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Commission IV
Invited Paper

REPORT ON THE ACTIVITIES OF COMMISSION IV
TOPOGRAPHIC AND CARTOGRAPHIC APPLICATIONS OF PHOTOGRAMMETRY

by

Dr. J. M. Zarzycki
President, Commission IV
Topographical Survey
Department of Energy, Mines and Resources
Ottawa, Ontario

At the 1976 ISP Congress in Helsinki, the following resolutions concerning Commission IV were passed:

1. Considering the rapid development of digital procedures in photogrammetry, it is recommended that a Working Group devoted to these procedures be formed. This group should study:
 - methods of data acquisition, including methods of automatic digitization of existing maps, and
 - the range of applications resulting from automatic treatment of the data files thus formed.

The accent should be placed on automation emphasizing the use of topographic data bases and digital terrain models, particularly in the areas of photogrammetry, cartography, and civil engineering.

It is recommended that necessary contacts be made with the International Cartographic Association (Commission III) to institute cooperation in areas of mutual interest.

2. It is recommended that Working Groups IV/2 "Revision" and IV/4 "Checking of Topographic Maps" be continued, with the two groups being merged. Without excluding the small scales achievable through the photogrammetry and remote sensing, a special effort should be devoted to the largest scales, and on the development of automation, in cooperation with Commission II.
3. Considering the development of orthophotographic procedures it is recommended to form a Working Group on the problems of "Production (especially by automated procedures), Reproduction and Use of Photocartographic Documents of All Kinds (orthophoto, stereo-ortho, photomaps, etc.)".

Cooperation with the International Cartographic Association in areas of mutual interest will be sought.

4. In connection with thematic and topo-cartographic applications of photogrammetry, it is recommended that a study be made of the integration and use of images from all sources (metric or non-metric sensors, aircraft or spacecraft).
5. Considering the needs for large scale cartographic products for land planning in all its forms, it is recommended to continue the activities of Working Group IV/3. This group will study in particular the integration of photogrammetry for multipurpose maps (compiled from diverse sources) for rural or urban planning, as well as for digital data bases and systems of geographic information. The optimization of production operations will be studied specifically. Cooperation with the Fédération Internationale des Géomètres (F.I.G.) will be sought in areas of common interest.

Considering these resolutions and interests expressed by many colleagues, several topics were identified for investigation and the following Working Groups were formed:

		<u>Chairman</u>
W.G.IV/1	Digital Map Compilation and Cartographic Treatment of Digital Data	J.R.R.Gauthier - Canada
W.G.IV/2	Revision and Accuracy of Topographic Maps	Brig.M.M.Data - India
W.G.IV/3	Large Scale Integrated Mapping for Urban and Rural Planning, Engineering	K.J.Lester - South Africa
W.G.IV/4	Mapping from Space-borne Photography and Non-photographic Imaging Systems	Dr.Alden P.Colvocoresses - U.S.A.
W.G.IV/5	Orthophotography and Photomapping	D.I.Glendingning - Australia
W.G.IV/6	Littoral Mapping	R. Brossier - France
W.G.IV/7	Integrated Resource Mapping	Gen.Pranato Asmoro - Indonesia

During the last four years, computer technology, computer graphics and the space-borne imagery systems made the largest impact on the topographic and cartographic applications of photogrammetry. We have seen an increased use of digital terrain elevation models as a means of depicting terrain relief, instead of the traditional way, by contours. The demand for terrain information in digital form and for geographically referenced information systems is increasing. In terms of the production process, digital topographic data is considered by an increasing number of photogrammetrists to be the prime product of photogrammetric compilation; the graphical map as an important by-product of the digital data. This trend necessitates a multidisciplinary approach to digital photogrammetric mapping and close cooperation between the photogrammetrist, computer scientist and cartographer. This cooperation is essential, not only in the research and development of digital mapping systems, but also in a digital

production environment. In the application of digital photogrammetric mapping to engineering and planning a much closer cooperation between the photogrammetrist and the users of digital data is emerging as an essential element of efficient application of digital technology.

Further improvements in orthophoto mapping technology took place during the last four years. Application of stereo-orthophoto mapping techniques is gaining ground. New areas of interest, namely, littoral mapping and increased use of photogrammetry in providing the foundation for integrated resource mapping emerged as an important activity.

The Working Group on Digital Map Compilation and Cartographic Treatment of Digital Data has carried out an international test in which 7 countries participated. The purpose of this test was to evaluate accuracy of digital mapping and to shed light on the economic factors of digital map compilation. Results of this experiment are presented in a special report of Working Group IV/1 prepared by Mr. J. Gauthier and Prof. Dr. Masry.

Working Group IV/5 on Orthophotography and Photomapping embarked on a task of preparation of a World Dictionary of Orthophoto Mapping and microfiche and survey on the trends of the orthophoto products during the last four years. The information sought by this group included impact on traditional line mapping, identification of users of orthophotos, what production systems would best serve the user, and what reproduction methods are being used. As a preparation for the World Survey, a pilot study was carried out in Australia and New Zealand. The results of the Australian survey were produced as an appendix to a paper "Orthophotomapping, a Digital Companion" prepared by the Working Group Secretary, Mr. R. Fieldgate and presented to the South East Asian Survey Congress in Singapore in March 1979. The World Survey was directed at orthophoto producers whose names were supplied by the principal manufacturing companies supplying orthophoto equipment or established from previous I.S.P. proceedings. A detailed report is included in the report of the Chairman of Working Group IV/5, Mr. D. Glendinning.

In Working Group IV/3, the subject of digital data bases and systems of geographic information created considerable interest and was recognized by many photogrammetrists to be an important endeavour for the years to come.

An International Symposium of Commission IV was held in Ottawa October 2nd to 6th, 1978. The theme of this Symposium was "New Technology for Mapping". It was attended by 232 delegates from 33 countries; a total of 61 papers were presented.

Judging by the numbers of papers presented in each Working Group session, the interest of the participants was as follows, in order of priority:

1. Digital map compilation and cartographic treatment of digital data.
2. Mapping from space-borne photography and non-topographic imagery systems.
3. Orthophotography and photo mapping.

These three groups represent 63% of all papers presented at the Symposium.

At this Symposium, the following resolutions were passed:

Resolution 1: Relative to Operational Space-Borne, Earth Sensing Systems -

Considering there is an urgent worldwide cartographic need to support resource management and environmental understanding, and recognizing that experimental Earth resource satellite programs have demonstrated the capability for meeting this need, and that several organizations and countries are taking steps to further improve space-borne Earth-sensing systems of Cartographic potential, with a variety of sensors -

Resolved:

The participants at the symposium of Commission IV, held at Ottawa, Canada, October 2-6, 1978, recommend to the Council that the Society urges member countries and international organizations to introduce at the earliest possible date, operational cartographically sound Earth-sensing systems for the benefit of mankind.

Resolution 2: Relative to the Name of the Society -

It has become increasingly evident that sensors other than conventional cartographic cameras can contribute significantly to standard mapping capabilities. It is equally evident that the characteristics of various remote sensor systems can be most usefully represented by new types of cartographic products.

Resolved:

The participants at the symposium of Commission IV, held at Ottawa, Canada, October 2-6, 1978, recommend to the Council that action be taken to amend the statutes to change the name of the Society to "International Society for Photogrammetry and Remote Sensing".

We further recommend that the description of technical commission activities in the Bylaws be amended as appropriate to include the acquisition, mensuration, and analysis, applications, professional practice and interpretation of remote sensor data.

Following the Symposium, a meeting was held on October 7, 1978 of Working Group Chairmen and Secretaries at which the program for the 1980 Congress was discussed.

In accordance with the resolutions passed in Helsinki, contacts were established with Commission III of ICA and Commission V of F.I.G. These contacts culminated in a first joint meeting of ICA/ISP/FIG in Zurich July 9th to 13th, 1979.

Commission IV made two presentations at that meeting, a position paper by Dr. J. M. Zarzycki entitled "The Impact of Computer Technology on the Relative Roles of Photogrammetric Engineers and Cartographers" and a discussion paper summarizing all position papers was prepared by Mr. J. Gauthier, Chairman of Working Group IV/1.

This joint meeting was also attended by the President of ICA, Professor Ormeling, and the President of ISP, Mr. Cruset. The delegates discussed the areas of possible cooperation between the three societies and means by which this cooperation could be achieved. The delegates to this meeting have adopted the following recommendations:

1. In considering how the societies can develop better collaboration in the rapidly changing and developing field of digital mapping, it is recognized, that simply adding more conferences would burden an already dense schedule of national and international conferences at a time of fiscal restraint in many countries. On the otherhand it is also recognized that effective technical exchange depends on people meeting to discuss areas of common interest as well as on the production of papers and reports for wider circulation. In this light the basic premise of the recommendation is to organize and/or support joint meetings and symposia in conjunction with the already scheduled Society conferences. These would be designed to focus on the specific areas of interface between the participating Societies. Conference-organizers of course are already allocating time to joint sessions. The purpose here is to make more explicit the preparation and organization of these joint sessions by:
 - 1.1 identifying and articulating the areas of common interest,
 - 1.2 establishing and participating on joint program committees which will aid the conference organizing committee in developing a balanced interdisciplinary format,
 - 1.3 publish the joint meetings in the Society publications.
2. It is recommended that a joint symposium be organized in conjunction with the 16th F.I.G. Congress 1981 in Montreux, Switzerland. In this year there are no ICA or ISP conferences to conflict with this schedule. This could be coordinated through the F.I.G. Congress committee and representatives from ICA and ISP, located in the host country. The subjects identified are the following:
 - 2.1 Classification and definition of topographic features (taxonomy).
 - 2.2 Description of digital topographic data, taking into account geometric accuracy, precision and content.
 - 2.3 Investigation of the structure of data files and data bases for digital mapping.
 - 2.4 Definition of basic capabilities needed in interactive graphics editing systems for digital mapping.
 - 2.5 Economic aspects of digital mapping.
3. It is recommended that the participating Societies establish and appoint members to the Joint Study Groups to consider the following subjects, with one society taking the leading role in each of the subjects:
 - 3.1 Classification of features for digital topographic mapping.
Lead Society - ICA.

- 3.2 Design and structure of data files and data bases most suitable for digital topographic information systems.
Lead Society - F.I.G.
- 3.3 Basic capabilities needed in interactive editing systems for photogrammetric and cartographic applications in digital topographic mapping.
Lead Society - ISP.

These groups would meet at the 1981 F.I.G. Congress to discuss their preliminary progress and submit a written report for the 1982 ICA Technical Congress and for the 1982 ISP Commission IV Symposium.

A detailed report of this first joint meeting was prepared on behalf of Commission IV of ISP by Mr. Ch. Eidenbenz of the Swiss Federal Office of Topography and is available at the Congress as a Presented Paper.

The application of photogrammetry to topographic mapping at various scales is very well established throughout the world. Maps in graphical form are produced on a routine basis, the methodology is well established and the capabilities of graphical systems are well known. However, digital photogrammetric mapping requires further investigation and analysis in the following fields:

- (i) digital data acquisition techniques (technical and economic factors regarding on-line interactive graphic (CRT) editing systems, "blind digitizing" with off-line editing and semi-interactive editing processes should be further examined).
- (ii) standards for digital mapping,
- (iii) design and structure of data files and data bases for digital topographic information systems.

The use of space-borne imagery for mapping applications, particularly map revision requires further development and evaluation. Map revision techniques require substantial improvements, particularly in the area of automated detection of changes and simplified compilation. The use of photogrammetry for littoral mapping and as a basic tool in integrated resource mapping must be further emphasized. It is almost certain that future developments in topographic and cartographic applications of photogrammetry will require a closer integration of classical photogrammetry with digital techniques and computer assisted cartography.

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