
**NATIONAL REPORT OF THE ISRAELI SOCIETY OF PHOTOGRAMMETRY
AND REMOTE SENSING
1997-2000**

Prepared for the Israeli Society of Photogrammetry and Remote Sensing

By

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ABSTRACT

The national Report of Israel outlines the pattern of activities and new developments in photogrammetry and remote sensing during the period 1997-2000. The involvement of most sectors engaged in these activities is described, including government, education, research, systems and equipment supply, consultancy, professional practice and contract services. A wide range of applications is reviewed and therefore the report treats them briefly.

COMPILATION OF THE REPORT

This abbreviated version of the National Report, has been compiled from proceedings of various professional meetings, symposia and conferences, from published papers, from responses to a circular letter to members of the National Society and from responses to direct questions by the authors. Editorial discretion has been used in presenting the various material received. This report does not necessarily represent the views of the Israeli Society of Photogrammetry and Remote Sensing.

1. INTRODUCTION

The Israel Society of Photogrammetry and Remote Sensing is the adhering body to the International Society for Photogrammetry and Remote Sensing and is a non-profit society, existing solely for the purpose of advancement of the profession. It is run on a voluntary basis by elected officials, is funded by membership fees and aided by services provided by members. The National Society was founded in 1949 and has currently 70 members. This rather small membership is perhaps characteristic of a small country, in which, for many years, photogrammetric practice was limited to the Survey of Israel, the government mapping institute and a small number of active in photogrammetry has increased considerably in the last decade (currently 20). Remote sensing applications are rather limited in Israel, because in a small country photogrammetry still dominates the field of mapping and land use monitoring.

The National Society conducted a symposium in each year of the report period on photogrammetric and remote sensing applications in Israel, with some 200 persons in attendance.

In addition, leading members of the National Society participated in a Symposium on research and studies under the auspices of the Survey of Israel.

2. PHOTOGRAMMETRY

Photogrammetry provides professional interest or employment, or both, for some 200 persons in Israel.

This is a fairly considerable number, considering the trend for increased productivity, not only through improved technology, but also through the omnipresent cost analysis. As a general policy, the government decreases gradually the number of employees in the Survey of Israel, and one observes the increase in contracts for photogrammetric projects awarded to private companies. In general, the users of surveying and mapping products, readily accept the photogrammetric products as the best solution to their requirements. Photogrammetry provided the necessary response to the urgent need for planning background maps, monitoring construction and "as made" maps. Most of these products were of the digital variety.

Today, one sees an increasing involvement of photogrammetry in cadastral tasks, in response to the policy of providing registration of rights, parallel with the completion of new housing projects.

2.1 GIS and mapping

Data acquisition for the topographic layers of the Digital National Data Base (DNDB) has now been completed for the whole country. This task has been carried out from aerial photography at 1:40,000 scale. The accuracy of topographic mapping derived from DNDB is estimated to be + 2 m, both in position and in elevation.

The next task is the updating of the DNDB to be based on following principles.

- Update the database and not replace it by new data acquisition.
- Wide use of digital photogrammetric systems.

The general outline of revision procedures can be found in Peled (1997), treating the problems of automation in revision, interception of changes, experimentation towards formulating procedures, etc.

One of the preliminary conclusions is that the DNDB should be updated within a 4 year cycle and that any area which depicts many changes due to rapid development will be updated regardless of the cycle. See Peled and Raizman (1997).

2.2 Aerial photography and related products

There are several modern major aerial cameras in Israel, in the government and private sector: RC 30, RMK Top Zeiss, LC 2000 Zeiss for aerial photography. Ofek Ltd. Which is the largest company in the private sector in Israel, owns two planes for aerial photography, an additional plane for oblique photography and a helicopter for electronic and video cameras.

The Survey has a black and white photo lab., whilst companies in the private sector handle color, black and white and infra red photography.

Contact prints and enlargements are very popular products with the Israeli customers and total sales of these products in 1999 are estimated at approximately 2,000,000\$.

Aerial photographs are admissible as evidence in courts of law, if supported by an appropriate declaration of a photointerpreter and some 40 cases per year are dealt with by courts on this basis, pertaining to rights to land.

2.3 Facilities

The following photogrammetric facilities exist in the country for internal use and to provide contract services. There is no manufacturer of photogrammetric equipment in Israel.

Aircraft	3
Major aerial survey cameras	6
Terrestrial cameras	1
Stereoplotters	12
Analytical plotters	20
Orthophoto	2
Digital Photogrammetric Work Stations	6

2.4 Education

The Technion – Israel Institute of Technology, offers a curriculum leading to a Bachelor of Engineering degree in 4 years, or a Bachelor of Science degree in 4 years, or a Bachelor of Science degree in Geodetic Science in 3 years. The curriculum includes courses in aerial and close range photogrammetry and image processing, remote sensing and mapping from satellite images as well as a whole range of courses typical of a degree programme in Geodetic Engineering. There are some 180 students in M.Sc. programme and 5 doctoral candidates.

Photogrammetry, remote sensing and GIS related courses

- Photogrammetry 1 (undergraduate level): introduction to the basic mathematical models of photogrammetry.
- Photogrammetry lab (undergraduate level): Familiarisation with and utilisation of basic photogrammetric equipment.
- Photogrammetric mapping (undergraduate level): Theory and practice of mapping with aerial photogrammetry.
- Photogrammetry 2 (undergraduate level): Aerotriangulation; GPS in photogrammetry; calibration of equipment.
- Advanced analytical photogrammetry (graduate level): Dynamic aerial and satellite imagery; close range photogrammetry.
- Introduction for digital photogrammetry and remote sensing (undergraduate/ graduate level): Source for digital imagery; basic image processing techniques.
- Digital Photogrammetry (undergraduate/ graduate level): Using digital imagery for the preparation of maps, digital orthophoto and mosaic maps; basics of image matching techniques.
- Remote sensing and cartography (undergraduate/ graduate level): Image segmentation and classification; link to GIS.
- Database in Geodesy (undergraduate level): Database models, topological relations, representation of features in a 3-D database.
- Geographic information systems (undergraduate/ graduate level): Combining vector and raster data, from different sources, in a structured database.

2.5 Research

Applied research is often initiated and monitored by the office of Chief Scientist, Survey of Israel, and is carried out at the Technion – Israel Institute of Technology, Haifa University and at a small number of private companies.

Digital photogrammetry, cadastral applications of photogrammetry, automation of procedures, extraction of elevation data from satellite images, video photogrammetry are some of the fields of research in Israel.

Following is a partial list of research and studies:

- Identification of changes for updating the DNDB.
- Automatic generation of distortionless digital orthophoto.
- A semiautomatic approach for 3-D reconstruction of building outlines.
- Reliability of automated procedures for surface reconstruction.
- Acquisition and resolution enhancement of digital images.
- Video photogrammetry – GPS supported.

An automatic generation of DEM from Spot imagery has been studied by A. Krupnik and A. Wiedman.

3. REMOTE SENSING

Although remote sensing is becoming more and more widespread in many walks of life, one must remember that a small country (approximately 20,000 square kilometers) leans naturally towards large scales in mapping and higher resolutions in the national databases. Considering, however, tasks such as monitoring of the environment, the development of GIS databases, participation in regional and global projects and the ever increasing data volume, one comes to the conclusion that remote sensing has a *raison d'être*, even in a small country.

Haifa University

The Department of Geography, GIS and Remote Sensing Laboratory.

4 Ph.D. Students, 2 in Remote Sensing.

9 M.Sc. Students, 5 in Remote Sensing.

Current research topics (a selection):

- 1) Crop yield estimates using air photography (Land held camera).
- 2) Modeling spectral indices for crop monitoring.
- 3) Multi source GIS data updating.
- 4) Change detection for updating spatial databases.
- 5) Management of Aquatic National Reserve.

Tel-Aviv University

The GIS and Remote Sensing Laboratory was established at the Department of Geography and Human Environment Tel-Aviv University in 1994 for providing an advance scientific environment to study the Earth from space. The aim was to gather under one-roof students, university staff, and academic fellows world-wide to study environmental problems of the Earth using remote sensing means.

The science activity in the laboratory is focused on the following main issues: Development of low-cost remote sensing capability (LCRS) for environmental application and establishing a strong foundation to study the Earth surface using Imaging Spectroscopy (IS) technique (also known as hyperspectral imaging).

M.Sc. projects

- 1) "Remote sensing of the Urban Heat Island of Tel-Aviv by Video Radiometry and GIS Techniques".
- 2) "Mapping Soil Salinity in Agricultural Fields Using Imaging Spectroscopy Technique" (Funded by the Keren Kayemet Le-Israel K.K.L).
- 3) "Urban Applications Using the Thermal Region of the DAIS-7915 sensor" (Funded by internal University Fund and Forter Fund).
- 4) "Geometric Correction of un-stabilized hyperspectral platform. A case study of the CASI data over urban environment".
- 5) "Geology mapping of Timna mount using DAIS-7915 data" (Funded by the GIF).

Student for Ph.D. Thesis

"Developing of new mathematical technique models for the classification of IS data" (Funded by the German Israel Foundation – GIF).

PostDoc. Fellows

"The spectral reflectance of physical crust during controlled rain storm events" (Funded by the Agriculture Ministry).

Ben-Gurion University of the Negev

The Department of Geography and Environmental Development.

10 Master's Degree Students and Ph.D. Students.

Current research topic include:

- 1) Retrieval of soil moisture by active microwave.
- 2) Subsurface remote sensing using active microwave.
- 3) Real time monitoring the quality for large water bodies.
- 4) The Development of a method to monitor phytoplankton the lake of Galilee.

The Remote Sensing Laboratory J. Blaustein Institute for Desert Research.

4 M.Sc. and 2 Ph.D. Students.

A list of current research topics (funded projects and thesis work):

- Soil and vegetation characteristic in semi-arid environment.
- Optical characteristics of desert aerosols retrieved from sky brightness measurements.
- Optical models of water quality in coastal and inland water bodies.
- Automatic extraction of surface features (drainage networks, lineaments, roads) from satellite images and DEMs.
- Mapping of geology, geomorphology and hazards related to active faults, using radar imagery of the ERS-1 satellite.
- GIS applications for environmental and agricultural projects.

The Hebrew University of Jerusalem

The "Ring" Department of Atmospheric Sciences, at the Institute of Earth Sciences, specializes at remote sensing of clouds and precipitation. Some of the unique capabilities developed at the Hebrew University are:

- 1) Retrievals of cloud properties and precipitation forming processes from NOAA/AVHRR and TRMM/VIRS data.
- 2) Improved methods for remote sensing of precipitation using weather radars.
- 3) Improved methods for remote sensing of precipitation from space.
- 4) Documentation from satellites of the detrimental impact of air pollution on cloud microstructure and precipitation forming processes.
- 5) Detailed cloud models for simulation of the satellite observations of the cloud processes and the impact of cloud-aerosol interactions on radiative and precipitating processes.

Strong links between the department and NASA, NASDA and ESA have been established, by virtue of Prof Daniel Rosenfeld being science team member in the following earth probing satellites:

- 1) Tropical Rainfall Measuring Mission (TRMM), on behalf of NASA.
- 2) Advanced Earth Observing System-II (ADEOS2), for NASDA, the Japanese space agency.
- 3) METEOSAT Second Generation (MSG), for ESA, the European Space Agency.

Bar-Ilan University

The main purpose of our research in the Remote Sensing & GIS Laboratory (Established in 1989) is to contribute for the understanding of Mediterranean environmental changes by developing methodologies for mapping and analyzing land transformation at a regional extent. A holistic rather than specific mapping approach is needed for that purpose where the historical dimension of these changes, causal factors and relationships between the different components of these ecosystems are considered.

Degradation and recovery of desert margin ecosystems are studied by following vegetation and soil patch dynamics using historical aerial photographs. Biophysical properties of forest, shrublands, dwarf shrublands and herbaceous growth are mapped and analyzed in two wide regions of climatic change. Crop monitoring systems based on developing knowledge based recognition systems which allow the incorporation of context information within the interpretation methodology were developed. These techniques as applied with Landsat TM, ERS-2 and SPOT imagery are utilized for providing national coverage and for updating land information.

Four PhD students and five MA students carry out their studies within the framework of the above described objectives and themes.

4. IN MEMORIAM

We regret to announce the death, in March, 1999, of our prominent colleague, Dr. Moshe Erez, Honorary President of the Israeli Society of Photogrammetry and Remote Sensing. For many years the leading photogrammetrist in the country, well known internationally, he will be remembered with respect.