INTITUTE OF GEODESY AND CARTOGRAPHY

Polish National Committee for International Cartographic Association

> CARTOGRAPHIC ACTIVITIES IN POLAND 2011 – 2014

NATIONAL REPORT

Presented to the 16th General Assembly of the International Cartographic Association Rio de Janeiro, Brazil August 2015

Head Office of Geodesy and Cartography



2015

Warsaw

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CONTENTS

1.	Introduction	5
2.	Cooperation between Polish cartographers and the International Cartographic	
	Association (ICA)	5
3.	Organization and tasks of the Geodetic and Cartographic Service in Poland	7
4.	Activity of Polish cartographic organizations	8
5.	Mapping and publishing activity	11
	5.1. Topographic and general geographic maps	11
	5.1.1. The databases of topographic (BDOT10k) and general geographic (BDOO) objects	12
	5.1.2. National Database Management System of Topographic Objects (KSZBDOT)	12
	5.1.3. New generation of topographic maps at the scales: 1:10 000, 1:25 000, 1:50 000,	
	1:100 000	13
	5.2. Orthophotomap and Digital Terrain Model	15
	5.3. Thematic maps and atlases	17
	5.4. School maps and atlases	23
	5.5. Atlases for the blind and visually impaired	24
	5.6. General use maps and atlases	25
	5.7. Cartographic literature	26
	5.8. Geographic names	28
6.	Education in cartography	30
7.	Research and implementation works in cartography	31
8.	Cartographic collections	35

Appendix

Selective bibliography of Polish cartographic publications 2011–2014

A.	Atlases	37
	Popular atlases of the world and Poland	37
	Thematic atlases	37
	School atlases	28
B.	Maps	39
	Topographic maps	39
	Thematic maps	39
	Wall maps for general use and schools	40
C.	Cartographic literature	41
	Catalogues of map collections and exhibitions	41
	History of cartography	41
	Contemporary cartography in Poland	44
	Geodesic bases. Cartographic projections	45
	Theoretical and methodological problems	45

Topographic and thematic mapping	46
Map perception and use	47
Toponyms in and for cartography	47
DTM. Remote sensing. Cartography in Internet	48
GIS. Spatial Information Infrastructure	49

1. Introduction

The National Report on the cartographic activities in Poland from 2011-2014, addressed to the delegates of the 16th General Assembly of the International Cartographic Association in Rio de Janeiro, Brazil, is the eleventh such a report that has been prepared by the Polish cartographers since the moment of the admission of Poland as a member of the Association in 1964. The previous reports were sent to the General Assemblies in New Delhi (1967), Moscow (1976), Tokyo (1980), Perth (1984), Morelia (1987), Barcelona (1995), Ottawa (1999), Durban (2003), Moscow (2007) and Paris (2011). The current Report, just as the above mentioned, has been mainly compiled on the basis of reports provided by the offices, research and training centers, organizations, libraries and publishers. The information, posted on the websites of these institutions and published recently for various occasions in different professional journals and the documents of the conferences dedicated to the cartography as well as to the related disciplines, has been used in this Report.

This Report has been prepared in the Institute of Geodesy and Cartography in Warsaw on the initiative of the Polish National Committee for International Cartographic Association and its editing has been financed by the Head Office of Geodesy and Cartography.

The structure of the contents of Polish reports has been rather consistently maintained for the several decades, but since the editing of the previous report, adressed to the 15th General Assembly in Paris, it has been changed and adjusted to the guidance received from the ICA Secretary-treasurer in early 2011. It begins therefore at the information about the Polish contribution to the activities of the ICA. In earlier reports this information was placed at the end. The current report informs widely about the activities of various associations dealing with the issues of cartography and geomatics, about the recent works relating to the official cartography, particularly about the maps being developed for the needs of environmental protection. The researches and implementations of innovatory technologies in the production of topographic and thematic maps are exposed. A separate place is dedicated to the important for the contemporary cartography issues of geographical names. But on the other hand, the information on the production of the school maps (with the exception of the original Atlas of the World for blind and visually impaired) as well as the information about the abundant production of maps and atlases for general use (both the scope and the level of this production are basically the continuation of the situation from the previous years) is limited to the basic data.

A specific feature of all Polish national reports is their last separate part: the selective bibliography of cartographical publications, which were released in the successive four-year periods. The bibliography closing this Report takes into account more important atlases and maps (most of all the official topographic and thematic maps), and then the selected academic manuals, monographs and scientific articles reflecting the interests and research results of Polish specialists in various fields – from the history of cartography and theoretical problems to the use of modern digital technologies and infrastructure of spatial information.

2. Cooperation between Polish cartographers and the International Cartographic Association (ICA)

The active participation of Polish cartographers in various forms of activity of the International Cartographic Association has a long, half-century tradition. Poland was accepted into this prestigious organization as early as in 1964 and it has belonged to the most active ICA members since. In the past, two representatives of Poland – Prof Lech Ratajski and Prof Andrzej Ciołkosz – served as the Vice-Presidents of the Association, four Poles became the Heads of various commisions, and two – Prof Stanisław Pietkiewicz in 1982 and Prof Andrzej Ciołkosz in 2003 received the Honorary Membership of ICA. The Poles hosted the 11th International Conference in Warsaw in summer 1982 and organized several meetings of

The official national representative of Poland in this Association is the Institute of Geodesy and Cartography, which has been fulfilling this function within ICA since 1964, i.e. since the very beginning. Poland's participation in various events and initiatives organized by ICA is coordinated by the National Committee for ICA. The Committee was established in 1976 at the Institute of Geodesy and Cartography. It includes 27 members represented the main cartographic institutions and organizations in Poland related to the cartography. Prof Andrzej Ciołkosz had been a Chairman of this Committee by March 2015; currently Prof Robert Olszewski from the Department of Cartography of the Warsaw University of Technology has been fulfilling this function. The Committee maintains the regular contacts and cooperates with the authorities of the International Cartographic Association, provides the Polish participation in various cartographic conferences (by preparing national reports, motions, opinions, initiatives, exhibits for international exhibitions and competitions), organizes international cartographic events in Poland. It is also a medium for the exchange of information related to the activity of the ICA commissions and working groups.

Polish delegation took part in the previous 15th General Assembly of the International Cartographic Association in Paris in August 2011. Poland was one among 30 countries which submitted their national reports to the Assembly. A large, 43-person group of cartographers from Poland, who presented 18 papers and 11 posters, was involved in the 24th International Cartographic Conference which held at the same place and time. Poland was also traditionally present at the International Cartographic Exhibition that accompanied the conference, showing 16 maps and 3 atlases, and at the exhibition of children's works prepared for the Barbara Petchenik Children's Map Competition.

The 25th International Cartographic Conference in Dresden in August 2013 was attended by 37 people from Poland, some people took the opportunity of the arrival only on one selected agenda day. Polish participants presented the readings of 13 papers and showed 22 posters. At the Cartographic Exhibition 4 atlases and 8 maps were presented by Poland. In the competition accompanying the exhibition, in the category "Special Cartographic Products", the innovatory Atlas of the World for blind and visually impaired (described in chapter 5.5 of this Report) was awarded the Second Price.

Polish cartographers also participates in the grand conferences organised by the Association or with its participation; among others conferences, the Poles participated in Joint ICA Symposium "Maps for the future. Children, Education and Internet" in Orleans (2011), in the meeting of the Commission on Maps and the Internet in Paris (2011), in the IVth Symposium on "Digital Approaches to Cartographic Heritage" in Barcelona (2012), in the meeting of the Commission on Cartography and Children in Dresden (2013) and in the Vth International Jubilee Conference on Cartography and GIS "Cartography for the society" as well as in the seminar on the cooperation within the European Union in the scope of early warning and crisis management in Riviera Holiday Club, Bulgaria.

In the period under Report, Polish cartographers took part in the works of the following commissions and working groups of ICA:

- Commission on Cartography and Children;

Commission on Cartography in Early Warning and Crisis Management;

- Commission on Cognitive Visualisation;

 Commission on Digital Technologies in Cartographic Heritage;

- Commission on Generalization and Multiple Representation;

- Commission on Geospatial Infrastructure and Standards;

- Commission on Map Projections;

- Commission on Maps and the Internet;

- Commission on Mountain Cartography;

Commission on Open Source Geospatial Technologies;

- Commission on Theoretical Cartography;

- Commission on Ubiquitous Mapping.

Among 35 ICA affiliated members there are one organization and one enterprise from Poland: Association of Polish Cartographers and Eco-Graf Cartographic Publishing House in Wrocław.

Polish cartographers contribute to the content of the official bulletin "ICA news – Nouvelles de l'ACI", edited by Igor Drecki, the Warsaw University absolvent, who lives and works in New Zealand.

3. Organization and tasks of the Geodetic and Cartographic Service in Poland

According to the act of May 17th, 1989 entitled "Geodetic and Cartographic Law", the Geodetic and Cartographic Service in Poland shall consist of:

1) Geodetic and cartographic supervisory bodies:

- Surveyor General of Poland,

 Voivodes executing their responsibilities through voivodship geodetic and cartographic supervision inspectors in the 16 voivodships;

2) Geodetic and cartographic administrative bodies:

 Chairmen of Voivodship Assembly executing their responsibilities through voivodship surveyors from the 16 voivodships,

 County chief Officials executing their responsibilities through county surveyors as well as commune heads and mayors.

The responsibilities of the Geodetic and Cartographic Service are defined in the Geodetic and Cartographic Law and in the Spatial Information Infrastructure Act. These responsibilities include:

1) to implement national policy in geodesy and cartography;

2) to provide survey and cartographic supervision of public offices, public institutions and businesses;

3) to organize and finance geodetic and cartographic operations;

4) to initiate scientific research and R&D work in geodesy and cartography;

5) to distribute and maintain a register of professional qualifications;

6) to manage and update national geodetic and cartographic resource;

7) to produce topographic and thematic maps of the country and the basic map;

8) to manage the national register of borders and the area of administrative divisions;

9) to arrange:

 the databases of general geographic entities, at the scale 1:250 000 or smaller;

 integrated databases of topographic entities, at the scales 1:10 000 – 1:1000 000, incl. Digital Terrain Model;

air photos and satellite images and orthophoto banks;

standard cartographic works at the scales
1:25 000, 1:50 000, 1:100 000, 1:250 000, 1:500 000,
1:1 000 000;

thematic and special cartographic products;to develop and submit the governmental pro-

grams for realization of survey and cartography objectives;

11) to create a system and a program of training in survey and cartography and cooperating with the research centers, R&D centers and professional organizations for the realization of such training.

The Surveyor General of Poland is the main administrative body in the terms of geodesy and cartography. It is supervised by the Minister of Administration and Digitalization. The Surveyor General of Poland executes his responsibilities through the central administration body: the Head Office of Geodesy and Cartography, where the Surveyor General serves as the Chairman. The Surveyor General is aided by the Deputy Surveyor General of Poland, the Chief Executive and lower organizational directors. One of them is the Department of Geodesy, Cartography and Geographic Informational Systems. The Surveyor General of Poland is appointed by the Prime Minister, based on a competition, for a 5-year term. Since 2012 Dr. Eng. Kazimierz Bujakowski has been fulfilling this function.

The State Geodetic and Cartographic Council and the Commission on Standardization of Geographical Names Outside the Republic of Poland work at the Surveyor General of Poland. The State Geodetic and Cartographic Council is an opinion-making and advisory body. The National Geodetic and Cartographic Documentation Centre works at the Head Office of Geodesy and Cartography. It is the budget economy institution. Surveying documents, air photos, cartographic products are collected, stored and shared here. All these documents are the Surveyor's General of Poland publications. Moreover, there are the Voivodship Geodetic and Cartographic Documentation Centres in the Marshal Offices of all the 16 voivodships.

*

The separate important place in the Polish cartography is occupied by the geographical service of the Polish Armed Forces operating within the organizational structure of the Ministry of National Defence. Until the last reorganization in early 2012 it had belonged to the Intelligence and Reconnaissance Analysis Executive Board of the General Staff of the Polish Armed Forces. Currently it is an independent organisational unit of the Ministry of National Defence known as the **Military Geography Directorate**. The Military Geographic Centre in Warsaw as well as the specialized military units in Komorowo, Toruń, Leszno are submitted to its authority. The main purposes of the Military Geography are the execution and acquisition of the analogue and digital geographical products, primarily the topographic maps, for the needs of the Polish Armed Forces.

4. Activity of Polish cartographic organizations

Since 1999, when Stowarzyszenie Kartografów Polskich (the Association of Polish Cartographers -APC) was established, Poland has belonged to the countries in which cartographers have been acting within their own independent professional organization. Apart from this Association, there are another autonomous teams of cartographers organized within the structures of other associations and research institutions in Poland. These are: Oddział Kartograficzny Polskiego Towarzystwa Geograficznego (Cartographical Division of the Polish Geographical Society) and Zespół Historii Kartografii przy Instytucie Historii Nauki Polskiej Akademii Nauk (Team for the History of Cartography at the Institute of History of Science, Polish Academy of Sciences). Moreover, such organizations as Polskie Towarzystwo Informacji Przestrzennej (Polish Association for Spatial Information) and Komisja Geoinformatyki Polskiej Akademii Umiejętności (Commission of Geoinformatics of the Polish Academy of Arts and Sciences) also deal with the issues related to the cartography.

Association of Polish Cartographers (APC) is a professional, scientific-technical organization uniting the Polish cartographers on the basis of voluntary membership. By the end of 2014 APC had numbered 180 normal members and 5 supporting members. Ms Joanna Bac-Bronowicz, Prof Dr. Eng., from the Department of Geodesy and Geoinformatics, Wrocław University of Technology, became the Chairperson of the Executive Council of APC in 1999, since the very beginning of the Association, and she has been fulfilling the duties since.

The main objectives of the Association are: representing the interests of the specialists practicing the profession of a cartographer, protecting the copyright of cartographers, rising the qualifications of its professional members, popularizing knowledge about cartography among the society and cooperating with the local and national government in the scope of cartography.

These tasks are fulfilled by organizing the conferences, symposia and competitions, publishing the reports on the pressing situation of today in the contemporary Polish cartography and the participating in the collaboration on legal acts and other documents concerning the cartography with the Head Office of Geodesy and Cartography. The cooperation with this Office is based on the strength of special agreement signed in January 2005.

In September 2011, the Association co-organized the 6th National Geoinformational Symposium (in the partnership with the Commission of Geoinformatics of the Polish Academy of Arts and Sciences) combined with the interdisciplinary seminar "The geographical names as a georeferential registry" (prepared together with the Head Office of Geodesy and Cartography) in Polanica-Zdrój.

In September 2012, The Association of Polish Cartographers co-organized the special forum on "Vocational training and improvement of professional qualifications of surveyors and cartographers" in Warsaw and Zegrze; in May 2013, APC organized the 4th Professional Cartographic Conference on "Acting capacities of a cartographer and a photogrammetric specialist". These conferences were organized in the partnership with the Polish Association of Photogrammetry and Remote Sensing, the Institute of Geodesy and Geoinformatics of the Wrocław University of Environmental and Life Sciences and the Department of Geoinformatics and Cartography of the Institute of Geography and Regional Development, University of Wrocław. The law which was prepared by the Polish parliament about the planned changes in the way of gaining the acting capacities in the field of geodesy and cartography was the inspiration to both meetings. The theme of 24 papers and discussions in Wrocław was the issues of vocational training of cartographers, photogrammetric, remote sensing and GIS specialists from the point of view of gaining the acting capacities and the urgent needs of all these specialists.

The annual competition "The Map of the Year", which has been organized regularly by the Association since 2000, is one of the most popular events among the Polish cartographers. Each year more than 10 leading cartographic publishers participate in the competition. The members of the Association vote in the contest for the atlases and maps submitted by the publishers in four categories: "tourists maps", "city maps", "the wall maps and atlases for the schools" and "other printed maps and atlases". Since 2011 the competicion "The Internet Map of the Year" has been proceeding; after the death of well-deserved academic teacher from the Warsaw University of Technology, Dr Eng. Krzysztof Buczkowski, in October 2013, the main prise of his name is awarded.

The latest initiative of the Association, taken in the spring of 2014, is the organization of special training conferences every two years; these are the so-called Academies of Cartography and Geoinformatics dedicated to the people processing and sharing the spatial information by using a variety of methods of cartographic presentation and modern tools of geoinformatics. The first such an Academy on "Digital topographic maps – theory and practice" was planned for May 2015.

As it has already mentioned at the beginning of the Report, The Association of Polish Cartographers has affiliated with the International Cartographic Association and cooperated with ICA inside the scope of widely dissemination of the information about the conferences and other forms of activity of this organization.

All the conference programs, materials and other information regarding the activity of APC are published in the "Bulletin of the Association of Polish Cartographers" (25 issues have been published by the end of 2014) as well as on the Internet site: www. polishcartography.pl

Cartographical Division of the Polish Geographical Society has been acting since 2000. It carries on the traditions of the active Cartographical Commission of this Society (1965-1999). By the end of 2014 the Division had numbered 58 members. Professor Wiesława Żyszkowska from the University of Wrocław had been the Chairperson of the Executive Council by October of 2012. Now Professor Marek Baranowski from the Institute of Geodesy and Cartography, Warsaw, is at the head of this Division. The main aim of the Division's activity is the organization of cooperation and exchange of experience between research, educational and production centres which are engaged in cartography in different areas and aspects as well as the popularization of cartography, especially among numerous teachers of geography, the members of the Society. The fulfilling of these goals is mainly possible due to the organizing national conferences, seminars and cartographic schools as well as to the publishing of the own journal and other publications.

The national cartographic conferences have been organized, for the most part – annually, since 1968 in

different cities of Poland in the partnership with the local cartographic training centres and other institutions and organizations related to cartography. There were three such conferences in the years 2011–2014:

- the 35th National Cartographic Conference on "Pragmatics in cartography" in Poznań (40 papers); the conference was organized in the cooperation with the Department of Cartography and Geomatics of the Adam Mickiewicz University in Poznań and the Greater Poland's Division of the Association of Polish Surveyors, October 2012;

- the 36th National Cartographic Conference on "The efficiency of cartographic presentation" in Warsaw (26 papers); the conference was organized in the cooperation with the Department of Cartography of the University of Warsaw and the Institute of Geodesy and Cartography, October 2013;

- the 37th National Cartographic Conference on "Cartography in the multimedia – multimedia in the cartography" in Toruń (34 papers); the conference was organized in the cooperation with the Chair of Geomatics and Cartography of Nicolaus Copernicus University in Toruń and the Division of Polish Geographic Society in Toruń.

The materials from these conferences are published in abstracts in the series "Studies in Cartography" (the latest volume was published in 2012), but the selected papers are published in "The Polish Cartographical Review", a special quarterly of the Division.

Cartographical Division of the Polish Geographical Society since the very beginning of its being has been co-working with the Department of Cartography (since 2013 – with the Department of Geoinformatics and Cartography) of the University of Wrocław in organizing the annual so-called "cartographical schools" – these are multi-day training conferences composed with lectures, exhibitions and discussions.

Since 2009 the annual competitions of Master's Theses in the field of geodesy and cartography have been organised on the initiative of the Division in the partnership with different Universities where the appropriate specialists are educated.

The Cartographical Division publishes regularly a professional journal, quarterly "The Polish Cartographical Review". It is published as the continuation of the periodical that was its precursor and had been published in Lvov for 11 years (1923 – 1934) under the same title. This new Warsaw edition has been distributed since 1969. Since 2014 the Quarterly has been publishing all the articles in English.

At the end of 2014 the Division has been starting the intensive preparation for the celebration of the International Year of a Map at the national, regional and local levels. This activity is coordinated by the Chairman of the Division Professor Marek Baranowski.

Information about the Division and the report on current activities are available on the web-site www. okptg.igik.edu.pl.

Team for the History of Cartography at the Institute of History of Science, Polish Academy of Sciences has been working as an active non-institutional group of historians, archivists and cartographers dealing with the history of cartography systematically or occasionally. By the end of 2014 the Team had consisted of 20 normal members and 3 honorary members. The Chairman of the Team is Professor Radosław Skrycki from the University of Szczecin. The main objectives of the Team are: the exchange of the information and experience, inspiration, coordination and promotion of the research on ancient cartography carried out in different institutions. These goals are achieved through the organizing different conferences, scientific meetings, participating in the events popularizing the science as well as the publishing activity. The Team organizes annually a national conference for the historians of cartography in cooperation with the local research centers. During the last years, mentioned in this Report, there were four such conferences:

 25th Conference on "Space on the old maps" in Poznań (41 papers); the conference was organized in the cooperation with the Department of Cartography and Geomatics of the Adam Mickiewicz University in Poznań, September 2011;

– 26th Conference on "The mile-stones in Cartography" in Warsaw (38 papers); the conference was organized in the cooperation with the National Archives of Warsaw, the Warsaw Surveying Company and the Institute of Geodesy and Cartography, September 2012;

– 27th Conference on "The old maps as the sources of geographical and historical research" (35 papers); the conference was organized in the cooperation with the Department of Cartography and Geomatics of the Institute of Earth Sciences of the Maria Skłodowska-Curie University and the Centre for Research on Historical Cartography of the Catholic the John Paul II University of Lublin, September 2013;

– 28th Conference on "The marine cartography and the cartography of the costal lands" (11 papers); the conference was organized in the cooperation with the Institute of the History and International Relations, University of Szczecin, September 2014. The most of the papers after their presentations on the conferences is, on their extension, editing and reviewing, published in the subsequent volumes of the series "From the History of Cartography". The example of the book covers of two series volumes are presented on the Figure 1.



Fig. 1. Last volumes of the series "From the History of Cartography"

Recently the Team has expanded its activity to the other forms, e.g. to annual participation in the Warsaw Scientific Picnics as well as regional conferences, exhibitions and promotions of publications.

The information about the members, experience, current achievements and the activities of the Team for the History of Cartography are available on the web-site: www.maphist.pl.

Polish Association for Spatial Information is an interdisciplinary association that has been operating since 2003 as the continuation of the Club of Users of Electronic Computational Techniques in Surveying, founded in 1969. By the end of 2014 it had numbered 98 members. Prof. Jerzy Gaździcki has been fulfilling the function of the Chairmen of the Association since the beginning of its activity. The main objective of the Association is to support the harmonious development of geomatics for the efficient creation and implementation of the spatial information systems, the general access to the spatial data in Poland as well as their comprehensive usage. The Association strives for its goals by: supporting the development of the geoinformation infrastructure, organizing and coordinating the cooperation of interested entities, propagating the knowledge, cooperating with the other national and foreign organizations, presenting the achievements of the members of the Association.

The main forms of activity of the Association are connected with the responsibility of organizing the annual conferences, seminars, workshops and trainings

as well as publishing. For the years 2011–2014 the Association has organized four conferences in Warsaw in the series "The Geoinformation in Poland"; the results of these conferences have been published in "Annals of Geomatics". Recently the deliberations of these conferences have been focused on the creation of legal, organizational and technical basis for the Polish spatial information infrastructure as an element of the European infrastructure (INSPIRE). Within this period, the Association has published 22 issues of "Annals of Geomatics", the science periodical. They are available on the Internet site of the Polish Association for Spatial Information: www.ptip.org.pl. In the Lexicon Section, one can find an online dictionary of geomatics which includes nearly 1000 entries in Polish with their counterparts in English as well as Polish definitions. Among them, there are various terms related to the cartography. The Association has joined to the International Year of the Map, when planning to organize an assigned scientific session devoted to the relations between geomatics and contemporary cartography during the Annual Conference of the Association in 2015.

Commission of Geoinformatics of the Polish Academy of Arts and Sciences, affiliated with the Faculty of Natural Sciences of Polish Academy of Arts and Sciences in Cracow, was created in 1998. The Chairman of the Team is Professor Tadeusz Chrobak from the Stanisław Staszic Academy of Mining and Metallurgy in Cracow. The main tasks of the Commission are: exchange of the experience between specialists in various disciplines in the field of geoinformatics, stimulation of the development of the science and promotion of its results. Members of the Commission are the scientists from the various fields of science: cartography, geology, geophysics, geodesy, photogrammetry and remote sensing, mining, informatics, forestry and geography. The activities of the Commission are connected with the monthly scientific seminar meetings and organization or co-organization of the national and international conferences. During the years 2011–2014, as a part of the meetings of the Commission, about 30 papers have been presented, 9 of them have been related to the field of cartography. The authors of these papers were scientists from different research centers in Poland and abroad, many of them have published their speeches in the form of articles in the periodical "Geomatica Polonica" (http://www.degruyter.com/view/j/gein).

In 2013 the Commission of Geoinformatics of the Polish Academy of Arts and Sciences in the cooperation with the Department of Mining Geodesy and Environmental Engineering of the Academy of Mining and Metallurgy in Cracow organized the scientific seminary on "The problems of cartographical generalization of today's resources topographical data" (14 papers).

5. Mapping and publishing activity

Head Office of Geodesy and Cartography is responsible for the development and publication of official maps in Poland. Maps for the Armed Forces are published by the Polish Army geographical service and maps and atlases for scientific and economic research are developed and published by national research institutes: mainly Polish Geological Institute – National Research Institute and the Institute of Meteorology and Water Management – National Research Institute, various institutes of the Polish Academy of Science and universities as well as some of the science societies and geodetic and cartographic enterprises.

Many privately owned companies and cartographic publishers operating in the Polish market publish general use maps, e.g.: school, road and tourist maps.

5.1. Topographic and general geographic maps

The tasks of the **Surveyor General of Poland** in the scope of the standard topographic and geographic maps are defined by the Geodetic and Cartographic Law of May 17, 1989, with the amendments.

The above mentioned Act provides the legal framework for the realization of the objectives in the scope of managing databases, i.e. the databases of topographic objects (BDOT10k) with the detailed elaboration providing the creation of standard maps at the scales $1:10\ 000\ -\ 1:100\ 000$, and furthermore, the databases of general geographic objects (BDOO250k) with the detailed elaboration providing the creation of standard cartographic works at the scales $1:250\ 000\ -\ 1:1\ 000\ 000$.

On December 01, 2011, it entered into force the Ordinance of the Ministry of the Interior and Administration of November 17, 2011, on the databases of topographic objects and the databases of general geographic objects as well as on the standard cartographic works. This Ordinance lays down:

1) the scope of the information collected in the database of topographic objects; 2) the scope of the information collected in the database of general geographic objects;

3) the organization, procedure and technical standards for the creating, updating and sharing of these databases;

4) the procedure and the technical standards for the creating of standard maps at the following scales: 1:10 000, 1:25 000, 1:50 000, 1:100 000, 1:250 000, 1:500 000, 1:1 000 000.

5.1.1. The databases of topographic (BDOT10k) and general geographic (BDOO) objects

The Head Office of Geodesy and Cartography, in the framework of the realization of the project "Geo-

- the generalization of each object class - it depends on the object class whether it is an automatic or semi-automatic process;

– the implementation of the processes of data simplification and saving them to the structure divided into the data sets corresponding to the individual voivodships in accordance with the ordinance.

As the result, the entire area of Poland is covered by the homogeneous (with regard to the quality and validity) BDOT10k and BDOO databases, which include the information about the object classes, among other things, there are such as: sewage network, road and railway networks, utility networks, constructions and facilities, land utility complexes, protected areas, administrative divisions, elements of relief.



Fig. 2. Functional diagram KSZBDOT

referenced Database of Topographic Objects (GBDOT) with the national system of management", finished the working on the construction of the databases BDOT10k and BDOO (which was created as a result of generalization of the base BDOT10k) in 2014.

Because of the project the processes of automatic generalization of the database BDOT10k using the type of ETL software (*Extract, Transform and Load*) have been implemented.

The implemented processes relied on:

the pre-selection of the data from the database
 BDOT10k based on the criteria set out in the ordinance;

5.1.2. National Database Management System of Topographic Objects (KSZBDOT)

In the years 2012–2014 the National Database Management System of Topographic Objects (KSZBDOT) has been implemented in the Head Office of Geodesy and Cartography.

This management system is created as a tool used to update and to process the data from the BDOT10k and BDOO databases. The data from the management system are available on www.geoportal.gov.pl both for the private users and for the other spatial information systems using the spatial data services. The solutions used in KSZBDOT greatly simplify the data management in the centers of geodetic and cartographic documentation; such a management contributes to the quality improvement of the data sets and to the efficient development of the spatial databases in Poland (Fig. 2).

National Database Management System of Topographic Objects (KSZBDOT) enables, among other things:

- updating the data sets BDOT10k, BDOO;

supporting the process of standard cartographic works' update;

disseminating the spatial data as well as the metadata for the publication by the OGC service through the portal www.geoportal.gov.pl;

controlling that is efficient and compatible with the technical standards of the data accepted to the national geodetic and cartographic resource;

- assessing the quality of the data sets;

- generalizing the BDOT10k base to the BDOO base using the FME tool.

5.1.3. New generation of topographic maps at the scales: 1:10 000, 1:25 000, 1:50 000, 1:100 000

In the years 2011–2014 the topographic maps at scale 1:10 000 were gradually elaborated and published, in accordance with the Ordinance of the Ministry of the Interior and Administration of November 17, 2011, on the databases of topographic objects and the databases of general geographic objects as well as on the standard cartographic works. By the end of 2014, 345 sheets of such a new detailed map had been elaborated and published; 1539 sheets have been publishing since, which together make up 12% of all 16191 sheets covering the Polish area. (Fig. 3).

Sheet N-34-61-A-c-2 Szymbark (edition with shading) of the Polish topographic map at scale 1:10 000 was rewarded in a competition of the Association of Polish Cartographers "Map of the Year" (2013) in category "Other maps and printed atlases" (Fig. 4).

In 2014, due to the new standards, the model sheets of the topographic maps were developed and pub-



Fig. 3. Index of the sheets of topographic maps at the scale 1:10 000 elaborated in years 2011–2014

lished at the scales 1:25 000, 1:50 000, 1:100 000. The maps of a new generation have been created taking into account the requirements set out in the above mentioned Ordinance of November 17, 2011, *on the databases of topographic objects and the databases of general geographic objects as well as on the stand-ard cartographic works*.

The task included the preparation of the maps in two variants (variant1 – elaboration in accordance with the Ordinance, variant 2 – elaboration enriched by the relief shading) for:

- 8 sheets of map at the scale 1:25 000;
- -2 sheets of map at the scale 1:50 000;
- -2 sheets of map at the scale 1:100 000.



Fig. 4. Sheet of the Topographic Map of Poland at the scale 1:10 000 awarded by the Association of Polish Cartographers



Fig. 5. Selected topographic maps of a new generation

The result of the elaboration and the conclusions caused by the implementation will be used to develop the final details of the assumptions for the whole scale range of the civilian topographic maps in Poland. At the same time the accomplishment of this pilot project is an important experience before the planned implementation of the production of topographic maps in Poland in 2015–2018 (Fig. 5).

5.2. Orthophotomap and Digital Terrain Model

The Surveyor General of Poland establishes and maintains the databases of the spatial information infrastructure in the ITC system for the total area of Poland.

One of the several bases conducted by the Surveyor General of Poland is the database of the aerial and satellite images as well as the orthophotomaps and digital terrain model conducted due to the standards prescribed in the Ordinance of the *Minister of Internal Affairs and Administration of November 3, 2011, on the aerial and satellite images, orthophotomaps and digital terrain model.*

Orthophotomap is a cartometric, photogrammetric elaboration worked out to create and update the maps, databases of topographic and general geographic data, registries of land and buildings. It is also used for planning as well as in the various constructional works. The Polish area is covered with the colourful digital orthophotomaps of the terrain pixel 25 cm and 50 cm (Index – Fig. 6) performed in the three-year updating cycle on the basis of photogrammetric digital aerial photos that are taken in the real colours (RGB) and in the falsified ones (near-infrared CIR) (Fig. 7).

In addition to these two standards performed periodically for the whole country territory, for the last four years the orthophotomaps with higher resolution (0,15 m and 0,10 m) have been performed for the needs of the low-level administration (counties and cities) from their own budgetary means. Moreover in 2011–2013, it was developed a highly-resolution orthophotomap in real colours of the dimension of terrain pixel 10 cm for the territory of 203 cities, towns and urban agglomerations with the total area of 20 000 km².

In parallel, with the increase in interest and demand for the digital orthophotomaps, the demand for the elevation data in Poland is growing. From the same images, which are used for the development of orthophotomaps with the pixels of 0,25 m and 0,5 m, it has been made a digital terrain model for the whole country with an accuracy of altitude for the exposed areas of 0,6–0,8 m and 1,0–1,15 m. An incomparably



Fig. 6. Polish orthophotomap coverage of pixel 0,5 m and 0,25 m



Fig. 7. Aerial photos taken with digital camera made in real and infrared colours

- land use maps;
- technical infrastructure maps;
- maps of medium prices of transactional lands;
- maps of territorial divisions of the country.

In 2011–2014 different bodies of the Geodetic and Cartographic Service continued to perform and pub-



Fig. 8. Digital Terrain Model developed on the basis of data ALS

For the last four years a series of works has been fulfilled for the development of the flood risk maps. The elevation data have been developed, acquired with the help of an air laser technology scanning LIDAR: NMT-Digital Terrain Model (Fig. 8) and NMPT-Digital Terrain Surface Model for the area of approximately 258 730 km².

5.3. Thematic maps and atlases

According to the Geodetic and Cartographic Low, the Surveyor General of Poland performs, conducts and provides the cartographic thematically special elaborations. On October 3, 2011 was signed the *Ordinance of the Council of Ministers on the cartographic thematically special elaborations*. Under that Regulation, the Surveyor General of Poland performs and makes available in digital form, among other things, the following:

- hydrographical maps;
- ecological maps;
- geomorphological maps;
- agricultural and soil maps;
- land cover maps;

lish the hydrographical and ecological maps. At the same time the Surveyor General of Poland realized the pilot tasks associated with the elaboration of the geomorphological maps for the test areas. In addition, since July 2013 the Surveyor General of Poland has been realizing the Project on "Database Model of Spatial Data of the Natural Environment along with the Management Systems in the Context of Cartographic Thematic Studies", developing the existing works related to the elaboration of the thematic Hydrographical Map of Poland at the scale 1:50 000 by the Geodetic and Cartographic Service.

Hydrographical Map of Poland 1:50 000 is a thematic map presenting the synthetic approach to the circulation of water in the relation to the natural environment, its redevelopment and transformation (Fig. 9). It is developed on the basis of a topographic map by adding the results of the land mapping of water entities and objects, soil permeability and the other numerous information related to the water management, water quality control and the network data of the hydrosphere monitoring.

The hydrographical database is necessary for solving the social-economic problems, such as: the water



Fig. 9. Hydrographical Map of Poland at the scale 1:50 000 (fragment)



Fig. 10. Coverage of territory of the country by the Hydrographical Map of Poland at the scale 1:50 000



Fig. 11. Ecological Map of Poland at the scale 1:50 000 (fragment)



Fig. 12. Coverage of territory of the country by the Ecological Map of Poland at the scale 1:50 000

supplies, locations of housing complexes, industrial and hydropower investments as well as the land reclamation investments (when the land is reclaimed from water), spatial development plans, flood prevention and early flood damage control, as well as the other issues related to the water management.

In the years 2011–2014, 82 new sheets of hydrographical maps were developed and published, which together with the previously published sheets constitutes 66,5% of the coverage for the entire country (Fig. 10).

Ecological Map of Poland 1:50 000 is a thematic map presenting the state of the natural environment, causes and effects of the changes exerted by the various processes, especially by the human activity and the forms of protection of the natural value of the environment (Fig. 11).

The ecological database is a useful source of the information on the environmental pollution providing an invaluable tool for researching and diagnosing its condition. It may also be used as a synthesis indicator of the natural environment of different spatial units, whereas its numerical version offers a chance to acquire, collect and visualize the geographical data with the constant update of the databases. In the years 2011–2014, 123 new sheets of the ecological maps were developed and published, which together with the previously published sheets constitutes the 65,6% of the entire coverage of the country (Fig. 12).

The hydrographical and ecological maps are developed on the basis of technical requirements specified by the Surveyor General of Poland: "GIS-3" – for the hydrographical maps and "GIS-4" – for the ecological maps. Both maps are being developed in analogue and digital versions using the GIS technology in the MapInfo Professional environment. VMap Level 2 database is used as a reference database of the topographical data for both thematically elaborated maps; its geometric precision corresponds to the map at the scale 1:50 000.

Currently, both maps are being developed on behalf of the Marshals of Voivodships. The works are coordinated by the Head Office of Geodesy and Cartography. These maps are addressed primarily to the institutions and offices as well as to the policy makers and planners at the regional, provincial, district and commune levels dealing with the formation and protection of the environment, spatial planning and water management issues.



Fig. 13. Digital Geomorphologic Map of Poland at the scale 1:100 000 (fragment)

The ecological map is especially useful in the spatial planning for the localization of the new economic units (incl. industrial units) and communal ones (incl. housing), the recreation centers, etc. This map constitutes a source of the information for the natural ecological maps at the smaller scales and for the other thematically related maps. **Digital Geomorphological Map of Poland** at the scales 1:100 000 and 1:500 000 is another thematically developed maps, the elaboration and sharing of which belong to the tasks of the Surveyor General of Poland. This map shows the variety of the Earth's surface forms, their location, origin and age (Fig. 13). Much attention was paid to the anthropogenic forms that convert the natural features of the Earth's surface. This map can be used for the spatial planning, among other things, for the location of the various kinds of investments or for the urban-architectural works. The geomorphologic database, combined with the other databases, can be the basis for the advanced spatial analysis conducting. In the years 2013–2014 8 maps of the test areas were elaborated (each area is not less than four sheets of a map at the scale 1:50 000) at both scales, which cover about 3% of the country (Fig. 14).



Fig. 14. Test areas of the Digital Geomorphological Map of Poland

The **Project "Model of the Spatial Database on the Natural Environment and Management System in the Aspect of Thematic Cartographic Studies** – **enviDMS"** has been realizing since July 2013 by the Head Office of Geodesy and Cartography in the cooperation with the foreign partner – Kartverket (Norwegian Mapping Authority) and the domestic partner – National Water Management. The agreement on the graft contract was signed on July 3, 2013. Time limit for the implementation of this project expires in April, 2016.

The project constitutes the development of the previous works related to the elaboration, carried on by the Geodetic and Cartographic Service, of the thematic Hydrographical Map of Poland at the scale: 1:50 000. This map, compiled in the analogue and database versions, does not have the harmonised model of the spatial database and management system, which would allow the integration with the other registers and would provide universal access to the data they contain. The aim of the project is to improve and dissimilate the thematic information provided by the Geodetic and Cartographic Service by the elaboration of the model of the spatial database related to the natural environment in Poland; particularly those, involving the efficient hydrographic data and the system of their management.

The geological mapping is one of the basic tasks and the basis of statutory activity of the **Polish Geological Institute – National Research Institute** (**PGI-PIB**). The Polish Geological Institute – National Research Institute elaborates the thematic maps in the scope of geology, hydrogeology, engineering geology, economic geology, geophysics and geochemistry of the environment, covering the entire territory of Poland. All the maps are elaborated in the digital forms and supply the geographic information system. The Institute conducts the work on thematic maps in the scope of geology. It carries out the work on the use of the map potential for series at the scale 1:50 000 to be prepared for the synthetic presentations at the scales 1:200 000 – 1:500 000.

The Institute has finished the second edition of the *Geoenvironmental Map of Poland* in two series (3288 sheets totally) at the scale 1:50 000, financed by the National Fund for Environmental Protection and Water Management (Fig. 15). Currently the Institute has been working on the conception of the further development of this map in the modified form and content.

The works on the new version of Geoportal IKAR (ICARUS), which will be transformed into the place of access to the whole information from the databases of the Institute, are going on. The system combines the existing and new solutions in geological, hydrogeological, geoenvironmental and geoeconomical mapping. Recently the new metadata catalogue and mapping browser have been made available. These tools, fast and reliable, allow to reach the data, you are interested in. By IKAR the Lithogenetic Map of *Poland* is disseminated. It arises as the result of digital processing of the information contained in the database SPECIFIC Polish Geological Map as well as terrain verification of genetic lithological boundaries. By the year 2010, 400 sheets had been edited; since 2010 the work on the next 300 sheets has been starting. The full edition of the map will end up around 2019.

The hydrogeological as well as the geoeconomical maps are available in both paper and electronic forms. The hydrogeological map is visible in the mapping



Fig. 15. Exemplary sheet of the Geoenvironmental Map of Poland, scale 1:50 000 (two series), published by the Polish Geological Institute

browser e-PSH, on the other hand the geoenvironmental map is available in the map service e-MGśP.

For the tourists' needs the Institute has developed and delivered another 5 geological-tourist maps, showing the National Parks and 8 geological-tourist maps of the landscape parks (Fig. 16). resources, waste management, treatment of waste sediments.

IMWM NRI provides the moderators of websites forecasts in the form of numerical relationship maps. IMWM NRI also conducts research in hydrography. In the reporting period, a new version of the database



Fig. 16. Geological-tourist maps of Polish National Parks published by the Polish Geological Institute

The Institute of Meteorology and Water Management – National Research Institute (IMWM NRI) represents Poland at the World Meteorological Organization. Its main objectives are to conduct research and to perform the function of national institution in the scope of: meteorology, hydrology, oceanography, water management and engineering, quality of water for the *Map of the Hydrographic Division of Poland* was developed (according to the Water Framework Directive of the EU) and *Atlas of extreme meteorological phenomena and synoptic situations in Poland* was issued. Work was also conducted on the database of regional and local flood areas of various genetic types, which was designed to help flood prevention

planning and spatial development. More information on the Institute's activity: http://www.imgw.pl/

Hydrographic Office of the Polish Navy (HOPN) fulfils in Poland the function of the national hydrographic office and navigational signage in the scope of marine hydrography and cartography. Within this function, HOPN represents Poland at the International Hydrographic Organization (IHO). HOPN is also responsible for navigational-hydrographic and meteorological-oceanographic services of the Polish Navy.

HOPN acquires and analyses marine geo-spatial information data, manages digital navigational and oceanographic databases and databases of underwater objects within Polish sea territory, edits paper editions of navigational charts and atlases and issues nautical publications, develops Electronic Navigational Charts and specialist products.

Collection, production, processing and managing of national ad international exchange of nautical information is the main task of the Nautical Information Department of the HOPN.

Editing and preparing for print analogue navigational charts and atlases is the main task of the Nautical Cartography Department of the HOPN. The Department publishes Polish navigational charts as part of international series (INT) and Polish series. Polish navigational charts fulfill the standards set by IHO.

Development of vectorial Electronic Navigational Charts (ENC) is one of the tasks of Hydrographic Department of the HOPN. They are used in Electronic Chart Display and Information Systems – ECDIS). HOPN is the sole author of ENC for the Polish territorial waters. http://www.hopn.mw.mil.pl/

In the years 2011–2014 more than 20 scientific atlases with different content and the territorial scope were published in Poland. Besides the *Atlas of meteorological hazards*, three more atlases were edited related to the environment and its protection. There were *Radiation atlas of Poland* (2011), *Atlas of the possible use of geothermal waters* (2014) as well as, worthy honourable mention, *Roztocze National Park* – *nature and man* (2013), comprehensively showing the nature of this attractive region.

The typical cartographic presentations of the statistical data in the administrative division units were *Atlas of population mortality in Poland* (2012) and *Statistical atlas of Lublin voivodshaft* (2014).

The edition of the last part of the *Historical Atlas* of *Poland* with maps of voivodships in the second half of the 16th century is a manifestation of the activity of Polish historians; this Atlas was elaborated in the **Institute of History of the Polish Academy of Sciences.** In 2014 an English edition of all previous volumes of the series *Historical Atlas of Poland. The detailed maps of the XVIth century*, also in the form of e-book, was edited by the publishing house Peter Lang in the form of a single publication: *Historical Atlas of Poland in the 2nd Half of the 16th Century. Voivodeships of Cracow, Sandomierz, Lublin, Sieradz, Lęczyca, Rawa, Plock and Mazovia (vol. 1. Maps, vol. 2 Commentary, vol. 3 Bibliography and Indices).* The *Atlas of Sources and Materials for the History of Old Poland* http://atlasfontium.pl/ is the place for publishing the authors' own source editions and studies. Additional information: http://www.ihpan.edu.pl/.

Moreover the edition of the 5-volumed *Historical Atlas of Polish Towns* is continued; it is coordinated by the Nicolaus Copernicus University in Toruń. Recently the following four fascicles of this atlas have been published, i.e.: *Chojnice*, *Świecie*, *Ziębice* and *Sandomierz*.

5.4. School maps and atlases

Cartography for schools has a long tradition in Poland. The first school atlases were published already in the 18th century. The Romer school of cartography, estabilished in Lvov by Professor Eugeniusz Romer (1871–1954), a distinguished Polish geographer and cartographer, was widely known in the first half of the 20th century for its ingenuity and originality, which are still alive today.

The ideas of the Romer's school were continued after the World War II mainly in Wrocław, where the Lvov publishing house Książnica-Atlas resumed its activities. The Cartographic Team of large **Nowa Era** publishing house is its successor. The publishing house has the widest range of products for the field of school cartography in Poland.

Its cartographic publications offer contains over 200 titles including 10 atlases, nearly 100 wall maps (hypsometric, political and thematic) and educational boards. The most popular in this offer are atlases for nature study in primary schools, *Geographical atlas, Poland, continents, the world* for upper-secondary schools, the set of historical atlases for all levels of teaching entitled *From the antiquity to the present day*, new atlas to the subject citizen ship and series of two-sided geographical and historical maps of Poland, chosen foreign territories and the world.

Since 2010 the range of publishing has been widened by several interactive publicatins, for instance



Fig. 17. Maps and atlases of the Nowa Era publisher

the *Interactive historical atlas*. From antiquity to the present day or *E-Maps* presenting economic data with the exercises for students.

Some examples of the Nowa Era cartographic products issued in the years 2011–2014 are presented on the Fig. 17.

School and Teaching Publishers (Wydawnictwa Szkolne i Pedagogiczne – WSiP) in Warsaw publish course books and atlases for all levels of education. Within the period 2011–2014 they have published two atlases: *Atlas to nature study for primary schools* and *Geographical atlas for secondary schools*.

Recently school atlases have also been published by **PWN School Publishers** in Warszaw. These up-to-dated and modernized editions of geographical and historical atlases have been prepared before 2007 by Demart publisher.

Specific feature of the Polish educational cartography is the unique series of atlases and maps adressed to the blind and visually impaired persons. The latest atlas of this category is worth a separate presentation below.

5.5. Atlases for the blind and visually impaired

The Head Office of Geodesy and Cartography has been elaborating and publishing the specifically designed maps and atlases for the blinds and visually impaired people for more than thirty years. Thanks to this initiative it was possible to support the schools and other educational institutions in the scope of the educational aids for this special mapping users.

The latest typhlological publication called the *Atlas* of the World for the blind and visually impaired was edited by the **Head Office of Geodesy and Carto-graphy** in 2012. This atlas is made in the relief technique using colour underprinting, it consists of 38, stored in a folder, loose map sheets charts divided into two volumes. (Fig. 18).

The basic format of the Atlas is an A3 format. The first part of the Atlas, printed on A3 paper, consists of 23 maps at the scale 1:90 000 000. It is dedicated to the natural environment (12 maps) as well as to the socio-economic issues (11 maps) from the global perspective. Whereas the second part of the Atlas is the overview of the continents and great regions, presented on 15 maps at the scales from 1:10 000 000 to 1:40 000 000. In this part the different continents have been presented in two maps, the first one is devoted to the political division of the continent, the second one presents the relief. On two separate sheets is posted a common thematic legend.



Rys. 18. The geographical Atlas of the Word for the blind and visually impaired people and a sample of the map



Fig. 19. The Atlas of the World for the blind and visually impaired awards by ICA and the Association of Polish Cartographers

The convex graticule as well as the scale facilitating the comparison of the areas are used in this atlas. This atlas contains an extensive commentary which includes the instruction of reading the maps and the description of presented issues. The previously used form of the attachment performed in the Braille writing is replaced by an electronic file, which can be opened with the help of every speech synthesizer application. Thanks to this innovative solution, it is possible to find the information, in which the blinds and visually impaired people are interested in, quickly and easily.

In 2013 the Atlas won 3 awards at the 26th International Cartographic Conference ICA in Dresden as well as 2 national awards (Fig. 19), but in July 2014 r. was awarded on the ICA website as the Map of the Month.

5.6. General use maps and atlases

Many atlases and maps for general purposes, mainly for tourism, are prepared and published in Poland by almost one hundred medium-sized and smallsized private publishing houses and agencies, at least 20 of these enterprises are the specialized cartographic publishers. These companies have various experience, are of different profiles and territorial range of products. They are located mainly in large cities, i.e. Warsaw (7 cartographic publishing houses), Cracow, Wrocław, Katowice, Poznań, Łódź and Lublin. However, some of them conduct their activities in the smaller towns, e.g. Jelenia Góra, Piła and Sopot.

The offer presented by the major market publishers of cartographic products is very rich, diverse and highly visible in the Polish bookstores and shopping malls. It consists of common geographical and historical atlases of the World, as well as of Poland, the atlases and road maps and finally of the most abundant variety of tourist maps presented the most attractive regions of the country. Among the letter ones, the maps of the mountain national parks dominate, first of all, the maps of Tatra National Park, Bieszczady NP and Karkonosze NP, there are various maps of the fragments of Polish Baltic Sea Coast, as well as of the Groups of Lakes in the region of Polish Lake Districts, particularly of the Great Mazurian Lakes.

The atlases and city maps are also quite numerous, they are often issued in the graphically unified series. In the recent years the plans of large and medium cities, issued together on one sheet with several plans of the smaller towns from their neighborhood, have been very popular. Such a solution, called "plan+" (e.g. *Lublin+*, *Toruń+*), has been initiated by the publisher of Demart in Warsaw and the other publishers have been following this publishing house.

Only a few publishers offer their road maps, tourist maps and city plans for the territory of the whole country. These are mainly companies such as: Daunpol, Demart and Military Cartographic Works (Wojskowe Zakłady Kartograficzne) in Warsaw, Compass in Cracow and Eco-Graf in Wrocław. A large part of publishers focuses its interests on the regions, with which the publishers are bounded by the places of their business. This part of publishers includes, among others, Plan in Jelenia Góra, BiK in Piła and Kartpol in Lublin.

Separately should be distinguished a long series of maps issued by the Military Cartographic Works. These are military topographical maps at the scale 1:50 000 with the overprinted tourist content and the description of the region and its attractions on the sheet reverse.

The source of information about the size and scope of an offer of every individual publisher is a catalog or directory of its products, including the atlases and maps, both printed ones, as well as those placed on the web. For instance, in the last directory of the publishing house ExpressMap in Warsaw, known for its highly durable and water-resistant laminated maps and plans of the series "comfort map", we find the offer of 71 road maps, 46 road-tourist maps, 71 tourist maps, 123 city plans, 18 maps for tracking, 4 wall maps (of Poland and of the World) and two glamorous atlases-albums: *Atlas of Polish mountains* and *Atlas of the word mountains*.

Electronic maps and atlases constitute a fairly new group of cartographic publications. While first, simple maps of this kind appeared in Poland as early as in 1993, it was not until the late 1990s that such maps gained wider use among the general public.

Currently published Polish electronic maps and at-

lases generally fall into two distinct categories: the first one contains general reference maps and atlases of the world and Poland, whereas the other contains numerous maps and on-line services designed primarily for route-planning purposes.

The Surveyor General of Poland maintains an online geoportal of the infrastructure of spatial information (*geoportal.gov.pl*) which is designed to serve as a depository of vector and raster official topographic maps prepared by the civilian survey. Apart from the vector database (up to the level of Vmap2), it contains scanned images of official topographic maps, as well as series of orthophoto imagery and digital terrain models. Several provincial and county level surveying administrations also maintain on-line map services for their respective areas of responsibility, and most of them, especially on the city and town level also contain the cadastral informatiom.

The route-planning software of varied quality is currently the most widely used electronic mapping in Poland. Maps and mapping services of this kind are available in three distinct forms, namely on DVD-ROMs for use on PCs; as software packages for hand-held car navigation units; and finally in the forms of online location services. Most of these products incorporates a vector-based cartographic database, containing a detalied representation of the entire road network (typically up to the scale of 1:50 000) integrated with a set of maps of all cities and towns as well as the large villages, with street-level detail and house numbering.

5.7. Cartographic literature

In Poland, the cartographic literature is traditionally rich and diversified. Summaring up the number of all published textbooks, monographs, articles, reports, reviews, instructions and catalogues, we obtain the result of nearly 500 publications a year. Recently, the issues covered by them have been more and more dominated by problems of the latest technologies and solutions (computer geovisualization, digital terrain models, spatial information infrastructure, or various GIS applications) with the less emphasis on theoretical issues and methods of cartographic presentation.

Scientific theses and articles are published mainly in the quarterly "Polski Przegląd Kartograficzny" http://ppk.net.pl/ ("Polish Cartographical Review" – since the 47th vol. also on-line, http://www.degruyter. com/view/j/pcr) published by the Cartographic Division of the Polish Geographical Society the only journal solely focusing on cartography; the half-yearly "Geodesy and Cartography" http://gc.czasopisma. pan.pl/ (with articles in English http://www.degruyter. com/view/j/geocart) published by the Committee of Geodesy of the Polish Academy of Sciences; "Annals of Geomatics" http://rg.ptip.org.pl/, which is published irregularly (4-8 numbers a year) by the Polish Associaton for Spatial Information; "Geoinformatica Polonica" http://www.degruyter.com/view/j/gein - the series published by the Commission on Geoinformatics of the Polish Academy of Arts and Sciences, and "Archiwum Fotogrametrii, Kartografii i Teledetekcji" http://ptfit.sgp.geodezja.org.pl/ (Archive of Photogrammetry, Cartography, and Remote Sensing) - the series published by four related scientific societies. A new periodical which replaced long-published "Prace Instytutu Geodezji i Kartografii" (Proceedings of the Institute of Geodesy and Cartography) is a half-yearly "Geoinformation Issues" http://www.igik.edu.pl/pl/ geoinformation-issues which has been published by the Institute of Geodesy and Cartography since 2009.

Practical issues of Polish geodesy and cartography, including legal and organizational problems, as well as technological issues dominate in two monthlies, i.e. "Przegląd Geodezyjny" (Geodetic Review) and "Geodeta. Magazyn geoinformacyjny" (Geodesist. Geoinformation Magazine). A half-yearly "Biuletyn Stowarzyszenia Kartografów Polskich" (Bulletin of the Association of Polish Cartographers) deals with the similar issues.

More important book publications which appeared in 2011–2014 include three new academic manuals, i.e. *Kartografia i geowizualizacja* (Cartography and geovisualization) by B. Medyńska-Gulij, *Kartografia tematyczna* (Thematic cartography) by W. Żyszkowska, W. Spallek and B. Borowicz (Fig. 20), and *Podstawy* odwzorowań kartograficznych z aplikacjami komputerowymi (Principles of cartographic projections with computer applications) by P. Pędzich.

An important group in Polish cartographic literature is formed by materials from numerous conferences, seminars and schools. These are mainly materials from conferences and schools co-organized by the Cartographical Division of the Polish Geographical Society. Materials from annual conferences since 2007 were published as volumes of a series "Prace i Studia Kartograficzne" (Studies in Cartography); the last 4th volume *Pragmatics in cartography* was issued in 2013. Lectures of cartographic schools were published as a series titled "Główne problemy współczesnej kartografii" (Main Problems of Contemporary Cartography); cover of the last volume of this series *Application of statistics in GIS and cartography*, issued by University of Wrocław, is president in the next chapter. Materials from national conferences of cartography historians ore published as volumes of the series titled "Z Dziejów Kartografii" (From the History of Cartography – see Fig. 1).

Five interesting teses were published which were prepared as a part of scientific title awarding procedures, i.e. Wpływ aparatu władzy w latach 1944–1989 na polskie publikacje kartograficzne do użytku powszechnego (Influence of the state in 1944-1989 on the Polish cartographic publications for general use) by B. Konopska, Metodyka oceny dokładności wielkoskalowych map cyfrowych (Methodology for assessing the accuracy of digital large scale maps) by A. Doskocz, Metodyka prezentacji kartograficznej w mobilnych systemach lokalizacyjnych i nawigacvinych (Methodology of cartographic representation in mobile localization and navigation systems) by D. Gotlib, Infrastruktura informacji przestrzennej w ujęciu systemowym (Spatial information infrastructure - the system approach) by M. Baranowski and Teoria nazw geograficznych (Theory of geographical names) by A. Czerny.



Fig. 20. New academic manuals of cartography

Among publications dedicated to the history of cartography two important works should be mentioned, i.e. three initial volumes of the monumental 16-volumes edition of manuscript Joseph's topographic map of Galicia from 1772–1783, and the 3rd corrected edition of the monograph *Kartografia Wielkiego Księstwa Litewskiego od XVI do połowy XVIII wieku* (Cartography of the Grand Duchy of Lithuania from the 15ht century to the middle of the 18th century) by late Prof. S. Alexandrowicz. ;

The above short review of cartographic publications in Poland in 2011–2014 is supplemented with reference list of chosen atlases, maps, books, and articles which constitutes the appendix to this report.

5.8. Geographic names

The Surveyor General of Poland's tasks concerning the geographical names are also regulated by the Geodetic and Cartographic Law. The above Law contains the information about carrying out the issues related to the standardization of the Polish-speaking territory of Poland, including 124 581 names of localities and 114 349 names of physiographical objects (Fig. 21). The names, obtained from the archival and contemporary maps, the lists of the naming conventions drawn up in accordance with the rules of geographical nomenclature, legal documents and the terrain reconnaissance, are entered to the register. For the last three years (2011–2014) the work, carried out within the framework of the National Register of Cartographical Names, has mainly consisted of:

- the verification and update of the list of the names of localities, including the verification of the attribute correctness of a name;



Fig. 21. Printed extract of the database of the National Register of Geographical Names

naming of the geographical objects located outside Poland as well as conducting the national registry database of geographical names including current and historical information related to:

- the official names of localities, their parts and physiographic objects;

the Polish phonation of the names of geographical objects located outside the borders of the Republic of Poland.

These are the tasks carried out by the Surveyor General of Poland.

National Register of Geographical Names is a major, full, reliable and updated reference database including the geographical names which are correct and recommended for the official use. The database contains a total of 238 930 geographical names of the the replenishment of the list with the additional names of localities in the national and ethnic minorities' languages;

- the verification and update of the list of the physiographical objects' names;

– the preparation of the collective lists of physiographical objects' names from the different voivodships of Poland for an opinion and approval by the Commission on Establishing Names of Localities and Physiographical Objects in the Ministry of Administration and Digitization.

Commission on Standardization of Geographical Names Outside the Republic of Poland has a long tradition, but since 2001 it has been operating at the Surveyor General of Poland. The tasks of the Commission should be: the opinions on the applications submitted to the Commission on the determination of the original phonation and spelling rules for the names of the geographical objects outside the borders of the Republic of Poland and the preparation of the list of these names;

 the determination of the phonation and spelling rules for the Polish names of the objects located outside the borders of Poland and the preparation of the official lists of these names for publishing;

 the process of establishing the principles of Romanization of the geographical objects' names originally not written in Latin writing system

 the cooperation and interaction with the international organizations and relevant organs dealing with the issues of standardization of the geographical names.

The results of the works of the Commission are the official lists of names of the countries and the dependent territories (issued every two years), the lists of the Polish names of the geographical objects located outside the borders of the Republic of Poland (issued every five years), the toponymic guides and the rules of Romanization. In 2013 two official publications compiled by the Commission was issued by the Head Office of Geodesy and Cartography (Fig. 22).

Official List of names of countries and non-selfgaverning territories contains the names of 195 countries recognized by the Republic of Poland (that is the 193 countries – members of the United Nation Organization, Kosovo and the Vatican) as well as 69 dependent territories. The Annex to the List is the list of 10 territories of an undetermined or disputed international status. This publication took into account the resolutions of the Commission that had been undertaken by November 2013. The names of the countries, territories and their capitals, included to the list, have been approved by the Ministry of Foreign Affairs.

The each country section contains the following information:

- the abbreviation of the country name in the nominative case (nominativus), genitive case (genetivus) and in the locate;

 the official (expanded/compound) Polish name of the country in the nominative case;

the official language/s of the country;

- the official abbreviation and the official full name of the country in the country language/s;

- an adjective of the Polish name of the country;
- the name of the citizens of the country in Polish;

- the name of the capital city (or capital cities) of the country in Polish and in the countries language/s.

Official list of the Polish geographical names of the world consists of the names of 13 358 geographical objects, for which the Polish names are recommended. The object names from all over the continents are included to this list, as well as the names of the undersea features; but the names of the objects that are entirely situated within the area of Poland are not taken into account. This list is divided into the eight chapters: the seven of them correspond to the particular parts of the world, the eight one is dedicated to the undersea features. The keywords, related to the individual geographical objects, contain the Polonised name as the first one, i.e. exonym or pseudoexonym.

The original name (endonym), written in the country language, is given as the next one (the original names are given next, if there is more than one country language or if this very object has the official names in several languages). A Latinized name record, which is converted into the Latin alphabet, is given for the non-Roman writing systems. In such a case, a transliteration is given first and then – a phonetic transcription of an original name into the Polish language. The geographical coordinates of an object are published after the names. At the end of the publication an Index is published.



Fig. 22. Publications of Commission on Standardization of Geographic Names Outside the Republic of Poland

All the publications of the Commission on Standardization of Geographic Names Outside the Republic of Poland are available in PDF format on the Internet site http://ksng.gugik.gov.pl/english/index.php

6. Education in cartography

Special education in cartography at the academic level is conducted in Poland as a specialization within the geographical studies at the Universities in Warsaw, Wrocław, Lublin, Poznań and Toruń, as well as within the framework of the technical geodetic studies at the Warsaw University of Technology, the Military University of Technology in Warsaw and the Stanisław Staszic Academy of Mining and Metallurgy in Cracow. Moreover, the elements of cartography and geoinformatics are passed to all the students of geodesy and geography at the universities, as well as to the students of technical colleges.

In 2011–2014, at the **Department of Geoinformatics, Cartography and Remote Sensing** of the University of Warsaw (till the end of September 2014 – the Department of Cartography), the Master's degree was awarded to 23 university graduates. Two people have obtained the doctoral titles. Currently, 2 graduates have been studying the cartography within the framework of doctoral course of the Faculty of Geography and Regional Studies.

Geography is taught on the three levels: bachelor, MSc and doctoral studies. Cartography is a specialization within the geographical studies on the MSc level. In 2014 the specialization of cartography was combined with the remote sensing and geoinformatics and named "Geoinformatics, Cartography and Remote Sensing". Under the new program, students can study in a much greater extent.

The issues of MSc theses include the maps of the *Atlas Województwa Mazowieckiego* (The Atlas of Mazovia voivodship), methods of cartographic presentation, maps for the blind and visually impaired people, animated maps and application of GIS for map analysis.

At the **Department of Geoinformatics and Cartography of the University of Wrocław** (till Ferbruary 2013 – the Departament of Cartography) the specialists are educated in the field of modern techniques and the basics of geoinformatics geostatistics, modelling and forecasting data, spatial databases creating, spatial data acquisition methods, thematic cartography and geovisualisation methodology, maps and atlases design, basic legislation in the field of geodesy and cartography. In 2013, the syllabus of this specialization was deeply reconstructed and the name was changed from "Cartography and GIS" to "Geoinformatics and Cartography". In 2011–2014, 35 university graduates were awarded the title of MSc in Cartography and GIS.

Discussing the educational activities, one should mention the Cartographic Schools which have been organized since 1985 by the Department of Geoinformatics and Cartography of the University of Wrocław and the Cartographical Division of the Polish Geographical Society. Meetings, to which app. 70-100 people come, are usually held weekly in spring and are dedicated to the selected issues. The topic of the latest meetings included: "Application of the statistics in GIS and cartography" (Brunów 2011), "Satellite technologies in GIS and cartography" (Wrocław 2012), and "Geoinformatics and atmospheric science" (Wałbrzych 2014). English has been used as the symposium language since 2012. The lectures of these meetings appear in the latest issue of the special publication series "Main Problems of Contemporary Cartography" (2011) and in a special issue of "Pure and Applied Geophysics" (Vol. 171, Issue 6), the journal published by Springer Birkhäuser Basel (Fig. 23).



Fig. 23. Publications with lectures of Cartographic Schools 2011–2012

Furthermore, the modern manual *Thematic cartography* has been written by the scientists from the Department and published in 2012.

The Department of Cartography and Geomatics of the Maria Curie-Sklodowska University in Lublin (till September 2011 – Department of Cartography) has educated the cartographers within the geographical studies since 1964. In connection with the expansion of new technologies in the cartography, the Department has opened the first in Poland specialty on geography under the name "Geography and Geoinformation". For the last four years the Master's degree was awarded to 20 university graduates. The themes of the recent theses were, among the other things, the maps of Roztocze National Park, digital terrain models and the applications of cartographic methods in spatial analysis.

The Department of Cartography of the Warsaw University of Technology educates the students in the field of cartography and geographic information systems. The employees of this Department teach mathematic cartography, topographic cartography, cartographic technologies, spatial information infrastructure, databases etc. within the first-level course. Within the second-level course, the Department of Cartography organizes classes in the specialization "Cartography and Geographic Information Systems". Subjects taught in this specialization include mathematic cartography, mobile cartography, multimedia cartography, map publication technologies, generalization of cartographic information, geostatistics, GIS and spatial information databases. In 2011–2014, 37 university graduates were awarded the title of MSc Eng. in Cartography. The subjects of the master theses include a wide range of issues, e.g. the elaboration of the thematic maps, geographic information systems, multimedia maps and atlases, animated maps and geoportals, as well as computer applications supporting the designing of map projections.

The Chair of Geomatics, Remote Sensing, and Geography of Nicolaus Copernicus University in Toruń (till 2013 – Laboratory of Geomatics and Cartography) in recent years has promoted 26 Masters of Geography within the specialization "Cartography and Remote Sensing". The subjects of the master theses were, among the other subjects, the geo-statistical maps of the counties, GIS system for the municipalities, analysis of the use of maps in school atlases, geography textbooks and use of geomatics' methods in the spatial analysis. One of the master theses awarded the first prize in the national competition of master theses in the scope of cartography and geoinformation.

The Department of Cartography and Geomatics of the Adam Mickiewicz University in Poznań is the young, but very active, rapidly developing educational centre for cartographers within the geographical studies. In 2013 the new specialty "Cartography and Remote Sensing" started, it was chosen by 26 students. Since the beginning of this Department the title of Master has been awarded to 56 people. The subjects of the graduate works were varied and, among the other subjects, there were the multimedia services and the thematic maps, the use of the cartographic sources for the demographic forecasts visualization, 3D visualizations.

At the Faculty of Geodesy and Environmental Engineering of the Stanisław Staszic University of Mining and Metallurgy in Cracow, in 2012 in the Division "Geodesy and Cartography" the specialty "Geomatics" was created. In the framework of this specialty the subjects in the scope of cartography and geomatics are taught. About 30 people annually graduated from the University with this specialty and the Master of Engineering degree, at the same time about 10 theses deal with the cartographic issues. In 2013, it was launched e-learning platform for the cartographic subjects.

Classes in cartography and GIS are also given at the **Faculty of Civil Engineering and Geodesy of the Military University of Technology in Warsaw** educating both civilian and military students. The courses include mainly: topography, fundamentals of cartography, thematic cartography, rules for map editing, geographic data analysis and geovisualisation. Each year, the students prepare 15–20 B.Sc. and 10–15 M.Sc. theses developing mainly thematic maps, city geoportals, thematic geoportals, geospatial analyses, and cartographic visualization.

For the last four years a hundred people have graduated from the Universities with the M.Sc. degree having the cartographic or geoinformation-cartographic and cartographic-remote sensing studies completed. Despite the problems connected with the labour market for the graduates, almost all of them have found the employment in the geoinformatic and GIS institutions, publishing houses, high schools and central or local administrations.

The lists of the graduates with the subjects within the graduate works performed are regularly published annually in the second issue of the quarterly "The Polish Cartographical Review".

7. Research and implementation works in cartography

The research works in the field of cartography carried out in Poland in the higher education institutions having in their structures the units, such as institutes, chairs, departments, involved into cartography and geoinformatics, in some institutes of the Polish Academy of Sciences and in the Institute of Geodesy and Cartography subordinated to the Ministry of Administration and Digitization.

The Institute of Geodesy and Cartography in Warsaw is the largest research unit in Poland dealing, among the other things, with the issues of cartography. The research works conducted by the Institute embrace the questions related to the modelling of spatial information and its imaging, i.e. the geovisualization.

The methodology for the preparation of photorealistic visualization of the Polish, European and Eastern European territories has been developed in the Institute of Geodesy and Cartography, Warsaw. This methodology is used for the maps at the scales from 1:1 000 000 to 1:10 000 000 showing the terrain relief by the method of shading, but the land cover – in natural colours. Due to the quaint variant of the combined shading, it is obtained an additional, distinct presentation of the area relief with the medium and small declines barely visible on the classical oblique model. The maps, made by this method, have given the good results both as the images viewed on a computer screen and in a printed form (Fig. 24). The results of the studies completed by the development of presented on the thematic maps, while maintaining the presentation aesthetics, which facilitates the perception of the thematic map, are carried on by the Institute. The Institute has completed its work on the methods of cartographic presentation for the indicators of landscape diversification in Poland using CORINE Land Cover databases and GIS technologies. The aim of this research was to present on the maps the complexity of Polish landscape shaped by the natural factors as well as by the human-being ones. It is necessary to mention, that for the fourth time the Institute took part in the implementation of the European Environment Agency project CORINE Land Cover to develop on the basis of current satellite images a new land-cover database for the area of whole Poland.

The project OGNIWO was very important from the point of view of cartography: it was realized in order to share and organize the own substantive resources. This project has opened a new chapter associated with the sharing of electronic cartographic resource and database held by the Institute. The important element of this project was the creation of the



Fig. 24. The photorealistic visualization of the European territories prepared in the Institute of Geodesy and Cartography

designing methodology of the time-space cartographic animation are equally interesting. They take into account the needs of the recipients from different age groups including those with the dysfunctions of colour perception.

Furthermore, the issues of the optimal modelling of the content for a digital, primer undercoat map of Poland, as well as its content adjusting to the issues Digital Library of IGiK (Instytut Geodezji i Kartografii – the Institute of Geodesy and Cartography). It gave an access to the full-text and bibliographical databases in the field of geodesy and cartography and the related fields. The Library, besides the full-text collections, provides the unpublished scientific–research works (doctoral dissertations, the results of the research projects). The Digital Library of IGiK is a part of the Federation of Digital Libraries and Europeana. More information about the Institute: http://www.igik.edu.pl/.

The Department of Geoinformatics, Cartography and Remote Sensing at the Faculty of Geography and Regional Studies of the University of Warsaw was created on the 1st of September, 2014 by the merging of the Department of Cartography with the Department of Geoinformatics and Remote Sensing.

Among 18 employees of the team (in their midst are: 1 PhD, 10 doctors and 4 doctoral students), 8 people engaged in cartography in a very diverse range of topics. Traditional subjects include cartographic methods of presentation. The works on the project entitled "The Internet Atlas of the Cartographic Methods" (www. educarto.pl) which was ended in 2012, are still in progress. The works on "The Atlas of Mazovia voivodship" are also proceeded. The main interests of the employees of the Department of Geoinformatics, Cartography and Remote Sensing include the theoretical cartography with the emphasis of the semantic aspects of the maps, computer generalization of topographic maps, newspaper maps, city plans, historical geoportals as well as the perception of animated maps, cartograms and legends of thematic maps. More information: http://geoinformatics.uw.edu.pl/

Staff members of the **Department of Geoinformatics and Cartography of the University of Wroclaw** carry out both the technology research works, based on the geographical information systems, and traditional studies of cartography. In particular, the spatial and spatial-temporal data processing and modelling techniques are used to understand and forecast different environmental variables, such as, for instance, temperature, sea level, and floods. The studies in the field of traditional cartography focused on the history of cartography and school cartography.

There were two research projects which had started and been carrying out at the Department of Geoinformatics and Cartography of the University of Wrocław since the end of 2011 and by the beginning of 2014. The first one "The development of new geoinformation methods for modelling and predicting the sea level changes over different timescales" was supported by the Foundation for Polish Science and financed by the European Union. The second one "System supporting and comparison of hydrologic predictions" got the approval of the National Scientific Centre of Poland. Staff members published many articles in the JCR-listed journals, e.g."Advances in Space Research", "Computers & Geosciences", "Biogeosciences", "Pure and Applied Geophysics", "Theoretical and Applied Climatology", "Studia Geophysica et Geodaetica", "Advances in Geophysics".

Between 2012 and 2014 the regular observations of the river valleys had been carrying out by the Unmanned Aerial Vehicle (UAV) which – along with the supercomputing laboratory – belongs to a few key elements of the scientific infrastructure used by the Department. The UAV-acquired spatial data are used to carry out the investigations on river flow dynamics. More information: http://www.kartografia.uni.wroc. pl/index.php/pl/.

The Department of Cartography in the Institute of Geodesy and Cartography of the University of Technology in Warsaw carries out the research works in the scope of cartography and GIS. The key direction of these research works is the broad cartographic modelling with the use of geoinformatics and GIS. In particular, the study objects are such issues as: topographical cartography, multi-resolution spatial database design, generalization of geographical information, cartographical research method, Internet and multimedia cartography, mobile and navigation cartography and, traditionally, mathematical cartography.

The research works on topographical mapping have been conducted for many years and they have focused on the development of Polish topographical database concept. Recently these studies have related to the methods of this database transformation from the model 2D to the model 3D. The result of these researches was the development of common conceptual model for reference data referred to two levels of a detail: 1:10 000 and 1:250 000; i.e. the concept of a scale series of topographical maps of new generation, the concept, which includes the methods of generalization, principles of editing and graphic solutions. It was also proposed to supplement the content of the maps by shading obtained from the digital terrain model of a high detail.

The research works, related to the creation of spatial multi-definition databases, resulted in various publications and in the assumptions' development of a prototype system of geographical informational generalization.

The employees of the Department have proposed a lot of innovative solutions which enhance the classic arsenal of tools used in cartographic research methods. Recently the research works on the use of spatial data mining with the advanced spatial data analysis have been conducted. In the field of web and multimedia cartography the concept of map using as the user interface has been developed; the user can integrate different spatial data sources, as well as any multimedia ones. The rules developed for such an operation have been used the dynamics of phenomena on the maps, assessment of the value in the use of touristic maps, implementation of geomatic methods for the analysis of tourist infrastructure, methods and techniques of interpretation of satellite images.



Fig.25. Interface design of the website statistics

for the implementation of geoinformatics services within the framework of the projects' realizations. The example of such an interface from one of the above mentioned services is shown at Fig.25.

In recent years the research works on the mobile mapping have been undertaken. The achievements of the Department in this field were its proposal of a formal model of the Mobile Cartographic Presentation and the development of editing principles for the cartographic mobile presentations. The research works on exploring the new options for the use of mobile mapping to navigate inside the buildings, for the first time in Poland, have started. More information: http://www.gik.pw.edu.pl/.

Department of Cartography and Geomatics at the Faculty of Earth Sciences and Spatial Economy of the Maria Curie-Skłodowska University in Lublin has a long tradition of research in the field of methodology of cartographic presentations, mainly, of such issues as: cartographic generalization, selection of primary fields for statistical maps, isopleths map design, the use of computer techniques in cartography. New research topics are: presentation of The cartographic monograph of the Roztocze National Park (2013) has also been edited by the specialists of the Department, as well as four chapters of the Statistical atlas of Lublin Voivodship (2014) have been developed. More information: http://geografia. umcs.lublin.pl/karto/.

At the Chair of Geomatics and Cartography at the Faculty of Earth Sciences of the Nicolaus Copernicus University in Toruń the research works are focused on the use of mapping tools and methods applied to the systems of geographical information and remote sensing. It is possible thanks to the modern equipment, including purchased in 2012 UAV with a very wide range of accessories. The research works in the field of multimedia cartography are also proceeded, first of all an original concept, the so called geocompositions as videographic representations, is developed.

The realization of a large interdisciplinary project called "Internet Atlas of Kujawy-Pomerania Voivodship" is in the final phase currently. The members of the Chair team continue to participate in editing and publishing a series of scientific notebooks "Historical Atlas of Polish Towns". More information: http://geo.umk.pl/.

At the Department of Cartography and Geomatics at the Faculty of Geographical and Geological Sciences of the Adam Mickiewicz University in Poznań the following lines of research directions are mainly developed: the use of cartographic methods in the study of geographical environment; geomatic base for the acquisition of spatial data and their processing; theoretical and practical problems of geovisualization, in particular, mobile and interactive cartography; the history of cartography in the aspect of formation and development of the rules for designing and editing maps, as well as determining the informational potential of the old maps in the study of environmental changes. Recently, the research studies on the concept of digital map of acoustical phenomena have been conducting. More information: http://www. kartografia.amu.edu.pl/.

The Faculty of Civil Engineering and Geodesy of the Military University of Technology in Warsaw conducts the research works concerning the effective mapping (geovisualisation) of the results of geographical, statistical and remote sensing data analyses for the decision making, both for military and civilian, applications. Another area of research concerns the issues of geographical data quality, database designing – mainly for topographic and surveying purposes – as well as developing the thematic geoportals. The Faculty cooperates with the Polish Armed Forces and public administration providing support for the tasks of military meteorology and imagery reconnaissance as well as for designing and developing the geoinformation systems and infrastructures. More information: http://www.wig.wat.edu.pl.

Environmental Information Center UNEP/ GRID-Warsaw specializes in developing spatial databases and thematic maps related to environment management issues. The Center is the author of many maps and visualizations of geographic information, particularly environmental data in geoportals. The most important cartographic works in the achievements of the Center UNEP/GRID-Warsaw include wall maps of protected areas in Poland which present the location of these areas in respect of the existing and planned road and railroad infrastructure. In recent years, intensive activities are carried out focusing on promotion possibilities of using spatial information as a tool supporting environment and space management among representatives of public administration. These activities directly support the process of creating the infrastructure for spatial information in Poland.

In the Team for Geographic Information Systems and Cartography in the Institute of Geography and Spatial Organization of the Polish Academy of Sciences, which was established in 2010, the works focused on the terrestrial laser scanning (TLS) and on its use for the mapping and natural environmental research. The measurements were performed in the Polish Carpathians and in Biebrza National Park.

The Team has taken the initiative to develop a new atlas – the National Atlas of Poland – and a complementary concept of its implementation has published. The preparatory works to edit this prestigious atlas have been proceeding in the Head Office of Geodesy and Cartography. More information: https://www.igipz.pan.pl/zsigik.html.

8. Cartographic collections

Collecting and making collections of maps and atlases available to the public has a long tradition in Poland, dating back to the 17th century. Despite the great losses suffered by the most valuable Polish collections in the Second World War, several dozen of scientific and public libraries, archives and museums have, at present, the priceless cartographical collections, often organizationally separated.

The leading position is occupied by the collection of the National Library in Warsaw. Within the library structure the Department of Cartographical Collections, led by Anna Kuklińska, conducts the intensive activities. The collection of the cartographical documents of this library is regularly enriched mainly by the compulsory copies forwarded to from the current production. In this way the library receives each year about 1 500 new positions of maps and atlases. Currently the collection includes more than 130 000 maps and 5000 atlases; the most valuable group among them consists of 300 atlases of old prints.

In 2011–2014 the National Library has been caring on the publication of the semi-annual journal "Bibliography of Cartographical Materials" started in 2006 as an integral part of "Polish National Bibliography". All bibliographies are put in the online catalogue on the web-site of the National Library http://alpha.bn.org.pl. Since 2013 the Digital National Library "Polona" has been functioning (http://polona.pl). This is the Internet service of the National Library that provides, in addition to the literary and scientific texts, various types of documents including maps and atlases. Currently more than 2500 maps and atlases are available on this website.

In 2012 the Department of Cartographical Collections was a co-organizer of highly popular exhibition "The world of Ptolemy. Italian Renaissance cartography in collections of National Library".

A large and intensely used cartographical collection, consisting of 94 600 maps and 5400 atlases, including many national atlases and multi-sheet maps from the different regions of the world, is in the possession of the Central Library of Geography and Environmental Protection at the Institute of Geography and Spatial Organization of Polish Academy of Sciences in Warsaw.

The detailed instruction for cataloguing the cartographical documents in the international format titled "Marc 21 format for bibliographic data: cartographical documents" was developed and published in this library. Within the Digital Repository of Scientific Institutes (RCIN) the digitalized collection of the priceless historical maps and atlases is expanded and gradually made available from this library. Currently it includes more than 2100 objects, that are available on the website http://rcin.org.pl/igpz.

The valuable historical collections of maps and atlases are also in possession of the Ossolineum Library in Wrocław, the Library of the Gdańsk Division of the Polish Academy of Sciences, different university libraries: in Cracow (the Jagiellonian Library), Wrocław, Warsaw, Toruń and Łódź. They may also be found in some large public libraries; the most valuable ones are in the Public Library of the Capital City of Warsaw, the Raczyńskis Library in Poznań, the Pomeranian Library in Szczecin and the City and Voivodship Public Library in Gorzów Wielkopolski.

The cartographical collections of the State Archives are very rich – the most valuable and largest ones are in the Central Archives of Historical Records in Warsaw as well as in the archives in Wrocław, Cracow, Lublin, Gdańsk and Przemyśl. They are different in their nature, since maintain and make available the documents mainly in the form of handwritten large-scale maps.

Recently the Polish scientific libraries, including their cartographical collections, have been intensively modernized from the point of view of cataloguing and the methods of giving access to the collected documents. This applies particularly to the collections being the parts of the national central catalogue of scientific and academic libraries NUKAT. The original stocktaking and cataloguing of the cartographical documents in the form of a georeferenced database containing information on these documents have been developed in the Department of Cartographical Collection of the University Library in Wrocław. The catalogue is available on the site www.bu.uni.wroc. pl/ozk.

Appendix

SELECTIVE BIBLIOGRAPHY OF POLISH CARTOGRAPHIC PUBLICATIONS 2011–2014

A. ATLASES

Popular atlases of the world and Poland

- 1. *Wielki atlas świata*. Editors Jolanta Sieradzka-Kasprzak et alli. Warszawa: Euro Pilot Sp. z o.o. Wydawnictwo Kartograficzne, 2014, 336 pp. (The great world atlas).
- Podręczny atlas świata. Editors Jolanta Sieradzka-Kasprzak, Ewa Chmielewska. Warszawa: Daunpol Wydawnictwo Kartograficzne, 2013, 140 pp. (Reference world atlas).
- 3. *Wielki atlas historyczny*. Editors Elżbieta Olczak, Julia Tazbir. Warszawa: Demart SA, 2011, 224 pp. (The great historical world atlas).
- Wielki ilustrowany atlas Polski. Historia. Geografia. Kultura. Editors: Elżbieta Olczak (History), Hubert Mroczkiewicz et alli (Geography), Anna Nadstawa (Culture). Warszawa: Demart SA, 2011, 424 pp. (Great illustrated atlas of Poland. History, Geography, Culture).
- Historia Polski. Atlas ilustrowany. Editors Witold Sienkiewicz, Elzbieta Olczak. Warszawa: Demart SA, 2014, 384 pp. (History of Poland. The illustrated atlas).

Thematic atlases

- Atlas zagrożeń meteorologicznych Polski Meteorological Hazard Atlas of Poland. Authors Zbigniew Ustrnul et alli. Instytut Meteorologii i Gospodarki Wodnej – Państwowy Instytut Badawczy. Kraków: Wydawnictwo Attyka, 2014, 164 pp.
- Atlas wykorzystania wód termalnych do skojarzonej produkcji energii elektrycznej i cieplnej przy zastosowaniu układów binarnych w Polsce – Atlas of the possible use of geothermal waters for combined production of electricity and heat

using binary systems in Poland. Scientific editors Wiesław Bujakowski, Barbara Tomaszewska. Instytut Gospodarki Surowcami Mineralnymi i Energią PAN; Akademia Górniczo-Hutnicza – Wydział Geologii, Geofizyki i Ochrony Środowiska; Państwowy Instytut Geologiczny, Oddział Karpacki, Kraków 2014, 184 pp.

- Atlas radiologiczny Polski Radiations atlas of Poland 2011. Elab. Krzysztof Isajenko et alli. Centralne Laboratorium Ochrony Radiologicznej. Warszawa: Inspekcja Ochrony Środowiska, 2012, 60 pp. (all texts and legends in Polish and English).
- Atlas sozologiczny gmin Polski 2000–2009. Elab. Mariusz Kistowski. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego, 2012, 316 pp. (Ecological atlas of Polish communes 2000–2009).
- Roztoczański Park Narodowy przyroda i człowiek. Monografia kartograficzna. Editors Krzysztof Kałamucki, Tadeusz Grabowski. Zwierzyniec: Roztoczański Park Narodowy, 2013, 28 folded sheets (Roztocze National Park – nature and man. Cartographic monography).
- Atlas umieralności ludności Polski 2008–2010. Elab. Bogdan Wojtyniak et alli. Warszawa: Narodowy Instytut Zdrowia Publicznego – Państwowy Zakład Higieny, 2012, maps 295 pp., statistical tables 184 pp. (Atlas of population mortality in Poland 2008–2010).
- Atlas firm przemysłu spożywczego w Polsce Atlas of food industry in Poland. 1:250 000. Editors Mateusz Sznajder, Mariusz Wideński. Przeźmierowo: Horyzont Mateusz Sznajder; Warszawa: Dom Wydawniczy PWN, 2012, 240 pp.
- Atlas firm przemysłu drzewnego w Polsce Atlas of timber industry in Poland, 1:250 000. Editors Maria Mech, Mariusz Wiedeński. Prze-

źmierowo: Horyzont Mateusz Sznajder; Warszawa: Dom Wydawniczy PWN, 2013, XII, 228 pp.

- Polska. Atlas samochodowy. 1:250 000. Editors Wojciech Kowalski, Krzysztof Radwański. Warszawa: Express Map Polska Sp. z o.o., 2012, maps 232 pp., text 97 pp. (Poland. Detailed auto atlas with touristic content and 17 city maps).
- Atlas linii kolejowych Polski 2014, 1:300 000. Elab. Ryszard Stankiewicz, Marcin Stiasny. Rybnik: Wydawnictwo Eurosprinter, 2014, 460 pp. (Atlas of railways of Poland 2014).
- Atlas. Społeczno-demograficzny rozwój Mazowsza. Elab. Marcin Stępniak, Aleksandra Deręgowska, Przemysław Śleszyński. Warszawa: Mazowieckie Biuro Planowania Regionalnego, 2012, 50 tabl., text 5 pp. (Atlas. Socio-demographic development of Mazovia).
- Produkcja rolnicza na obszarach wiejskich województwa mazowieckiego. Atlas. Elab. Justyna Dziadosz, Joanna Podolska. Warszawa: Urząd Statystyczny w Warszawie, Mazowiecki Ośrodek Badań Regionalnych, 2013, 96 pp. (Agricultural production in rural areas of Mazovia voivodshaft).
- Statystyczny atlas województwa lubelskiego 2012. Elab. Urzszula Bronisz et alli. Lublin: Urząd Statystyczny w Lublinie, 2014, 139 pp. (Statistical atlas of Lublin voivodshaft).
- Atlas historyczny Pomorza Zachodniego. Tom I: Topodemograficzny atlas gmin i obszarów dworskich Pomorza Zachodniego w 1871 roku. Elab. Dariusz K. Chojecki, Edward Włodarczyk. Cartogr. editing Andrzej Guza, Paweł Trefenko. Szczecin: Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, 2012. 37 tabl. with maps 1:500.000, text 96 pp. (Historical Atlas of Western Pomerania. Vol 1: Topodemographic atlas of communes and manor areas of Western Pomerania in 1871).
- Górny Śląsk w XX wieku. Atlas historyczny Oberschlesien im 20. Jahrhundert. Authors Marcin Kordecki, Dawid Smolarz. Cartogr. editing Dariusz Przybytek, Anna Osowska. Instytut Pamięci Narodowej. Gliwice – Opole: Dom Współpracy Polsko-Niemieckiej, 2013, 48 pp. (Upper Silesia in the 20th century. Historical atlas).
- Atlas historyczny (archi)diecezji lubelskiej 1805–2010 – The Historical Atlas of the Lublin (Arch)Diocese 1805–2010. Editor Henryk Gapski. Lublin: Towarzystwo Naukowe Katolickiego Uniwersytetu Lubelskiego, 2011, 298 pp.

- 22. Atlas historyczny miast polskich. Tom I, Prusy Królewskie i Warmia. Zeszyt 7, Chojnice – Historical Atlas of Polish Towns. Vol. I, Royal Prussia and Ermland. Fasc. 7, Chojnice. Historical content Roman Czaja. Cartogr. elab. Radosław Golba, Zenon Kozieł, Izabela Lewandowska. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika, 2013, 18 tabl., text 25 pp.
- Atlas historyczny miast polskich. Tom IV, Śląsk. Zeszyt 16, Ziębice – Historical Atlas of Polish Towns. Vol. IV, Silesia. Fasc. 16, Ziebice. Scientific editor Rafał Eysymontt. Elab. Rafał Eysymontt, Radosław Gliński, Marcin Siehankiewicz. Toruń: Uniwersytet Mikołaja Kopernika, 2014, 24 tabl., text 36 pp.
- Atlas historyczny miast polskich. Tom V, Małopolska. Zeszyt 2, Sandomierz – Historical Atlas of Polish Towns. Vol. V, Lesser Poland. Fasc. 2, Sandomierz. Editor Zdzisław Noga. Towarzystwo Naukowe Sandomierskie. Kraków: Wydawnictwo Antykwa, 2014, 44 tabl., text. 48 pp.

School atlases

- 25. *Atlas ilustrowany. Świat przyrody.* Elab. Krystian Gaik et alli. Warszawa: Wydawnictwo Nowa Era, Sp. z o.o., 2013, 88 pp. (Illustrated atlas. Primary science. For primary schools).
- Nowy atlas. Przyroda. Świat wokół nas. Elab. Sławomir Curyło et alli. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o. 2014, 92 pp. (New atlas. The world around us. Geographical atlas for primary schools).
- Atlas przyrodniczy. Szkoła podstawowa. Editors Magdalena Gerwell-Wronka, Ludwik Przyłuski. Warszawa: Wydawnictwa Szkolne i Pedagogiczne, 2013, 103 pp. (Atlas for nature study. Primary schools).
- Atlas geograficzny. Gimnazjum. Editorial elab. Jan Niedźwiedzki, Anna Ostrowska, Janusz Puskarz. Warszawa: Wydawnictwa Szkolne i Pedagogiczne, 2012, 132 pp. (Geographical atlas for secondary schools).
- 29. Atlas geograficzny dla szkół ponadgimnazjanych. Elab. Marek Dajek et alli. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o. 2012, 232 pp. (Geographical atlas. Poland, continents, the world. For upper-secondary schools).
- 30. *Szkolny atlas geograficzny*. Editorial elab. Marzena Wieczorek, Beata Byer, Adam Zakrzewski.

Warszawa: Demart SA., 2013, 200 pp. (School geographical atlas).

- Atlas geograficzny Polski. Editors Beata Byer, Marzena Wieczorek, Wiesław Ostrowski. Warszawa: Wydawnictwo Szkolne PWN, 2012, 63 pp.
- Atlas. Wiedza o społeczeństwie. Gimnazjum. Szkoły ponadgimnazjalne. Editor Izabela Hajkiewicz. Wrocław: Nowa Era, Zespół Kartograficzny. Warszawa: Nowa Era Sp. z o.o., 2012, 74 pp. (Atlas. Citizen ship. For secondary and upper-secondary schools).
- 33. Atlas historyczny. Od starożytności do współczesności, z płytą CD: Dzieje Polski na mapach interaktywnych. Gimnazjum. Elab. Izabela Hajkiewicz et alli. Wrocław: Nowa Era, Zespół Kartograficzny. Warszawa: Nowa Era sp. z o.o., 2014, 72 pp. (Historical atlas. From antiquity to the present day, with CD: History of Poland on interactive maps. For secondary schools).
- Atlas historyczny. Od starożytności do współczesności. Szkoły ponadgimnazjalne. Editor Izabela Hajkiewicz. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o., 2012,

170 pp. (Historical atlas. From antiquity to the present day. For upper-secondary schools).

- Szkolny atlas historyczny. Editor Witold Sienkiewicz, Marzena Wieczorek. Elab. Konrad Banach et alli. Warszawa: Demart SA., 2014, 192 pp. (School historical atlas).
- 36. Od starożytności do współczesności. Interaktywny atlas historyczny. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era sp. z o.o. 2012 (From antiquity to the present day. Interactive historical atlas. For secondary and upper secondary schools).
- 37. Atlas świata dla niewidomych i słabowidzących. Editors Ewa Lodzińska, Waldemar Wieczorek. Collective elab. Warszawa: Główny Urząd Geodezji i Kartografii, 2012, two parts with 38 tactile map sheets (Atlas of the World for the blind and visually impaired).
- 38. Atlas parków narodowych w Polsce dla osób niewidomych i słabowidzących. Editor Mariusz Olczyk. Laski: Towarzystwo Opieki nad Osobami Ociemniałymi, 2014, 23 sets of tactile maps (Atlas of national parks in Poland for the blind and visually impaired).

B. MAPS

Topographic maps

- Mapa topograficzna cieniowana 1:10 000. N-34-61-A-c-2 Szymbark. Elab. InterTIM. Gdańsk: Urząd Marszałkowski Województwa Pomorskiego, 2013 (Sheet of a new generation topographic map with relief shading).
- Mapa topograficzna cieniowana 1:25 000. M-34-75-C-d Żywiec. Elab. OPEGIEKA Sp. z o.o. w Elblągu. Warszawa: Główny Geodeta Kraju, 2014 (Pilot sheet of a new generation topographic map with relief shading).
- Mapa topograficzna cieniowana 1:50 000. M-34-75-C Bielsko-Biała – Południe. Elab. OPEGIEKA Sp. z o.o. w Elblągu. Warszawa: Główny Geodeta Kraju, 2014 (Pilot sheet of a new generation topographic map with relief shading).
- Mapa topograficzna 1:100 000. N-34-139 Warszawa – Wschód. Elab. OPEGIEKA Sp. z o.o. w Elblągu. Warszawa: Główny Geodeta Kraju, 2014 (Pilot sheet of a new generation topographic map without relief shading).

Thematic maps

- Mapa hydrograficzna Polski 1:50 000. Piaseczno N-34-139-C. Elab. Z.U.G.iK. Pryzmat P. Jungowski. Editor Adam Martczak. Warszawa: Główny Urząd Geodezji i Kartografii, Główny Geodeta Kraju, 2013 (Hydrological map of Poland, sheet Piaseczno).
- Mapa sozologiczna Polski 1:50 000. Karsin N-33-84-8. Elab. Polkart Sp. z o.o. M. Gil. Editor Piotr Piekarczyk. Warszawa: Główny Urząd Geodezji i Kartografii, Główny Geodeta Kraju, 2012 (Ecological map of Poland, sheet Karsin).
- 45. Mapa geośrodowiskowa Polski 1:50 000. 640 Radzyń Podlaski (M-34-10-C); Part A, elab. Katarzyna Siwy-Będkowska, Zbigniew Będkowski; Part B, elab. Jerzy Król, Małgorzata Marczak. Warszawa: Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy, Ministerstwo Środowiska, 2011 (Exemplary sheet of geoenvironmental map of Poland in 1069 sheets. Every sheet in two plates: A and B).

- Cyfrowa mapa geomorfologiczna Polski. 1:100 000 Tomaszów Lubelski. Elab. Jan Buraczyński et alli. Warszawa: Główny Urząd Geodezji i Kartografii, Główny Geodeta Kraju, 2013 (Digital geomorphological map of Poland, test sheet Tomaszów Lubelski).
- Szczegółowa mapa geochemiczna Górnego Śląska 1:25 000. Libiąż. Elab. Anna Pasieczna. Warszawa: Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy, Ministerstwo Środowiska, 2011, 87 pp. (Detailed geochemical map of Upper Silesia. Exemplary sheet Libiąż in form of covered map set with text).
- Bieszczadzki Park Narodowy. Mapa przyrodniczo-turystyczna. 1:40 000. Collective elab. Wydawnictwo Compass, Kraków. Ustrzyki Górne: Bieszczadzki Park Narodowy, 2014 (Bieszczady National Park. Natural-tourist map with text 68 pp.).
- 49. Gorczański Park Narodowy. Mapa geologiczno--turystyczna. 1:25 000. Elab. M. Kucharska et alli. Warszawa: Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy, 2013 (Gorce National Park. Geological-tourist map).
- Pieniński Park Narodowy. Mapa geologiczno--turystyczna. 1:25 000. Elab. J. Relisko-Rybak, A. Piotrowski, T. Żuk. Warszawa: Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy, 2013 (Pieniny National Park. Geological-tourist map).
- Park Narodowy "Ujście Warty". Mapa geologiczno-turystyczna. 1:25 000. Elab. J. Relisko--Rybak, A. Piotrowski, T. Żuk. Warszawa: Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy, 2013 ("Ujście Warty" National Park. Geological-tourist map).
- Gostyńsko-Włocławski Park Krajobrazowy. Mapa geologiczno-turystyczna. 1:60 000. Elab. J. Rychel et alli. Warszawa: Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy, 2014 (Gostyń-Włocławek Landscape Park. Geological-tourist map).
- Suwalski Park Krajobrazowy. Mapa geologicznoturystyczna. 1:25 000. Elab. J. Przasnyska, J. Rychel, I. Trekiel. Warszawa: Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy, 2014 (Suwałki Landscape Park. Geological-tourist map).
- 54. Mapa geologiczno-turystyczna gminy Kłodawa Geological-tourist map of the Kłodawa muni-cipality. 1:35 000. Elab. J. Rychel, R. Wasiluk, M. Kucharska. Warszawa: Państwowy Instytut

Geologiczny – Państwowy Instytut Badawczy, 2012.

- 55. Województwo lubelskie. Parki krajobrazowe i inne formy ochrony przyrody. 1:300 000. Elab. Paweł Cebrykow et alli. Lublin: Kartpol s.c., 2013 (Lubelskie voivodshaft. Landscape parks and other forms of nature protection).
- 56. *Parki krajobrazowe Wielkopolski.* 13 maps 1:25 000 – 1:75 000. Elab. Daunpol, Wydawnictwo Kartograficzne, 2014 (Landscape parks of Great Poland. 13 maps at scales from 1:25 000 to 1:75 000 in common etui).
- Polska. Atrakcje turystyczne. 1:675 000. Collective elab. Warszawa: ExpressMap Sp. z o.o., 2014 (Poland. Tourist attractions).
- Tatry Polskie i Słowackie. Mapa turystyczna The Polish and Slovak Tatra Mts. Tourist map. 1:50 000. Elab. Tomasz Bieroński et alli. Wrocław: Wydawnictwo Kartograficzne Eko-Graf Sp. z o.o., 2013.
- Dolny Śląsk. Mapa turystyczna Lower Silesia. Tourist map – Niederschlesien. Wanderkarte – Dolní Slezsko. Turistická mapa. 1:300 000. Elab. Tomasz Bieroński et alli. Wrocław: Wydawnictwo Kartograficzne Eko-Graf Sp. z o.o., 2014 (Map with texts in Polish, English, German and Czech).
- 60. Interaktywne mapy turystyczno-topograficzne z zestawami pytań maturalnych. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o. 2012 (Interactive tourist-topographic maps with sets of tasks for upper-secondary schools exam).

Wall maps for general use and schools

- 61. Świat. Mapa polityczna. Mapa krajobrazowa. 1:21 500 000. Collective elab. Warszawa: Express-Map Sp. z o.o., 2014 (The World. Two-sided political and landscape map).
- 62. *Europa Środkowa*. 1:2 000 000. Elab. Jacek Drahal, Anna Dębowska. Warszawa: Instytut Geodezji i Kartografii, 2012 (Central Europe. Image map with combination of satellite images and terrain model).
- Polska. Mapa ogólnogeograficzna. 1:500 000. Editorial elab. Daunpol Wydawnictwo Kartograficzne. Warszawa: Główny Urząd Geodezji i Kartografii, Główny Geodeta Kraju, 2911 (Poland. General geographical map, with hypsometry).
- 64. Polska. Mapa podziału administracyjnego. 1:500 000. Editorial elab. Daunpol Wydawnic-

two Kartograficzne. Warszawa: Główny Urząd Geodezji i Kartografii, Główny Geodeta Kraju, 2911 (Poland. Map of administrative division).

- Polska. Mapa krajobrazowa. 1:500 000. Editorial elab. Daunpol Wydawnictwo Kartograficzne. Warszawa: Główny Urząd Geodezji i Kartografii, Główny Geodeta Kraju, 2911 (Poland. Landscape map with land cover and shaded relief).
- Polska. Gleby. 1:750 000. Elab. Joanna Fiedor et alli. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o., 2011 (Poland. Soils: international and genetic classification of soils. Two-sided map for secondary and upper-secondary schools).
- Polska 1939–1945. Podziały administracyjne. 1:750 000. Elab. Jan Laskowski. Instytut Pamięci Narodowej. Warszawa: Demart SA., 2013 (Poland 1939–1945. Administrative divisions).
- 68. Gospodarka Polski Ludowej. Wystąpienia społeczne w Polsce Ludowej. 1:800 000. Elab. Izabela Hajkiewicz et alli. Wrocław; Nowa Era,

Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o., 2013 (Economy of Polish People's Republic. Social occurance in Polish People's Republic. Two-sided historical map for secondary and upper-secondary schools).

- 69. Świat podczas II wojny światowej. 1:24 000 000. Elab. Izabela Hajkiewicz et alli. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o., 2011 (The World during World War II. Two-sided map for secondary and upper-secondary schools).
- Narodziny Stanów Zjednoczonych. 1:10 000 000. Powstanie państw w Ameryce Północnej i Ameryce Południowej. 1:17 500 000. Elab. Izabela Hajkiewicz et alli. Wrocław: Nowa Era, Redakcja Kartograficzna. Warszawa: Nowa Era Sp. z o.o., 2013 (The birth of the United States. The creation of states in North America and South America. Two-sided map for secondary and upper-secondary schools).

C. CARTOGRAPHIC LITERATURE

Catalogues of map collections and exhibitions

- 200 lat kartografii leśnej. Katalog wystawy. Sękocin Stary 2013. Elab. Artur Sawicki, Krzysztof Okła. Warszawa: Instytut Badawczy Leśnictwa, Dyrekcja Generalna Lasów Państwowych, 2013, 50 pp. (200 years of forest cartography. Catalogue of exhibition).
- 72. Łopatecki Karol, Walczak Wojciech: Mapy i plany Rzeczypospolitej XVII w. znajdujące się w archiwach w Sztokholmie – Maps and plans of the Polish Commonwealth of the 17th c. in archives in Stockholm. Warszawa: Ministerstwo Kultury i Dziedzictwa Narodowego, 2011, vol. 1, 331 pp.; vol. 2, 35 map facsimiles.
- Plany miast w zasobie Archiwum Państwowego w Koszalinie – City maps in the collection of National Archive in Koszalin. Editors Joanna Chojecka et alli. Koszalin: Archiwum Państwowe w Koszalinie, 2012, 115 pp.
- 74. Świat Ptolemeusza. Włoska kartografia renesansowa w zbiorach Biblioteki Narodowej. Wystawa w stulecie urodzin Jana Zamoyskiego. Scientific editors Tomasz Płóciennik, Mikołaj Baliszewski. Catalogue elab. Lucyna Szaniawska. Warszawa: Biblioteka Narodowa, 2012, 255 pp.

(The world of Ptolemy. Italian Renaissance cartography in collections of National Library in Warsaw. Exhibition in the centenary of Jan Zamoyski's birth).

- 75. Wielka Mapa Księstwa pomorskiego Eilharda Lubinusa – Die Grosse Karte des Herzogtums Pommern von Eilhard Lubinus. In: Eilhard Lubinus Reise durch Pommern. Szczecin: Zamek Książąt Pomorskich, 2013, pp. 17–43. (Great Map of Duchy of Pomerania by Eilhard Lubinus. Catalogue of exhibition in Pomeranian Dukes' Castle in Szczecin).
- Wójcik Andrzej J.: Carta Geologica. Mapy geologiczne Królestwa Polskiego wydane w latach 1815–1915. Katalog. Dąbrowa Górnicza: Muzeum Miejskie "Sztygarka", 2013, 180 pp. (Carta Geologica. Geological maps of Polish Kingdom published in 1815–1915. The catalogue).

History of cartography

77. Alexandrowicz Stanisław: Kartografia Wielkiego Księstwa Litewskiego od XV do połowy XVIII wieku – Cartographia Magni Ducatus Lithuaniae XV–XVIII saeculorum. The 3rd corrected and supplemented edition. Instytut Historii Nauki Polskiej Akademii Nauk. Warszawa: Oficyna Wydawnicza ASPRA–JR, 2012, 344 pp., summ.: Cartography of the Grand Duchy of Lithuania from the 15th century to the middle of the 18th century.

- Alexandrowicz Stanisław: Kartografia ziem Wielkiego Księstwa Litewskiego w epoce panowania Jagiellonów. Polski Przegląd Kartograficzny, vol. 46, 2014, no. 1, pp. 62–76, summ.: Cartography of the Grand Duchy of Lithuania in the epoch of Jagiellonian rule.
- 79. Bartoszewicz Henryk: Z dziejów kartografii Mazowsza i ziem sąsiednich XVII–XX wieków. Warszawa: Geodeta Sp. z o.o.; Pułtusk: Akademia Humanistyczna im. Aleksandra Gieysztora, 2012, 236 pp. (From the history of cartography of Masovia region and neighboring lands of XVII–XX centuries. Collection of 28 papers).
- 80. Bartoszewicz Agnieszka, Bartoszewicz Henryk: Dzieje kartografii miast polskich do końca XIX wieku. Zarys problematyki. Polski Przegląd Kartograficzny, vol. 45, 2013, no. 3, pp. 236–255, summ.: History of the cartography of Polish cities until the end of the 19th century.
- Bogacz Teresa: Symbolic space on the old maps of Silesia (16th–18th c.). Studia Geohistorica, no. 01, 2013, pp. 81–90.
- 82. Bułatowicz Olga, Pasławski Jacek: O mapie poglądowej Królestwa Polskiego Jadwigi Wójcickiej z 1885 roku. Polski Przegląd Kartograficzny, vol. 45, 2013, no. 2, pp. 131–143, summ.: On illustrative school map of the Polish Kingdom from 1885 elaborated by Jadwiga Wójcicka.
- Dawna kartografia miast. Editors Jerzy Ostrowski, Paweł E. Weszpiński. Z Dziejów Kartografii, vol. 15, Warszawa 2011, 592 pp. (Old cartography of towns. Collection of 31 papers with English summaries).
- 84. Dawne mapy jako źródła historyczne. Editors Beata Konopska, Jerzy Ostrowski, Jacek Pasławski, Paweł E. Weszpiński. Biblioteka Polskiego Przeglądu Kartograficznego, vol. 3, Warszawa 2012, 169 pp. (Old maps as historical sources. Collection of 14 papers with English summaries).
- 85. Dawne mapy jako źródła w badaniach geograficznych i historycznych. Editors Beata Konopska, Jerzy Ostrowski. Z Dziejów Kartografii, vol. 18, Warszawa 2014, 359 pp. (Old maps as a source in geographical and historical research. Collection of 24 papers with English summaries).

- 86. Galicja na józefińskiej mapie topograficznej 1779–1783 – Die Josephinische Landesaufnahme von Galizien 1779-1783. Editors Waldemar Bukowski, Bogusław Dybaś, Zdzisław Noga. Polska Akademia Nauk - Instytut Historii, Uniwersytet Pedagogiczny w Krakowie - Instytut Historii. Tom - Band 1: Część - Tail A, tekst CXVIII, 325 pp., Część – Teil B, facsimilia of 30 sheets; Tom - Band 4: Część - Teil A, texts CXVIIII, 324 pp., facsimilia of 38 sheets, Kraków: Wydawnictwo Antykwa 2012; Tom - Band 2: Część - Teil A, texts XCIV, 330 pp., Część -Teil B, facsimilia of 27 sheets, Kraków: Wydawnictwo Towarzystwa Naukowego "Societas Vistulana", 2013. (Austrian province Galicia on Joseph's topographic map 1779–1783. Edition of manuscript sheets and annexed descriptions. All texts in Polish and German).
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