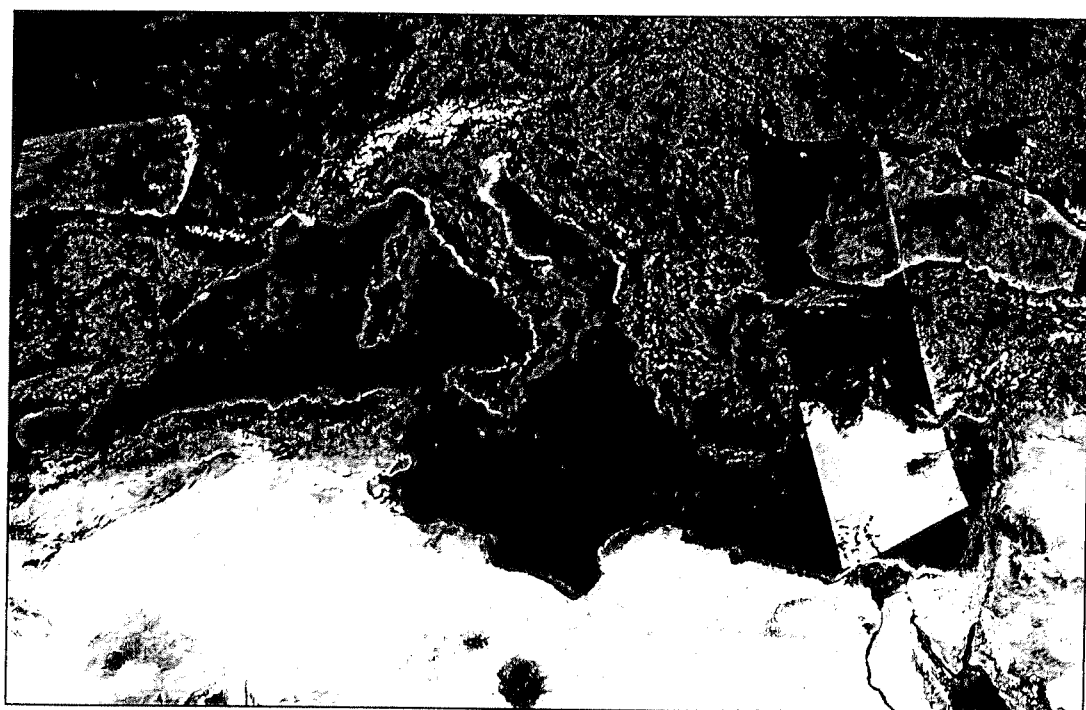


eurisy

COLLOQUIUM

SATELLITE OBSERVATION FOR SUSTAINABLE DEVELOPMENT IN THE MEDITERRANEAN AREA

ESA/ESRIN - Frascati (Italy) - 2/3 October 1996



CENTRE ROYAL
DE TELEDETECTION
SPATIALE



AÉROSPATIALE



Honorary Chairman: Hubert Curien, President of EURISY

*Co-Chairmen of the Colloquium:
Nicola Cabibbo, President of ENEA,
and Silvano Casini, Administrator of ASI*



MATRA MARCONI SPACE



**NEEDS AND CO-OPERATION IN MEDITERRANEAN:
THE HELLENIC CASE**

C. C. Kontoes, G. Veis

Hellenic Space Research and Technology Committee
Lofos Nymfon, 11810, Athens, Greece

Paper presented at:

EURISY International Colloquium for,

**'SATELLITE OBSERVATION FOR SUSTAINABLE DEVELOPMENT
IN THE MEDITERRANEAN AREA'**

organized at ESA/ESRIN - Frascati (Italy) - 2/3 October 1996

NEEDS AND CO-OPERATION IN MEDITERRANEAN: THE HELLENIC CASE

C. C. Kontoes, G. Veis

Hellenic Space Research and Technology Committee
Lofos Nymfon, 11810, Athens, Greece

Introduction

The increasing strategic importance of Earth Observation from space for regular and operational monitoring of the planet Earth and its environment, the continuous market change regarding the production of E.O. data and the services provided, as well as the requirement for their best usage, presuppose a thorough examination and coordination of the relevant initiatives and activities and the promotion of scientific co-operation at a national, European and international level. However, these actions might first remain under the responsibility of the national governments, agencies and European Organisations which are responsible to identify the respective needs and specify the relevant space programmes and co-operation directions, before they are integrated into a common European framework of space activities.

In this view the Hellenic Space Research and Technology Committee (HSRTC) has started in collaboration with the European Commission an initiative, towards the "Development of the Hellenic National Strategy for Earth Observation".

Among the main objectives of this initiative were:

- 1) The identification of the current level of expertise in the domain.
- 2) The definition of the scientific, commercial and user's community requirements regarding Earth Observation from space.
- 3) The coordination of relevant initiatives and activities at a national level.

These objectives once achieved will help to increase the operationalization of Earth Observation in the country, certify the good quality

and efficient usage of the E.O. studies and their results, permit a better control on the invested manpower and funds, help to support further the relevant research and application activities and moreover avoid waste in money and human effort because of unused or duplicated investments. Additionally, they will guide the steps of decision makers in the view of a profitable development and involvement of the local industry in the area of space technology and will help the fruitful integration of the existing expertise in the frame of national and international cooperations.

Remote Sensing in Greece: Current situation, Perspectives and Needs

In the frame of the project towards the "Development of the Hellenic National Strategy for Earth Observation and Monitoring" the Hellenic Space Research and Technology Committee organised a series of workshops, studies and scientific papers and circulated various questionnaires for the identification of the current level of expertise and user's community needs. This research enabled the Hellenic Space Research Technology Committee to report the organisations involved in the field and identify the running applications and the existing capabilities in data capture, manipulation, use and dissemination. There were reported the special interests or specific application problems which could be eventually resolved by the use of E.O. data and techniques. Last but not least, it helped to define the degree of flexibility found in public or private domain to adapt the advanced and in some cases new technique of using E.O. data to meet specific requirements.

The user's community views and suggestions regarding:

a) the specific needs on spectral and spatial characteristics of the E.O. data, as well as the processing requirements for the production of useful value added products,

b) the requirements on scientific personnel, computer facilities and software packages for data exploitation,

c) the organisation and coordination of the activities and exchange of data and expertise throughout the scientific community and country,

were also collected and evaluated.

The Hellenic Space Research Technology Committee is currently occupied with the compilation of the final report of the forementioned study before it is submitted to the Administration. However, some of the most significant conclusions and recommendations could be summarised as follows:

The present E.O. activities in Greece cover a wide range of application areas, as for example land cover, land use, mapping, forestry, geology, agriculture, marine environment and atmospheric studies.

A good amount of meteorological satellite data is been received on a daily basis in Greece. At present three Meteosat and five NOAA receiving stations are operational, whereas a fourth Meteosat station is under installation. Satellite scenes of high resolution provided by optical sensors have been mainly used by scientists in the frame of their studies. Emphasis may be placed on the dissemination and use of radar satellite data. However, the level of expertise and knowledge to use SAR data should be further developed. In addition special attention should be given to transferring adequately the needed know-how and exploiting fully and fruitfully the existing operational satellite systems. We find that international co-operation and exchange is an important factor to enable scientists and engineers to follow the relevant evolutions in the field and thus avoid redundancies in production, investments and results.

On the basis of the running projects, it becomes evident that the national level of know-how and expertise is adequate. However special effort should be placed on the establishment of networking facilities and usage of existing or under development ones, in order to assure the necessary transfer and exchange at a national or international level.

One of the main actions to be undertaken by the Hellenic Space Research and Technology Committee is to coordinate the work of the existing teams and support the exchange and collaboration between them in view of avoiding unnecessary duplications. Regarding the available E.O. information, the Hellenic Space Research and Technology Committee might undertake the responsibility to maintain continuously updated catalogues of all existing relevant data and processing tools. Specific actions will be directed towards

updating the catalogues, by dispatching questionnaires on a regular basis and furthermore by using the existing networking facilities, in order to facilitate the communication with available data bases and catalogues at a national and international level. In addition, the needs of the Greek users for data and image storage and acquisition could be also accommodated through participation in pan-European efforts like CEO (Centres for Earth Observation).

The Greek territory presents a great variety of environmental parameters which should be monitored, examined and managed continuously. It is by now well established that Remote Sensing could play an important role to meet specific needs for the management of the environment, the support of infrastructure activities and the planning of new industrial and other economic actions. In a country like Greece, where except for the environmental variety there is a dominant diversity in natural, economic and social conditions and human views regarding the protection, management, usage and exploitation of the land, one could mention many application areas where the development and operationalization of Remote Sensing is considered as indispensable.

Monitoring of ecosystems, wetlands and forested areas is of great national importance since they are continuously subject of destructive interventions caused by humans, as the result of economic, touristic and infrastructure development. In order to realise the necessity of using E.O. data that cover big surface areas of varied ecotopes on a systematic way, one could only mention the national areas of special environmental interest which comprise 10 national forests, 19 forested areas, 300 areas of special natural beauty, 370 wetlands areas, 615 animal refuges.

Forest fires eliminated many thousands of hectares of forested areas during the last fifteen years. According to the statistics, one hundred and ten thousand hectares were burnt out only during the year 1988. The economic, social, ecological and environmental consequences of forest fires are immense and not easily estimated. The needs for the continuous observation and mapping of these sensitive areas and the development of advanced Remote Sensing systems for early warning and evaluation of the fire's damaging impact are not yet met. The appropriate technology for a real time monitoring of the fire's behaviour during the fire fighting operations, should be

necessarily envisaged. The Administration has allocated resources in order to help research and development of the technology in this field, especially by using Remote Sensing.

Agricultural land management, which is an action of great economical importance for Greece, may not be supported adequately because of the present difficulties to maintain updated and reliable registers for crops. A major initiative for a modern and multipurpose Greek Cadastre, which started since two years now, will not give its fruits before the next century. Thus, it becomes clear that specific techniques including Remote Sensing and GIS should be used on an operational basis to provide the necessary support to the Administration, towards the application of a prosperous and profitable Agricultural Policy, always in agreement with the Common Agricultural Policy. A yearly estimation of the most significant crop production, the evaluation of the products' quality and the control on the national funds provided to the farmers for subsidies, are necessary to policy makers. Furthermore, the measurement of the damaged agricultural production and the management of the resources provided as insurance, necessitate the development of advanced information systems including GIS and Remote Sensing, to get reliable, fast and objective estimations. Given that the Greek Ministry of Agriculture pays the amount of 45Mecu per year for calamity insurances, it becomes evident the importance of using E.O. data and systems for early warning and continuous monitoring of agricultural land.

The directives and conventions of the E.U. and the Greek government regarding environmental management and support, have contributed significantly to the protection of soils. However, many problems are still reported especially in agricultural and coastal areas because of the rapid economic and tourist exploitation. On the other hand, in mountainous areas, the lack of forest management plans in combination with vegetation losses, result in significant soil erosions. Thus, mapping, monitoring and suitability evaluation should be realised systematically in order to support the decision making process for soils management and protection.

Earthquakes, landslides and flooding are among the major threats for many Greek villages, cities and agricultural areas as the result of the great seismicity present throughout the country as well as the rains which wash out the soils in steep mountaineous areas. The capabilities provided by satellite

data of radar and optical sensors and especially the interferometric SAR, to monitor the landscape at a regional level and give information to support actions for mitigation of seismic and flood hazards and landslide activities is of great national importance. This is because the latter can have serious socio-economic impacts, even when they occur away from inhabited areas. Special actions for the identification, detailed mapping and monitoring of the active faults and the study of the horizontal and vertical displacements of the land surface should be routinely accomplished, in order to develop early warning systems. Moreover, the operationalization of flood monitoring by the use of Remote Sensing data should be necessarily developed, since it will enable the government to better manage the emergency situations and provide the insurance organisations with more precise data regarding losses in production, ownership, etc.

Specific national matters, as for example the development of the transportation network, the increased demands for production and distribution of energy, the rapid extension of cities, the industrialisation of urban and semi-urban areas, the establishment of new economic activities and generally any type of socio-economic development, need continuously supported actions for land and urban management and planning. The Ministry of Development and the Ministry of Public Works have expressed already their interest to have available updated land use/land cover maps in a medium scale to support planning actions.

Remote Sensing is potentially applicable to the seas and in particular to specific areas such as, water quality, oil spill detection, study of dynamic phenomena, fishing/fleet and coastal zone management. In Greece with a such dominant aquatic environment, the development of Remote Sensing systems to provide monitoring in such areas is imperative. However, special attention should be placed to increase further the national level of know-how and develop the research in the domain, investigate better the most appropriate spaceborne Remote Sensing systems, emphasise on the use of specialised sensors and their products, like ERS SAR wave and ERS altimetry data, initiate data calibration campaigns and promote the co-operation of the relevant Greek Institutions with centres of excellence in the field world-wide.

Examining the role and applicability of Remote Sensing in the areas of the atmosphere, meteorology and climate, the existing human potential and infrastructure (NOAA and Meteosat receiving stations) and the requirements for monitoring of the atmospheric environment in Greece, it becomes evident the need for the operational use and promotion of this technology to predict air pollution episodes, to develop advanced systems for monitoring the weather conditions, to apply satellite climatology e.t.c. In Greece Remote Sensing for atmospheric studies has not been used to the needed level and extend. Special effort should be placed to integrate this in the action programmes of the public entities and in particular of Ministries. Pilot projects should be initiated and run in order to convince the interested parties for the potential use of Remote Sensing data.

In the area of Remote Sensing subsystems and services, there is a great demand for advanced sensors, on-board digital units (DPUs) and ASICs and ground subsystems for data and image transmission, compression, storage, archiving and processing where the use of such tools as neural networks, expert systems, etc is very important. Specific actions should be undertaken to motivate Greek industry to get involved and pursue niches in advanced technologies regarding both the space and ground segment, instrument and system testing campaigns. This is because an adequate national industrial base for the design and construction of special on board components and instruments, can be found in Greece. The currently running projects indicate a good level of expertise of the local industry for the provision of Remote Sensing services. However, co-operation at a national and international level should be more promoted in order to achieve the best exploitation of human resources and relevant materials.

Conclusions

Earth Observation from space in Greece is currently used primarily in the frame of research studies but also in operational projects which are funded by the government and the relative framework programmes of the European Union. The investigation which has been carried out by the Hellenic Space Research and Technology Committee, shows that Remote Sensing may play an important and complementary to the existing technologies role, in order to respond to specific national needs in various application areas by providing quick, new and useful information for environmental management,

risk monitoring and infrastructure planning. It should be noted that according to the market analysis performed, the main operational user of E.O. data and relevant techniques is primarily the state in its action programmes. Although, the existing human, scientific and infrastructure resources are considerable, the scientific and economic co-operation with neighbouring countries having similar application needs and technological requirements, should be further promoted. In addition, this co-operation will permit the full exploitation of the existing systems and subsystems, processing and archiving facilities worldwide and facilitate the information dissemination and the transfer of the needed know-how and expertise. The Hellenic Space Research and Technology Committee is willing to play an important role in the direction of supporting the co-operation between Greek research groups with other specialised centres at a European and international level, by providing relevant information to interested parties. It should be noted that the Hellenic Space Research and Technology Committee is maintaining continuously updated records with the current national Earth Observation activities, the scientific personnel involved and the existing data capture and processing facilities.