GENERAL SECRETARIAT FOR RESEARCH AND TECHNOLOGY
HELLENIC SPACE RESEARCH AND TECHNOLOGY COMMITTEE
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DRAFT FINAL REPORT ON THE PROJECT
TOWARDS THE

"DEVELOPMENT OF THE HELLENIC NATIONAL STRATEGY FOR EARTH OBSERVATION AND MONITORING"

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1. OBJECTIVES

The increasing strategic importance of Earth Observation from space towards the fulfilment of the needs for regular and operational monitoring of the planet Earth and its environment, as well as the continuous market change regarding E.O. data production, E.O. data use and relevant E.O. services provided, require the development of a European Policy for Earth Observation from Space. However, as it is also stated in the paper entitled "PROPOSAL FOR A EUROPEAN POLICY FOR EARTH OBSERVATION FROM SPACE" which was elaborated by representatives of European Commission, ESA and EUMETSAT the implementation of a common European E.O. policy from space remains under the responsibility of the European national governments, Agencies and European Organizations. The national organizations are responsible to specify their respective needs and relevant programmes and integrate them into a common European policy.

In this view the Hellenic Space Research and Technology Committee (HSRTC) was initiated, in collaboration with the European Commission, a project towards the "Development of the Hellenic National Strategy for Earth Observation". The European Commission funded the project. The scientific personnel of the DG XII/D4 "Space Unit" was in charge to support the project with the provision of expertise gathered throughout Europe as well as to follow the progress of the works.

The initiatives taken by the HSRTC were directed towards:

1) The identification of the national level of expertise on Earth Observation from space and the reporting of the existing scientific personnel and their relevant activities.

2) The definition of the scientific, commercial and user's community requirements regarding Earth Observation from space.

3) The coordination of the relevant initiatives at a national level.

These objectives are considered among the most important ones, since once achieved they lead to the increase of the operationalization of

Earth Observation, certify the good quality of the results of the E.O. studies as well as of the relevant value added products, permit a better control on the dedicated manpower and required funds and avoid unnecessary investments in money and human effort. Also the national know how and expertise would integrate easier in a European level frame of requirements.

Moreover, the Hellenic national strategy as part of a European strategy would:

1) Necessarily be user oriented.

2) Establish operational services at a national level.

3) Ensure the development, integration and competitiveness of the local E.O. industry.

4) Minimize the cost of the relevant services by simultaneous maximization of the E.O data use.

5) Promote the knowledge on E.O. data use.

2. ACTIONS AND RESULTS

In the frame of the project towards the "Development of the Hellenic National Strategy for Earth Observation and monitoring" the HSRTC has organized two workshops, realized a series of relevant studies and position papers, as well as compiled and circulated questionnaires for the identification of user's needs. A more detailed description of these actions is given in the following:

2.1 Organization of the 1st workshop. Report on the works and results

The first workshop was held on 26th and 27th of January 1995 at the NATIONAL RESEARCH FOUNDATION. In this first meeting which was entitled "SYSTEMS for EARTH OBSERVATION and MONITORING", emphasis was given on the investigation and identification of the user's

community of Remote Sensing data in Greece, as well as of the existing situation regarding mainly the techniques, types of data, running applications and results obtained in the field of Earth Observation. The majority of the participants attempted to document the necessity and supported the need for the development of a Hellenic National Strategy for Earth Observation and Monitoring and some of them suggested initiatives to be taken, in order to achieve such a goal.

The meeting was opened by the Prime Minister C. Simitis, then Minister of Commerce, Industry, Energy and Technology, who in his opening address stated the necessity for a national strategy for E.O., especially in nowadays, that it is generally accepted the significance of Remote Sensing for Environmental Applications and the development of new markets. He also added that the wide range of existing technologies, techniques and applications relating to Remote Sensing require thorough consideration and any choice should be based on an exhaustive investigation of the specific technical and economic aspects, as well as the resulting social and economic benefits for the Greek taxpayer. He concluded that the coordination of all the current and future actions on the domain of Earth Observation is highly required for our country and this should be considered between the main goals to be achieved by the HSRTC.

Prof. G. Veis, president of the HSRTC and prof. D. Rokos, member of its executive bureau, presented the aims, goals and philoshophy of the workshop.

2.1.1 Position papers prepared by scientists of the HSRTC, ESA and EU and presented during the works of the 1st workshop

Two position papers were elaborated by three Greek specialists, one ESA representative and one EU DG XII representative. In the first paper entitled **"The Remote Sensing in Greece: Current situation and Perspectives"** the results of an investigation based on replies to a specific questionnaire put in circulation by the Secretariat of the HSRTC, were given. The relevant answers enabled the working group to create a data base comprising of individual users, research organizations, university laboratories and scientific teams of public and private sector who claim activities in Earth

Observation. Moreover, the replies to the questionnaire helped to report all the currently running applications throughout the country and identify the national capabilities in E.O. data capture and dissemination. Some additional results of this investigation are as follows:

1) The present E.O. activities cover a wide range of application areas. However, the lack of coordination at a national level and the weak collaboration between the existing working groups, result in serious losses in capital investments and human effort.

2) An excess of ground stations for receiving meteorological satellite data, is reported. For the time being, three stations for NOAA AVHRR images and two for METEOSAT data, are available. Moreover, the two of the NOAA AVHRR stations are located in the same geographical area (greater Athens).

3) Data, know how, technology and expertise dissemination is done with difficulties. There is no dedicated network established to facilitate this exchange at a national level.

4) Many scientists make use of data produced by optical sensors. Only very few of them started recently using ERS-1 data.

Regarding the perspectives and possibilities to fund Earth Observation studies in Greece, the working team of the HSRTC, presented a series of framework programmes that could encompass and fund such activities. As for example they mentioned the "Fourth Framework Programme for Research and Technology", the "Centres for Earth Observation", the European Union programmes for supporting CAP (MARS, FEOGA, e.t.c), the Operational Programmes for Research, Technology and Environment and the project to establish the National Cadastre in Greece.

The second position paper entitled **"Towards a Strategy for the Development of Remote Sensing in Greece"**, suggests the establishment of a specific Institutional Organization which would be responsible for the development of a co-ordinated National Programme for Earth Observation and Monitoring by Remote Sensing aiming among others to:

1) Support the participation of Greece to international initiatives related to Earth Observation programmes.

2) Support and co-ordinate the work of research laboratories, agencies and scientific groups in Greece.

3) Support any private and/or public initiative relating to space activities as well as to the space industry in Greece.

4) Disseminate in the most appropriate way existing raw and value added data, knowledge and experience within the user's community and organize programs for training and education on Earth Observation subjects.

2.1.2 The level of expertise on Remote Sensing in Greece and its relation to the European one

The national level of expertise on the exploitation of E.O. data, as well as its relation to the European experience, was presented during the two days workshop, by a series of scientific presentations. Among the most interesting ones, one should emphasize on the presentations of:

1) Dr Pittella M.G. the ESA's representative, regarding ESA's Earth Observation Programmes.

2) Dr. M. Sharman, the "Space Unit" representative, who described the Plans and Status of the C.E.O. programme and the framework offered by CEO to provide support and funds to E.O. service providers, end users and customers.

3) Dr. Thomas G, who presented the Remote Sensing Applications in U.K.

4) Dr. N.J.J. Bunnik, described the National Remote Sensing Programme 1990-2000 of the Nederlands and the strategy to achieve the long term objectives.

5) Prof. M. Buchroitner, who demonstrated a series of Examples of Operational Remote Sensing Applications in Europe.

6) Dr M.J. Vasconcelos, who presented Applications of Remote Sensing on an Operational Basis in Portugal.

7) Dr. G. Kritikos, who exhaustively presented the DLR activities in supporting the German Remote Sensing programme.

8) Prof. D. Rokos, explained and documented the necessity of a global strategy for Earth Observation and Monitoring as a reliable infrastructure for National Strategies and,

9) Mr. A. Kolovos, who made an interesting review of the current but also expected satellite systems and tried to outline their impact to user's community.

There were also presented a series of papers emphasizing on the application domain (Agriculture, Mapping, Sea surface, Geology, Atmosphere, Urban, Forest) illustrating the national level of expertise found in specific scientific teams throughout the country and denoting their objectives. The representatives of the Alenia Spazio S.p.A gave a detailed presentation of the CO.S.M.O project (Constellation of small Satellites for the Mediterranean Basin Observation) the concept and technical aspects of the project. Regarding this project, it should be noted that the Greek Ministry of Commerce, Industry, Energy and Technology in collaboration with the Board of Executives of HSRTC examines the probable participation of Greece in this, on the basis of the scientific, economic and social benefits that such a decision would encompass.

2.1.3 Conclusions on the 1st workshop - Edition of the proceedings

The two days meeting was concluded by a round table discussion, where it was clearly stated by all participants the need to prepare a second workshop, as already agreed with DGXII of E.U., in which it would be presented with the most exhaustive way the needs of the Greek user's community in terms of operational use of E.O. data, equipment, human and capital resources. This would enable decision makers to easier specify guidelines and orientations to a prospected national strategy. The HSRTC

would be responsible to collect the user's requirements and prepare the 2nd workshop which should held before June 1996.

The Secretariat of the HSRTC made all the necessary for collecting the paper presentations and prepare the edition of the proceedings of the 1st workshop. The scientific elaboration of the edition was done by the member of the Board of Executives of HSRTC prof. D. Rokos. Five hundred copies of the proceedings have been produced by the available funds and are now available in the premises of the HSRTC. Their distribution to the greek user's and scientific community has already started. Five of these copies are sent together with the present report.

2.2 Compilation and circulation of specific questionnaires towards the organization of the 2nd workshop

The Secretariat of the HSRTC in collaboration with a team of specialists on the subject, was prepared and circulated within the user's community a questionnaire aiming to:

1) Complete the list and at the same time update the existing records of the data base maintained by the HSRTC, regarding the organizations which apply or express their interest to adapt techniques for processing and exploiting E.O. data.

2) Report the special interest(s) or specific problem(s) faced by these organizations, which would eventually may be resolved by the use of E.O. data.

3) Define the degree of flexibility within some of the organizations to adapt the advanced and in some cases new for them technique of using E.O. data.

4) Identify the level of expertise on the domain as it may be derived by the projects currently in progress as well as by the ones realized in the past.

5) Report 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.

6) Specify the requirements on scientific personnel but also computer facilities and software packages for data exploitation.

7) Collect user's views and suggestions on the organization and coordination of the activities and exchange of data and expertise throughout the country.

The questionnaire once prepared was mailed (by June 1995), to about one hundred of relevant organizations. Even though the questionnaire was dispatched early in the summer with the request to get the relevant replies the soonest possible, the secretariat of the HSRTC arrived to get a critical number of answers only by the end of year 1995. The personnel of the secretariat invested much time to ask and convince people to send their replies. At the same time a team of experts of the HSRTC was realizing in parallel a similar investigation by paying visits to representatives and decision makers with the aim to get a better understanding of their views regarding the E.O. policy aspects in Greece.

The thorough study of the replies, helped the experts of the HSRTC to identify the current but also future domains of Remote Sensing applications in Greece. The identification of specific current problems and/or needs revealed thematic areas where either a holistic or (in the majority of the cases) a complementary application of E.O. data could be suggested. This information was the basis for the preparation of the "Draft Proposal for the operationalization of Remote Sensing in Greece", which was submitted for discussion in the frame of the 2nd workshop. Moreover, the answers to the questionnaire helped the organizing committee of the workshop, to identify the appropriate representations for the round table discussions and suggest the lists with the participants' names.

2.3 Organization of the 2nd workshop. Report on the works and results

On the basis of the gathered data, regarding the level of expertise and existing know how on Earth Observation throughout the country, the HSRTC in collaboration with the scientific and organizing committees decided to go for the 2nd workshop which should lead to specific suggestions regarding the

E.O. policy aspects in Greece. The suggestions made by the scientific and organizing committees regarding the organizational aspects and scientific content of the workshop were accepted with slight modifications by the Board of Executives of the HSRTC. According to the HSRTC board decision the 2nd workshop would comprise of six round tables each of which would examine the degree of operationalization of Remote Sensing in Greece on a significant application area and conclude to specific suggestions in order to meet the requirements of the scientific and user's community. The following application areas were decided to be subjects of discussion in the panels:

1) Water pollution - Coastal monitoring - Fisheries.

2) Agriculture, Forestry Applications, Biotope and Wetland, Desertification, Soil Mapping, Erosion Mapping.

3) Urban and Regional Planning (including: cadaster, sustainable development, land use/cover mapping) - Cartography.

4) Geological - Hydrogeological Applications, Natural Hazards (Earthquakes Landslides, Floods, Volcanoes).

5) Weather Forecast - Atmospheric Applications.

6) New Systems and Technologies - Remote Sensing Products - National Industry.

The workshop was held at the premises of the National Observatory of Athens between 20th and 21st of June 1996. One hundred and two persons were attended the workshop. Sixty two of them were invited to participate in the panel discussions. The representatives of the European Commission and ESA, Mr. M. Paillon and Mr. G. Kohlhammer were invited to present their views in panel 6 relating to space technology, space products, market orientations, future space programs.

The detailed report on the works and the resulting recommendations follow in section 2.3.2.

2.3.1 Position paper on the operationalization of Remote Sensing in Greece

A position paper was prepared by a working group of the HSRTC, aiming to suggest areas of operational application of Remote Sensing in Greece. The paper entitled **"Draft Proposal for the Operationalization of Remote Sensing in Greece"** was presented to the participants during the workshop, as this was considered to be the basis for further discussions on the subject. As it has been mentioned previously the authors of the paper based their work on a thorough study of the replies of the questionnaire. This helped them to identify the current problems and/or needs of the user's community that suggest Remote Sensing application in Greece. At the same time it revealed thematic areas which were of the special interest of the participants. The participants were asked to make their comments on the various topics of the working document according to their domain of specialization and to provide their knowledge and expertise in order to conclude in suggestions and recommendations regarding the development of operational E.O. applications in Greece and at the same time give their views towards the development of a national E.O. policy on the studied topics.

The working document was comprising the following thematic areas and sub-topics:

THEMATIC AREA 1: Earth Observation and Land Environment

The proposed actions relate to the use of Remote Sensing in order to:

a) support the decision making process to manage and protect the national forests, natural parks, ecotopes, biotopes and wetland areas from damages caused by human and/or physical reasons,

b) support the decision making process to manage and protect the agricultural areas and farmer's income. Support to the Common Agricultural Policy,

c) support the decision making process to manage and prevent erosions of soils,

d) support the decision making process to manage and protect the urban environment,

e) support actions for land use and urban planning, production of useful thematic maps and completion of the databases of the National Cadastral System and,

f) monitor continuously the interventions of human beings and physical impacts to the quality of the Land Environment.

THEMATIC AREA 2: Earth Observation and Aquatic Environment

The proposed actions relate to the use of Remote Sensing in order to:

a) define biological, chemical and physical parameters of the aquatic environment. Monitor the sea water pollution,

b) study the dynamic phenomena of sea surface,

c) support the hydrological research as well as actions for water resources management and coastal zones monitoring and,

d) develop specific sensors dedicated to study the aquatic environment.

THEMATIC AREA 3: Earth Observation and Atmospheric Environment

The proposed actions relate to the use of Remote Sensing in order to:

a) support actions for the continuous monitoring of the quality of the air in the atmosphere,

b) support the work of the National Meteorological Service and complete the maintained data bases for a more reliable forecasting of weather changes,

c) monitor and study the climatic changes and,

d) observe the application and mutual respect of international environmental treaties, regarding atmospheric environment and clima.

THEMATIC AREA 4: Prerequisites for the development of Remote Sensing applications

The proposed actions relate to:

a) the use of existing and/or development of the more suitable sensor systems. Production and dissemination of the appropriate value added products. Market analysis and definition of the needs of the scientific, commercial and user's community,

b) technology audit and technology transfer,

c) exploitation and good dissemination of the results of the completed Remote Sensing studies. Creation of catalogues with the necessary information on the available processing methods and algorithms, existing data, value added products, etc.

THEMATIC AREA 5: Development of the needed scientific, human, technical and institutional infrastructure at a national level

The proposed actions relate to:

a) undertake actions towards the support and coordination of a fruitful collaboration between organizations at a national and international level,

b) the development of the necessary network infrastructure,

c) the increase of the level of knowledge and expertise of the scientists, through the organization of specific educational and training programs and,

d) the foundation of the appropriate institution, as for example a National Space Agency which will undertake the responsibility for a co-ordinated development of space sciences, applications and technology throughout the country.

2.3.2 Report on the works realized in each thematic panel. Discussions, considerations and recommendations

The discussions and considerations as well as resulting suggestions and recommendations by each thematic panel are given in the following:

PANEL 1: WATER POLLUTION - COASTAL MONITORING - FISHERIES

WORKING GROUP:

1. Prof. Papanikolaou D.	chairman
2. Dr. Tsilimbaris T.	raporteur
3. Vasilatos G.	Min. of Commercial Maritime
4. Georgakarakos S.	Institute of Marine Biology of Crete
5. Kavadas S.	National Center for Marine Research
6. Kritzia D.	EYDAP
7. Laskaratos Al.	Univ. of Athens/ Meteorology, Oceanography
8. Paraskevopoulos B.	Min. of Commercial Maritime
9. Siapatis Ap.	National Center for Marine Research
10. Triantafyllou G.	Institute of Marine Biology of Crete
11. Tsantilas S.	Univ. of Athens - Meteorology, Oceanography

Remote Sensing is a modern technology potentially applicable to oceanography and in particular to specific areas such as, water quality, oil spill detection/monitoring, study of dynamic phenomena, fishing/fleet management. In the following sections, a short list of recommendations for supporting use of remote sensing in each of the aforementioned areas, is given:

SUBJECT: WATER QUALITY

The working group,

CONSIDERING THAT:

1. In a country like Greece, with a dominant aquatic environment, systematic acquisition of water quality data, is very important .

2. Remote sensing is a proven technology for extracting biological, chemical, physical parameters of the aquatic environment.

3. AVHRR (NOAA), TM (Landsat), and ATSR (ERS) data as well as data from the forthcoming SeaWIFS satellite, can be utilized to generate eutrophism maps.

4. The existing infrastructure in Greece regarding human resources and hardware is relatively adequate.

5. There exists the need to further develop the existing know-how.

6. The conditions for a routinely commercialization of added-value remote sensing products, are not favourable, due to the absence of permanent customers.

RECOMMENDS THAT:

1. Technology transfer activities, making full use of relevant services (technology brokers, liaison offices, innovation relay centres) recently introduced in Greece, should be undertaken.

2. Data calibration campaigns to fine tuning information extraction techniques to account for the specific to the Greek aquatic environment conditions, should be launched.

3. Adequate financial recourses towards supporting water quality research using remote sensing in Greece should be allocated.

4. An institutional framework governing water quality meta-data dissemination policy should be suggested.

5. Full services, regarding vocational training and targeted higher education, relevant to water quality and remote sensing, should be developed and offered.

SUBJECT: OIL SPILL DETECTION/MONITORING

The working group,

CONSIDERING THAT:

1. For Greece the need to operate an oil spill detection/monitoring mechanism is imperative.

2. Such a mechanism should ensure frequently updated and spatially detailed information.

3. The existing satellite systems do not meet the prerequisites stated above, at least for the geographic latitude of Greece.

4. The existing know-how in Greece regarding utilization of remote sensing data for oil spill detection/monitoring is limited.

RECOMMENDS THAT:

1. Further research should be conducted in Greece, to investigate the potential of spaceborne remote sensing for oil spill detection/monitoring.

2. Co-operation of the relevant Greek Institutions with centres of excellence in the field should be strengthen.

SUBJECT: DYNAMIC PHENOMENA

The working group,

CONSIDERING THAT:

1. Satellite altimetry is an established tool for the acquisition of sea surface elevation as well as wave height measurements and is well understood in Greece.

2. ERS SAR wave mode data provide substantial information regarding wave direction and length, however there is a limited know-how in Greece.

3. Optical sensors like TM could possibly support hydrographic studies for depths down to 20 m, however there is a limited know-how in Greece.

RECOMMENDS THAT:

1. Further applied research should be conducted in Greece, to investigate the potential of ERS SAR wave mode/optical data for long-time monitoring of dynamic phenomena.

2. Co-operation of the relevant Greek Institutions with centres of excellence in the field should be strengthen.

3. Data calibration campaigns to fine tuning information extraction techniques to account for the specific sea-state dynamics occurring in Greece, should be launched, considering Topex Poseidon, NOAA, ERS and Landsat TM data.

SUBJECT: FISHING/FLEET MANAGEMENT

The working group,

CONSIDERING THAT:

1. Remote sensing has a complementary role in operational systems being used for fishing mainly by USA and Japan, including DGPS, satellite communications Argos.

2. Typical systems such as the one described above are rather appropriate for fleet management than fishing per se.

3. Satellite imagery could yield reliable mid-term estimations about biomass concentration, thus enabling identification of fisheries and eventually their monitoring through time.

4. In Greece, there exists a core know-how, which nevertheless is less than adequate to operate remote sensing based systems, to provide information about fisheries.

RECOMMENDS THAT:

1. Co-operation of the relevant Greek Institutions with centres of excellence in the field should be strengthen.

2. Data calibration campaigns to fine tuning information extraction techniques to account for the specific biomass concentration conditions of the Greek seas, should be launched, considering NOAA and SeaWIFS data.

SUBJECT: COASTAL ZONE MANAGEMENT

The working group,

CONSIDERING THAT:

1. Spaceborne remote sensing imagery can be operationally used for coastal zone management.

2. In Greece, the existing know how as well as technical infrastructure is adequate to implement and operate remote sensing based systems to monitor coastal changes regarding coast line evolution through time, land use practices and their effects to suspended sediment concentration and water quality in coastal waters.

3. There exists the prospects for value-added image or other type of products generated and distributed by both public and private sector, to _make it_ to the markets.

RECOMMENDS THAT:

1. Governmental bodies involved in coastal zone management should become more active in establishing remote sensing as the key-technology towards that end.

PANEL 2: AGRICULTURE, FORESTRY APPLICATIONS, BIOTOPE AND WETLAND MAPPING, DESERTIFICATION, SOIL MAPPING, EROSION MAPPING

WORKING GROUP:

1. Prof. Rokos D.	Chairman
2. Dr. Kontoes Ch.	Rapporteur
3. Adamantiades A.	ELGA (Organization for Agricultural Insurances)
4. Vasilaki E.	Ministry of Environment & Public Works
5. Gatsis I.	Agricultural University of Athens
6. Diamantis S.	NAGREF - Institute for Forestry Research
7. Zalidis G.	Centre for Wetland Research
8. Karteris M.	Aristotle University of Thessaloniki
9. Mavriki E.	Ministry of Environment & Public Works
10. Panagiotopoulos S.	Agricultural University of Athens
11. Petrelis V.	Ministry of Agriculture / Forest Cadastre
12. Toulios L.	NAGREF - Institute for Soils Classification and Mapping

The working group of panel 2,

CONSIDERING THAT:

1) The project to compile maps for the forested areas of the entire country in the scale of 1:20000 needed many man-years to be realized. This project is still running and the responsible organization of the Ministry of Agriculture (MOA) declares that it will be completed by the next year. However, it is a general requirement that the project should run a second phase for map update since the maps are already out of date. Moreover, it was decided that this update would be based on a more recent aerial photography taken between 1990-1992 (the production of the first series of maps was based on aerial photography dated since 1962). For the time being, it seems very difficult to continue with this action and the whole project for forest mapping will be suspended in the near future for the two following reasons:

a) There is no available scientific personnel, which will ensure the treatment of the enormous number of aerial photographs and the completion of the project within a reasonable time.

b) The investments of the Administration in H/W and S/W tools for setting up the necessary GIS map layers, are not technically supported by the company which has provided the material. However, these investments may be considered enough in terms of H/W and S/W availability.

2. There is a special national interest from economic and ecological point of view to monitor all kinds of changes within the forested areas. There are human and natural impacts which may improve or inversely destroy the natural vegetation within the forested areas. Today there is no any operational possibility for monitoring and mapping the changes through the time for the national forests, biotopes and natural parks. The human and natural impacts to natural environment are known with little precision.

3. There is no a unique method to observe and map on an annual basis, the extend of damage caused by forest fires. The available relevant data are not easily comparable, because they are in different scales and the degree of precision varies significantly.

4. Any project for land management and land planning requires the existence of land use maps for the whole country in the scale of 1:100000 and for specific areas in the scale of 1:50000 and 1:25000. The main problems faced by the relevant governmental organizations of the Ministry of Environment & Public Works and generally by the specialist on the subject, is that the existing maps provided by the Military Agency are too old and they do not represent land use classes which are of their interest. On the other hand the use of aerial photography is difficult since the latter is very detailed and not easily managed because of the amount of required photographs. The studies for land management and planning need more concise and updated map products representing the significant land use classes.

5. The project run by MOA for mapping soils in the forested areas for the entire country and in the scale of 1:50000 will be completed the next year. However, this map is not representing soils for agricultural areas and it is not the appropriate tool for agricultural purposes. Furthermore, the Institutes of

the National Agricultural Research Foundation prepares suitable and more detailed soil maps for agricultural areas but only occasionally and after a specific demand and not on an operational basis for the entire country.

6. The support to the Agricultural Policy and relative decision actions for the reorientation of agricultural activities towards the development of an ecological and prosperous agriculture requires the creation, maintenance and continues update of an integrated system of registers on a farm basis. However, the existing base maps are old and the studies of the National Programme for Cadastre organization which is currently run by the Ministry of Environment and Public Works will need years before it provides new and updated map products in the appropriate scale.

7. The decision making processes at a national level, require the knowledge of the main agricultural land use classes and natural resources throughout the country. For the time being there is no any updated map representing these land use classes even on a concise and more general scale as for example the 1:100000. The latter would be a very useful material to support studies for agricultural planning.

8. The protection of the agricultural production and capital investments at a national level from natural risks requires many actions, initiatives and money. For the time being the whole administration of this problem is under the responsibility of the Ministry of Agriculture and especially the National Organization for Agricultural Insurances (ELGA). Today there is a special need to find out methods and techniques to automate and facilitate the procedure to verify and measure (on a regional and farm level) the degree of impact to the agricultural production and consequently to farmer's income. Moreover, any action for weather forecasting and thus early alarm on coming natural risks, requires meteorological data and relevant satellite images on an every hour basis. Finally to confront draught problems, it is very important to know with detailed maps the extend of snow coverage on the surrounded mountainous areas.

The working group of panel 2,

CONCLUDES AND RECOMMENDS THAT:

1. Remote Sensing data and image processing techniques should be used appropriately for the production of updated maps for the forested areas throughout Greece. The same data could additionally used to draw boundaries between forested and areas of other use.

2. The use of Remote Sensing data to monitor changes in the forested areas because of human interventions and natural phenomena, is needed. Also, changes in the natural vegetation of forests could be detected continuously. Such projects could use appropriately gathered E.O. data, dated since satellite sensors produce images of the Earth surface (that is early '70's).

3. It is important to hire specialists and educate the existing personnel of the organizations to exploit fruitfully E.O. data. Special attention should be placed to define adequate shifts which will permit the maximum use of the abundant H/W and S/W facilities existing today in the MOA.

4. E.O. data and Remote Sensing techniques are the appropriate means for the representation of the areas being affected by forest fires on an annual basis for the entire country.

5. The development of forest fire fighting systems which integrate Remote Sensing data and GIS techniques is very important, since it is possible to get in almost real time the image of the fire's behavior. Today the responsible for the coordination of fire extinguishing operations needs a lot of time to collect the necessary maps which represent land use and natural vegetation classes in the threatened by the fire zones.

6. The existing satellite systems as well as the forthcoming ones could be used unreservedly for forest mapping studies.

7. E.O data and Remote Sensing techniques are strongly suggested for mapping wetland areas and their surrounding environment. The application of Remote Sensing is necessary, since there are about 370 wetland areas which cover approximately 200.000 Ha for which the land use classes should be mapped. For the time being a very small number of such

areas (less than 5 to 6) have been mapped by the use of E.O. data in the frame of pilot projects.

8. There is a special need of imaging systems which produce images in the infrared part of the spectrum, in order to map wetland areas and their content in water.

9. The update of maps representing land use classes in wetland areas need the acquisition of a complete set of satellite images (e.g. LANDSAT TM, SPOT XS, e.t.c.) which cover the totality of the study areas every 5 years. This frequency in map updating is considered as the most cost effective one in order to get results regarding the changes in the wetland area. The close collaboration with the Ministry of Environment and Public Works which is responsible for the management of natural environment is absolutely required.

10. E.O data may be used as the main input to prepare land use maps for the entire country in the scale of 1:100000 as they required by the Ministry of Environment and Public Works for regional and land planning. The responsible units of the Ministry need final map products which should be prepared by external specialists on the subject. For the time being it seems difficult to train the personnel in order to be able to produce such products by itself.

11. It is necessary to produce a soil map for the entire country representing the suitable soils for agriculture activities and planning. Remote Sensing data and techniques will be used for the first soil classification and the production of the corresponding maps in the scale of 1:100000 or even 1:50000. More detailed maps will be produced in a later stage by using a mixture of aerial photography, ground surveys and Remote Sensing data.

12. It is necessary to monitor by the use of E.O. data the changes in the quality, suitability and availability of soils for agricultural purposes in specific agricultural areas. Also it seems very important the development of applied research towards the use of imaging spectroscopy data for a more detailed soil classification.

13. For the purposes of the Ministry of Agriculture it is necessary to produce land use maps for the entire country in the scale of 1:100000 or even 1:50000. It is suggested that the update of these maps is done every 5 years.

14. Multi-temporal remote sensing imagery in conjunction with existing statistical and cadastral data is suggested to be used for the update of registers of crops.

15. The combined use of multi-temporal remotely sensed data with orthophotos produced by recently acquired aerial photography is needed in order to verify the farmer's declaration regarding the kind of crop and the area of exploitation on a farm level, especially for crops which are subject of subsidies and insurance payments.

16. Meteorological satellite data are required on a every hour basis in order to forecast coming natural risks because of weather changes and take measures to prevent damages in the agricultural production. The close collaboration with the National Meteorological Service and other national centres which can provide such satellite data (Meteosat, NOAA) is required.

17. Satellite data of optical sensors but especially SAR data should be used in order to map the extend of snow coverage in the surrounded mountainous areas. This information is required to prevent damages caused by draught.

The Working Group has evaluated the degree of priority for the various operational applications which have been mentioned previously. This evaluation has been based on criteria like the national character of a certain action, the requirements in know how, technology and expertise transfer, the degree of getting involved the public and private domain in the various phases of the project, the resulting improvement to the national state of the art and competence level of the local industry, the level of support provided to Ministries and other decision bodies of the country, the capital investments but also the ease to undertake such actions with the existing national infrastructure. This study has led to the following conclusions:

Between the actions of first priority are the mapping of forestry areas as well as the monitoring of changes in land classes and vegetation

throughout the forested areas. The same rank of priority is given to the monitoring of climatic and weather changes which are crucial for agricultural production as well as to the precise estimation of damages in crop production because of weather phenomena.

Among the next most important actions are soil mapping for the entire country and the continuous study of soil suitability and agricultural land quality throughout the entire country. The use of remote sensing data and techniques for the development of advanced fire fighting systems as well as the specific actions to support the development of an integrated system for agricultural land management, update and maintenance of crop registers are also ranked between the important actions.

PANEL 3: **URBAN AND REGIONAL PLANNING (including: cadaster, sustainable development, land use/cover mapping) - CARTOGRAPHY**

WORKING GROUP:

1. Prof I. Bandekas	Chairman, Hellenic Mapping and Cadastral Organisation.
2. Dr. N. Sifakis	Rapporteur, CORINE land cover project in Europe.
3. A. Vaina	Dir. of Reg. Planning, Min. of the Envir., Reg. Planning and Public Works.
4. C. Zambelis	Dir. of Environment, Min. of the Env., Reg. Planning and Public Works.
5. A. Smonos	Organisation for the Planning of Athens.
6. E. Stefani	Organisation for the Planning of Athens.

The working group of panel 3,

CONSIDERING THAT:

1. The set up of guidelines for a strategy of planning at a national level are carried out at small cartographic scales (1/100000 to 1/250000).

2. The CORINE programme carried out in 22 countries, has shown the advantages, in terms of cost effectiveness and rapidity, when using EO data for land cover inventories at small scales over large areas.

3. The CORINE database, which aims at the comparability of objective and reliable information on land cover throughout the EU member states, is now available for virtually all Greece.

4. The know-how on using EO data for land cover/use mapping is well established, and relevant experience exists in Greece since 1987 through the EC CORINE land cover project.

5. In order to perform the regional planning and urban planning on moderate scales, the decision makers need to gather spatial quantitative and other

qualitative data in digital form with an accuracy allowing land cover/use mapping from 1/25000 to 1/50000 scales; these data may cover the whole or parts of the country depending on the required level of detail.

6. The cost of EO data increases with the required mapping scale and decreases with the surface of the covered area; in particular that EO data combined with other data (e.g., aerial photography, field surveys) can be the most cost-effective method for land cover mapping on moderate scales especially when very large areas have to be covered.

7. EO satellites provide homogeneous data that allow to produce comparable information over different regions.

8. Urban planning and change monitoring on large scales requires quantitative spatial information, namely, land cover/use maps corresponding to 1/5000 scale.

9. The national cadaster will be carried out at scales between 1/1000 and 1/10000, and that the updating of the cadaster plans will require very accurate spatial information on the limits of the properties rather than on land cover/use changes.

10. The cadaster plans will be completed with other qualitative information (i.e., concerning the property status), that can be obtained only by field surveys.

11. At present, the spatial resolution of the EO satellite sensors does not allow the extraction of spatial information with the required level of detail for mapping at scales larger than 1/20000.

12. EO capabilities will improve as new VHSR satellite sensors with enhanced spatial and spectral features have been scheduled for launching in the forthcoming years.

13. The information derived from EO data is in digital form and can thus be combined with any spatial data sets by means of a GIS.

14. EO can be used for fast controls of land cover changes at moderate scales.

15. EIAs for big works and infrastructure have a very high degree of priority for the country.

16. The EO data with high spatial resolution are systematically updated but the regular revisit period of the satellites is that of a few weeks.

17. EO data can provide a first overall picture of the impact that certain anthropogenic activities may have on the environment; and that combined with other data they have been effectively used in other countries for allocating the sites to install new industries and other infrastructure as well as for improving the management of urban waste.

18, There is a very high priority for monitoring the coastal and sensitive zones in Greece.

19. The high purchase cost of the satellite imagery makes it to be not always the most economic solution for monitoring linear elements, such as, extended coastlines or rivers, except if the images are jointly used for other applications covering the surrounding areas.

20. The full range of capabilities and limitations of EO are not always well known by the users in the public sector.

21. The public domain in Greece is poorly equipped with image processing and GIS facilities.

22. A certain type of EO data offer stereoscopic views and can therefore be used in cartographic applications and in particular for mapping, revision of topographic maps and production of digital terrain models.

23. EO data have been used as input data in demographic surveys.

RECOMMENDS THAT:

1. No immediate use of EO satellite data can be attempted in the urban planning and change-monitoring on large scales (e.g., 1/5000).

2. The research institutions and the HSRTC shall follow from close the evolution in the state-of-the-art of EO sensors, and inform the interested organisations-users as soon as the operational capabilities of EO data allow their cost effective application in the area.

3. The use of HSR EO data combined with other ancillary data (e.g., field surveys, aerial photographs) shall be adopted for all relevant land cover/use inventories on moderate (i.e., 1/25000 to 1/50000) and small (i.e., 1/100000 and below) scales in Greece.

4. Any attempt for land cover/use mapping on moderate scales shall be consistent with the three common European levels of the CORINE land cover nomenclature and shall be based on the already existing CORINE database; complementary EO data can be used for parts of the country that require a higher level of detail.

5. The existing CORINE land cover database shall be first fully exploited by the interested services before any attempt is made to start new inventories at the same resolution.

6. At least all land applications of EO should take advantage of the know-how gained and the lessons learnt by the operationalisation of the European CORINE programme in Greece.

7. The updating of the CORINE land cover database shall be performed according to the standards set by the European Environment Agency.

8. The public domain shall be equipped with adequate H/W and S/W for GIS and image processing; also personnel from the interested services shall be specialised in the field.

9. EO satellite data cannot directly be used for extending and updating the cadaster plans at large scales (i.e., 1/1000 to 1/10000).

10. The advantages of an integration of supplementary EO data along with the cadaster digital files in a GIS environment shall be examined by the responsible authority.

11. The interested services can be addressed to the HSRTC if they desire to be further informed on the capabilities of EO.

12. The HSRTC co-ordinates and promotes the collaboration between public institutions and the private sector, and helps the dissemination of relevant information.

13. With respect to the mapping of the coastal and sensitive zones, EO data can be used in combination with conventional techniques to the extent that this will improve the cost effectiveness of the methodology.

14. EO data shall be used to monitor "slow" changes in the coastal and sensitive zones.

15. The organisations/users should carefully examine the existing capabilities of EO and the advantage of their application in the areas of cartography and demography.

NOTES:
CORINE = COoRdinate the INformation on the Environment.
EO = Earth Observation (satellite data)
VHSR = Very High Spatial Resolution
GIS = Geographical Information System
EIA = Environmental Impact Assessment.

PANEL 4: GEOLOGICAL - HYDROGEOLOGICAL APPLICATIONS, NATURAL HAZARDS (EARTHQUAKES, LANDSLIDES, FLOODS, VOLCANOES)

WORKING GROUP

1. Prof. Th. Astaras	Chairman
2. Dr. Y. Karfakis	Rapporteur
3. Agelakis B.	Ministry of Environment and Public Works
4. Prof. Argialas D.	NTUA - Lab. of Remote Sensing
5. Ioannides	OASP (Organization for Seismic Protection)
6. Parharides I.	OASP (Organization for Seismic Protection)
7. Stefouli M.	IGME (Institute of Geological and Mineral Research)
8. Papoulia I.	National Centre for Marine Research
9. Holevas K.	National Centre for Marine Research

The working group of panel 4,

CONSIDERING THAT:

1. The current remote sensing techniques are related with receiving and analysis (optical and digital) of panchromatic and "false colour" images derived, mainly, from (1) multispectral scanners and Radar systems (SAR) of the "Earth Resourses Satellites" (LANDSAT and SPOT series, MOS, ERS, JERS etc.) and (2) the meteorological / environmental Satellites (GOES, METEOSAT, NOAA, METEOR series etc.).

2. The remote sensing techniques for multitemporal detection of the environment which is absolutely necessary nowadays is being constantly degraded.

3. Remote sensing provides the users - geoscientists with images of the environment having synoptic view, repetitive coverage and giving information needed for better understanding of the various components of the environment.

4. The remotely sensed images contribute to the geomorphological - geological mapping (drainage network patterns, watershed devides), mapping of geomorphological units, determination of rock types and geological structures.

5. Remote sensing contributes to the detection, mapping / delineation of fracture zones which have relationships with earthquakes (active faults), mineral exploration and ground water extraction.

6. The delineation / mapping of the displacement fields of earthquake areas, could be achieved by the use of interferometric Radar data (Radar interferometry).

7. The delineation of regions which are underlain by shallow watertables could be realised by using T.IR. or Radar images.

8. The monitoring and mapping of areas suffering from natural hazards (landslides, subsidence, volcanic eruptions, floods) as well as the mapping of land regions suffering from accelerated erosion can be assisted by the analysis of satellite data in combination with other ancillary data (geological, topographic data etc.).

9. The multi-temporal monitoring / mapping of open-cast minings and quarries as well as the determination of possible pollution at the surroundings of the open-rifts, are being faced with remote sensing techniques which at the same time may contribute to the environmental restoration after the mining works.

10. The detection of fresh water outflows along the coastal areas can be delineated and mapped by using LANDSAT / T.IR. images or images from airborne thermal scanners.
Note: it is well known, that large amounts of fresh water flow unexploited into the sea in karstic areas, while it could be used for domestic, industrial or agricultural purposes.

11. The detection of the most suitable areas for urban and waste disposal can be assisted by remote sensing techniques as well as combination of R.S with other techniques (e.g. G.I.S.).

12. The best programming for the execution of large scale engineering projects (National roads, dams, bridges, tunnels, etc), is achieved by the use of the remote sensing technique.

13. The monitoring of environmental damages, caused by human interventions and constructions (e.g. reduced landslide danger etc.) may be realized by remote sensing.

14. Multitemporal monitoring of coastal areas' proceedings in order to avoid erosion, is supported by remote sensing techniques in combination with other methods.

15. The geological remote sensing techniques are applied on an operational basis by public administration institutions as well as by universities and in less extend by the private sector.

RECOMMENDS THAT:

1. Remote sensing for geological sciences, should be considered as a basic and useful tool, which can be of great importance for the geologists / geoscientists which with the support of other related sciences, the best results (solutions) to requested problems could be drawn.

2. Through the HSRTC, the necessary catalogue and other information and data could be disseminated to the users with the minimum cost.

3. All the activities regarding remote sensing and the relevant projects run by Public Institutions, Universities and related private companies must be registered, furthermore this information should be given to the interested parties as soon as possible.

4. The available remote sensing data should provide high spatial and spectral resolution as well as shore repetitive coverage (e.g. multispectral analysis for the determination of mineral deposits and the pollution of land and sea, high spatial resolution for the determination of landslides, fracture zones etc.).

5. Certain software programs should be developed, by Greek specialists, related to:

a) digital image processing / GIS, since the annual rate to upgrade the already existing software packages is too high,

b) geomorphometric analysis by satellite data,

c) multimedia application for educational needs of Universities and other Public Services / Organizations, either for photo-interpretation or satellite data interpretation (analysis).

PANEL 5: WEATHER FORECAST - ATMOSPHERIC APPLICATIONS

WORKING GROUP:

1. Prof. Asimakopoulos D.	Chairman
2. Dr. Kartalis K.	Rapporteur
3. Kostopoulos V.	National Meteorologiacal Service
4. Dr. Kambezidis Ch.	NOA - Institute of Meteorology and Physics of the Atmoshperic Environmrnt
5. Prof. Lalas D.	NOA - General Director of the Centre
6. Dr. Petrakis M.	NOA - Institute for Meteorology and Physics of the Atmoshperic Environment

The working group of panel 5,

CONSIDERING THAT:

1. The role and applicability of remote sensing in the areas of the atmosphere, meteorology and climate.

2. The degree of priority for thematic and application areas for Greece, in which remote sensing could play a direct or indirect role.

3. The prospects and drawbacks for the integration of remote sensing in various atmospheric or climatic applications which are traditionally dealt with ground measurement.

CONCLUDES AND RECOMMENDS THAT:

1. The existing infrastructure in Greece in terms of NOAA and METEOSAT high resolution receiving stations is very good. At present three METEOSAT and five NOAA stations are operational, whereas a fourth METEOSAT station is under installation.

2. The wealth of existing infrastructure in terms of receiving stations was examined in connection to the need for active and close co-operation among the various entities which own and operate such stations. It was also recognised that a framework for data policy should be worked out the soonest possible; such a policy should benefit the parties which are interested in obtaining satellite NOAA and METEOSAT data. In addition a platform for the exchange of data should be worked out; the existing CEO platform could well facilitate the existing needs.

3. The primary role of the National Meteorological Service (National Focal Point of Greece in EUMETSAT) was recognised in terms of METEOSAT data, while at the same time the NMS was urged to conclude its data policy and improve its data services so that to facilitate the provision of satellite measurements to interested parties.

4. NMS suggested to organise a special Workshop in Athens, with the participation of EUMETSAT. The workshop would aim to disseminate information on EUMETSAT activities to the Greek public and private parties.

5. Examining a wide number of activities in the fields of Atmosphere-Meteorology-Climate and ranking these activities on the basis of such criteria as importance for the country, existing expertise, existing human potential, infrastructure, prospects for the participation of public and private entities, value added products, e.t.c., the Working Group agreed that five of these activities should be prioritised. These activities area:

a). use of meteorological satellite in support of the prediction of air pollution episodes in urban areas.

b) use of E.O. for the development of operational systems for extreme weather events,

c) connection and coordination of NOAA/METEOSAT receiving stations in Greece,

d) application for satellite climatology,

e) use of Earth Observation in support of environmental conventions and directives in the field of the atmosphere-climate.

6. Taken the need for the replacement of existing METEOSAT receiving stations by the year 2001, it was agreed that the METEOSAT station to be installed by the National Observatory of Athens should be oriented - to the extent possible - to the technology to be required for the next generation of satellite receiving stations.

7. It was agreed that the role of the private sector was limited in the fields, although significant prospects exist for value added products.

8. It was recognised that the public entities - with the exception of the NMS, Universities and Research Centres - have been minimally using satellite remote sensing for their needs. Some exceptions exist - i.e. Ministry of Environment - yet much is to be done to integrate remote sensing in the action programmes of the public entities, in particular of Ministries. It was agreed that pilot projects should be promoted to convince public entities on the potential of satellite remote sensing.

9. It was agreed that an Institute of Remote Sensing could facilitate the needed efforts as described above and provide the required coordination and action policy.

PANEL 6: NEW SYSTEMS AND TECHNOLOGIES - REMOTE SENSING PRODUCTS - NATIONAL INDUSTRY

WORKING GROUP:

1. Prof. Sarris E.	Chairman
2. Dr. Koukos I.	Repporteur
3. Prof. Banninger Cliff	JOANNEUM Research - Gratz
4. Dr. Kohlhammer G.	ESA - ERS Mission Manager
5. Paillon M.	Head of Unit, DG XII, European Commission
6. Prof. Ventouras I.	University of Creete
7. Giannakouros G.	National Centre for Space Research/Min. of Defence
8. Gkikopoulos V.	KETA - KETHM - Nat. Air Force/Min. of Defence
9. Dr. Dialetis D.	NOA - Institute of Ionospherics and Space Physics
10. Dr. Kasotakis G.	NOA - Institute of Ionospherics and Space Physics
11. Katsigiannis D.	Hellenic Aerospace Industry
12. Kolovos Al.	National Centre for Space Research/Min. of Defence
13. Kontizas E.	NOA - Astronomical Institute
14. Mbelehaki A.	NOA - Institute of Ionospherics and Space Physics
15. Pipitsoulis N.	MARAK S.A.
16. Spathopoulos Th.	SEB/Association of Greek Industrialists
17. Tzavaras I.	INTRACOM S.A.
18. Tritakis V.	Academy of Athens
19. Tsiropoula G.	NOA - Institute of Ionospherics and Space Physics
20. TYMBAS K.	INTRACOM S.A.
21. FELLAS Ch.	Hellenic Aerospace Industry
22. Frangos P.	NTUA
23. Fokas E.	HSRT / Ministry of Development

The working group of panel 6,

CONSIDERING THAT:

1. It has been determined by an already performed study[1] that Greek user requirements about revisit frequency and image resolution - provided by the currently operational remote sensing satellites - are not met.

2. For the future acquisition of remote sensing products there could be several choices, namely either a proprietary Mediterranean satellite constellation or commercial American satellites or satellites operated by the European Space Agency or by other European concerns.

3. The development and operation of a proprietary Mediterranean remote sensing satellite constellation constitutes an excellent opportunity for the Greek industry to contribute towards building an advanced technology satellite system.

4. Several proposals for a proprietary Mediterranean remote sensing satellite constellation have been submitted to or considered by Directorate DG-XII of the EU.

5. A remote sensing satellite system of high resolution and revisit time may have applications in the field of national security.

6. In the area of remote sensing subsystems and services there is a high demand for advanced sensors, on-board digital processing units (DPUs) and ASICs, and ground subsystems for data and image transmission, compression, recognition, storage and archiving including the usage of neural network techniques and expert systems, geographical information systems (GIS) and other special software systems.

7. Especially for the transmission of remote sensing data and imaging the current data rate requirements exceed the 2 Mbps.

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[1] about the proposed COSMO (COnstellation of Small satellites for Mediterranean Observation) a consortium that consists of organizations from three European Mediterranean Countries i.e. Italy, Greece and Spain.

8. There is an adequate industrial base for design and construction of special on board components and instruments as well as for testing campaigns of products, and systems and ground truthing of space observations (e.g. sea surface temperature measurements, phytoplancton colour, state of vegetation etc).

9. There is an adequate industrial base for the provision of remote sensing services.

10. Interdisciplinary Earth Sciences require effective access to efficient information systems and reliable connectivity to the Internet and the World Wide Web service.

RECOMMENDS THAT:

1. A strategy about the most appropriate satellite constellation allowing the acquisition of high quality remote sensing products should be implemented by the Greek Government.

2. The results of the existing study of user requirements should be made widely available to the Greek remote sensing community.

3. The existing study of user requirements should be used as an initial basis for policy position and for further analysis and market study with emphasis in quantitative results regarding determination of user requirements, and of national industrial and scientific capabilities.

4. Greece should take the initiative for concerted action and a pilot project, in the EU framework, for the evaluation of the submitted proposals about a proprietary Mediterranean remote sensing satellite constellation.

5. A concerted action for a proprietary Mediterranean remote sensing satellite constellation should seek the involvement of more Mediterranean countries and possibly ESA.

6. An involvement in a proprietary Mediterranean remote sensing satellite constellation project should address questions of future sustainability of the industrial base created for the project.

7. The Greek participants should seek further responsibilities in developing space segment subsystems beyond the expressed interest on the development of ground systems.

8. Determination of potential involvement by the Hellenic Ministry of Defence is needed.

9. Greek state agencies and organizations should participate in pilot projects for the design and production of value added remote sensing products.

10. The capabilities of the HELLENIC SPACE RESEARCH AND TECHNOLOGY COMMITTEE (National Packet Network of Research and Technology) should be expanded to accommodate transmission of remote sensing data and imaging.

11. Through HELLENIC SPACE RESEARCH AND TECHNOLOGY COMMITTEE there should be established a connectivity of Greek remote sensing centers to TEN (Trans-European Networks), to Internet and the WWW.

12. The needs of the Greek users for data and image storage and acquisition should be accommodated through participation in pan-European efforts like the CEO (Centers of Earth Observations).

13. Greek private industry should be motivated to get involved and pursue niches in advanced technologies regarding both the space segment (DPUs, ASICs, other VLSI components) and the ground segment (Neural Networks, GIS, Expert Systems, Special Packet Networks etc.) as well as in instrument and system testing campaigns (e.g. space instruments, solar cells, etc) and ground truthing of space observations.

14. Greek private industry should be motivated to get involved in the provision of remote sensing services to the private as well as the state user.

Εφ

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