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The Institute of Geodesy and Cartography — its scientific outline, cartographic investigations and international activity

Abstract. The aim of this paper is to introduce the Institute of Geodesy and Cartography (IGiK) to the participants of the 11th International Cartographic ICA Conference. This Institute represents Poland in the International Cartographic Association. The paper presents: the outline of the Institute's history, directions of scientific investigations carried out at the Institute, results and current directions of cartographic investigations, organization and activities of the Institute and its activity in the field of international scientific and scientific-technical cooperation.

Introduction

The Institute of Geodesy and Cartography, which represents Poland in the International Cartographic Association, cordially welcomes the participants of the 11th International ICA Conference. Cartographers and other scientists from the Institute are truly glad that cartographers from all over the world can be their guests and that it will be possible to exchange experiences and opinions with them, to discuss recent results of world cartography, to consolidate the existing and to establish new friendly relations.

We welcome you, our Honourable Colleagues, on the Polish land, in our capital. We wish you a successful and pleasant stay.

With regard we greet all representatives with Respectable Professor Ormeling, the President, and with Honourable Mr. Hedbom, the Secretary-Treasurer.

Ladies and Gentlemen, as Director please let me, introduce our Institute to you. I would like to characterize its scientific outline in this paper, as well as the ways and methods of its activities and its international activity. Selected cartographic problems will be discussed by my colleagues from IGiK in further elaborations of this volume.

1. Outline of the Institute's history

The Institute of Geodesy and Cartography has been active for over 37 years. It was founded on March 30, 1945 and named Scientific-and-

-Research Institute of Geodesy. It belongs to the oldest institutes of this type in Poland. It has been working within the framework of the State Geodetic-and-Cartographic Service.

On its founding, our Institute was the second scientific institution of geodetic services in the socialist countries after the Central Scientific-and-Research Institute of Geodesy, Photogrammetry and Cartography in Moscow, which has existed since 1928.

Professor Edward Warchałowski (1885—1963), a well known Polish scientist — surveyor, rector of the Warsaw Technical University and later the President of the Head Office of the Country's Measurements, was the organizer and the first director of the Institute.

In the first period of its existence, 1945—1951, the activities of the Institute were directed on elaborating new methods and techniques of geodetic computations, as well as on rules and designs of basic networks. Investigations of geodetic methods for measurements of ground and construction deformations were also started in this period.

Professor Stanisław Kryński became the director of the Institute in March, 1952 and he held this post for 22 years, that is till mid-1974. The Institute, well developed from the personnel point of view and equipped with necessary devices and laboratories, became active in realization of basic tasks of the geodetic-and-cartographic service. The range of investigations carried out at the Institute was systematically expanded, including successive directions of elaborations, connected with needs of the national economy. The Institute reactivated and developed the astronomical-and-geodetic observatory at Borowa Góra, undertook preservation of the unit of length and checking out the precision of geodetic gauges, took-up and developed general technical activities in the field of scientific-technical information. A mechanical-and-design centre was organized, which aimed at designing and making particular geodetic and cartographic devices.

Since 1955, the Institute has been active under the current name. During the last period (since 1974) a further development of the range of scientific tasks of IGIK took place. Instrumental-and-designing direction has been modernized, new measurement methods and techniques have been introduced, among others, in the field of interference and diffraction. Investigations concerning applications of special airborne and spaceborne photographs for the needs of various scientific, economic and state administrative branches, carried out from scientific and practical points of view have been started. Since January 1st, 1976, the Polish Centre of Remote Sensing (OPOLiS) has been active, which performs the function of the country's remote sensing centre. The Centre is equipped with modern devices for processing and interpretation of satellite and airborne images, registered on photographs or on magnetic tapes.

2. Directions of scientific investigations of IGIK

The scientific elaborations of the Institute of Geodesy and Cartography are very vast. They can be divided into the five following directions: geodesy, photogrammetry, cartography, remote sensing, designing and construction of new devices for geodesy and cartography. A brief characteristic of problems represented by the particular directions is presented below.

Geodesy:

- studies on installation and modernization of horizontal and vertical geodetic networks,
- investigations of current movements of the Earth's crust and elaboration of maps of these movements,
- new methods and technologies for determining astronomical coordinates and azimuths within geodetic networks,
- gravimetric measurements and elaboration of gravimetric maps for geodetic purposes,
- measurements of the Earth's magnetism and elaboration of component maps of the magnetic field,
- permanent preservation of the unit of length, comparison of wire and tape gauges, new methods and technologies of measurements of standard length bases and other problems concerning geodetic metrology.
- methodology and technologies of attestation of electromagnetic distance meters and their application for basic and detailed measurements of geodetic networks,
- methods and specialistic devices for engineering measurements—deformation and dislocation measurements of engineering structures, water dams and of similar objects, measurements for assembling large structures, machines and devices, measurements for setting out large structure designs.

Photogrammetry

Investigations in the field of aerial photogrammetry carried out at IGIK concern mainly elaboration and improvement of methods and technologies of the following tasks:

- elaboration of large-scale maps,
- application of orthophotogrammetry for elaboration of linear elements of the topographic maps as well as for elaboration of photographic maps,
- determination of deformations in mining areas,
- aerotriangulation,
- photogrammetric digital elaborations,

- testing of new types and series of photogrammetric instruments,
- elaboration of thematic maps by means of photogrammetric methods.

In the field of terrestrial and close range photogrammetry, research problems of activities of the Institute include methods, techniques and technologies of measurements and elaborations of:

- engineering sites,
- deformations of structures and constructions,
- fast changing biological processes,
- microphotogrammetry,
- photographs for medical needs,
- photographs for various fields of science,
- digital elaboration of results of photogrammetric measurements.

C a r t o g r a p h y

Investigations in the field of methodology of cartographic elaborations as well as rules and methods of thematic map editing mainly concentrate on:

- drafting methods of varied forms of the terrain relief,
- rules of generalization of contents of large-scale and medium-scale topographic maps,
- methods and ways of cartographic projection of thematic map content elaborated for physical planning, rational rural land utility, aerial traffic control, sea radiocommunication, etc.

Problems of the cartographic technologies mainly concern:

- updating of maps,
- low reproduction edition of thematic maps,
- reproduction of orthophotomaps,
- printing of tone images without rasters.

Directions of cartographic elaborations of the Institute will be discussed in more detail separately.

R e m o t e S e n s i n g

Investigations and applications in this field include three basic types (groups) of problems, namely:

- determination of relations between features of airborne and spaceborne images and photographs as well as natural objects, represented by these features,
- methods, techniques and technologies of basic and preliminary processing of source remote sensing data, which is usually followed by branch data interpretation,
- methods and technologies of applications of remote sensing images — satellite, aerial and terrestrial, for different practical purposes. These aims are mainly connected with agriculture, forestry, physical planning and protection of the environment. In the field of agri-

culture remote sensing application is connected with such problems as: recognition and determination of crop structure, investigation of maturity of crops and yield forecasting, investigation of health state of vegetation and determination of damages caused by biotic and abiotic factors, investigations of water relations in soil. Forestry is first of all interested in maps on the stand of trees and damage inventory within stands, caused by biotic and abiotic factors.

For the needs of physical planning and protection of the environment, remote sensing deals with such problems as: elaboration of land use maps, elaboration of physiographic maps, investigation and mapping of pollution of water reservoirs, atmosphere and other components of the geographic environment.

Construction of equipment

From the following, already realized, designs can be mentioned:

— systems and devices for determining deformation and dislocations of engineering structures, such as feeler gauges, devices for measurements of distances changes, recorders of foundation slopes, attachments for slope measurements, etc.,

— devices for cartographic elaborations.

At present opto-electronics as well as measuring electronics are applied at the Institute for the construction of measurement equipment. It enables to represent measured linear and angular values in a digital form. Techniques connected with laser light, and among others interferometry, are also applied. The Institute has patent rights for several tens of original construction solutions in the field of measuring equipment.

3. IGiK scientific cartographic elaborations

Cartographic problems were included in the activity of the Institute in 1956. They included different tasks, from conceptional and editing to technologies of map elaboration and publishing. They were connected with various scales of maps, from engineering and economic large-scale maps, to general, small-scale geographical maps.

In the period between 1956 and 1975 the following elaborations can be mentioned as the most important achievements of IGiK in the field of cartography: atlas of drafting of the Polish terrain relief (elaborated and published in cooperation with the former Department of Cartography of the Warsaw Technical University), technology of elaborating relief maps (applied in map production by the State Cartographical Publishing House), a method of layer engraving for drafting maps, elaboration and performance (by the Mechanical-and-Constructional Department of IGiK) of a set of engraving tools, a method of stripped layer used in the process of map reproduction, various special maps, among them the

geomorphological map of Poland at 1 : 500 000 scale, published by the State Cartographical Publishing House (PPWK), the user's need analysis connected with the content and accuracy of the basic map at 1 : 5 000, 1 : 2 000, 1 : 1 000 and 1 : 500 scales, methods of editing different problematic maps (thematic maps) for the needs of local physical planning.

The scientific investigations and the development elaborations in the field of cartography, carried out at IGiK (since 1975), from the point of view of aims and results can be divided into the following types:

- 1) concepts of new maps, their systems and subsystems, directed on the needs of particular users,
- 2) development and utilization of new sources and methods of information acquisition for cartographic needs,
- 3) improvement of already existing and elaboration of new methods and technologies for map elaboration, publishing and updating,
- 4) standardization of contents and forms of maps, elaborated for the needs of mass users.

The majority of scientific cartographic problems which are solved at the Institute serves, of course, simultaneously more than one of the above mentioned aims. Therefore, further characteristics of this type of elaborations should be understood as a classification which is carried out according to leading aims (motives) of work.

New systems and subsystems of maps

A classification of thematic maps for economic needs has been elaborated at IGiK; an open system has been proposed, enabling its flexible revision due to changing needs and conditions. The system of thematic maps considers needs of different branches of the national economy, administration and management as well as needs of different environmental planning levels. This system is being utilized for programming of cartographic activity in the field of thematic maps, which are coordinated in Poland by the Head Office of Geodesy and Cartography.

Jointly with the Institute of Environmental Design IGiK, has elaborated and initiated in practice the subsystem of thematic maps (16 problematic maps) for the needs of terrain (local) physical planning. The subsystem is the subject of a separate elaboration by J. Ciesielski, included in this publication. Similarly, the subsystem of socio-economic maps, elaborated at IGiK for the needs of rational utilization of agricultural productive land, is presented in a separate paper by K. Podlacha.

Elaborations on methodology of state maps and estimation of biological environment resources should be mentioned among further investigations concerning the system of thematic maps, carried out at our

Institute. It is of particular importance and an up-to-date problem due to the high social rank of geographical environment protection in Poland.

New sources and methods of information acquisition for map elaboration

In this direction much attention should be paid to remote sensing. The introduction of methods on remote recording of objects and phenomena on and under the Earth's surface, and in the atmosphere, by means of utilizing a special scanner and photographic techniques from airplanes and satellites, considerably enriched the existing sources of cartographic data acquisition. Apart from essential expansion of the range of information content, remote sensing brought about the acceleration and shortening of the process of information acquisition. It has, in turn, a substantial influence on map up-dateness, particularly for those which contents include changing processes.

A more detailed discussion of this direction of cartographic elaborations is presented in a separate paper by A. Ciołkosz included in this publication.

Improvement of methods and technologies for map elaboration, editing and updating of maps

In the period between 1976—1980 an important achievement of IGiK was the elaboration and productive implementation of technology for preparing orthophotomaps. An orthophotomap includes more terrain information than a conventional dashed map, and due to this fact, it has a wider range of application. It is particularly useful for the elaboration of new type of background maps for environmental planning, technical designing and for elaboration and up-dating of the country's basic map. Orthophotomaps are important for thematic cartography, for example for mapping of terrain deformations caused by mining exploitation. The orthophotomap technology, including its elaboration and reproduction, has been elaborated in cooperation with the State Geodetic and Cartographic Enterprise. This technology has been subsequently modified and improved. Particular features of mapped areas (for example high mountainous areas), and further technical possibilities (stereoorthophoto) are considered for this reason.

The system of spatial references, elaborated at IGiK in the form of a uniform country grid of the so-called, marked areas, is very important for cartography. The size of the basic side is equal 5° of latitude and 10° of longitude. The area of Poland is divided into 72 strips and 61 columns and the origin of the coordinate system is located in the point with coordinates equal $\varphi = 55^\circ$ and $\lambda = 14^\circ$. Smaller units are the fields at 1:100 000, 1:50 000 and 1:25 000 scales; the size of each is approx. 1 cm \times 1 cm and the area, accordingly, approx. 100 ha, 25 ha and 6.25 ha. Each field has an explicit coding designation, that results from adaptation of the system to the computerized and automated ela-

boration of maps. The marked areas allow to record the map content in a matrix form. The system has been applied under the name PROMEL to process the data concerning resources and estimation of biological-and-soil and soil-and-land melioration environment. The already elaborated maps concern such problems as: soils, needs of melioration of arable land, retention ability of arable land, agricultural usefulness of arable land and needs of agromelioration. The Office for Studies and Design of Water Melioration and Country Water Supply BIPROMEL is a partner of the Institute in the development and practical implementation of this system.

Among the problems included in the discussion and elaborated at present at the Institute, the following matters should be also mentioned:

- technological ensurance of realization of the video-and-cartographic system with the utilization of photochronic layers as well as with the utilization of a ruby or dye laser for thematic map composition according to the principle of adding particular images of elementary matrixes of map content,

- technology of up-dating a basic map at different scales,

- technology of up-dating maps of areas with technogenic motions (mining areas),

- technology of elaboration of a basic map at 1:5 000 scale by means of photogrammetric methods,

- up-dating of topographic maps with the utilization of satellite photographs (small-scales),

- digital technologies for thematic map elaboration on the base of satellite images.

Developmental trends in the field of automation of cartographic processes (H. Kowalski), digital processing of satellite photographs for thematic cartography (J. Domański and K. Lady Drużycka), as well as principles and technologies of large-scale map up-dating (J. Zwierzyński) are subjects of separate papers presented in this publication.

Standardization of maps' content and form

Elaborations in this field have been directed on the basic map (large-scale) and on thematic maps. Basic map users' needs, concerning the map's contents, have been thoroughly examined. It formed the base for forming conclusions concerning norms, which have been applied to elaborate the technical instruction K-1, „The basic map”, issued by the Head Office of Geodesy and Cartography. This instruction included the determination of the basic map, principles of sheet division, performing its imprint, accuracy parameters of the map and detail description of map content in the form of catalogue of conventional symbols. Map standards at all four scales, and the standard of a frame description are

appended to this instruction. The K-1 instruction has been obligatory since 1979. Technical principles K-1.2, elaborated at our Institute and concerning the up-dating and modernization of the basic map, are an appendix to this instruction.

The instruction K-3 concerns thematic maps and includes: principles of map classification, projection, division into sections and territorial units, methods for map designation with emblems, rules of map editing, elaboration of the original sketch edition and a clean copy, reproductive principles, elaboration of imprint and authorization of maps. The diagram of map classification and the model of imprint are appended to the instruction. Supplementary to the instruction K-3 are technical principles: „Principles for editing thematic maps” and „Elaboration of engineering-and-economic maps of industrial plants by means of photogrammetric methods”, elaborated at the Institute.

Works in the field of thematic map standardization are continued, even though the K-3 instruction has been published, since they concern an open set of maps, and life makes it necessary to introduce new types of cartographic elaborations.

4. Forms of work and activities of the Institute

Our Institute is a scientific, of a departmental character institute and thus it does not carry out training activity suitable for higher schools. The principal task of IGiK is to develop methods, techniques and technologies of geodetic and cartographic elaborations for practical needs. This principal task is mainly realized through the solution of scientific problems which create practical new methods, devices and technologies.

The Institute works on a system of an economic account, which means, that the basic costs of maintenance are covered by financial means obtained from payments for elaborating results of research purchased by customers. About half of all research works are carried out at the order of the Head Office of Geodesy and Cartography, the Union of Geodetic-and-Cartographic Enterprises „GEOKART” and particular enterprises subordinated to GUGiK. The remaining subjects (the second half of the whole) are ordered by different scientific institutions, administrative and productive enterprises, which do not belong to the State Geodetic-and-Cartographic Service. Among them are the economic departments and belonging to them scientific institutes of agriculture, forestry, geology, mining, power energy, transportation, building industry; the Polish Academy of Sciences and its scientific institutes, the department of science, higher education and technology, including higher schools, and finally, different economic organizations as well as local country state administrative organs. At the same time, part of the

accepted works are ordered by IGiK at other, specialized scientific centres. The participation of other centres in elaborations carried out and conducted by IGiK differ in particular years, but the average is approximately 30% for the last period. Higher schools, and particularly — but not exclusively — their departments (institutes works and chairs) of geodesy, cartography and geography are the main performers of investigations elaborated at the order of our Institute. The Institute acts as the general coordinator in the field of scientific investigations carried out in Poland for the needs of geodetic-and-cartographic practice. Since 1980, the Institute financed by the state (through the Polish Academy of Sciences) has also been conducting investigations in the field of remote sensing in the framework of the so called, crucial problem of space research and their peaceful application.

It should be underlined that in the range of all utility problems and which at the same time dominate at IGiK, the Institute is coresponsible for practical application of the results. During practical introduction of results, the Institute is helpful for the introducing units (institutions) mainly for the geodetic-and-cartographic enterprises). Forms of this help are: education of engineers and technicians in the sphere of practicing new methods and techniques, consultations for introducing units (institutions) and publishing detailed directions, instructions, descriptions etc., for the need of practitioners.

Apart from basic activity, concerning scientific investigations, the Institute performs the so called general technical activity, which is conducive to technical development and increase of professional level of geodetic-and-cartographic personnel in Poland. The general technical activity of IGiK includes:

- scientific-and-technical information,
- normalization,
- patent protection,
- publishing,
- exhibitions.

The main departmental library is active at the Institute for readers from all over the country. It consists of the largest collection of geodetic books in Poland and it subscribes over 100 foreign magazines.

The Institute issues the following publications:

- the Proceedings of IGiK, which include original scientific elaborations,
- Astronomical Annual,
- Bulletin of IGiK, as the supplement to the monthly Geodetic Review, published by the Polish Surveyors Association,
- Information Bulletin,
- Documentational Review (bibliography, patents),
- Express information for the managing staff.

A Scientific Council consisting of representatives from various Polish scientific institutions (among others — cartographic) is active at the Institute. Professors and assistant professors employed at IGiK are also members of this Council. The Scientific Council is helpful to the IGiK administration in planning and estimating research activity, and also opinionates scientific titles and appointment of the scientific staff. The Institute has the right to confer technical Ph.D. titles in the field of specializations performed at IGiK, in cartography as well. Ph.D. theses are conducted by the Scientific Council.

Other collegiate bodies are active at the Institute; they consist of specialists from outside the Institute and of IGiK staff. They are: the Normalization Committee, the Inventory Committee and the Publishing Council.

Specialists of the following professional categories are employed at the Institute: scientific (professors, assistant professors, tutors, senior assistants and assistants), engineering and technical, librarians, workers (mainly at the Mechanical-and-Constructive Department), administrative and others. Among specialists of basic activities, besides geodesists of different specializations and cartographers, the Institute also employs geographers, mathematicians, specialists in computer science and electronics, hydrologists, photographers, specialists in forestry and agriculture, etc.

The Institute is organized in the form of scientific and scientific-and-productive departments, branch centres and functional departments and units.

Cartographic problems are elaborated at the Department of Cartography (a leading department in this field), at the Centre for Remote Sensing (OPOLiS) and also at the Department of Photogrammetry, and partially also at the remaining units of basic activities. Groups of specialists belonging to different departments are flexibly established for performing numerous elaborations. Each problem has an individual manager. Related subjects, usually representing particular specializations, are formed in problem or thematic groups, conducted by coordinators.

5. International cooperation and activity of the Institute

The Institute and its scientific staff are very active in the international scientific-technical cooperation in the field of geodesy and cartography. The main forms of this activity area:

- participation in works performed by international scientific and scientific-technical organizations;
- participation in international cooperation through governmental organizations and agencies;
- participation in special multilateral research programmes;

- multilateral scientific technical cooperation of geodetic services of the socialistic countries;
- direct scientific cooperation with foreign scientific institutes and with institutions of a different character;
- scientific and designing export works, elaborated mainly for developing countries.

Since 1964 the Institute of Geodesy and Cartography has been representing Poland at the International Cartographic Association, and since 1978 Professor Andrzej Ciołkosz from our Institute has been one of the vice-presidents of the Association. Cartographers from the Institute actively participated in international technical ICA conferences, presenting there numerous papers. At present one of the ICA commissions, newly created during the Tokyo Conference (1980), concerning the cartographic remote sensing is also conducted by Prof. Ciołkosz. Another specialist from the Institute, Prof. Henryk Kowalski, is an active member of the Commission for Computer Assisted Cartography.

The Institute, through its specialists, participates in activities of other international organizations: the International Society for Photogrammetry and Remote Sensing (ISPRS), the International Association of Geodesy (IAG), the International Union of Geodesy and Geophysics (IUGG) and the International Federation of Surveyors (FIG).

Specialists from the Institute represented Poland at regional cartographic conferences, organized by the United Nations Organization (for example Prof. Jan Ciesielski, Panama, 1976) and participated in the works of the Technical Subcommittee of the UN Committee on the Peaceful Uses of Outer Space (for example prof. Adam Linsenbarth, New York, 1978).

We actively participate within the INTERCOSMOS programme, where one of the working groups is dedicated to remote sensing, and thus also deals with cartographic problems. A conference of this group was held in Warsaw in 1980. A series of other scientific conferences within the INTERCOSMOS programme have been held with the active participation of our Institute. It is worth mentioning, that one of the experiments carried out on board of the Soviet orbital station Salyut-6 during the Soviet-Polish space flight (Colonel Mirosław Hermaszewski, 1978) was to take photographs of the Earth by means of a multispectral MKF6 camera. The photographs of Poland were applied for various purposes. IGiK participation in the preparation and elaboration of results of this experiment was commemorated with a special medal, the original of which was taken on a space flight.

The Institute participates in polar investigations, performing geodetic and cartographic works on Spitsbergen and the Antarctica. Several IGiK specialists participated in Southern and Northern polar expeditions, and even two of them were leaders of expeditions.

Since 1966, IGiK has participated in works carried out by the Academy of Sciences of the socialist countries in the sphere of planetary geophysical investigations. A specialist of IGiK, Prof. Stanisław Kryński, is the head of the subcommission of geodesy and gravimetry, while several other IGiK specialists participate in working groups, dealing with problems of geodesy, geodetic astronomy, gravimetry and the Earth's magnetism.

Within the frameworks of this cooperation, among others current vertical movements of the Earth's crust have been investigated and their results have been presented on maps covering East, and partially, Central Europe. The last edition of this type of maps appeared over 10 years ago. A new edition is under elaboration.

Geodetic services of the socialist countries started multilateral cooperation in 1952, which at first concerned primarily the creation of a uniform astronomical geodetic, levelling and also gravimetric system and elaboration of a topographic map at 1 : 25 000 scale and derivative maps. This cooperation has been considerably enlarged since 1976; which apart from common ventures included also development of geodetic-and-cartographic methods, techniques and technologies.

One of the six thematic groups concerns general cartography, small-and medium-scale. IGiK Department of Cartography participates in activities of this group, while the Institute heads, on behalf of the Polish geodetic service, another group, dealing with problems of engineering geodesy.

The exchange of scientific publications of IGiK is a common form of cooperation. Our Institute sends its scientific publications to 80 foreign centres. The Institute holds temporary contacts with numerous scientific institutions abroad. Among others, a considerable number of specialists from the newly created Centre of Remote Sensing at our Institute (OPOLiS) in the period between 1977 and 1978 was trained at leading centres in the USA, Canada, France, the Netherlands, Great Britain and the Soviet Union.

Direct, permanent cooperation connects our Institute with the Scientific-and-Productive Remote Sensing Centre „Priroda” in Moscow, the Czech Remote Sensing Centre in Prague. Representatives of several countries have been trained at our Remote Sensing Centre (OPOLiS). Thermal and multispectral photographs have been taken and elaborated by a group of our specialists in foreign countries in the framework of cooperation or help, among others in Czechoslovakia, Hungary and Vietnam.

Direct Polish-American cooperation was started in 1980 in the sphere of remote sensing application in agriculture and forestry. Two problems have been elaborated concerning agricultural statistics and the health stage of trees. From the Polish side IGiK is the leading, expert institution in this cooperation.

The Institute participates in export of technical consulting and services in the field of geodesy and cartography. In this sphere we cooperate with the Union of Geodetic-and-Cartographic Enterprises GEOKART. The Union is the performer of large contracts, which usually concern the creation of basic geodetic networks, topographic map elaboration, economic and thematic maps, geodetic services for designing and construction of towns, roads and railroads systems and cadastral surveying.

Translation: Jacek Domański

BOGDAN NEY

L'INSTITUT DE GÉODÉSIE ET DE CARTOGRAPHIE — SON PROFIL SCIENTIFIQUE, RECHERCHES EN CARTOGRAPHIE ET ACTIVITÉS INTERNATIONALES

Résumé

L'Institut de Géodésie et de Cartographie (IGiK), organisme scientifique réalisant ses activités dans le cadre du service national de géodésie et de cartographie en Pologne, a été créé le 30 mars 1945. Durant 37 ans de son activité l'Institut a apporté une contribution considérable au développement scientifique et technique de la géodésie et de la cartographie nationales. Parmi les activités scientifiques de l'Institut il faut noter: la géodésie, la photogrammétrie, la cartographie, la télédétection et la construction des appareils. Depuis de plus de 6 ans dans le cadre de l'IGiK fonctionne un centre scientifique exécutif national de la télédétection. Des recherches scientifiques en tous les domaines sont réalisées en coopération avec plusieurs organismes scientifiques et productifs nationaux.

Les travaux scientifiques de l'Institut peuvent être classés en quatre orientations comme suit:

- nouveaux systèmes et sous-systèmes de cartes,
- nouvelles sources et méthodes d'acquisition d'informations pour l'élaboration de cartes,
- perfectionnement des méthodes et des technologies d'élaboration, d'édition et d'actualisation de cartes,
- standardisation du contenu et de la forme de cartes.

Une attention particulière est actuellement attirée sur les cartes thématiques. L'Institut a élaboré un classement de cartes thématiques constituant un système ouvert. Les sous-systèmes principaux de cartes thématiques concernent l'aménagement local du territoire, les conditions socio-économiques du point de vue agricole ainsi que l'évaluation des ressources du milieu naturel sous l'aspect de sa protection. Les conséquences essentielles pour la cartographie résultent d'une nouvelle source de données, c'est à dire de la télédétection aérienne et satellitaire. Dans l'IGiK on été élaborées plusieurs cartes à la base d'informations de la télédétection.

Parmi les thèmes technologiques dont l'Institut se préoccupe il faut distinguer: la technique d'orthophotocarte sous l'aspect de son élaboration et de sa reproduction, le système des champs marqués comme système de rapports spatiaux

pour l'élaboration automatique des cartes de conditions pédologiques et agricoles ainsi qu'hydrologiques et d'amélioration, l'actualisation de cartes aux grandes échelles (carte fondamentale) et de quelques cartes thématiques et enfin l'élaboration numérique de cartes thématiques à base d'images de satellite.

Dans les dernières années l'Institut a élaboré des standards concernant le contenu et la forme de la carte fondamentale (échelles 1 : 5000, 1 : 2000, 1 : 1000 et 1 : 500) et des cartes thématiques. Ces standards ont été insérés dans les règlements techniques cartographiques GUGiK (Office Central de Géodésie et de Cartographie) K-1 et K-3 ainsi que dans les recommandations techniques pour ces règlements.

L'IGiK réalise ses activités scientifiques dans le domaine de la cartographie depuis 1956. Parmi les réalisations plus anciennes de l'Institut, il convient de souligner: l'atlas d'établissement des cartes du relief de la Pologne, la technologie d'élaboration de cartes en relief, la méthode de gravure pour dessiner les cartes, la méthode d'une couche détachable (dans la reproduction de cartes) ainsi que différentes cartes spéciales et thématiques (carte géomorphologique de la Pologne au 1 : 500.000 par ex).

L'activité technique générale de l'IGiK englobe: l'information scientifique et technique, la normalisation, la protection de brevets, les éditions, les expositifs. L'Institut édite: Travaux de l'IGiK, Bulletin d'Information, Revue Documentaire et Information Express pour les Cadres.

Depuis 1964 l'IGiK représente la Pologne à l'ICA et, de plus, l'Institut participe dans les activités de l'ISP, l'IAG, l'IUGG et la FIG ainsi que des organisations internationales au niveau gouvernemental et la leurs agences spécialisées.

L'Institut coopère directement avec des organismes scientifiques étrangers et participe aux programmes scientifiques internationaux (INTERKOSMOS, recherches polaires). L'IGiK participe aussi aux travaux d'exportation réalisés par l'Union GEOKART.

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БОГДАН НЕЙ

ИНСТИТУТ ГЕОДЕЗИИ И КАРТОГРАФИИ — ЕГО НАУЧНЫЙ ПРОФИЛЬ, ИССЛЕДОВАНИЯ В ОБЛАСТИ КАРТОГРАФИИ И МЕЖДУНАРОДНАЯ АКТИВНОСТЬ

Резюме

Институт Геодезии и Картографии (IGiK) — научное учреждение, работающее в ведомстве государственной геодезической и картографической служб в Польше, был основан 30 марта 1945. В течение 37 лет деятельности Институт внёс прочный вклад в научное и техническое развитие геодезии и картографии в стране. Объёмом научных работ Институт охватывает следующие области геодезию, фотограмметрию, картографию, дистанционное зондирование, конструирование аппаратуры. В IGiK свыше шести лет работает всеобщий научно-технический центр дистанционного зондирования. Научные исследования во всех областях ведутся в сотрудничестве с многими отечественными научными и производственными учреждениями.

Научные работы Института в области картографии можно представить в следующих четырех направлениях:

- новые системы и подсистемы карт,
- новые источники и методы получения информации для создания карт,
- совершенствование методов и технологии составления, издания и обновления карт,
- стандартизация содержания и формы карт.

В настоящее время внимание направлено на тематические карты. В Институте разработана классификация тематических карт, представляющая открытую систему. Главные подсистемы тематических карт касаются местного пространственного планирования, социально-экономических отношений с точки зрения сельского хозяйства, а также богатств природной среды в аспекте охраны окружающей природной среды. Существенные последствия для картографии приносит новый источник данных, каким является дистанционное аэро- и космическое зондирование Земли. В IGIK разработан целый ряд карт с использованием информации дистанционного зондирования.

Среди технологической тематики картографии, разрабатываемой в Институте, можно перечислить: технику ортофотокарты, охватывающую её составление и воспроизведение, систему обозначенных полей как систему пространственных отнесений для автоматического составления карт почвенно-сельскохозяйственных и водно-мелиорационных отношений, обновление крупномасштабных карт (основная карта) и некоторых тематических карт, а также цифровое составление тематических карт на основе космических снимков.

В последние годы были разработаны в Институте стандарты относительно содержания и формы основной карты (масштабы 1 : 5000, 1 : 2000, 1 : 1000 и 1 : 500), а также тематических карт. Эти стандарты входят в технические картографические инструкции GUGiK K-1 и K-3 и в технические указания к этим инструкциям.

Научную деятельность в области картографии IGIK ведет с 1956 г. Среди ранних картографических достижений Института можно указать: атлас картографирования форм рельефа Польши, технологию изготовления рельефных карт, метод гравирования слоев при вычерчивании карт, метод „съёмного слоя” (в репродукции карт), а также разные специальные и тематические карты (например, геоморфологическая карта Польши 1 : 500 000).

Общетеchnическая деятельность Института охватывает: научно-техническую информацию, нормализацию, патентную защиту, издательства, выставки. IGIK издает: Работы IGIK, Астрономический Ежегодник, Бюллетень IGIK, Информационный Бюллетень, Документационный Обзор, Экспрес-Информация для руководящих кадров.

С 1964 г. IGIK представляет Польшу в ICA. Кроме того Институт принимает участие в деятельности ISP, IAG, IUGG и FIG, а также в международных неправительственных организациях и в их специализированных отделениях. Институт непосредственно сотрудничает с зарубежными научными учреждениями и участвует в международных научных программах (INTERKOSMOS, полярные исследования). IGIK участвует в экспортных работах, проводимых Объединением GEOKART.

Перевод: Róża Tołstikowa

BOGDAN NEY

INSTYTUT GEODEZJI I KARTOGRAFII — JEGO PROFIL NAUKOWY,
BADANIA Z DZIEDZINY KARTOGRAFII I AKTYWNOŚĆ
MIĘDZYNARODOWA

Streszczenie

Instytut Geodezji i Kartografii, placówka naukowa pracująca w resorcie państwowej służby geodezyjnej i kartograficznej w Polsce, był utworzony 30 marca 1945 r. W ciągu 37 lat działalności, Instytut wniósł trwały wkład w rozwój naukowy i techniczny geodezji i kartografii w kraju. Zakresem prac naukowych Instytut obejmuje następujące kierunki: geodezję, fotogrametrię, kartografię, teledetekcję oraz konstrukcję aparatury. W IGiK pracuje od ponad sześciu lat naukowo-wykonawcze krajowe centrum teledetekcji. Badania naukowe we wszystkich kierunkach są prowadzone we współpracy z wieloma krajowymi placówkami naukowymi i produkcyjnymi.

Prace naukowe Instytutu w dziedzinie kartografii można ująć w czterech następujących kierunkach. Oto one:

- nowe systemy i podsystemy map,
- nowe źródła i metody pozyskiwania informacji do opracowania map,
- doskonalenie metod i technologii sporządzania, wydawania i aktualizacji map,
- standaryzacja treści i formy map.

Szczególne uwagi jest obecnie skierowane na mapy tematyczne. W Instytucie opracowano klasyfikację map tematycznych, tworzących otwarty system. Główne podsystemy map tematycznych dotyczą miejscowego planowania przestrzennego, stosunków społeczno-gospodarczych z punktu widzenia rolnictwa oraz oceny zasobów środowiska przyrodniczego w aspekcie ochrony środowiska. Istotne konsekwencje dla kartografii przynosi nowe źródło danych, jakim jest teledetekcja lotnicza i satelitarna. W IGiK opracowano cały szereg map z wykorzystaniem informacji teledetekcyjnych.

Spośród technologicznej tematyki kartografii uprawianej w Instytucie, można wymienić: technikę ortofotomapy, obejmującą jej opracowanie i reprodukcję, system pólznaczonych jako system odniesień przestrzennych do automatycznego sporządzania map stosunków glebowo-rolniczych i wodno-melioracyjnych, aktualizację map wielkoskalowych (mapa zasadnicza) i niektórych map tematycznych oraz numeryczne sporządzanie map tematycznych na podstawie obrazów satelitarnych.

W ostatnich latach opracowano w Instytucie standardy dotyczące treści i formy mapy zasadniczej (skale 1:5000, 1:2000, 1:1000 i 1:500) oraz map tematycznych. Standardy te zostały ujęte w technicznych instrukcjach kartograficznych GUGiK K-1 i K-3 oraz w wytycznych technicznych do tych instrukcji.

Działalność naukową w dziedzinie kartografii IGiK prowadzi od 1956 r. Spośród dawniejszych osiągnięć kartograficznych Instytutu można wymienić: atlas kartowania form rzeźby terenu Polski, technologię wykonywania map plastycznych, metodę warstworytu do kreślenia map, metodę warstwy zrywanej (w reprodukcji map) oraz różne mapy specjalne i tematyczne (np. mapa geomorfologiczna Polski 1:500 000).

Ogólnotechniczna działalność IGiK obejmuje: informację naukowo-techniczną, normalizację, ochronę patentową, wydawnictwa, wystawy. Instytut wydaje: Prace

IGiK, Rocznik Astronomiczny, Biuletyn IGiK, Biuletyn Informacyjny, Przegląd Dokumentacyjny, Ekspres Informację dla kadry kierowniczej.

Od 1964 r. IGiK reprezentuje Polskę w ICA. Ponadto Instytut bierze udział w działalności ISP, IAG i IUGG oraz FIG, a także międzynarodowych organizacji rządowych i ich specjalistycznych agend.

Instytut bezpośrednio współpracuje z zagranicznymi placówkami naukowymi i uczestniczy w międzynarodowych programach naukowych (INTERKOSMOS, badania polarne). IGiK uczestniczy w pracach eksportowych prowadzonych przez Zjednoczenie GEOKART.