environmental protection, water supply, forestry etc.

In the year 2000, a three-year project of estimating the risks caused by water ground erosion in Croatia according to CORINE method ended. The maps at the scale of 1:300 000 have been produced presenting potential and real risk of water ground erosion. The maps were made in digital and printed form, and can be used at national and regional level, for planning of sustainable development and ground protection where these results can present one of the fundamental bases for various planning actions in agriculture, forestry, spatial planning, construction and environmental protection.

The *Hydropedological Map of the Republic of Croatia at the scale of 1:300 000* project started in 2001. In this respect the Hydropedological Map of the Water Area near the Sava River was completed in 2002, and the Hydropedological map of the Drava river and Danube in 2003. There is only the production of hydropedological maps for the Istrian and Dalmatian water-basin left to be completed.

More data about the activities of the Institute for Pedology at the Faculty of Agriculture, University of Zagreb can be found at the Internet address <http://www.agr.hr>

3.6 History Department of the Faculty of Philosophy, University of Zagreb

History Department is one of 20 departments at the Faculty of Philosophy, University of Zagreb. During academic year 2000/2001, there was an optional subject introduced at that Department called *Cartographic Sources for European and Croatian History of the New Age*. The head of the course is M. Slukan-Altić. It is held two hours a week (lecture + seminar), in two semesters. Lecture manuscripts that will make it easier for the students to prepare their exams have been prepared for this course (Slukan-Altić, 2000a).

Since the academic year 2001/2002 this Department also had the course *Cartographic Sources for Religion History*. The heads of the course were D. Roksandić and M. Slukan-Altić. The lectures were two hours a week (lecture + seminar), in two semesters.

Within the scope of the postgraduate studies of history at the Faculty of Philosophy, cartographic sources are partly lectured within the scope of the course *Auxiliary Historical Sciences* (4 teaching hours), and the lecturer is M. Slukan-Altić.

On the occasion of the 300th anniversary of the Karlovac Piece, the Institute for Croatian History at the Department of History of the Faculty of

Philosophy, University of Zagreb in collaboration with the Croatian State Archive organised a scientific colloquium and the exhibition in Zagreb titled *Cartographic Sources for the Triplex Confinium History*. There were maps from Habsburg, Croatia, Venetia and Ottoman provenience exhibited that were made in the period from the end of the 16th till the end of 18th century. The exhibition was designed and successfully realised by M. Slukan-Altıć. It is of special significance that there was also the *Cartographic Sources for the Triplex Confinium History* publication published containing the study by the author and the exhibition catalogue in Croatian, English and German (Slukan-Altıć, 1999b). The reports from the scientific colloquium were prepared as scientific works and published as a special unit Triplex Confinium in the *Radovi Zavoda za hrvatsku povijest* at the Faculty of Philosophy, University of Zagreb, double issue of a journal 32–33 for the period 1999–2000 (Slukan-Altıć 2001k, Roksandić 2001, Moačanin 2001, Fürst-Bjeliš 2001a, Grünfelder 2001, Jurišić 2001, Holjevac 2001, Štefanec, 2001, Lazanin 2001, Mlinarić 2001).

In the phase of being registered at the Ministry of Science and Technology of the Republic of Croatia is the project *Atlas of the Religion History of the Southeast Europe from Prehistory to Modern Age*. Its heads are D. Roksandić (Faculty of Philosophy, University of Zagreb and Central European University in Budapest) in collaboration with M. Mitterauer (Vienna University).

More data about the activities of the History Department at the Faculty of Philosophy, University of Zagreb can be found at the Internet address <http://www.ffzg.hr>

3.7 History Department at the University of Zadar

History Department is one of the departments at the University of Zadar. In researching the history of cartography, M. Kozličić and the scientific novice M. Pavić are very active at this Department and have published a great number of papers and a book (Kozličić, 1999a-c, 2000, 2001a-b, 2003; Kozličić, Duplančić-Leder, 2003; Pavić, 2000).

More details about the activities of the History Department at the University of Zadar can be found at the Internet address <http://www.unizd.hr>

3.8 Scientific projects in Croatia

The data about scientific projects financed by the Ministry of Science and Technology of the Republic of Croatia during the period 1996–2002 can be found at the following Internet address: <http://www.mzt.hr/projekti9699/index.htm>

Among them the following projects can be classified completely or partly into the field of cartography:

- Vegetation Map of Croatia, the head I. Šugar, Faculty of Pharmacy and Biochemistry, Zagreb, <http://www.mzt.hr/projekti9699/1/006280.htm>
- History of East Adriatic Sea Navigation, the head M. Kozličić, Faculty of Philosophy, Zadar, <http://www.mzt.hr/projekti9699/6/070002.htm>
- Croatian Cartography – Scientific Foundations, the head N. Frančula, Faculty of Geodesy, Zagreb, <http://www.mzt.hr/projekti9699/2/007001.htm>
- Geological Map of the Republic of Croatia 1:50 000, the head M. Šparica, Geological Research Institute, Zagreb, <http://www.mzt.hr/projekti9699/1/01810101.htm>
- Base Hydrological Map, the head B. Biondić, Geological Research Institute, Zagreb, <http://www.mzt.hr/projekti9699/1/01810102.htm>
- Base Engineering and Geological Map of the Republic of Croatia, the head K. Braun, Geological Research Institute, Zagreb, <http://www.mzt.hr/projekti9699/1/01810103.htm>
- Map of Mineral Resources of the Republic of Croatia, the head J. Benić, Geological Research Institute, Zagreb, <http://www.mzt.hr/projekti9699/1/01810104.htm>
- Geothermal Map of the Republic of Croatia, the head A. Šimunić, Geological Research Institute, Zagreb, <http://www.mzt.hr/projekti9699/1/01810105.htm>
- Base Geochemical Map of the Republic of Croatia, the head J. Halamić, Geological Research Institute, Zagreb, <http://www.mzt.hr/projekti9699/1/01810106.htm>
- Structural and Geomorphological Map of the Republic of Croatia, the head I. Hečimović, Geological Research Institute, Zagreb, <http://www.mzt.hr/projekti9699/1/01810107.htm>
- Description of the lands of the Kingdom of Croatia on Military Maps, the head M. Valentić, Croatian Institute for History, Zagreb, <http://www.mzt.hr/projekti9699/6/00190101.htm>
- Croatian Dialect Atlas, the head M. Lončarić, Institute for Croatian Language and Linguistics, Zagreb, <http://www.mzt.hr/projekti9699/6/02120103.htm>
- Croatian Names of Settlements, the head M. Nosić, Faculty of Education in Rijeka, <http://www.mzt.hr/projekti9699/6/000905.htm>

- Geomorphological Mapping of the Republic of Croatia, the head A. Bognar, Faculty of Sciences, Zagreb, <http://www.mzt.hr/-projekti9699/1/119352.htm>
- Borders of the Republic of Croatia in the Adriatic and Economic Relationships Connected with the Sea, the head D. Rudolf, Faculty of Law, Split, <http://www.mzt.hr/-projekti9699/5/018002.htm>
- Geographic Elements of the Development of Small Croatian Islands, the head D. Magaš, Faculty of Philosophy, Zadar, <http://www.mzt.hr/-projekti9699/1/070001>
- Sediments of the Adriatic. Scientific Bases of Geological Mapping, the head M. Juračić, Faculty of Sciences, Zagreb, <http://www.mzt.hr/-projekti9699/1/119301.htm>

4 Commercial Cartography

4.1 Institute for Photogrammetry d.d.

The Institute for Photogrammetry Zagreb, Borongajska cesta 71, is one of the most important institutions for Croatian geodesy, not only because of the extent and quantity of executed geodetic works, but also because of the pioneer role that it has had for more than 40 years of existence, since its foundation in 1961, in introducing and applying modern technologies in the profession and in the development of geodetic activity in Croatia.

The company is technically and professionally capable of carrying out all geodetic works, and it encompasses:

- basic works and higher geodesy,
- cadastre and practical geodesy,
- engineering and applied geodesy,
- photogrammetry and topographic survey,
- cartography and spatial information systems.

The Institute for Photogrammetry employs 75 workers, mostly engineers and technicians of geodesy, and it consists of Technical department and Financial and administrative department. The Technical department is divided into two sectors – Surveying and Processing sector – that are constituted of five teams. In the Surveying sector the works are carried out in connection with surveying in the field, cadastre and GPS survey. All photogrammetric work, digital data processing, production and completion of plans and maps is carried out in the Processing sector (Paj, 2002).

In recent years, the Institute for Photogrammetry has greatly enhanced and modernized the production by acquiring three digital photogrammetric stations, two new-generation GPS units, an A0 format scanner in colour, and other geodetic equipment, as well as professional software for digital orthophoto, aerotriangulation, GIS and cartography. A procedure of installing quality preservation systems ISO 9001 was initiated into production processes of the company, and it is expected to be finished in 2003.

During the period 1999–2003 the Institute for Photogrammetry worked on the following cartographic tasks:

Topographic map 1:25 000

1. Istria – West: 20 sheets of TK 25; principal contractor the Institute for Photogrammetry, sub-contractors: Geodetic Institute Rijeka (5 sheets), Geofoto Zagreb (4 sheets). Completed and printed in December 2000.
2. Velika Gorica: 3 sheets, completed and handed in 2000.
3. Zagreb: 4 sheets, principal contractor Geofoto. Completed and handed in 2000.
4. Istria – east: 6 sheets, completed and handed in 2001.
5. Varaždin – Čakovec: 4 sheets, completed and handed in 2001.
6. Križevci: 4 sheets, completed and handed in 2001.
7. Bjelovar: 6 sheets, 2001.
8. Sisak: 8 sheets, 2001.
9. Krapina: 5 sheets, 2001.
10. Bjelovar II: 6 sheets, 2002.
11. Bjelovar III: 5 sheets, 2003.
12. Kornati: 12 sheets – in preparation.

The topological processing of TK 25 data for the official topographic database at SGA will be finished in 2003. According to the research done by CRONO GIP's project team, the Institute of Photogrammetry made 38.5% of all TK 25 (six Croatian companies produce TK 25).

Croatian Base Map 1:5000

1. Zagreb: 25 sheets, principal contractor Geofoto. Completed and handed in 2000.
2. Čakovec: 24 sheets, completed and handed in 2000.
3. Varaždin: 12 sheets, completed and handed in 2000.
4. Velika Gorica: 6 sheets, completed and handed in 2000.

5. Topusko: 6 sheets, completed and handed in 2000.
6. Samobor: 11 sheets, completed and handed in 2001.

Digital orthophoto (DOF)

About one thousand sheets of various areas at the scale of 1:5000:

1. Varaždin, Križevci, Topusko (1999–2000)
2. For the needs of demining Lika and Banovina – 110 sheets (2001)
3. Eastern Slavonija – 100 sheets (2002)
4. Samobor – 11 sheets (2002)
5. Velika Gorica – 70 sheets in colour (2002)
6. Varaždin County – 230 sheets in colour (2003)
7. For the needs of demining Lika – 80 sheets (2003)
8. Karlovac County – 150 sheets (2003)
9. State border with Bosnia and Herzegovina – about 100 sheets in colour (will be finished in 2003)

Several tasks at various scales:

1. Gas pipeline Lučko – Ivanja Reka at the scale of 1:1000 in colour (2001)
2. Drava river at the scale of 1:10 000 (2002)
3. AC Zagreb – Sisak at the scale of 1:5000 (2002)
4. AC Split – Ploče at the scale of 1:1000 (will be finished in 2003)
5. AC Beli Manastir – Svilaj 1:1000 (will be finished in 2003), etc.

Thematic cartography

1. Križevci – City plan – 1999
2. Karlovac County – Road and tourist map – 2001
3. Statistical Chronicle – thematic maps with general topics in single counties and general maps of counties – 1999, 2000, 2001, 2002.
4. Varaždin – city plan – 2002.
5. Several thematic maps for the needs of Croatian Highways Ltd. Zagreb – 2002

Projects and other

The Institute for Photogrammetry has made a working procedure for the production of TK 25 which is continuously being worked on and improved. This procedure has been accepted by the majority of other contractors on TK 25, and some of them have given their contribution. The Institute for Photogrammetry has made the first versions of the cartographic key for TK 25 and HOK. The employees of the Institute for Photogrammetry participate at several projects connected with the establishment of the Official Topographic and Cartographic Information System of the Republic of Croatia. These projects include: *Cartographic Generalization with the Standardization for State Maps* (Paj et al., 2003), *Graphical and Alphanumeric Code System of State Topographic Maps* (Paj, 2003), *CRONO GIP I* and *CRONO GIP II*. The active participation on Eurogeographics projects: Seamless Administrative Borders of Europe (SABE – 1999, 2001) and Euro Global Map (EGM – 2003) should be mentioned, too.

More data about the Institute for Photogrammetry can be found at the Internet address <http://www.zzf.hr>

4.2 Geofoto d.o.o.

The firm's residence is in Zagreb with a branch in Rovinj. The firm started its activity in 1993 as the first Croatian service for aerial photogrammetric surveying. Apart from aerial photogrammetric surveying it is especially active in the field of digital mapping, analytical photogrammetric mapping, cadastral surveying and establishing geoinformation systems.

Geofoto has 28 employees and 5 contract workers, the most modern and best equipped photolaboratory in the south-eastern Europe, its own plane, aerial camera of high technology – Leica RC20, two analytical stereoinstruments, precise photogrammetric scanner, several digital photogrammetric workstations, powerful information infrastructure, great international experience and young highly educated operators.

During the period 1999–2001 Geofoto worked at the following tasks:

1. Production of the tasks TK 25 as ordered by the State Geodetic Administration, altogether 21 sheets.
2. Photomap production (city light boards) 115x170 cm of the City of Zagreb, altogether 60 settlements
3. Production of digital orthophoto (DOF) for the following towns/areas:

- | | | | |
|----------|----------|-------------|---------------------|
| Poreč | 1:25 000 | black/white | 1 sheet |
| Umag | 1:25 000 | colour | 1 sheet |
| Zagreb | 1:5 000 | black/white | 55 sheets |
| Pula | 1:5 000 | black/white | 18 sheets |
| Makarska | 1:5 000 | black/white | 18 sheets |
| Zagreb | 1:2 000 | colour | 180 sheets |
| Labin | 1:2 000 | colour | |
| | 1:5 000 | colour | 280 km ² |
| Rijeka | 1:5 000 | colour | 17 sheets |
| Rovinj | 1:5 000 | black/white | 23 sheets |
4. Production and introduction in use of CROTIS – Topographic and Information System of the Republic of Croatia
 5. Production of Croatian Base Map (HOK) 1:5 000:
 - Zagreb 55 sheets
 - Makarska 18 sheets
 - Pula 18 sheets
 - Karlovac 15 sheets
 6. Production of photomaps 1:5 000 “Special purpose”, the border areas of the Republic of Croatia with Bosnia and Herzegovina, altogether 111 sheets
 7. Initiation and agreement of the implementation project STOKIS (Official Topographic and Cartographic System), and 10 subprojects

At the International Cartographic Exhibition held in the 19th International Cartographic Conference in Ottawa in 1999, the photomap of Velika Gorica, made by S. Frangeš and Z. Biljecki was awarded the *Honourable Mention for Excellence in Cartography* by the official jury in the group of city maps.

At the International Map Exhibition held at the 20th International Cartographic Conference in Beijing in 2001 the photomap of Upper Town Zagreb made by the firm Geofoto was awarded for *Excellence in Cartography* by the public jury in the group of maps for orientation and recreation.

More data about the activities of the firm Geofoto d.o.o. can be found at the Internet address <http://www.geofoto.hr>

4.3 Križovan Cartographic Laboratory (KLK)

Križovan Cartographic Laboratory (KLK) is a private firm with the residence in Zagreb, founded in 1991. In the KLK maps are made by means of computers and are kept in digital vector format. During the period 1999–2001 the following maps were produced:

1. Road map and tourist map of Zagreb county, scale 1:115 000, format B1, 5 colours, publisher Tourist Community of Zagreb County, Zagreb, 1999.
2. General topographic map, scale 1:500 000, format B0, 9 colours, publisher Ministry of Defence of the Republic of Croatia, Civil Engineering Administration and Environmental Protection, Zagreb, 1999.
3. Road map of Croatia, Slovenia and B&H, with city plans, scale 1:500 000, format B0, 6 colours, publisher Trsat-Polo d.o.o. Zagreb, 1999, and 2001, 2nd revised edition.
4. Digital relief map of the Republic of Croatia, scale 1:1 000 000, 4 colours, publisher TV Mreža d.o.o., Zagreb, 1999.
5. Auto- und Wanderkarte, the island Zakynthos (Greece), scale 1:50 000, format B1, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria 1999.
6. Auto- und Wanderkarte, the islands Karpathos and Kasos (Greece), scale 1:75 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria 1999.
7. Digital hypsometric map of the Republic of Croatia, scale 1:2 000 000, format A3, 4 colours, publisher Croatia Airlines, Zagreb, 2000.
8. Auto- und Wanderkarte, the islands Hios, Psara and Antipsara (Greece), with city plan of Mitlini and Hios, scale 1:50 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
9. Auto- und Wanderkarte, the island Lesbos (Greece), scale 1:75 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
10. Auto- und Wanderkarte, the islands Paros and Antiparos (Greece), scale 1:50 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
11. Auto- und Wanderkarte, the islands Mykonos, N. Rinia and N. Dilos, (Greece), scale 1:50 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
12. Auto- und Wanderkarte, the islands Naxos, Iraklia, Ilaria, Konfonisi, (Greece), scale 1:50 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
13. Auto- und Wanderkarte, the islands Santorin and Thira (Greece), scale 1:30 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
14. Road Map of the Republic of Croatia, scale 1:600 000, format A0, 5 colours, publisher Trgojež d.o.o., Zagreb, 2000.
15. Auto- und Wanderkarte, Island, scale 1:500 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.

16. Auto- und Wanderkarte, the island Menorca (Spain), scale 1:50 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
 17. Auto- und Wanderkarte, the island Ibiza (Spain), scale 1:50 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2000.
 18. Illustrated atlas of Croatia, geographic map of the Republic of Croatia and general map of Croatia at the scale of 1:2 000 000, scale 1:500 000, map cut-outs on 24 sheets of format 189x235 mm, 4 colours, atlas volume 90 pages, hardback, publisher Naklada Zadro d.o.o., Zagreb, 2000.
 19. School atlas of Croatia, obligatory school textbook, maps of Croatia, Europe and other parts of the world, thematic maps, city plans in various scales, satellite images, perspective cartographic presentations, digital terrain models, additional colour photographs with thematic maps, legend and list of abbreviations, contents, 216 pages of format 296x215 mm, 4 colours and 8 colours, plastic coated hardback, publisher Alfa d.o.o., Zagreb, 2000.
 20. Road map of Croatia, scale 1:750 000, format B1, 5 colours, publisher Naklada Zadro d.o.o., Zagreb, 2001.
 21. Road atlas of Croatia, scale 1:750 000, 80 pages format 120x170 mm, 5 colours, hardback, publisher Naklada Zadro d.o.o., Zagreb, 2001.
 22. Auto- und Wanderkarte, the island Lefkada (Greece), scale 1:50 000, format B1, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2001.
 23. Auto- und Wanderkarte, the island Kefalonia (Greece), scale 1:50 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2001.
 24. Auto- und Wanderkarte, Kapverdische Insel (Cape Verde Islands), scales 1:150 000, 1:80 000, 1:30 000, format A0, 5 colours, publisher Freytag & Berndt, Kartographische Anstalt, Wien, Austria, 2001.
 25. Military air chart, scale 1:500 000, 2 sheets (Zagreb–Zadar and Osijek–Split) format B1, 9 colours, publisher Ministry of Defence of the Republic of Croatia, Civil Engineering and Environmental Protection Administration.
- (1998), then in Rijeka, Belgrade and Munich, Vienna and Washington. It employs more than 70 people, mostly young experts in the field of applying information technology, geoinformation systems, satellite images and GPS who collaborate with a group of subcontractors being the top experts in the field of individual thematic disciplines. For twelve years, the firm has had its specific way of training its employees in the field of geoinformation technologies. The whole work of the firm whose annual turnover is today measured in millions of euros, was initiated in Zagreb in 1989 by father and son, professor of physics Josip Lončarić, and B.S. of electrical engineering Boran Lončarić (today the Management president). The greatest value of the project that was boldly initiated at the time as that of technology was a great news in the world, are the people and education system. Gisdata is today a prominent geoinformation firm of European size with constant trend of further expansion of business and the network of its branch offices.
- In the last few years Gisdata has made a series of cartographic products, with the following among them being rather significant:

1. Digital Relief Model of Croatia at the scale of 1:25 000
2. land cover and land use in Croatia
3. Digital atlas of Croatia at the scale 1:100 000
4. Satellite atlas of Croatia at the scale 1:100 000
5. Digital atlas of Croatia at the scale 1:300 000
6. Digital orthophoto map of the island Krk at the scale 1:5000
7. Digital atlas of Croatian towns
8. Croatian towns – address centroides, house numbers
9. Croatian towns – land cover and land use for general usage
10. Croatian towns – digital relief model
11. Croatian towns – land cover and land use for telecommunications
12. Croatian towns – 2D building model
13. Croatian towns – 3D building model
14. Croatian towns – 3D model of the Earth's surface with objects
15. Croatian towns – services according to position
16. Croatian towns – digital orthophoto map 1:5000
17. Digital atlas of Bosnia and Herzegovina at the scale of 1:300 000
18. Digital atlas of Bosnia and Herzegovina at the scale of 1:200 000
19. Digital relief model of Bosnia and Herzegovina at the scale of 1:200 000
20. Digital atlas of Sarajevo at the scale of 1:5000

4.4 Gisdata d.o.o.

Gisdata is an international private firm founded in Zagreb in 1989 and it is one of the leading firms for establishing GIS not only in Croatia, but also in wider region of Central and South-Eastern Europe. The first branch-office was opened in Ljubljana (1992), then in Sarajevo (1996), in Skopje

21. Digital atlas of Macedonia at the scale of 1:200 000
22. Digital relief model of Macedonia at the scale of 1:200 000
23. Digital atlas of Skopje at the scale of 1:5000
24. Macedonian towns – 3D building model
25. Macedonian towns – land cover and land use
26. Macedonian towns – digital relief model
27. Digital atlas of Federal Republic of Yugoslavia at the scale of 1:300 000
28. Digital atlas of Serbia at the scale of 1:300 000
29. Digital atlas of Monte Negro at the scale of 1:200 000
30. Digital atlas of Monte Negro at the scale of 1:300 000
31. Digital relief mode of Yugoslavia at the scale of 1:200 000
32. Digital atlas of Monte Negro at the scale of 1:50 000
33. Digital relief model of Monte Negro at the scale of 1:200 000
34. Digital relief model of Monte Negro at the scale of 1:50 000
35. Land cover and land use in Monte Negro at the scale of 1:50 000
36. Digital atlas of Podgorica at the scale of 1:10 000
37. Digital atlas of Kosovo at the scale of 1:200 000
38. Digital atlas of Albania at the scale of 1:200 000
4. The Republic of Croatia – Mountain Croatia at the scale of 1:900 000, a new map of the mountain Croatia area, and three maps of national parks: Plitvice Lakes, North Velebit and Risnjak at the scale of 1:200 000 being completely new referring to their contents.
5. The Republic of Croatia – North Croatian Littoral at the scale of 1:900 000 and the new maps of national parks: Brijuni, Paklenica and Krka at the scale of 1:200 000
6. The Republic of Croatia – Seaside Croatia – South Croatian Littoral at the scale of 1:900 000 and two contextually new maps of national parks Kornati and Mljet at the scale of 1:200 000.

All these maps are contextually processed with the data that can help a primary school pupil to acquire the existing contents within the scope of teaching programs. The purpose of these maps is to present regional Croatia as simply as possible in order to help pupils orientate in space and learn about what can be learned today about the area of Croatia. It is important to point out that these are eight pages of new maps made manually.

7. The Republic of Croatia – Climate, rain and snow, vegetation
8. The Republic of Croatia – Economic map and the Republic of Croatia – Average population density (according to 1997)
9. Croats in the word at the scale of 1:125 000 000
10. Discoveries of lands in 15th century with a small map: Croatia in the period of new discoveries in 1493.

More details about the Gisdata firm can be found at the Internet address <http://www.gisdata.com>

4.5 Croatian School Cartography

During the period 1999–2000, the geographic atlas for primary schools was worked on in Croatian School Cartography. The following new maps have been made for that atlas:

1. The Republic of Croatia – Croats in the Republic of Croatia (thematic population map of Croatia with nationality, religion and mother tongues topics)
2. Two thematic maps: dialects of the Republic of Croatia and general sheet of the Republic of Croatia for further processing for each region
3. The Republic of Croatia – Lowland Croatia, a new map at the scale of 1:900 000 that encompasses the area of East and North–Western Croatia

Apart from that, the primary school atlas is processed with the same maps for the whole world with a map of Falklands islands added, and instead of the economic map of the world there is a World – Time Belts map added.

It should be pointed out that new maps have been made manually: six large maps and small somewhat smaller in relation to 33 large physical maps in this atlas is a pretty large number. The time in which the work was supposed to be executed to be prepared for printing in May 2000 should be taken into consideration.

For the geographical high school and secondary school atlas the maps of Alaska at the scale of 1:24 100 000 and Hawaii at the scale of 1:23 300 000 were made during the period between 1998 and 1999 as an addition to the map of the USA. These small maps were published in the school year 1999/2000. They have enriched the contents in the sense of connecting all entities that are parts of the USA.

During the period between 1999 and 2000 as it was intensively worked on the geographic atlas, the

map of the island Timor in the Indonesian area was added at the scale of 1:6 000 000 which required some technical interventions on the atlas.

Both geographic atlases have been published as changed and revised editions although the primary school atlas has a newly processed cartographic image of Croatia which should actually be a new product.

During the period between 1999 and 2000 the following maps were worked on: reference World Map 1:40 000 000 that was then prepared for printing, however it has not yet been printed. The map of Croatia at the scale of 1:750 000 was being worked on, reference physical map, but it requires a lot of interventions in order to be ready for printing.

During the period between 2000 and 2001, two obligatory corrections were made on geographical atlases for primary schools and geographical atlases for high schools and secondary schools. Much more work has been invested into the reference map of Europe with physical and political contents. During this period the only printed map was the physical wall map of Europe 1:3 000 000, and a small map of Croatia at the scale of 1:2 680 000 that is published every year by the Statistical Chronicle of the Republic of Croatia.

In the year 2002, the following maps and atlases were printed: Republic of Croatia – County Constitution (geographic wall map), Republic of Croatia – table map (geographic map 1:1 100 000), Development of the Ottoman Empire – historical wall map, Europe 1815–1849 – historical wall map, Bosnia and Herzegovina – geographic wall map 1:300 000, Geographic Atlas for the Primary School, Geographic Atlas for High Schools and Secondary Schools, Croatian Historical Maps.

In 2003 the following maps were printed: South America – geographic wall map, The World – geographic wall map. Two new atlases that were designed should be published for the school year 2003/04. These are *Geographic Atlas for Primary School* and *Historical Atlas for Primary School*.

Historical Atlas for Primary School is made completely using the new computer technique. It was made by A. Szabo and M. Raić with the participation of reviewers and the employees of Croatian School Cartography. The whole world history is processed on 53 pages answering the questions where and in what conditions Croatia was located in single historical periods.

Geographic Atlas for Primary School was produced with the new and the existing documents with some changes and additions regarding the needs of the curriculum. It has been enriched with new thematic maps, made partly manually, and partly computer-aided. It has been produced by

the employees of Croatian School Cartography with the collaboration of professional collaborators and reviewers. However, since the old Geographic Atlas for Primary School is considered obligatory in schools for this school year, the new edition was not printed. The new edition is waiting for the next school year 2004/05 in order to make the geography courses for pupils and teachers in primary schools easier.

The following new editions are being prepared: Europe – geographic reference map, Europe – political reference map, the World – geographic reference map, the World – political reference map, Croatia – geographic reference map. All these are maps that were being prepared for a long time, but it is not determined when they will be printed.

4.6 Geodetic Institute Rijeka

In the Geodetic Institute Rijeka the basic cartographic activity during the period from 1999 to 2000 was the production of Croatian Base Map sheets and of the topographic map at the scale of 1:25 000.

The Croatian Base Map (HOK) is made in digital format and at the scale of 1:5000. For the territory of a part of Lika-Senj County 143 sheets were produced. It was ordered by the State Geodetic Administration and the sheets are now being checked. For the territory of the City of Rijeka 16 sheets are being produced, ordered by the State Geodetic Administration and City Hall of Rijeka.

The sheets of the topographic map are made at the scale of 1:25 000. For the territory of West Istria these are the following sheets: the island M. Brijun, Vodnjan, Marčana, Pula and Medulin. It was ordered by the State Geodetic Administration, the sheets have been printed. For the territory of the North Dalmatia the following sheets have been made: Bay of Nin, Ljubačka vrata, Nin. It was ordered by the State Geodetic Administration. The sheets are being checked. For the territory of Kvarner the following sheets are being made: Rupa, Klana, Opatija, Rijeka, Mošćenička Draga according to the order by the State Geodetic Administration. For the territory of the Northern Adriatic islands the following sheets are being made: Dragozetići, Brzac, Krk, Vrbnik as ordered by the State Geodetic Administration.

4.7 galaGIS d.o.o.

galaGIS d.o.o. is an internationally oriented company established at the end of the year 2000 to offer specialized solutions and services for geoinformation systems applying leading-edge geoinformation technology. galaGIS is the first Croat-

ian company that implemented 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 with 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 the 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 fulfil complex requests of integration and connectivity with other data format 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. Beside 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, retain the complete history of all land information edits, long-term transaction management, versioning and temporal data management for the GeoMedia Professional/Oracle9iTM environment.

The strongest references can be found in State Geodetic Administration. galaGIS is the first company in Croatia that implemented solution for management, analysis and maintenance cadastre data over the Internet and Intranet. For the national food company Gavrilović d.o.o., the company implemented GIS for management and tracking infrastructure changes and conditions in drives, installations, leads, measures, etc. In Bosnia and

Herzegovina company has designed GIS for electric power company Elektroprivreda HZHB. The GIS system will monitor and support: management/maintenance of the geospatial data, error report, service analysis with marketing, blackout analysis, network analysis, project management, etc. The company is involved in project implementation of GIS for Hungarian State Forest Service.

Use of the 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 GIS market of Croatia.

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>

5 Other Activities

5.1 Croatian Cartographic Society

Inaugural assembly of the Croatian Cartographic Society (CCS) was held on October 10, 2001. The goals of CCS are:

- contribution to the development of cartography and related disciplines
- promotion of cartography and related disciplines
- motivation of creative activities and application of scientific achievements in practical and professional work in all forms of cartographic activity
- supporting publishing activity in cartography and related disciplines
- foundation and taking care of collections of maps, plans, books, photographs and other publications
- developing relationship with other similar institutions in Croatia and abroad
- giving opinions and estimations of cartographic work done by organisations and individuals if requested by the authorities or directly by interested citizens.

CCS realizes its goals by performing the following activities:

- organizing scientific and professional lectures, gathering, seminars, symposiums and similar
- international collaboration
- membership in international cartographic associations
- awarding rewards and acknowledgements

- improvement and specialisation of its members in Croatia and abroad.

M. Lapaine was elected the first president of CCS. In 2002, the Society started publishing the first Croatian cartographic journal, *Kartografija i geoinformacije*. The journal is published annually, in both Croatian and English.

The Croatian Cartographic Society took over the preparation of the participation of Croatian cartographers at international cartographic conferences. Preparations for Croatian participation at the 21st International Cartographic Conference and the 12th ICA General Assembly in Durban lasted during 2002 and 2003. Croatia will actively participate at the General Assembly, at the conference with papers and posters, at the international cartographic exhibition and at the international children's drawing contest and exhibition. One can find out more about Croatian Cartographic Society's activities at the Internet site <http://www.kartografija.hr>

5.2 Section for Cartography of the Croatian Geodetic Society

The Section for Cartography has prepared the participation of Croatian cartographers at the 19th International Cartographic Conference and the 11th General Assembly in Ottawa in 1999, and at the 20th International Cartographic Conference in Beijing 2001.

The Section takes care about the participation of Croatia at exhibitions of children's drawings with the theme World Map for the Barbara Petchenik Award held every two years during international cartographic conferences. At the end of 1999 there was a festive meeting of the Section held at which acknowledgements and occasional presents have been given to educational institutions participating at the competition of children's drawings for the conference in Ottawa in 1999 (Frangješ, Lapaine, 1999a; Frangješ et al., 2001; Lapaine, 2000c, d, f).

18th Meeting of the Section for Cartography was held on 4 February 1999 with the lecture held by M. Pelc on *Information Aspects in the Graphics by Martin Kolunić Rota and Natale Bonifacio (Geodetski list 200, 1, 15–28)*.

19th Meeting of the Section for Cartography of HGD was held on 24 March 1999. S. Frangješ held the lecture on *Map Graphics in Digital Cartography*.

20th Meeting of the Section was held on 8 April 1999. M. Bogunović and S. Husnjak held the lecture on *Application of GIS Technology in Land Area Management*.

21st Meeting of the Section for Cartography was held on 10 June 1999. B. Malić had a lecture on *Physical and Technical Aspects of Map Visualization on Display*.

22nd Meeting of the Section for Cartography was held on 6 December 1999 with a report by M. Lapaine on *19th International Cartographic Conference and 11th General Assembly of the International Cartographic Association – Ottawa 1999*

23rd and festive meeting of the Section was held on December 20, 1999 at which the awards were handed to the educational organizations participating in the Croatian part of the Barbara Petchenik competition.

24th Meeting of the Section for Cartography was held on 6 April 2000 with the report by Robert Paj on the ISPRS Conference – *Bridging the Gap – Ljubljana 2–5 February 2000* and with the presentation of *Topographic and Cartographic System of the Republic of Slovenia*.

25th Meeting of the Section for Cartography was held on 24 May 2000. M. Husak held a lecture on *Digital Historical Atlas of Varaždin*.

26th Meeting of the Section at which I. Kljajić had a lecture on *Croatian Cartographers* was held on March 27, 2001.

One can find out more about the activities of the Section for Cartography from Geodetski list or at the Internet address <http://www.geof.hr>

5.3 Croatian Geographic Society – Zadar

In collaboration with the Department for Geography at the University of Zadar, Croatian Geographic Society (HGD) – Zadar has published four issues of the journal *Geoadria* during the period 1999–2003, and the 8th issue is being prepared for printing. In 2002 a unique lexicographic work *Geographic Dictionary* by A. Cvitanović was published. It contains among other things, a large number of entries from geodesy and cartography.

The activity of HGD–Zadar has been reflected in organizing public lectures aiming to popularise geography and related sciences. From about ten well visited lectures and book presentations (with altogether about 1000 visitors), one can point out the lectures held by M. Lapaine – *Croatian Cartographers*, by Z. Bićanić – *Problems of Sea Navigation Chart Generalisation*, by M. Lapaine – *Cartographic and Geodetic Themes in the Geography Textbooks*, and the book presentation by M. Marković – *Croatian Towns on Old Plans and City Plans* (the presenters were M. Marković, D. Magaš and M. Kozličić).

The Department for Geography at the University of Zadar and Croatian Geographic Society – Zadar have been included into the activity of the Croatian Cartographic Society. Zadar geographic centre, among other things, has a task in its activity plan to actively collaborate with cartographic institutions and associations in Croatia and abroad.

5.4 GIS Forum

GIS Forum is the society dealing with promotion and development of geoinformation in Croatia, and it has been operating within the scope of the Croatian Information Association for many years. Since 1996, GIS Forum organizes once a year the conferences with the experts from various field participating at them and having in common some of the applications of GIS. Each conference is regularly accompanied by the published Proceedings. From time to time GIS Forum organizes exhibitions of thematic maps and graphics made by means of digital processing of Croatian and foreign authors and institutions. In this way the cartographic and geoinformation achievements in Croatia and abroad are popularised.

So far, GIS Forum was the organizer or coorganizer of international conferences in Zagreb, Osijek, Cracow, Split, Trogir, York, Warsaw, Katowice, Lonjsko Polje, Dubrovnik, etc. The International Conference GIS Odyssey was held in 2002 in Split, Trogir, Korčula, Mljet and Dubrovnik. The International Conference GIS Silesia 2003 will be held in September 2003 in Silesia in South Poland.

5.5 Astronomy Observatory of the Zagreb Astronomy Association

In 2000, the wall map of the star sky by G. Kren was printed in two parts, the 7th edition in the magazine *Drvo znanja*. The format of each half is 70x100 cm, published in four colours. The appropriate article was published with the map (Kren, 2000). The eight edition of the same map, changed smaller details and linguistically edited was published the same year in four colour print, by the firm Lapis d.o.o. with the instructions on four pages, format A4.

A new sky wall map by Damir Hržina was published in the spring 2001.

More details about the activities of the Astronomy Observatory of the Zagreb Astronomy Association can be found at the Internet address <http://www.zrs.hr/zgastr.html>

5.6 Conferences

During the period from 1999 to 2003 the following scientific or professional gathering were held with Croatian cartographers giving their contribution.

- *State Geodetic Bases and Land Information Systems*, organized by the Croatian Geodetic Society in Opatija in 1999 with the Proceedings edited by Z. Kapović and M. Roić.
- *18th International Conference on the History of Cartography* in Athens in July 1999 with the Book of Abstracts.
- *19th International Cartographic Conference and 11th General Assembly of the International Cartographic Association* in Ottawa in August 1999 with the Proceedings published in two books and on CD.
- *Cartographic Sources for the Triplex Confinium History*, scientific colloquium and occasional exhibition in the Croatian State Archives in Zagreb on 29 October 1999, the exhibition catalogue edited by M. Slukan-Altić, the reports from the colloquium were published in the *Radovi Instituta za hrvatsku povijest* at the Faculty of Philosophy, University of Zagreb, Vol. 32–22.
- *2nd Croatian Geographic Congress*, organized by the Croatian Geographic Society in Lovran in 1999 with the Proceedings edited by D. Pejnović.
- *Spatial Information Management in the New Millennium*, international conference organized by GIS Forum, Cracow, Poland, in November 1999 with the Proceedings edited by G. Szpor and D. Kereković
- *Eco-History of the Triplex Confinium*, a scientific conference held in Zadar in May 2000
- *GIS Croatia 2000*, an international conference in the organization of GIS Forum, Zagreb, Osijek and Lonjsko Polje, September 2000, with the Proceedings edited by D. Kereković.
- *19th International Conference on the History of Cartography*, Madrid, July 2001, with the Book of Abstracts, the Proceedings on a CD.
- *20th International Cartographic Conference*, Beijing, August 2001, with the Proceedings in five books and on CD.
- *GIS Polonia 2001*, international conference organized by GIS Forum, Warsaw University of Technology and the Faculty of Geodesy, University of Zagreb, October 2001, Proceedings in paper format and on CD edited by E. Nowak and D. Kereković
- *2nd Croatian Congress on Cadastre*, organized by the Croatian Geodetic Society in Zagreb in October 2001, with the Proceedings printed as a book and on CD, edited by M. Roić and Z. Kapović.

- *First Congress of Croatian Art Historians*, organized by the Society of Art Historians of Croatia and the Institute for Art History, Zagreb, November 2001, the Book of Abstracts was published.
- *Conference on the occasion of the 40th anniversary of the independent activity of the Faculty of Geodesy*, University of Zagreb, with the Proceedings edited by T. Bašić.
- *Problems of Regional Development of Croatia and the Neighbouring Countries*, international conference organized by the Croatian Geographic Society, 28–30. XI. 2002, Book of Abstracts and Field Work Guide, editors Z. Curić et al.
- *GIS Odyssey 2002*, Split, Trogir, Korčula, Mljet, Dubrovnik, international conference organized by GIS Forum, University of Silesia and University of Zagreb, Faculty of Geodesy, Proceedings, edited by Davorin Kereković.

5.7 Publishing activity

Apart from the editions mentioned in the previous chapters of this report, various publishers have published during the period 1999–2003 the following editions that can be listed completely or partly into the field of Croatian cartography.

- Champuis, O.: *A la mer comme au ciel, Beautemps-Beaupré & la naissance de l'hydrographie moderne (1700–1850)*, Presses de l'Université de Paris-Sorbonne
- Cowan, J.: *San crtača zemljovida, Meditacije fra Maura kartografa na mletačkom dvoru (A Dream of a Map Drawer, Meditation by Fra Mauro, a cartographer at the Venetian court)*, translated from English by G. Vujasinović, Biovega, Zagreb, 1999.
- Filipčić, A. (ed.): *Školski atlas Republike Hrvatske (School Atlas of the Republic of Croatia)*, Znanje, Zagreb, 2000.
- Jeny, R. (ed.): *Veliki školski atlas (Large School Atlas)*, Znanje, Zagreb, 2000.
- Lapaine, M. (editor of the Croatian edition): *Atlas svijeta za 21. stoljeće (World Atlas for the 21st Century)*, Naklada Fran, Zagreb, 2003.
- Magaš, D.: *Vinjerac*, Croatian Academy of Sciences and Arts, Institute for Historical Sciences in Zadar, and Croatian Geographic Society, 1999.
- Marković, M.: *Descriptio Bosniae et Hercegovine*, AGM, Zagreb, 1998.
- Marković, M.: *Hrvatski gradovi na starim planovima i vedutama (Croatian towns on old plans and views)*, AGM, Zagreb, 2001.

- Marković, M.: *Kartograf Ivan Klobučarić i Rijeka (Cartographer Ivan Klobučarić and Rijeka)*, Adamić, Naklada Benja, Povijesno društvo otoka Krka, Rijeka, 2002.
- Marković, M.: *Hrvatska na starim zemljovidima (Croatia on Old Maps)*, Jesenski i Turk, Zagreb, 2002.
- Marković, M.: *Klaudije Ptolemej (Claudius Ptolemy)*, Jesenski i Turk, Zagreb, 2002.
- Marković, M., Vuković, M.: *Zagrebačka šokadija, Šokadija–Zagreb*, 2002.
- Matvejević, P.: *Druga Venecija (The Second Venice)*, VBZ, Zagreb, 2002.
- Obad, S., Dokoza, S., Martinović, S.: *Južne granice Dalmacije (Southern Borders of Dalmatia)*, State Archives in Zadar, Zadar, 1999.
- Oluić, M.: *Snimanje i istraživanje Zemlje iz svemira (Taking Photographs of and Researching the Earth from the Space)*, Croatian Academy of Sciences and Arts and, Zagreb, 2001.
- Petrač, B. (ed.): *Školski atlas (School Atlas)*, Alfa, Zagreb, 2000.
- Radovinović, R., Karadole, N.: *Satelitski atlas Hrvatske 1:100 000 (Satellite Atlas of Croatia 1:100 000)*, Publishers Ljevak and Gisdata, Zagreb, 2001.
- Sobel, D.: *Longituda (Longitude)*, translated from English by S. Ivčević, Jesenski and Turk, Zagreb, 2000.
- Tomašević, N. (ed.): *Zemljopisni školski atlas (Geographical School Atlas)*, Publisher Ljevak, Zagreb, 2000.
- Topalović, D.: *Balkanska Europa (Balkan Europe)*, Diorama, Zagreb, 2000.

Digital Historical Atlas of Varaždin from 12th to 20th century

Digital Historical Atlas of Varaždin from 12th to 20th century is the first atlas of that type in Croatia, and it encompasses 16 maps and plans from the collection of the Varaždin City Museum, cadastral plan and modern topographic map from the Regional Cadastral Office Varaždin and three sketches from the book I. Lentić-Kugly: *Historical Urban Entity of the City of Varaždin (Povijesna urbana cjelina grada Varaždina)*, Croatian Society of Historians, Zagreb 1977. The maps are chronologically ordered, and they end with the presentation of Varaždin today. Bibliographic descriptions were taken from the catalogue of the exhibition *Plans and views of Varaždin from 14th to 19th centuries held in the City Museum in Varaždin (M. Klemm: Planovi i vedute Varaždina od 14. do 19. stoljeća (Plans and Views of Varaždin from 14th to 19th Centuries)*, exhibition catalogue, the City Museum Varaždin, Varaždin, 1984). The atlas was made in four forms:

1. Slide show of chronologically ordered maps: varazdin.ppt
2. Touch-Screen-System – interactive system controlled by touch screen
3. CD ROM
4. Internet: <http://www.varazdin.hr> – official Internet page of the City of Varaždin.

The Atlas was presented for the first time in public (as Touch-Screen-System) during the exhibition *Varaždin County in the Middle Ages* in Stari Grad in Varaždin from 8th September till 6th December 1999 (Težak, S.: *Županija Varaždinska u srednjem vijeku (Varaždin County in the Middle Ages)*, exhibition catalogue, City Museum Varaždin, Varaždin, 1999). It was also presented at the professional gathering *Spatial Information Management in the New Millennium*, in Cracow, Poland, November 1999 (Husak, 1999c).

Tourist and Economic Map of Novi Marof, Plan of Varaždinske toplice

R. Milić from the Cadastral Office in Novi Marof made a tourist map of the town Novi Marof at the scale of 1:50 000 in 1999. The part of that map is a special cut out of the centre itself in the town Novi Marof at the scale of 1:5600. In 2001 the same author published the Economic Map of Novi Marof. In 2002, the map of Varaždinske toplice was published at the scale of 1:20 000 by the same author. The map especially presents the pedestrian and bicycle zones in the surroundings of Varaždinske toplice. On the backside there is a map of the centre of Varaždinske toplice at the scale of 1:5000.

5.8 Exhibitions

Cadastral Plans in the State Archive in Pazin

The exhibition was organized on the occasion of the Archive Week and of 180 years of Land Cadastre in Istria, from 26 April till 30 June 1999. The author of the exhibition and the catalogue was M. Hammer, and the catalogue was published by the State Archive in Pazin.

Šibenik on Old Drawings and Engravings

The exhibition held on the occasion of the International Museum's Day in the County Museum of Šibenik, from 20th May till 15th June 1999. The catalogue was published (Lambaša, 1999). The presentation of the exhibition can be found at the Internet address http://public.srce.hr/muzej_sibenik

Cartographic Sources for the Triplex Confinium History

On the occasion of the 300th anniversary of Karlovac Peace, the Institute for Croatian History at the History Department of the Faculty of Philosophy, University of Zagreb, in collaboration with the Croatian State Archives in Zagreb organized a scientific colloquium and the exhibition *Cartographic Sources for the Triplex Confinium History*. There were maps of Habsburg, Croatia, Venetia and Ottoman provenience presented that were made at the time between the 16th and the end of the 18th century. The exhibition was designed and successfully carried out by M. Slukan-Altić. The same exhibition was set up in the spring 2001 at the Central European University, History Department in Budapest. It is of special significance that there was also a publication issued titled *Cartographic Sources for the Triplex Confinium History* containing the study made by the author and the catalogue of the exhibition in Croatian, English and German (Slukan-Altić, 1999b).

Peace Images – Revived Croatia at the Time of Karlovac Peace 1699

On the occasion of the 300th anniversary of the Karlovac Peace, an exhibition was organized in the Croatian Historical Museum from November 18, 1999 till May 15, 2000. The catalogue with the same name *Peace Images – Revived Croatia at the Time of Karlovac Peace 1699* was published (Pandžić 1999).

Old Maps of the Island Cres

The exhibition Old Maps of the Island Cres was organized by the Centre for Possible Development, Ecopark Pernat in a small place Lubenice on the island Cres during the period between the 8th July till 3rd September 2000. The author of the exhibition was M. Slukan-Altić from Zagreb (Husak, 2000).

Reproductions of 23 old maps were shown at the exhibition, from the oldest presentation of the island Cres on Ptolemy's Map of Europe originating from the 2nd century (preserved in the copy from the 15th century) and on Idrisi's World Map from the 12th century, up to the first cadastral plan of the town Cres from 1821. A very nice four-lingual catalogue in Croatian, Italian, German and English was also published, with 75 pages of text and 8 colour illustrations on high quality luminous paper (Slukan-Altić, 2000b).

Kukuljević's Days 2001

In November 2001 a scientific gathering was organized and a large exhibition of geographic maps and original documents from the Archive of

Varaždin was prepared by the Croatian Academy of Sciences and Arts, the Institute for Scientific Work from Varaždin and Matica hrvatska from Varaždinske toplice.

Split – the Centre of the Adriatic Hydrography and Maritime Cartography, Significant Anniversaries in Researching Sea and Submarine Area

Organized by the Hydrographic Institute of the Republic of Croatia, the exhibition of sea navigation charts was held in Zagreb in Gliptoteka of HAZU (Croatian Academy of Sciences and Arts) in April 2003 under high patronage of the president of the Republic of Croatia. In the accompanying catalogue, M. Kozličić and T. Duplančić-Leder (2003) gave the historical presentation of the development of maritime cartography with special reference to the town Split and its harbour.

Martin Rota Kolunić and Natale Bonifacio – the Works in Croatian Collections

The concept of this exhibition and the selection of works were made by M. Pelc, who is also the author of the monographs on two Croatian artists from the 16th century. Martin Rota Kolunić held a high position as a court portraitist at the time of the Habsburg emperors. Only famous and proved skill could give to Natale Bonifacio the role and responsibility of the main illustrator in transferring the obelisk in front of the Vatican basilica who was observed and recorded around Europe. This exhibition aimed to make everybody pay attention to the affiliation and participation of Croatian cultural and artistic inheritance in the great renaissance and mannerist European inheritance. The exhibition was accompanied by a very nice catalogue (Marković, 2003).

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