

HUNGARY
NATIONAL REPORT
FOR
PHOTOGRAMMETRY AND REMOTE SENSING
1992 - 1995

Prepared for the Hungarian National Committee for Photogrammetry and Remote Sensing

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ABSTRACT:

The National Report of Hungary outlines routine activities and new trend in photogrammetry and remote sensing during the period 1994-1995, with special emphasis to the economical changes in the country in this period. The activities in the field of photogrammetry and remote sensing are described according to the fields of activities of ISPRS Commissions.

KEYWORDS: Hungary, National Report, Applications, Institutions

The past 4 years have brought important changes in the socioeconomic and scientific areas in Hungary. The environment and conditions of our profession activities have been changed totally. The state monopoly over copyrights, state secrecy protection and surveying activities has been minimized. Consequently, privatization created flexible and more suitable conditions for operation and reaching the development goals. Photogrammetry and remote sensing technologies and applications have suffered decrease in state financing due to the fact that the applications and results obtained from the implementation of these technologies are rather investment of infrastructure than investment generating profit. During the early nineties, beside some few local projects, organizational modifications, influence of foreign capital, some projects ordered by foreign partners, and the aid programmes (e.g. PHARE etc.) played the most important role in keeping photogrammetry and RS profession alive. During the last two years the strategic importance of photogrammetry and RS became more evident. Some very high quality digital photogrammetric and remote sensing equipments have become available to be used in state and military surveying and in institutions of higher education. All these will bring suitable environment for the development of photogrammetry and RS technology, and will create the required basis for education and research in this field.

Attained results related to the commissions activities

Commission I - Sensors, Platforms and Imagery

Airborne SLAR and 2-frequency microwave radiometer were developed. Good quality data were obtained by both the radar equipment and the microwave radiometer. The results of these developments were utilized and published within the frame of international projects. Modification of stereocomparator and software development for an analytical plotter was carried out. This resulted higher level of numerical plotting and helped the aims of education.

The National Remote Sensing Centre continued its activity as national distributor of high resolution satellite images in purchasing, processing and archiving of such type of data. Within the frame of this activity, besides of well-known Landsat TM and SPOT data, new products like ERS-1 SAR data, the indian IRS data processing and distribution have been solved in both experimental and operative levels.

For the purposes of aerial photography, the photogrammetry and RS community in Hungary has access to one of the most modern aerial camera with forward motion compensation. Unfortunately, the aircraft used to fly this modern camera is an old-type one with low flying height (max. 3500 m) capacity, thus the state surveying authority doesn't have access to an aircraft with better performance. This makes difficult to acquire small scale imagery suitable for topographic and remote sensing applications, but there are some indications that the airplane problem may be solved. The quality of aerial photographs are various, and during the last few years there is no noticeable improvement in the photographic or processing quality. We hope, that the effect of privatization will result significant improvement in quality of aerial photography.

We developed technology for hand-held colour aerial photography. A colour photogrammetric photolaboratory was established.

The decrease of level of secrecy has opened new possibilities for application of aerial photography. Lot of experimental studies being done for application of digital cameras. Transformation of analogue products to digital imagery with high resolution (7.5 mm) equipments exist and being used in Hungary too.

Commission II - Systems for data processing, analysis and presentation

The RDI photogrammetric data management equipment was developed for numeric photogrammetric processing, together with the ITR data management software by hungarian experts. The RDI and ITR made it possible to connect the conventional photogrammetric instruments to computers and the online interactive operation of digital map production.

In the past years we developed software for aerial triangulation, which are widely used in practice. Also, we have some of the internationally well known software, like BLUH (Hannover), PAT-B (Stuttgart), ORSENT (Vienna) and BINGO (Hannover). The aerial triangulation technology is used even for large scale mapping.

Commission III - Theory and Algorithms

In the area of digital terrain modelling, a new terrain description and interpolation algorithms have been developed. Other algorithms were developed to store and process new data models.

Particularly, in the terrain analysis and filtering, new method and procedures have been developed. Intensive research and development were done in the area of digital elevation models (DEM). Digital terrain model (DTM) which has a mesh form and cover the whole area of the country was prepared by the use of topographic maps (scale 1:50.000). The computer aided design (CAD) systems will be accompanied by increased demand on the digital elevation model's (DEM) applications, so it is expected that the results of research and development in this field will find their way to utilization in real projects.

Mathematical-physical Model have been developed to process and analysis of satellite imagery for the purpose of practical applications like agriculture. The processing of remotely sensed data, including atmospheric correction, has been done successfully by using well prepared algorithms and programs developed by the hungarian RS community. The national agricultural remote sensing system on the county and country levels has almost reached an experimental operative stage. The shaping of data model for environment monitoring geoinformation system has been accomplished. New reliable algorithm was developed for the solution of spatial recursive planning problem. An other algorithm was developed for monoplotting procedure, which is able on the base of already existing digital terrain model - to determine the spatial coordinates of points by the use of single aerial photographs.

Within the frame of the GIS/LIS'95 Central European Conference a tutorial under the title "Basic concepts of GIS" had been organized.

Commission IV - Mapping and Geographic Information Systems.

More than 5 analytical plotters are in operation in Hungary. Computer systems are used for processing and analysis procedures. Feeding the measurement results from the analogue Instruments to the computers and then to the map compilation instruments have enhanced the whole process. Use of systems like CAD or GIS (ITR, Autocad, ArclInfo, Microstation) make it possible to store structures of data. This mechanism represents one of the most efficient spatial analysis procedures in classical photogrammetry. Never the less, this procedure guarantees the easy preparation of digital topographic maps and digital large scale maps, and makes it easy to insert the geometric reference field spatial data into different GIS/LIS systems. For practical, experimental

and special educational purposes, digital photogrammetric workstations are used in Hungary in private sector, state institutes, high education institutions.

For orthophoto mapping we have some conventional analogue instruments and computer controlled equipment. The use of digital orthophotomaps is starting nowadays.

Commission V - Close-Rang Techniques and Machine Vision

Bundle block adjustment and stereo rectification of normal case terrestrial stereomodels with analytical plotters is often used method in Hungary. Software were developed for absolute orientation and stereo rectifications on analytical plotters.

Some projects were carried out for application of close-range technic in industrial and medical fields.

Commission VI - Economics, Professional Matters and Education

The education of our profession is centred around digital image technic, image analysis and GIS system integration. Productional practice - the technology - doesn't follow so quickly the changes as research does therefore beside theoretical tuition we have to train students for engineer practice as well. This double-task carries such contradictions in itself which can not be solved uniformly on international level as we have to adapt ourselves to the technical level of the given country. One can state generally of strengthening basic education of natural and technical sciences upon which a versatile eventually several levelled educational system can be built. In this direction go we as well as several years ago in many universities postgradual (PhD) education was introduced. During the past 5 years thorough preparedness of our students was proven by the following: seven students defended their diploma theses at Karlsruhe Technical University, one acquired a PhD at the University of Dundee, two students obtained M.Sc.degrees in the U.S.A. and one in the Netherlands.

Commission VII - Resource and Environmental Monitoring

To analyze the information content of digital images beside visual (perception) interpretation mathematical methods are applied to obtain relevant information. Such algorithms serving the annualization (interpretation) of renewable earth resources (vegetation, soil) or the non renewable earth resources (minerals), monitoring water or atmospheric conditions were also prepared in Hungary. Among them in agricultural sphere crop estimation and cropland mapping are on international level, but definite results were born in soil and geological sciences and environmental protection topics, too.

International Relations

Hungarian institutions and scientific bodies have several fruitful connections with FIG, ISPRS, EARSEL, IAF (International Astronautical Federation), IAA (International Academy of Astronautics), COSPAR. In several bodies our specialists are serving

in various functions or are commission members (FIG, ISPRS, EARSEL) A successful international Symposium was organized in the framework of EARSEL in 1992.

For two years Hungary participates in CERCO's working group of Updating Large Scale Databases, mutually operating with OEPEE.

On the fields of research and education Hungarian institutions have fruitful connection with the relevant Chairs of the Technical Universities of Vienna, Munich, Stuttgart, Karlsruhe, Hannover, Ohio State University (USA). Within this cooperations our students attended semesters at Vienna, prepared diploma theses (Karlsruhe), participated on postgraduate (PhD) courses for several years (Ohio), organized mutual technical excursions (Hannover).

Within exchange framework between Universities or through other stipendiums staff members or researchers could participate on study-tours ranging from a few days to one year. Universities and Research Bases Joining foreign research projects received significant hardware or/and software products. These technical development allow that in Hungarian institutions foreign students or postgraduates can study or prepare theses.

Within various European programs (as TEMPUS, PHARE, MEGRIN, MARS, CORINE, Copernicus) cooperation on project levels were established between Hungarian and foreign institutions. Such type of cooperations in which our specialists are "measured" further strength the systematic connection and cooperation.