

SPACERESEARCH

GLOBAL MONITORING ENVIRONMENT SECURITY SATELLITE
COMMUNICATIONS SPACE TRANSPORTATION



Developing applications for
the benefit of the citizens



European Commission
Directorate-General Enterprise and Industry

GLOBAL MONITORING FOR ENVIRONMENT AND SECURITY

The 6th Research Framework Programme has largely contributed to the use of Earth observation. Pre-operational services have been developed through integrated projects to respond to users' needs for monitoring and surveillance in particular in the areas of land management, marine observation, emergency response, atmosphere monitoring and security issues.

SATELLITE TELECOMMUNICATION

Support for the introduction of broadband communications in less favoured regions, improved telecommunications in case of an emergency, telemedicine and tele-education applications are examples of research outcome based on the use of satellite telecommunication.

SPACE TRANSPORTATION

Research and development in the area of space transportation participate to reinforce the position of Europe as a global player. The support action SOYMANTRY contributed to the installation of the Soyuz launcher in Kourou.



II SPACE IS A STRATEGIC ASSET

Space-related applications support a wide range of activities and initiatives at European level, but are also crucial for understanding global issues. In Europe, they are helping to achieve important domestic and international objectives in areas such as transport, agriculture, fisheries, emergency management and humanitarian aid. Their added value has been demonstrated in support of environmental policy and response to climate change. Applications and services based on space research allow the efficient functioning of today's society; satellites deliver live news broadcasts, enable modern navigation systems, provide medium and long term weather forecasts.

Space is a strategic asset, a driver for the Lisbon process aimed at improving citizens' lives and contributing to the knowledge-based society. It is therefore crucial that Europe has a competitive space industry, served by strong and long-term investment in new space technologies, backed up by a firm research environment.

II THE SIXTH RESEARCH FRAMEWORK PROGRAMME

For the first time, in the Sixth Framework Programme for Research and Technological Development (FP6) space became one of the priorities for research with an overall budget of € 235 million. Three areas were supported:

- Development of Earth observation-based applications in support of global monitoring for environment and security;
- Satellite telecommunication;
- Satellite navigation, positioning and timing systems for the Galileo programme.

This brochure presents the 42 research projects funded in the area of global monitoring and satellite telecommunication, and one support action in the domain of space transportation. It does not cover the Galileo applications.

Global monitoring for environment and security has been highlighted as a strategic initiative for ensuring a European autonomous monitoring capability in support of decision-making for both institutional and private bodies.

Typical decisions concern new laws to preserve the environment or urgent measures in case of natural or man-made disasters. The progressive implementation of a global monitoring capability has been made possible thanks to activities and investments provided by EU Member States, the European Commission, the European Space Agency and other entities at national or European level.

Developments in the field of **satellite telecommunication** are aimed at providing affordable and economically viable services supporting the policies of the European Union. These include re-establishment of emergency communications following catastrophes, support for the introduction of broadband communication in less favoured regions, telemedicine and tele-education. Satellite telecommunication can also support the data distribution needs for global monitoring and Galileo applications.

Under FP6, the European Commission is also contributing to the installation of a launch pad for the Russian medium-lift Soyuz at the European Space Port in French Guiana, which will help reinforce the European position in the area of **space transportation** by completing the European launch capabilities of the heavy-lift Ariane 5 and the new lightweight Vega vehicle.

II THE EUROPEAN SPACE POLICY

The growing importance of space is confirmed by the newly adopted European Space Policy. High-level technological expertise in space-based science and space exploration is one of its cornerstones. Building on the experience from FP6 and in line with the European Space Policy priorities, the European Commission is continuing to support space research under the Seventh Research Framework Programme (FP7) for the benefit of all citizens and for the competitiveness of the European industry. FP7 will mainly concentrate on space applications, with emphasis on global monitoring, but will also integrate aspects of research in support of space science and technology.

GLOBAL MONITORING FOR ENVIRONMENT & SECURITY

- || **AMFIC** Air Quality Monitoring and Forecasting in China
- || **ASSIST** Alpine Safety, Security & Informational Services and Technologies
- || **AWARE** A tool for monitoring and forecasting Available Water Resource in mountain environment
- || **BOSS4GMES** Building Operational Sustainable Services for GMES
- || **CASCADOSS** Development of a trans-national cascade training programme on Open Source GIS&RS Software for environmental applications
- || **DRAGONESS** DRAGON in support of harmonizing European & Chinese marine monitoring for Environment & Security System
- || **EAGLE** Exploitation of Angular effects in Land surface observations from satellites
- || **GEMS** Global and regional Earth-system Monitoring using Satellite and in-situ data
- || **GENACS** GMES European Wide Network Assistance and Coordination Support
- || **GEOLAND** GMES products and services, integrating EO monitoring capacities to support the implementation of European directives and policies related to 'land cover and vegetation'
- || **GMES-POLAND** Promoting Polish participation in GMES
- || **GMOSS** Global Monitoring for Security and Stability
- || **GNU** GMES Network of Users
- || **GOCINO** GOCE in Ocean Modelling
- || **GOSIS** GMES Organisational and System Integration Scenarios
- || **HALO** Harmonised coordination of Atmosphere, Land, and Ocean integrated projects of the GMES backbone
- || **HAWKEYE** Thermal Infra Red Hyperspectral sensing Assistance to clandestine weapon surveillance under Working conditions Linking fixed airborne or space borne systems
- || **HUMBOLDT** Development of a Framework for Data Harmonisation and Service Integration
- || **INSEA** Data Integration System for Eutrophication Assessment in Coastal Waters
- || **INTEGRAL** Interferometric Evaluation of Glacier Rheology and Alterations
- || **LIMES** Land and Sea Integrated Monitoring for European Security
- || **MERSEA** Marine Environment and Security for the European Area
- || **MONRUK** MONitoring the marine environment in Russia, Ukraine and Kazakhstan using Synthetic Aperture Radar
- || **MOTIIVE** Marine Overlays on Topography for Annex II Valuation and Exploitation
- || **NAVOBS** A support measure to boost the business prospects of GMES and Telecom satellites through focused and innovative RTD work involving SMEs
- || **NAVOBS PLUS** Expanding the existing NAVOBS network of GMES users in order to factor out common needs and to instigate economies of scale in service delivery which will help SMEs (GMES service providers or customers) become more competitive
- || **PEARL** Port Environmental information collector
- || **PREVIEW** PREVENTION, INFORMATION and EARLY WARNING pre-operational services to support the management of risks
- || **RISE** Reference Information Specifications for Europe
- || **SCHEMA** Scenarios for Hazard-induced Emergencies Management
- || **SEOS** Science Education through Earth Observation for High Schools
- || **VGT4-AFRICA** Distribution of VEGETATION data in Africa through EUMETCast

SATELLITE TELECOMMUNICATION

- || **AFSAGA** African Satellite communication and Galileo Applications
- || **BASE2** Broadband Access Satellite Enabled Education
- || **HEALTHWARE** Standard and Interoperable satellite solution to deploy HEALTH care services over Wide Area
- || **MOWGLY** Mobile Wideband Global Link system
- || **NET-ADDED** New Technologies to Avoid Digital Division in e-Divided areas
- || **RURAL WINGS** Spreading the Wings of Knowledge: Bringing Rural Communities Closer
- || **SATMAC** Satellite Communication Market Assessment and Cost Benefit
- || **SISTER** The Satcoms In Support of Transport on European Roads
- || **TANGO** Telecommunications Advanced Networks for GMES Operations
- || **TWISTER** Terrestrial Wireless Infrastructure integrated with Satellite Telecommunications for e-Rural

SPACE TRANSPORTATION

- || **SOYMANTRY** Soyuz at CSG Programme Management and Launch System Telemetry and Remote Control Adaptations

Further information is available at:
<http://www.gmes.info/> || <http://ec.europa.eu/enterprise/space/> || <http://cordis.europa.eu/>

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Air Quality Monitoring & Forecasting in China

|| HELPING MONITORING AIR POLLUTION IN CHINA

AMFIC addresses one of the most urgent issues of China today, increasing atmospheric pollution. The aim of the project is to develop an integrated information system for monitoring and forecasting tropospheric pollutants in the country. The system uses satellite and in situ air quality measurements and modelling to generate consistent air quality information. The data cover recent years and actual situation including air quality forecast for several days ahead. Air pollutants included in the analysis are ozone, nitrogen dioxide, sulphur dioxide, formaldehyde, carbon monoxide, methane and aerosol/particulate matter.

The proposed system will supplement and broaden the existing ground-level monitoring and air quality assessment activities in China. Satellite data will cover regions where no ground-based stations are available. Air quality models will fill-in the sparse temporal and spatial sampling of the measurements and connect them in a physically consistent manner.

The system targets environmental agencies in China, some of whom are participating in AMFIC, and assists them in their reporting duties on air quality. A case study for the city of Shenyang will be performed.

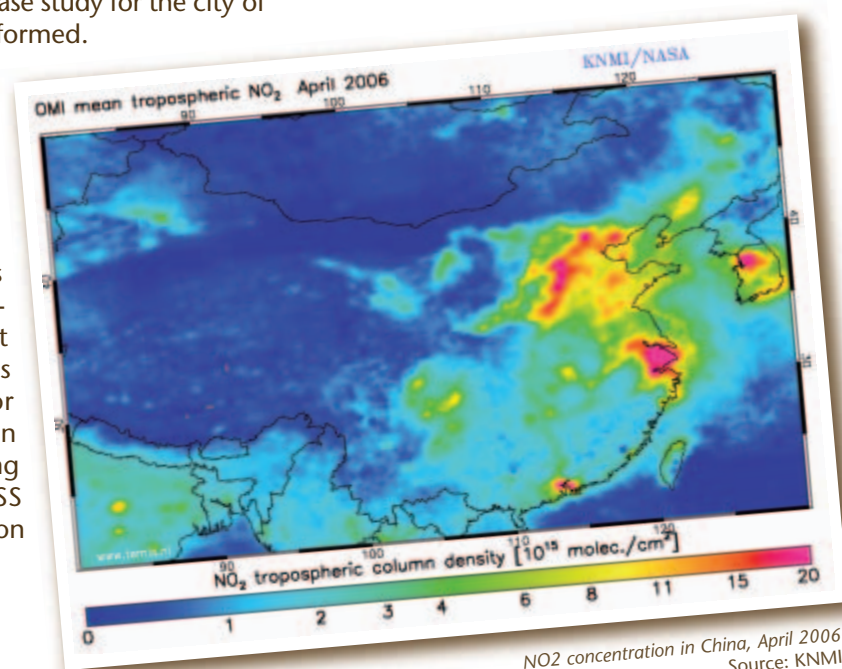
The project will also improve the understanding of the transport of air pollution within, from and to China.

AMFIC builds on aspects of the ESA GMES Atmosphere Service Element PROMOTE which has a strong potential for providing the European atmospheric monitoring contribution to GEOSS (Global Earth Observation System of Systems).

|| LARGE INCREASE OF NO₂ OVER SHANGHAI

The NO₂ concentration in the troposphere of China is one of the trace gases monitored by AMFIC using satellite measurements. The combined measurement series of the satellite instruments GOME and SCIAMACHY span almost over a decade, which allows for a trend analysis of NO₂ concentrations. It can be concluded that the 10-year long NO₂ dataset can be used for significant trend analysis in most parts of China. The largest trend is found in Eastern China, where the economic growth is one of the fastest of the world.

The fastest growing city with respect to economy is Shanghai and it shows the largest increase in tropospheric NO₂ with a yearly increase of about 29% since 1996. It is interesting to note that the growth in the region around Hong Kong is less than for other regions with a high economical activity. This is probably due to the already high level of economic activity in 1996 when the AMFIC trend study started, and to a package of measures to combat air pollution in Hong Kong adopted over the last years.



NO₂ concentration in China, April 2006
Source: KNMI

Air Quality Monitoring & Forecasting in China

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- | Demokritus University of Thrace (DUTH), Greece
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- | National Satellite Meteorological Center (NSMC), China
- | Institute of Atmospheric Physics (IAP-CAS), China
- | Flemish Institute for Technological Research (VITO), Belgium
- | Institute of Environmental Physics (IFE), Germany
- | National Observatory of Athens (NOA), Greece
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|| PROJECT INFORMATION

AMFIC: Air Quality Monitoring and Forecasting in China
Specific Targeted Research Project
Contract No: SST5-CT-2006-030940
Starting date: 01/09/2007
Duration : 24 months
EU Contribution: € 1.132.978.00
Estimated total cost: € 1.652.538



ASSIST

Global Monitoring for ENVIRONMENT & SECURITY



II IMPROVING RISK MANAGEMENT IN ALPINE REGIONS

ASSIST aims at improving the capabilities of risk warning and crisis management systems in Alpine regions. The main objective is to deliver a pre-operational information service which shall be based on existing systems and products and make use of satellite-based navigation and earth observation (EO) data. The underlying idea is to develop and implement a flexible and distributed system for the production and exchange of relevant static and dynamic data required for risk prediction and management of disasters.

The backbones of the overall concept are the so-called "Service Nodes". These nodes will be autonomously operated by organisations which are responsible for risk and/or crisis management. The Service Nodes are capable of:

- requesting and receiving raw input data (satellite-borne, air-borne, terrestrial);
- processing the input data into products suitable for risk prevention and crisis management;
- distributing the products within the "User Network" (fixed and mobile regional risk management centres and - in case of crisis - up to the mobile staffs in field);
- exchanging products with other Service Nodes operated by different organisations (e.g. police, hospitals, ambulance services, air rescue, fire fighters, etc.).

II REQUIREMENTS BASED ON SCENARIO ANALYSIS

In the beginning of the project, users have identified risks and scenarios - possible processes to be supported by an ASSIST system. The most promising subset has been selected, for which users have established their requirements. These requirements were translated into a set of technical system requirements and a preliminary top-level architecture has been established.

Based on the specified requirements, a functional demonstrator has been designed and implemented. Its validation started in February 2007 with a long-term test to prove the functionality for product import and exchange. The final validation was done in a test campaign under participation of all partners including users in June 2007.

Alpine Safety, Security & Informational Services and Technologies

II MAIN LESSONS LEARNED

- The ASSIST concept and its demonstrator have shown the benefits of an integrated data handling and visualisation of a variety of different data types relevant to crisis prediction and management;
- A set of newly developed processing algorithms for high resolution EO data (landslide hazards maps, avalanche maps, snow coverage maps) have shown the benefits of these data for risk management purposes;
- The mobile components of the ASSIST demonstrator have shown the benefits of state-of-the-art technology for information exchange with in-field personnel in actual crisis situations;
- Although the ASSIST project has successfully reached all its objectives and provided a proof-of-concept for the benefits of harmonized exchange of EO and terrestrial data for crisis management, several tasks remain to be further elaborated:
 - Data ownership, data rights and information security issues have to be addressed for an information exchange across organisations.
 - On the technological side, additional sources of information are likely to be integrated based on a flexible concept (e.g. GPS-based slope measurement systems).



Source: VCS

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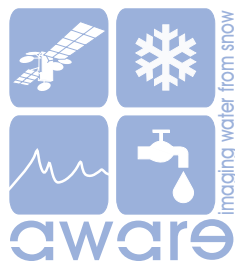
II PROJECT INFORMATION

ASSIST: Alpine Safety, Security & Informational Services and Technologies
Specific Targeted Research Project
Contract no: SST4-CT-2004-012317
Starting date: 01/06/2005
Duration: 30 months
EU Contribution: € 1.113.722
Estimated total cost: € 2.149.494



Global Monitoring for ENVIRONMENT & SECURITY

AWARE



A tool for monitoring and forecasting Available Water Resource in mountain environment

II BETTER MANAGEMENT OF WATER RESOURCES IN ALPINE REGION

AWARE aimed at providing innovative tools for monitoring and predicting water availability and distribution in those areas where melted snow is a major component of the annual water balance, such as the Alpine catchments. AWARE has been mainly motivated by the urgent need to predict medium-term flows from snowmelt for an effective and sustainable water resources management.

A main goal was to bridge the gap between available data about the status of water resources and information requested by different stakeholders involved in the local water resources management. Models produced were designed to solve problems raised by different users, such as hydropower companies, irrigation consortia, municipal water suppliers, and to assist stakeholders responsible for water policy.

The models developed integrate earth observation (EO) data and in-situ hydrological and meteorological measurements, introducing thereby a novel approach to the representation of the involved physical processes in time and space.

II MODELLING AND GEO-SERVICES: MAIN INNOVATIONS

- Use of EO data, in order to model snow water availability and snow-melt dynamics in a spatially distributed framework exploiting the enhanced capability of such data to provide continuous information on hydrometeorological state variables.
- Development of an on-line tool to make runoff models accessible on the web, sharing them with interested users by offering the possibility to run hydrological models, by means of specifically designed geo-services capable to select, discover and harmonize ground and EO data needed for the purpose.

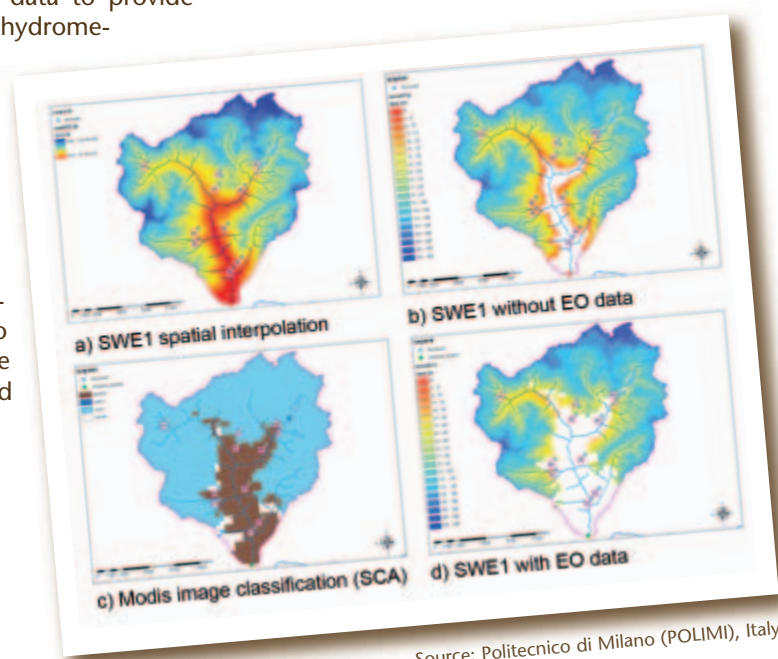
II IMPROVED MODELS

Models created concerned primarily snow water availability and snow-melt dynamics. Four models have been selected for the set up of the assimilation activity: two models for Snow Water Equivalent (SWE) evaluation (one based on statistical approach and the other on physical approach); two models for the snow melt dynamic quantification. A model for the analysis of groundwater impact on runoff formation has been also investigated to study the influence of snowmelt on groundwater dynamics. Model calibration, validation and demonstration have been performed for representative catchments of different geographic conditions in the European Alps.

Estimation of Snow Water Equivalent (SWE) on the Mallero river basin, North of the Lombardia region, Italian Alps by statistical approach:

II AWARE GEOPORTAL

Runoff models are now implemented in a geoportal allowing the tailoring of data and models to different environments under an integrated approach capable of effectively addressing specific problems. The geo-services designed are fully compliant with the architecture of the INSPIRE (INfrastructure for SPatial InfoRmation in Europe) initiative, and capable of coupling global and local data to compute, archive, upgrade and distribute model results.



Source: Politecnico di Milano (POLIMI), Italy

A tool for monitoring and forecasting Available WATER REsource in mountain environment

II LIST OF PARTNERS

- I Consiglio Nazionale delle Ricerche - Istituto per il Rilevamento Elettromagnetico dell'Ambiente (CNR - IREA), Italy
- I Politecnico di Milano (POLIMI), Italy
- I Swiss Federal Institute for Forest, Snow and Landscape Research (SLF), Switzerland
- I Technische Universität Wien, Institute for Hydraulic and Water Resources Engineering (TUW), Austria
- I University of Ljubljana (ULFGG), Slovenia
- I Remote Sensing Data Engineering Srl (RSDE), Italy
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II PROJECT INFORMATION

AWARE: A tool for monitoring and forecasting Available WATER REsource
in mountain environment
Specific Targeted Research Project
Contract no: SST4-CT-2004-012257
Starting date: 01/07/2005
Duration: 36 months
EU contribution: € 1.292.750
Estimated total cost: € 1.704.900



BOSS4GMES

Global Monitoring for ENVIRONMENT & SECURITY

BOSS4GMES
Building Operational Sustainable Services

II SUPPORTING GMES FAST TRACK SERVICES

BOSS4GMES is a project designed to help promote the transition of the Global Monitoring for Environment and Security from a concept to an effective long-term operational programme. The project will enable the implementation of the Fast Track Services (FTS) for ocean forecasting, response to emergencies and land monitoring and, to a lesser extent, of the new Pilot Services.

The technical inputs of all 37 project partners are organised around three main activities (pillars):

- I Technical enhancement and validation of operational services delivery;
- I Development of appropriate organisational and financial frameworks for long-term sustainability;
- I Increasing the awareness of GMES services through communications.

By the time BOSS4GMES is completed in mid 2009 the following goals, should be achieved:

- I Technical pillar:
 - I Three FTS fully designed/tested and ready to implement;
 - I New pilot services designed to gain added value from the development of these FTS;
 - I Service synergies identified to enhance, for example, climate change monitoring and mitigation.
- I Organisation and Finance pillar:
 - I A developed data policy (covering both availability and access);
 - I Defined organisation/governance for operational services;
 - I Demonstrated benefits for the citizen.
- I Communications pillar:
 - I The 'GMES message' delivered to stakeholders, users and citizen;
 - I A developed 'GMES standard' for information delivery;
 - I Global Monitoring for Environment and Security defined as the most appropriate route for future information requirements.

Building Operational Sustainable Services for GMES

The team will prepare a series of recommendations and implementation plans for the FTS and the new Pilot Services to support the long-term operational success of Global Monitoring for Environment and Security through the provision of accurate and reliable information to a wide range of users.

II UNDERSTANDING THE STATE OF PLAY

The teams have concentrated in the first phase on the collection and review of information upon which to base the analyses that to be undertaken within each of the three pillars. On the technical side this consisted in the assessment of current data analysis procedures and of existing infrastructure, prior to the definition and validation of proposed upgrades. This work has been performed in close contact with the user communities.

The communication team has been assessing the current public perception and understanding of Global Monitoring for Environment and Security in order to identify the most appropriate tools for raising awareness in all areas, from the general public to major information users. BOSS4GMES has already produced a multi-lingual press release and a multi-media presentation of the three Fast Track Services.



Building Operational Sustainable Services for GMES

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- I Infoterra Ltd – Project Coordinator, UK
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- I Astrium SAS, France
- I Centre for Ecology and Hydrology, UK
- I Collecte Localisation Satellites, France
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- I Eurimage, Italy
- I European Centre for Medium-Range Weather Forecasts, United Kingdom
- I European Union Satellite Centre, Spain
- I Flemish Institute for Technological Research, Belgium
- I GAF AG, Germany
- I GeoVille Informationssysteme und Datenverarbeitung GmbH, Austria
- I Hellenic Centre for Marine Research, Greece
- I Indra Espacio S.A., Spain
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II PROJECT INFORMATION

BOSS4GMES: Building Operational Sustainable Services for GMES Integrated Project
Contract no: SIP5-CT-2006-030966
Starting date: 01/12/2006
Duration: 30 months
EU contribution: € 11.846.213
Estimated total cost: € 20.222.662

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CASCADOSS

Global Monitoring for ENVIRONMENT & SECURITY



II OPEN SOURCE SOFTWARE SOLUTION FOR ENVIRONMENTAL PROBLEMS

"Open Source Software" (OSS) is technically defined as software whose source code is available to the public, or "open". However truly successful OSS projects are not created by merely releasing free source code, they are created through the growth of communities of shared interest.

Over the last few years the concept "open source" has gained currency within the geospatial community. However, although the geospatial community has already made huge strides towards OSS that can truly compete with proprietary software, many geospatial end-users still shy away from using OSS due to the lack of formal support and a fear of new technology. As such, a considerable degree of potential innovative geospatial projects based on OSS is left unexploited.

The goal of CASCADOSS is to encourage geospatial end-users, especially those linked to GMES services, in using OSS. This is to be achieved by setting up a trans-national cascade training programme on Open Source GIS&RS software with an emphasis on environmental applications. The cascade training programme aims at training, at international level, small groups of 'high-end' geospatial users (e.g. high level Geographic Information System (GIS) and/or RS (Remote Sensing) and/or IT experts). They will be expected to transfer on national or regional level the acquired knowledge and abilities to 'low-end' geospatial users (e.g. scientists, public administrators) and could support them in finding open source solutions for environmental problems.

Principal target groups for the cascade training programme are geospatial end-users from Central and Eastern EU Member States. The adoption of OSS in those countries is a topic of particular interest as this will reduce licensing costs and will promote indigenous technological development. Open source GIS&RS software can play a key role in making a truly European Spatial Data Infrastructure.

Development of a trans-national cascade training programme on Open Source GIS&RS Software for environmental applications

II THE THREE PHASES OF THE TRANS-NATIONAL CASCADE TRAINING PROGRAMME

This training programme is divided in three phases.

In the **first phase**, an extensive study will be conducted on issues related to Open Source Geographic Information System (GIS) & Remote Sensing technology (RS):

- A wide range of Open Source GIS & RS software projects are reviewed and evaluated.
- A wide range of environmental applications build on top of Open Source GIS&RS Software are reviewed and evaluated.
- Different types of business models that can be based on the Open Source GIS&RS technology are explored and documented.
- Open Source licensing policy is screened and translated into a comprehensive guide on Open Source legal issues.

In the **second phase**, CASCADOSS will organize a one-day international symposium, combined with a 3-day information workshop. The symposium will bring together both professional developers and potential customers of Open Source technology and will also stimulate research & innovation and networking in this field.

In the **third phase**, the consortium participants will transfer the acquired knowledge to local stakeholders by organizing a 2-day national or regional information workshop in their own countries. The target audience will be people involved in the use of GMES services.



Source: K.U. Leuven

Development of a trans-national cascade training programme on Open Source GIS&RS Software for environmental applications

|| LIST OF PARTNERS

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|| PROJECT INFORMATION

CASCADOSS: Development of a trans-national cascade training programme on Open Source GIS&RS Software for environmental applications
Specific Support Action
Contract no: SSA5-CT-2006-030776
Starting date: 23/04/2007
Duration: 24 months
EU contribution: € 606.220
Estimated total cost: € 606.220



DRAGONNESS

Global Monitoring for ENVIRONMENT & SECURITY



DRAGON in support of harmonizing European and Chinese marine monitoring for Environment and Security System

II EUROPEAN AND CHINESE MARINE MONITORING

The primary aim of the project DRAGONNESS is to make an inventory of Chinese and European capacities of marine monitoring for environment and security including Earth observation data. The objective is to harmonize methods in the frame of international programs such as the Global Ocean Observing System (GOOS) and Global Monitoring for Environment and Security (GMES) and investigate the potential for establishing and harmonizing operational services contribution to the Global Earth Observation System of Systems (GEOSS).

In so doing, DRAGONNESS will take stock of existing information production and service deliveries in order to:

- Identify service/data gaps and barriers for the efficient delivery of data in China;
- Review and adapt products and services derived or customized from current GMES development activities for dissemination and utilisation in China;
- Analyse the potential for foreseen sustainable European GMES services to be transferred to China and provide building blocks to Chinese marine monitoring services, and hence to GEOSS;
- Study potential transfer of Chinese experience in marine monitoring for the monitoring of European coastal seas;
- Stimulate the building of new partnerships in earth observation science and technology between Europe and China to support global environmental monitoring.



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II ACHIEVEMENTS

The DRAGONNESS project kicked-off in Beijing in October 2007 and addresses important cross-topics such as:

- Data validation and fusion from multiple sources;
- Data assimilation and integrity;
- Data delivery processes of observation systems (satellite, in-situ);
- Interoperability and interconnection of the data processing and delivery systems;
- Data handling, management, dissemination, organization and related information service architectures and operation.

The DRAGONNESS project is considered to be an important precursor for international cooperation in the Earth observation field as it aims at establishing a strategic mechanism for exchange of knowledge and expertise in marine monitoring for environment and security between Europe and China. Building expertise within China is a key element in this context and is managed through a central web site, conferences and a summer school.

DRAGON in support of harmonizing European & Chinese marine monitoring for Environment & Security System

II LIST OF PARTNERS

- I Nansen Environmental and Remote Sensing Center, Norway
- I GKSS Forschungszentrum, Germany
- I Ocean Remote Sensing Consulting, Germany
- I Ifremer, France
- I Collecte Localisation Satellites, France
- I The Nansen-Zhu International Research Center, P.R.China
- I Ocean Remote Sensing Institute, Ocean University of China, P.R.China
- I Institute of Atmospheric Physics, Chinese Academy of Sciences, P.R.China
- I National Satellite Ocean Application Service, P.R.China
- I Beijing Normal University, P.R.China
- I Ministry of Science and Technology, P.R.China
- I National Marine Environmental Forecasting Center, P.R.China
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II PROJECT INFORMATION

DRAGONESS: DRAGON in support of harmonizing European and Chinese marine monitoring for Environment and Security System
Specific Support Action
Contract no: SSA5-CT-2006-030902
Starting date: 29/08/2007
Duration: 36 months
EU contribution: € 500.542
Estimated total cost: € 500.542



EAGLE Global Monitoring for ENVIRONMENT & SECURITY



Exploitation of AnGular effects in Land surface observations from satellites

II APPLYING MULTI-ANGULAR VIEWS IN LAND OBSERVATION

The accuracy of the geophysical products derived from remote sensing generally does not meet the requirements of user communities concerned with, for example, climate change issues. With the new generation of global imaging spectroradiometers capable of acquiring simultaneous multi-angle observations, both the new approaches and quantitative improvements in accuracy can be now achieved to exploit the multi-angle signals as unique and rich sources of diagnostic information.

The objectives of the EAGLE project were:

- *Evaluation and correction:* To evaluate and to reduce the uncertainty associated with the angular effects in the historical and current sensors.
- *Modelling:* To propose improved algorithms that permit generating sensor independent bio-geophysical products.
- *Demonstration:* To provide a demonstration of improvements in biophysical parameters obtained with the proposed algorithms.
- *Validation:* To validate models and products using in situ field data.
- *Application:* To provide a dynamic biophysical map of Europe that will be continuously updated by comparing modelling results with actual observations from the various sensor systems.
- *Recommendation:* To indicate new algorithms and configurations that could be considered in the future for improved estimations of the biophysical parameters.

II MAIN ACHIEVEMENTS

- Several experiments were carried out in Spain, France and Netherlands, and field measurements were collected simultaneously with satellite and aircraft overpasses. This has allowed building excellent high quality databases. The data provided by these experiments will provide an important support to the analysis of the impact of the angular effect in remote sensing data. Moreover the benefits of building these databases are available to a wider scientific community interested in the angular aspects.

- A software package to compute biophysical parameters from satellite images has been developed during the project.
- Maps of NDVI (Normalized Difference Vegetation Index), surface temperature, surface emissivity and albedo (i.e. fraction of solar energy reflected from the Earth back into space) have been calculated from PAL data. A land surface temperature map of Europe has been produced with data from March 2000 to 2006 which can be used to study land surface phenology in Europe.
- A methodology to derive surface albedo from hyper-spectral model simulations has been developed. Albedo maps have been produced from using the dynamic vegetation mapping facility available.
- A method has been proposed to perform the atmospheric corrections in the visible and near infrared channels at two view angle observations. Fractional vegetation coverage has been obtained for the AATSR images of the EAGLE campaigns.



Illustration of vegetation growth dynamics (red colours) and snow cover (purple colours) for the year 2002 obtained from SPOT-VGT data and the HANTS algorithm. Upper left shows the end of February (maximum snow cover), upper right the end of May, lower right the end of August (minimum snow cover), and lower left the end of November. Greenish and white colours indicate bare soils. (Source: EAGLE).

Exploitation of AnGular effects in Land surfacE observations from satellites

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- I Wageningen University and Research Centre, Alterra, the Netherlands
- I Université Louis Pasteur, France
- I National Aerospace Laboratory, The Netherlands
- I Internacional Institute for Geo-Information science and Earth Observation, The Netherlands

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EAGLE: Exploitation of AnGular effects in Land surfacE observations from satellites
Specific Targeted Research Project
Contract no: SST3-CT-2003-502057
Starting date: 01/02/2004
Duration: 42 months
EU contribution: € 787.614
Estimated total cost: € 1.055.253



GEMS Global Monitoring for ENVIRONMENT & SECURITY



Global and regional Earth-system
Monitoring using Satellite and in-situ data

II MONITORING AND FORECASTING OF ATMOSPHERE COMPOSITION

The principal aim of the GEMS project is to develop validated, integrated systems for global and European modelling and data assimilation, in order to monitor and forecast the composition of atmosphere, its dynamics and thermodynamics. Substantial use will be made of both satellite and in-situ data in the formation and validation of products. GEMS will enable successor services to provide routinely:

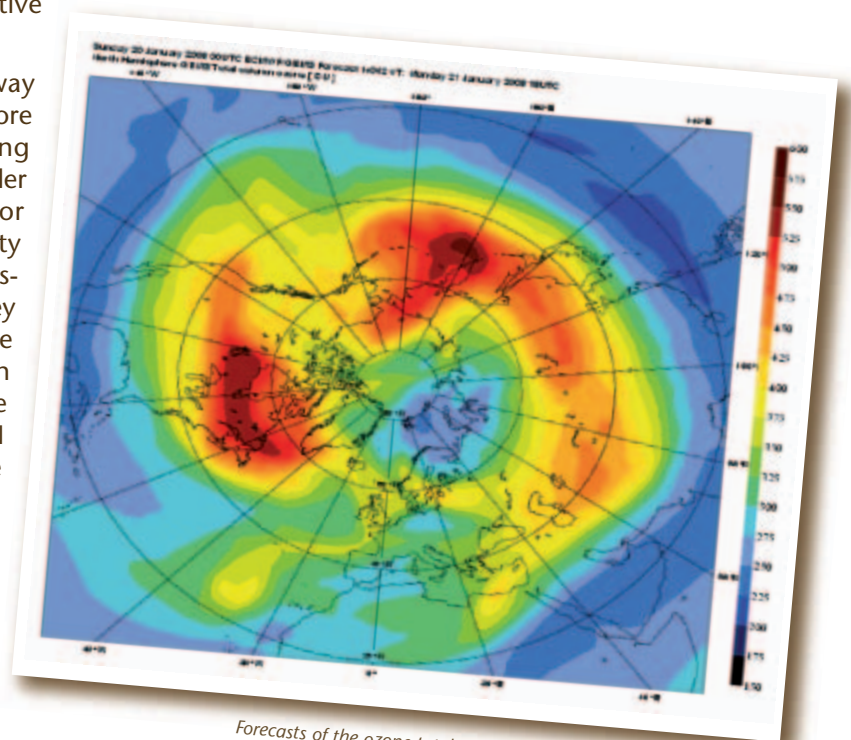
- Air-quality monitoring and forecasting for Europe based on nationally-developed systems;
- Surface solar and UV radiation products related to renewable energy supply and biological impacts;
- Products to support health warnings for conditions such as dust-borne meningitis, pulmonary disorder and pollen allergies;
- Global monitoring of greenhouse gases, reactive gases and aerosols;
- Global medium-range forecasts of reactive gases and aerosols;
- Estimates of emissions and sinks of greenhouse gases and pollutants;
- Estimates of the radiative forcing of climate change.

GEMS is paving the way towards a fully operational core monitoring and forecasting service to be developed under the Global Monitoring for Environment and Security (GMES). GEMS and its successor services will deliver key information relevant to the UN Framework Convention on Climate Change, the Montreal Protocol, the UN Convention on Long-Range Trans boundary Air Pollution, as well as to the work carried out by the Intergovernmental Panel on Climate Change.

II THE GLOBAL WEATHER FORECAST MODEL EXTENDED

The global weather forecast model developed by the European Centre for Medium-Range Weather Forecasts (ECMWF), the coordinator of the project, has been extended in collaboration with partners to include variable greenhouse gases, reactive gases and aerosols, with comprehensive internal representations of key processes for the greenhouse gases and aerosols, and a novel coupling with a chemical transport model to determine the sources and sinks of the reactive gases.

Based on routine numerical weather prediction, the system re-analyses meteorological observations in order to obtain detailed daily records and forecasts of weather and atmospheric composition. The records for ozone spanning over several decades can be examined for evidence of climate variability and change as well as the ozone hole recovery. Samples of forecast information in a map form updated daily from prototype versions of the GEMS system for reactive gases and aerosols are being run on the GEMS website.



Forecasts of the ozone total columns of the northern hemisphere by the GEMS prototype system.
Source: GEMS/ECMWF

Global and regional Earth-system Monitoring using Satellite and in-situ data

II LIST OF PARTNERS

- | European Centre for Medium-Range Weather Forecasts, International Organisation
- | Met Office, UK
- | Centre National de la Recherche Scientifique, France
- | Commissariat à l'Énergie Atomique, France
- | Max-Planck-Institute for Biogeochemistry, Germany
- | Max Planck Institut für Meteorologie, Germany
- | Royal Netherlands Meteorological Institute, The Netherlands
- | Belgian Institute for Space Aeronomy, Belgium
- | Finnish Meteorological Institute, Finland
- | Danish Meteorological Institute, Denmark
- | Deutscher Wetterdienst, Germany
- | University of Bremen, Germany
- | Université Pierre et Marie Curie, France
- | National and Kapodistrian University of Athens, Greece
- | Météo-France, France
- | National University of Ireland, Galway, Ireland
- | Royal Meteorological Institute, Belgium
- | ARPA Emilia-Romagna, Italy
- | Istituto di Scienze dell'Atmosfera e del Clima Consiglio Nazionale delle Ricerche, Italy
- | Meteorologisk Institutt, Norway
- | Rheinisches Institut für Umweltforschung, Germany
- | Joint Research Centre, Institute for Environment and Sustainability, International Organisation
- | Institut national de l'environnement industriel et des risques, France
- | Czech Hydrometeorological Institute, Czech Republic
- | Irish Environmental Protection Agency, Ireland
- | Polish Institute of Environmental Protection, Poland
- | Imperial College of Science, Technology and Medicine, UK
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II PROJECT INFORMATION

GEMS: Global and regional Earth-system Monitoring using Satellite and in-situ data Integrated Project
Contract no: SIP4-CT-2004-516099
Starting date: 01/03/2005
Duration: 48 months
EU contribution: € 12.453.900
Estimated total cost: € 17.445.970





GENACS

GMES European Wide Network
Assistance and Coordination Support

II COMMUNICATING ABOUT GMES

The GENACS project aimed at supporting information exchange within the Global Monitoring for Environment and Security (GMES) community and strengthening the involvement in GMES of countries from the enlarged Europe through a series of complementary actions.

The first action concerned the identification of institutional actors in new Member States and candidate countries, with the objective to encourage and help them to cooperate more actively with the GMES community, and to establish constructive and long-standing contacts. The second action focused on the organisation of thematic workshops in order to foster the collaboration between the various stakeholders. The third action targeted the dissemination of GMES-related information and the implementation of a communication flow in close relationship with the European Commission.



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II THE WWW.GMES.INFO WEBSITE

During the project significant resources have been dedicated to the design and implementation of the www.gmes.info website. The contacts established with the representatives of the GMES Advisory Council have enabled the consortium to identify the relevant institutional actors and GMES-related activities within the Member States.

This work led to the production of "national" pages on the website providing country-specific information.

The www.gmes.info website has been regularly updated and in addition, several in-depth evolutions have been implemented in order to reflect some major changes such as the creation of the GMES Bureau, the launch of the GMES Fast Track Services and of the corresponding implementation groups.

In its current version, the website welcomes more than 10 000 visitors each month. Since its release in 2005, more than 130 events have been announced and more than 220 news have been published. A database of 116 GMES-related projects is available on line and an "e-newsletter" is sent to 1360 registered users every two months. A library of GMES reference documents is also available.

II WORKSHOPS IN SUPPORT OF GMES

GENACS assisted the European Commission services in the organisation of thematic workshops which gathered large audience of experts and scientists. Three workshops were dedicated to the GMES Fast Track Services ("land monitoring core service", "marine core service" and "emergency response core service") in October and November 2005, and a fourth workshop dedicated to GMES Atmosphere Service took place in 2006. The project contributed to the organisation of major events such as the 'Earth and Space Week' and supported also groups of National Contact Points for information days.



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GMES European Wide Network Assistance and Coordination Support

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II PROJECT INFORMATION

GENACS: GMES European Wide Network Assistance and Coordination Support
Specific Support Action
Contract no: SSA4-CT-2004-516162
Starting date: 01/12/2004
Duration: 42 months
EU contribution: € 580.000
Estimated total cost: € 580.000





GMES products and services, integrating EO monitoring capacities to support the implementation of European directives and policies related to 'land cover and vegetation'

II GEO-INFORMATION SERVICES FOR BETTER MANAGEMENT OF NATURAL RESOURCES

GEOLAND has been set-up to underpin the priorities of the Global Monitoring for Environment and Security (GMES): "Land Cover Change in Europe", "Environmental Stress in Europe" and "Global Vegetation Monitoring".

Within eight sub-projects (6 observatories and 2 core services), the 57 geoland partners developed products and services, utilising available earth observation resources in combination with in-situ measurements, and integrating them with existing models into preoperational geo-information services. These services support international, European, national and regional authorities and institutions in better management of natural resources and decision-making related to water quality, nature protection, Kyoto-process and food security issues.

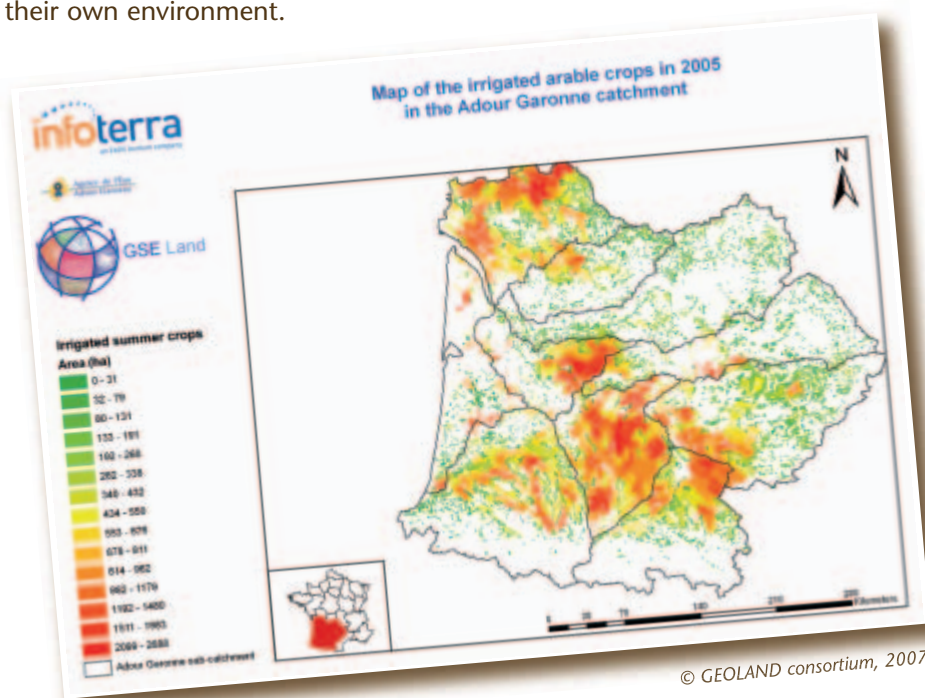
The project was structured into three regional and three global observatories, each of them supported by a core service providing basic geo-information inputs. An operational scenario was established to define the geo-information infrastructure and satellite technology requirements to achieve a fully operational service. The GEOLAND service development and demonstrations were closely linked to user organisations which were driving and reviewing each step and then accepting the results after integration into their own environment.

The user community involved more than 100 user organisations ranging from international to local coming from 24 EU Members States and candidate countries. 18 organisations even joined the consortium as full members.

II SUCCESS OF GEOLAND PRODUCTS

A range of GEOLAND sub-tasks succeeded to attract additional funding to advance downstream service integration with user organisations (e.g. using local user funds); exploit synergies with other GMES services (e.g. Atmosphere, Ocean, Risk Management); and support large-area demonstrations in Europe (through the European Space Agency's GMES Service Elements programme), China (through the EuropeAid Asia Information Technology and Communications project) and at global scale (Global Daily Burnt Area project of the Joint Research Centre). A transition phase addressing both CORINE Land Cover and first high-resolution layers has been initiated by the European Environment Agency and its member states as "Fast Track Service Precursor" (2006 – 2007).

95 products for the six application fields and two core services have been developed and thoroughly assessed for their maturity. The final proof-of-concept was achieved during the GEOLAND life-time for approximately two thirds of the products.



GMES products and services, integrating EO monitoring capacities to support the implementation of European directives and policies related to 'land cover and vegetation'

II LIST OF PARTNERS

- | Agenzia per la Protezione dell' ambiente e per i servizi tecnici, Italy
- | Alterra bv, The Netherlands
- | Amt der Vorarlberger Landesregierung, Austria
- | Austrian Research Centers GmbH, Austria
- | Commissariat à l'énergie atomique LSCE, France
- | Consiglio Nazionale delle Ricerche, IREA, Italy
- | County Administration Board of Dalarna, Sweden
- | Delphi Informations-MusterManagement GmbH, Germany
- | European Centre for Medium-Range Weather Forecasts, International Organisation
- | European Topic Centre on Terrestrial Environment, International Organisation
- | Geoville Informationssysteme und Datenverarbeitung GmbH, Austria
- | German Aerospace Center DFD, Germany
- | HG Geo Data Solutions, Germany
- | Infoterra France SAS, France
- | Infoterra GmbH, Germany
- | Infoterra Ltd., UK
- | Ingenieursbureau voor Environmental Analysis and Remote Sensing bv, The Netherlands
- | Institut Cartogràfic de Catalunya, Spain
- | Institut Français de l'Environnement, France
- | Institut National de la Recherche Agronomique, France
- | Institute of Geodesy and Cartography, Poland
- | Inst. de Investigacao Científica Tropical, Portugal
- | Instituto de Meteorologia, Spain
- | JOANNEUM RESEARCH Forschungsges. M. b. H., Austria
- | Joint Research Centre of the European Community, International Organisation
- | Landesamt für Natur und Umwelt Schleswig-Holstein, Germany
- | Leeds Metropolitan University, UK
- | MEDIAS-France, France
- | Mediterranean Agronomic Institute of Chania, UK
- | Météo-France Centre National de la Recherche Scientifique, France
- | Metria, Sweden
- | National Agricultural Research Foundation – Forest Research Institute, UK
- | Natural Environment Research Council, UK
- | Netherlands Geomatics & Earth Observation B.V., The Netherlands
- | NOVELTIS, France
- | Norsk Regnesentral, Norway
- | Österreichisches Institut für Raumplanung, Austria
- | PUMA Task Team (EUMETSAT), International Organisation
- | Pöyry Environment, France
- | Remote Sensing Solutions GmbH, Germany
- | Royal Netherlands Meteorological Institute, The Netherlands
- | Space Research Institute of Russian Academy of Science, Russia
- | Spot Image SA, France
- | Swedish Environmental Protection Agency, Sweden
- | Swedish University of Agricultural Sciences, Sweden
- | Thuringian State Institute for Wood, Hunting and Fishing, Germany
- | Tragsatec Tecnologías y Servicios Agrarios S.A., Spain
- | TU Vienna, Austria
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- | UN Environment Programme, Division of Early Warning and Assessment, International Organisation
- | University of Bonn, Germany
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II PROJECT INFORMATION

GEOLAND: GMES products and services, integrating EO monitoring capacities to support the implementation of European directives and policies related to 'land cover and vegetation'
Integrated Project
Contract no: SIP3-CT-2003-502871
Starting date: 01/01/2004
Duration: 39 months
EU contribution: € 9.993.340
Estimated total cost: € 16.800.000





Promoting Polish participation in GMES

II POLAND AND GMES

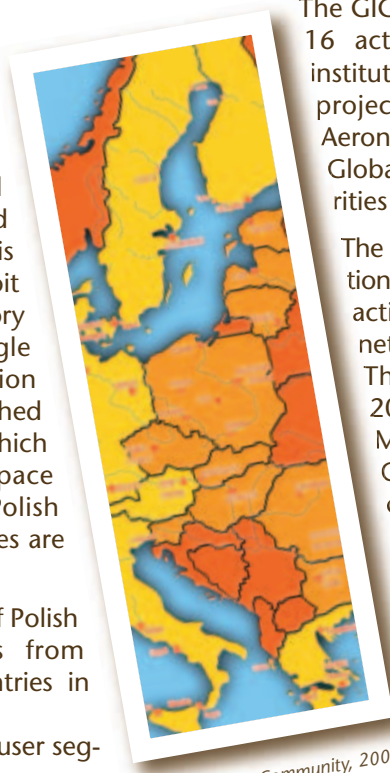
The main goal of GMES POLAND has been the promotion of the participation of Poland and other Central European countries in the Global Monitoring for Environment and Security (GMES) initiative. For this purpose and in order to exploit synergies of information, advisory and support activities a single entity – the GMES Information Centre (GIC) – has been established within the Polish Space Office which is co-ordinated by the Space Research Centre of the Polish Academy of Sciences. Its activities are devoted to:

- I Supporting the participation of Polish institutions and institutions from other Central European countries in GMES thematic projects;
- I Supporting the growth of the user segment of GMES-related projects.

II LONG-TERM SUCCESS OF THE GMES INFORMATION CENTRE

During the project, the GIC significantly facilitated the information exchange between GMES-related entities in Poland. It opened several communication channels especially with potential Polish co-operators. It contributed to a more efficient participation of Poland in GMES activities, as proved by actions that the GIC either initiated or supported.

The GIC initiated the work of 8 thematic panels to exchange information about the activities of institutions involved in research on particular topic and to coordinate their efforts with regard to participation in GMES activities. Leaders of panels were also strongly involved in user-oriented activities, in particular seminars and meetings with local authorities



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The GIC also initiated or co-organised 16 activities aimed at supporting institutions willing to participate in projects submitted to the Aeronautics and Space, and to the Global Change and Ecosystem priorities of FP6.

The GIC co-ordinated the preparation of a regional specific support action - 'NewEUser' - focusing on networking of the GMES users. The consortium assembled 20 entities from 8 new EU Member States and Candidate Countries. Communication channels created remain in place and facilitate further efforts in the area.

The project was also dedicated to support the growth of the user segment. The GIC co-organised 2 seminars for representatives of public administration to promote awareness of opportunities

offered by the earth observation technologies. This effort was followed by GIC co-organising Eurisy conference on GMES. As a result, the growing political awareness of potential GMES benefits led to greater support for the concept of the 'common action plan', an effort aimed at co-ordination of GMES-related activities of Polish public institutions, subject to regulatory framework and funding priorities.

The GIC also organised a series of seminars dedicated to local authorities, held in six major Polish cities. The seminars contributed to a better understanding of the local users' needs and subsequent activities resulted in definition of several concepts of possible pilot projects to be funded independently of GMES Poland.

Promoting Polish participation in GMES

II LIST OF PARTNERS

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II PROJECT INFORMATION

GMES POLAND: Promoting Polish participation in GMES
Specific Support Action
Contract no: SSA3-CT-2003-502954
Starting date: 01/11/2003
Duration: 26 months
EC contribution: € 78.192
Estimated total cost: € 78.192





II INTEGRATING RESEARCH ACTIVITIES

The network of Excellence GMOSS has been launched in March 2004 in the context of the GMES programme comprising 22 contractors from 11 European countries. The primary objective of GMOSS is to integrate the European community concerned with the use of Earth Observation for civil security applications through joint research and training activities, sharing resources and infrastructure, and exchange of expertise and staff.

Joint activities included an analysis of the potential of remote sensing data for threat analysis and early warning, the monitoring of critical infrastructure and damage assessment, monitoring of borders and the migration of people; as well as benchmarking of recent data analysis and visualisation concepts and techniques.

The GMOSS approach is research-oriented rather than operations-oriented. GMOSS addresses a wide and heterogeneous community covering academic research, service providers, user organisations, Commission services. By integrating remote sensing data analysis, social science and the analysis of key threats and risks, GMOSS contributes to the EU awareness of the security dimension of GMES.

II IRAQ, IRAN, ZIMBABWE AND KASHMIR: WHAT CAN WE LEARN FROM EARTH OBSERVATION?

The GMOSS work program has focused on joint work on 4 test cases relevant for European security or prone to natural disasters: Iraq, Iran, Kashmir, and Zimbabwe. Methodologies such as rapid mapping, specific feature extraction, image automatic interpretation, geographic information system modelling for decision support have been tested and different solutions have been compared and benchmarked. Information has been provided to representatives of the European Commission on pipeline sabotage in Iraq, nuclear facilities in Iran, land reform in Zimbabwe and damage assessment in Kashmir.

II NEAR-REAL TIME CRISIS MANAGEMENT

Two near real-time exercises have been performed evaluating the efficiency of internal collaboration and the effectiveness of tools and strategies in a realistic emergency scenario. End users and various Directorates General of the European Commission have been integrated in these exercises.

Global Monitoring for Security and Stability

II TALKING TO USERS...

GNEX'07, the second near real-time exercise organized by GMOSS, focused on a crisis situation in the Eastern Mediterranean, a region suffering from inner conflict and general instability. The GMOSS network was tasked to provide detailed decision support information on the following urgent issues:

- I Damage & Situation Assessment
- I Safe places, evacuation routes
- I Transportation & response facilities
- I Analysis and possible development of the situation



Damage assessment map of a refugee camp. Within 3 ½ days the GMOSS teams produced the information requested by the users. It was presented to representatives from the European Commission in Brussels.

II SPREADING GMOSS EXPERTISE

The expertise of GMOSS is disseminated through summer schools and training seminars, targeting primarily young professionals in both the research and the end-user domains, such contributing to capacity building of EU and non-EU institutions. GMOSS supports the development of GMES services through its work on:

- I the integration of socio-political background assessment and remote sensing methodologies
- I benchmarking of data suitability and data evaluation strategies
- I training and seminars
- I near real-time exercises and rapid mapping.

The GMOSS proposal of possible new applications for remote sensing data analysis concerns among others the use of:

- I night lights data for monitoring the impact of disasters and the movements of refugees
- I low-spatial high-temporal resolution sensors for monitoring conflict-related explosions and/or fires
- I automatic satellite image matching techniques for precise damage assessment of buildings
- I radar and optical sensors for automatic detection of moving targets.

II LIST OF PARTNERS

The GMOSS Consortium

- | Deutsches Zentrum für Luft und Raumfahrt e.V., DLR, Germany
- | Forschungszentrum Jülich GmbH, Germany
- | Technische Universität Bergakademie Freiberg, Germany
- | Bundesamt für Geowissenschaften und Rohstoffe, Germany
- | Department of Computer and Information Science, Linköpings Universitet, Sweden
- | OD Science Application, Sweden
- | FOI Swedish Defence Research Agency, Sweden
- | Commissariat à l'Énergie Atomique, France
- | Centre National d'Études Spatiales, France
- | King's College London, UK
- | QinetiQ, UK
- | Centro di Ricerca Progetto San Marco, Italy
- | Dipartimento di Ingegneria e Fisica dell'Ambiente - Università della Basilicata, Italy
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- | University of Salzburg, Center for Geoinformatics, Austria
- | Patrimony of the Royal Military Academy, RMA, Belgium
- | Technical University of Denmark, Denmark
- | The Netherlands Organisation for Applied Scientific Research, the Netherlands
- | European Union Satellite Centre, Torrejon, Spain
- | The Joint Research Centre, International Organisation
- | United Nations Office for Project Services, International Organisation
- | Swisspeace, Switzerland

Associated partners

- | Fachhochschule Hof, Germany
- | International Institute for Geo-Information Science and Earth Observation (ITC), The Netherlands
- | Institute of Methodologies for Environmental Analysis (CNR-IMAA), Italy
- | Threat Analysis and Solutions (TAAS), Austria
- | Centre Morris Janowitz, France
- | Definiens AG, Germany
- | Laboratorio di analisi e modelli per la pianificazione (LAMP), Italy
- | University of Salamanca, Spain
- | Technical University of Vienna, Austria
- | Bonn International Centre for Conversion (BICC) Germany
- | University of Pavia, Italy
- | European Academy Bozen/Bolzano, EURAC, Italy
- | Service Régional de Traitement d'Image et de Télédétection (SERTIT), France

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II PROJECT INFORMATION

GMOSS: Global Monitoring for Security and Stability
Network of Excellence
Contract no: SNE3-CT-2003-503699
Starting date: 01/03/2004
Duration: 48 months
EU contribution: € 6.000.000
Estimated total cost: € 6.000.000



GNU

II CONNECTING GMES USERS

GNU aims at structuring the GMES demand side by setting up an independent platform that will become the focal point to express European GMES users' needs for environmental applications and their feedback on GMES products. Likewise GNU will foster a systematic dialogue between the stakeholder communities.

The main objectives of the project include:

- I De-fragmentation of the environmental GMES user communities: currently user federations of GMES projects are isolated from each other, owing to the topical approaches (land, forest, air, marine, etc.), and there is a need to address cross-cutting issues.
- I Enable independent and unfiltered user statements: so far GMES user groups exist only within the frame of projects led by service providers. Often these users have no or little access to project resources which makes it difficult for them to exchange information.
- I Be a mouthpiece for the needs of GMES users at national and regional levels: European level users are already well represented in various bodies, but this is not the case for users that operate on subsidiary levels.
- I Aggregate and differentiate user appraisals of GMES products: GMES projects have brought about a wealth of different products. There is a need to prioritise and catalogue GMES data products to facilitate access by users to the products most suitable for their needs.
- I Link data-related and human aspects of GMES: most problems in GMES projects relate to communication issues rather than to technology development, however these issues have not always been properly addressed. An investigation of user-provider relations will provide the basis for efficient modes of collaboration.



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GMES Network of Users

The project consortium includes environment agencies and ministries; specialist agencies on air, forestry and land information; SMEs for support work; and research organisations. The consortium intends to closely interact with an outer network made of national and regional level stakeholders including service providers, European and international stakeholders, and other projects and networks.

II JOINT WORK OF THE CONSORTIUM

The partners exchange experiences and good practices, collect and interpret GMES related documents, with the aim of acquiring a common state of knowledge.

II CONNECTING GNU TO OTHER ACTIVITIES

The consortium sets up links with European and international level stakeholders, other projects and networks, in order to exchange experience and information. Results are presented and discussed with national stakeholders including industry, researchers, policy makers, and users.

II EVALUATING GMES PRODUCTS

The partners define criteria to evaluate GMES data products, develop common validation standards, set up a meta data base of GMES data products and prioritise these products. An analysis of the response from GMES stakeholders will provide ways to optimise the impact of GMES data products in relation to different stages of particular policy cycles.



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GMES Network of Users

II LIST OF PARTNERS

- | Federal Environment Agency, Austria
- | Agency for Land Information Flanders, Belgium
- | European Forest Institute, Finland
- | Ministère de l'écologie, du développement et de l'aménagement durables, France
- | Federal Environmental Agency, Germany
- | Informus, Germany
- | Thuringian State Institute for Forestry, Game and Fishery, Germany
- | Agency for Environmental Protection and Technical Services, Italy
- | Latvian Environment, Geology, and Meteorology Agency, Latvia
- | Netherlands Organisation for Applied Scientific Research (National Geological Survey), the Netherlands
- | Norwegian Institute for Air Research, Norway
- | Transparent World, Russia
- | Slovak Environmental Agency, Slovakia
- | European Topic Centre on Land Use and Spatial Information at the Autonomous University of Barcelona, Spain
- | GeoVille, Luxemburg
- | Swedish Environmental Protection Agency, Sweden
- | National Environmental Research Council (British Geological Survey), UK
- | Environment Agency of England and Wales, UK
- | Joanneum Research, Austria
- | Wuppertal Institute for Climate, Environment, and Energy, Germany
- | Ecologic, Austria
- | Siberian Centre for Environmental Research and Training, Russia

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II PROJECT INFORMATION

GNU: GMES Network of Users
Coordination Action
Contract no: SCA5-CT-2006-030956
Starting date: 01/10/2007
Duration: 36 months
EU contribution: € 1.099.467
Estimated total cost: € 1.099.467





II ENHANCED OCEAN MODELLING

The GOCINO support action aims at contributing actively to the pre-operational capability in ocean modelling for GMES utilizing data from the approved ESA satellite mission GOCE that is planned for launch by spring 2008.

The Gravity and Ocean Circulation Experiment – GOCE satellite mission is a new type of Earth observation satellite that will measure the Earth gravity and geoid with unprecedented accuracy. Combining GOCE geoid models with satellite altimetric observations of the sea surface height, substantial improvements in the modelling of the ocean circulation and transport are foreseen.

GOCINO will support the exploitation of Earth observation data from the forthcoming satellite mission GOCE through the following specific networking activities:

- Dissemination of the scientific results from an EU funded research project “Geoid and Ocean Circulation in the North Atlantic – GOCINA”;
- Use GOCINA products and recommendations to develop strategies for the implementation of GOCE products in operational ocean models;
- Facilitate the interaction and communication between the GOCE data processing consortium and the oceanographic users to transfer knowledge and exchange experiences and requirements;
- Promote the exploitation of GOCE data in the operational centres developed for the GMES maritime core service.

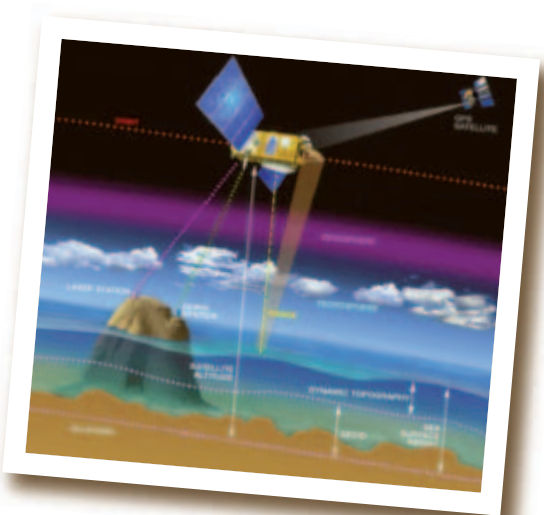


The GOCE satellite - Source: GOCINO-CNES

II IMPROVED OCEAN CIRCULATION MODELLING

If the oceans were motionless the mean sea surface would correspond to the geoid reflecting variations in the gravity field. In the GOCINA project a new accurate geoid has been determined by merging existing gravity data with new airborne gravity data. Differences in the ocean water density, winds, and variations in air pressure cause the height of the mean sea surface to depart from the geoid creating the mean dynamic topography, which provides the absolute reference surface for ocean circulation and heat transport.

Within the GOCINA project it was demonstrated how an improved mean dynamic topography model could be derived by combining the mean sea surface determined from space with geoid and ocean modelling results. Dissemination of this substantial improvement in the modelling of the ocean circulation and transport will be presented through the GOCINO support action.



Sketch showing the relationship between the geoid, the Mean Dynamic Topography (MDT – the mean value of the Dynamic Topography) and the Mean Sea Surface (MSS – the mean value of the Sea Surface Height). Improved geoid models from GOCE and MSS from ENVISAT is expected to enhance the performance of operational ocean and seasonal forecasting models.

GOCE in Ocean Modelling

|| LIST OF PARTNERS

- | Danish National Space Centre, Denmark
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- | Nansen Environmental and Remote Sensing Center, Norway
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GOCINO: GOCE in Ocean Modelling
Specific Support Action
Contract no: SSA5-CT-2006-030756
Starting date: 24/05/2007
Duration: 24 months
EU contribution: € 535.800
Estimated total cost: € 535.800



GOSIS

GMES Organisational and System Integration Scenarios

II GMES GOVERNANCE

The GOSIS project provided assistance to the European Commission in preparing for operational Global Monitoring for Environment and Security (GMES). In particular, GOSIS focused on the organisational aspects of GMES, i.e. how GMES will deliver its services and infrastructure components, who should be involved, what are the relationships between players, what governance and funding sources to use.

II ASPECTS OF GMES STUDIED

- An analysis of "GMES communities" – groups of existing users of geo-information for environmental and security purposes who could benefit from GMES services and infrastructure, such as the oceans, land, civil protection, and humanitarian aid and security communities;
- An examination of a wide range of potential governance structures for GMES;
- Investigation of a range of related communities such as meteorology and related initiatives and programmes (e.g. INSPIRE, EIONET);
- Development of a generic value chain for GMES information services and mapping of the GMES fast-track projects;
- Introduction and discussion about a system of systems engineering approach, with the phased integration of new and legacy systems at European and Member State level.
- A legal study to provide more insight into GMES institutional and scoping scenarios, particularly in the context of satellite data;
- The development of three possible governance models based on the balance of functions between the different key organisations involved in GMES.

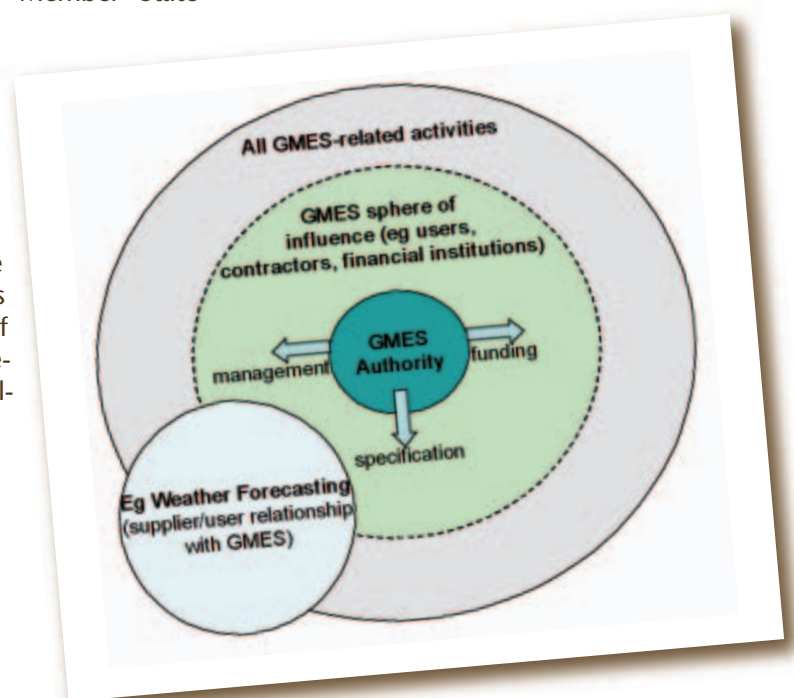
II THREE MODELS FOR GMES GOVERNANCE

After consideration of a wide range of options, the project has presented three potential models for GMES, in particular looking at the role of a central GMES management body - the GMES Authority - and its interfaces and integration with other key players in the GMES domain. The models all acknowledge the need to integrate new and legacy systems and work with a range of user and provider organisations in Europe.

In the Centralised Model the GMES Authority effectively becomes synonymous with GMES itself. The key assumptions in this model are that the GMES Authority manages all GMES funds and as such has overall political, managerial and technical responsibility for the programme.

The Current Competences Model sees the GMES Authority working in partnership and networking with a large range of supplier and user organisations.

In the Services Centric Model the GMES Authority is primarily a coordination body between a number of baseline service providers. The main funding, managerial and technical roles are channelled through the service organisations.



GMES Organisational and System Integration Scenarios

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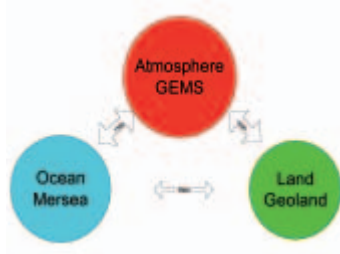
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II PROJECT INFORMATION

GOSIS: GMES Organisational and System Integration Scenarios
Specific Support Action
Contract no: SSA3-CT-2003-502891
Starting date: 18/02/2004
Duration: 24 months
EU contribution: € 398.935
Estimated total cost: € 398.935



HALO Global Monitoring for ENVIRONMENT & SECURITY



Harmonised coordination of Atmosphere, Land, and Ocean integrated projects of the GMES backbone

II HELPING TO ACHIEVE OPERATIONAL GMES

The aim of the HALO project was to support three service lines for Global Monitoring for Environment and Security - ocean, land and atmosphere monitoring - in their transition from research to operational status.

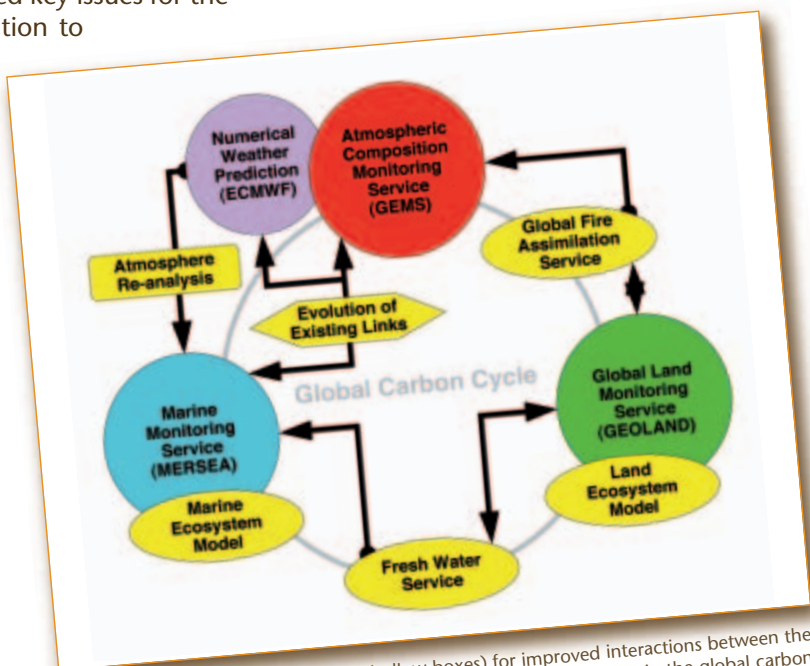
Effective coordination and management of the transition of the three systems poses technical, scientific and management challenges. The technical challenges concern identification of the nature, volume and transport mechanisms of the data exchanges needed between the core services. The scientific challenges concern identification of the likely path of service evolution for the interacting parts of the individual services/projects, together with identification of emerging needs for modelling/assimilation capabilities, and emerging needs for observations.

The objective of the HALO was to optimise the efficiency of the interactions of the global ocean, land, and atmosphere monitoring systems by formulating agreed recommendations to the projects and to the GMES Steering group.

II MAIN RECOMMENDATIONS

HALO provided an efficient and manageable forum for discussions and coordination among three integrated projects: MERSEA, GEOLAND and GEMS. Their coordinators and industrial experts from HALO identified key issues for the interaction and joint transition to the operational status. They agreed on the following recommendations:

- I As implied by the INSPIRE directive, the provision of an Information System based on Internet technology should be addressed.
- I A global fire assimilation capability should be established to supply the atmosphere and land monitoring services with adequate products describing the biomass burning emissions into the atmosphere and the associated changes in carbon stock and land cover.
- I The scientific development of ecosystem models that include the carbon cycle explicitly should be encouraged in the marine and land monitoring services.
- I A fresh water monitoring capability should be established to provide the ocean and land monitoring services with adequate products describing, amongst others, soil moisture, river run-off, and fertiliser transport.
- I A new atmosphere re-analysis should be facilitated in support of the ocean re-analysis that will be produced by the marine fast track service.
- I The marine and atmosphere monitoring systems should be encouraged to maintain close scientific and operational contacts with existing numerical weather prediction services so as to coordinate and further develop the multitude of interfaces already implemented between the pre-operational and operational schemes.



HALO scientific recommendations (yellow boxes) for improved interactions between the GMES global monitoring services: Grey lines represent interactions in the global carbon cycle. Black arrows represent further key interactions.

Harmonised coordination of Atmosphere, Land, and Ocean integrated projects of the GMES backbone

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Specific Support Action
Contract no: SSA3-CT-2003-502869
Starting date: 01/02/2004
Duration: 36 months
EU contribution: € 900.000
Estimated total cost: € 1.039.800



HAWKEYE

Global Monitoring for ENVIRONMENT & SECURITY



II IMPROVED SURVEILLANCE TECHNOLOGIES IN SUPPORT OF SECURITY

HAWKEYE represents a consortium of eight organisations working on a research program to evaluate the benefits of Thermal Infra Red Hyper Spectral Imaging (TIHSI) technologies, as remote sensing units integrated into surveillance systems for the detection of clandestine weapon development or activities putting at risk civil security.

Five SMEs specialised in the development, use and processing of hyper spectral data are implementing ground and airborne experiments, building and using a prototype sensor unit which is able to detect traces of gases or solid materials typical of clandestine activities. The need to detect a new spectrum of chemical species makes it necessary to adapt the existing technology, originally developed by ATIS, both in terms of hardware and software.

II MAIN ACHIEVEMENTS

- I Identification of potential applications of the developed technology for non-proliferation enforcement and homeland security.
- I List of scenarios and detectable products established and discussed with external experts through the advisory board.

Thermal Infra Red Hyperspectral sensing
assistance to clandestine weapon surveillance
linking airborne or space borne systems

- I Development of methods for validating and extrapolating the results including the validation of a simulator.
- I Performance assessment of existing and new algorithms.
- I Construction of a spectral data base.
- I Improvement of the software used in signal analysis.
- I Specifications of the prototype for airborne experiments taking into account the performance requirements needed compared to the present ground based sensor.
- I Manufacture of an airborne device with improved hardware performance for the sensitivity and to adapt the device to specific constraints related to flight.
- I Preparing the prototype for test in real-life conditions.
- I Preparing flight tests.

The airborne prototype will be tested in real life conditions giving input data that will allow the consortium to validate the algorithms and give the necessary information to extrapolate the performances of the detector. On the basis of the experimental results through field and airborne experiments, a preliminary evaluation of a space borne solution will be made.



This aircraft is equipped with a TIHSI prototype for airborne tests.
Source: Onera

Thermal Infra Red Hyperspectral sensing assistance to clandestine weapon surveillance linking airborne or space borne systems

|| LIST OF PARTNERS

- | ATIS, France
- | THALES Alenia Space, France
- | Actimar, France
- | PEPITE, Belgium
- | KeyObs, Belgium
- | SpaceBel, Belgium
- | Joint Research Centre, International Organisation
- | King's College of London, UK

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HAWKEYE: Thermal Infra Red Hyperspectral sensing Assistance to clandestine weapon surveillance under Working conditions linking fixed airborne or space borne systems
Specific Targeted Research Project
Contract no: SST4-CT-2005-516168
Starting date: 01/08/2005
Duration: 36 months
EU contribution: € 971.120
Estimated total cost: € 1.809.800



HUMBOLDT Global Monitoring for ENVIRONMENT & SECURITY



II TOWARDS HARMONISATION OF SPATIAL INFORMATION IN EUROPE

The weather, rivers, preserve areas, or oceans do not care about national borders. The problems and challenges resulting from natural disasters are trans-boundary concerns. The spatial data necessary for disaster prevention and protection, however, are held in different formats and systems in different countries, making a cross-national cooperation very difficult.

The HUMBOLDT project aims to manage and advance the implementation process of a European Spatial Data Infrastructure (SDI) that integrates the diversity of spatial data available for a multitude of European organisations. Besides facilitating the harmonisation of the spatial data, HUMBOLDT endeavours the reduction of harmonisation costs by automating the necessary processes as far as possible. Harmonisation is understood as a process of transforming the available data (SDIs of the first generation) into usable data (SDIs of the upcoming second generation).

The aim of the HUMBOLDT framework is to provide tool sets of software modules plus connecting technology that can be used to build a (local or cross-border) SDI, where different organisations can share their spatial information in an effective and sustainable way without having to develop all parts of their (distributed) SDI applications from scratch. The tools and processes created will demonstrate the feasibility and advantages of an Infrastructure for Spatial Information in Europe as planned by the INSPIRE initiative, meeting the goals of Global Monitoring for Environment and Security.

Furthermore, the project fosters a broader use of geodata by overcoming the hurdles between the different domains and supporting the reuse of data without further processing. To ensure this, the developments are driven by several application scenarios within HUMBOLDT. The scenarios have been collected to cover a broad range of potential geodata applications. Therefore the scenarios cover different domains and actors, different scales, different languages, and cultures.

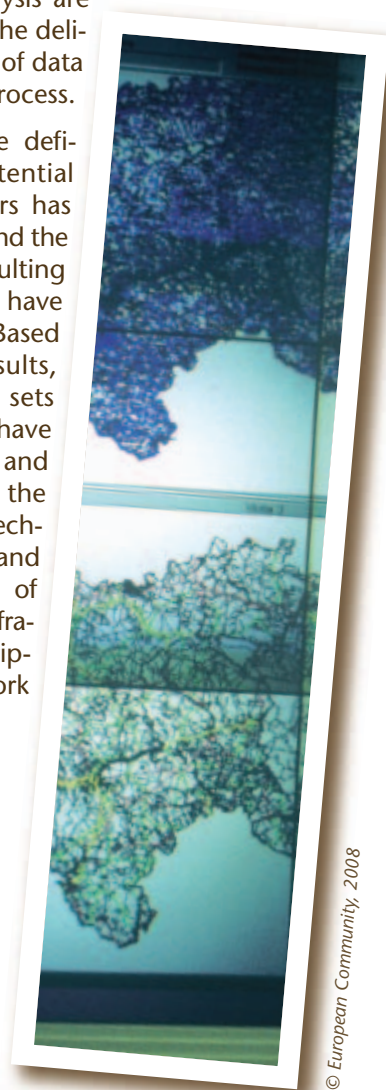
Development of a Framework for Data Harmonisation and Service Integration

II FROM STATE-OF-THE-ART ANALYSIS TO IDENTIFYING TOOL SETS

HUMBOLDT commenced with a comprehensive state of the art analysis on related themes for it is the aim of this project to base on the existing know-how within and even outside the geo-information community. Methods and tools for geodata and metadata management were investigated and evaluated in order to facilitate the re-use of existing concepts, processes, implementations, and experiences. In the course of this initial phase, the first deliverable of major importance, the Handbook of Standards, was established. It provides a comprehensive overview of existing concepts, which will be incorporated in the HUMBOLDT framework.

The next step was to undertake a process analysis, which showed the steps necessary to harmonise data and metadata. The results of this process analysis are documented in the deliverable Concept of data harmonization process.

Furthermore, the definition of potential HUMBOLDT users has been improved and the requirements resulting from this group have been selected. Based on these results, important tool sets for HUMBOLDT have been identified and used to develop the concept of a technical prototype and the first version of the HUMBOLDT framework (Description of Framework Prototype).



Development of a Framework for Data Harmonisation and Service Integration

II LIST OF PARTNERS

- Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V, Germany
- ETRA Investigacion y Desarrollo, Spain
- Help Service Remote Sensing, Czech Republic
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- Institut Geographique National, France
- Intergraph CR spol. s r.o., Czech Republic
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- INI-GraphicsNet Stiftung, Germany
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- University of the West of England, Bristol, UK
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- National Environment Research Council, UK
- Hellenic Centre for Marine Research, Greece
- Swedish Meteorological and Hydrological Institute, Sweden
- Telespazio, Italy
- Geographical Information Systems International Group, Italy
- Consiglio Nazionale delle Ricerche, Italy
- Forest Management Institute, Czech Republic
- Instituto Geografico Portuges, Portugal
- Collecte Localisation Satellites, France
- University of Gävle, Sweden
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HUMBOLDT: Development of a Framework for Data Harmonisation and Service Integration
Integrated Project
Contract No: SIP5-CT-2006-030962
Starting date: 01/10/2006
Duration: 48 months
EU Contribution: € 7.927.631
Estimated total cost: € 13.477.445.95

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II MODELLING SYSTEMS FOR COASTAL MANAGEMENT

INSEA focuses on the development of integrated tools for coastal eutrophication assessment combining models, satellite remote sensing and in-situ measurements, capable to act as supporting tools for management and policies implementation.

INSEA will provide to users, in particular to local decision makers, valuable information for assessing coastal eutrophication problems. The data delivery system behind INSEA will be supported by state of the art numerical tools, for simulating the complexity associated with these ecosystems, and the most recent information technology tools for supporting data delivery and storage.

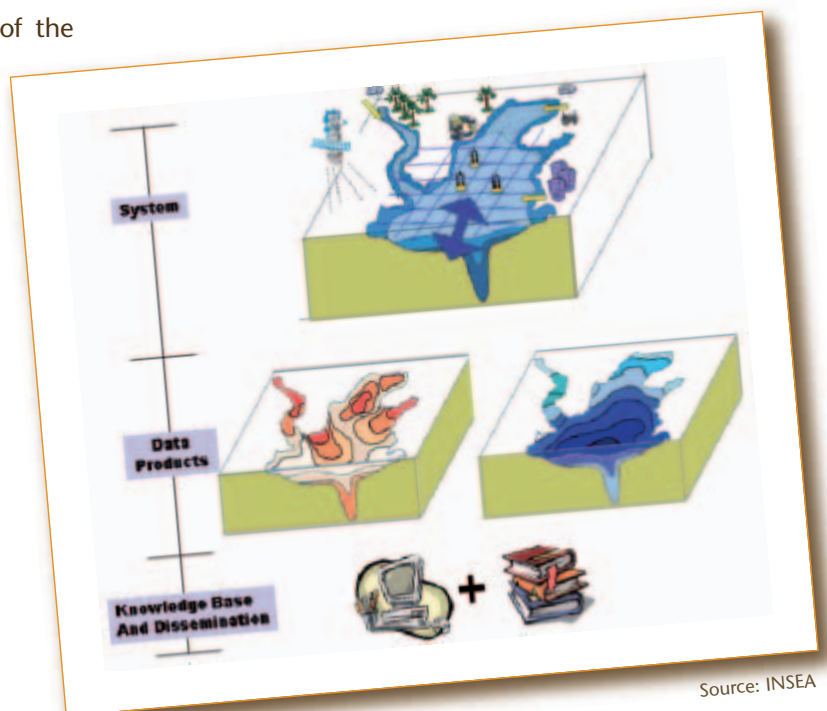
II INSEA SPECIFIC OBJECTIVES

- Downscaling physics from global to regional models and assimilating remote sensing data.
- Improve and develop new tools for real-time in situ measurements.
- Improve and develop new tools for processing and using remote sensing data.
- Improve and validate the ecological models of the areas under investigation, with a special emphasis on eutrophication related parameters.
- Demonstrate the potential of the combination of Earth Observation data, numerical modelling and in-situ data for assessing eutrophication in coastal areas.
- Explore the forecasting capabilities of the modelling system.

INSEA aims at setting-up and validating numerically robust ecological modelling systems in order to describe biogeochemical cycling of carbon and nutrients occurring under different hydrographical and trophic regimes, and to explore the system capabilities in a forecast mode to support coastal zone management issues.

As supported by the Global Monitoring for Environment and Security initiative, environmental services must use those data sources that best meet user needs; in most cases this means that EO data, in-situ data and models must be used together to establish an integrated decision-support capability that is of practical use for policy and decision makers.

The EU Water Framework Directive states that the results of the systems operated by each Member State shall be expressed as ecological quality ratios for the purposes of classification of ecological status. These ratios shall represent the relationship between the value of the biological parameters observed for a given body of surface water and the value for these parameters in the reference conditions applicable to that body. INSEA supports this objective which is translated through the development of methodologies to downscale physics from large scale data systems to regional models.



Data Integration System for Eutrophication Assessment in Coastal Waters

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INSEA: Data Integration System for Eutrophication Assessment in Coastal Waters
Specific Targeted Research Project
Contract no: SST4-CT-2005-012336
Starting date: 01/01/2006
Duration: 36 months
EU Contribution: € 1.383.371
Estimated total cost: € 2.528.443



INTEGRAL

Global Monitoring for ENVIRONMENT & SECURITY

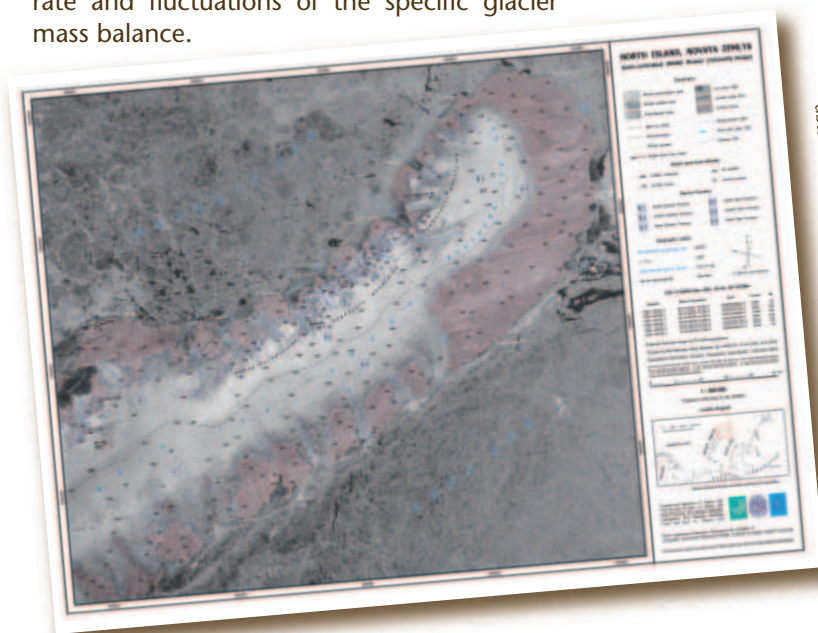


II STUDYING GLACIER CHANGES

The INTEGRAL project dealt with spaceborne interferometric surveys and change analyses of the largest European glaciers. The general objective was to promote an advanced observation technology for the unsupervised detection, precise measurement and variational analysis of ice motion and deformation on large European glaciers. The central idea was to enhance the detail, accuracy and versatility of glacier interferometric models without involving complex process artifices and to demonstrate new utilities of differential radar interferometry to operational users working with SAR data from post-operational, operational and upcoming systems.

The INTEGRAL project focused on methodological aspects and empirical issues of glacier interferometry and major attention was paid to:

- design of enhanced algorithms and program tools for processing and fusing SAR interferograms, both air - and spaceborne, with radar altimetry data aimed at precise geocoding and upgrading the information content of glacier rheological models;
- practical application of phase-gradient, offset-tracking, transferential and combined interferometric techniques to the detection and interpretation of glacier activity, numerical modelling of the glacier regime, and assessment of main tendencies in the state of land ice resources in response to climate change;
- production, demonstration and implementation of the series of interferometric "snapshots" and value-added products showing the ice-surface velocity structure, glacier strain rate and fluctuations of the specific glacier mass balance.



Main Ice Sheet, Novaya Zemlya - ERS-1/2 SAR image map (produced by Ioannem Research, 2006).

Interferometric Evaluation of Glacier Rheology and Alterations

II BETTER UNDERSTANDING OF ICE FIELDS THROUGH SATELLITE INTERFEROMETRY

Spaceborne INSAR and altimetry data, both lidar and radar, were successfully used for studying glacier regime. Frontal velocities of 41 tidewater glaciers in the European High Arctic were precisely measured in laboratory for the first time in the history of their explorations.

Three ice caps and four outlet / valley glaciers were surveyed during the field campaigns using airborne systems and precise geodetic equipment. The existence of floating glacier parts have been proved and certain evidence on the surging character of ice flow at several glaciers was gained. It was concluded that the combination of satellite interferometry and altimetry offers a particularly efficient tool for conducting glaciological studies in Polar Regions and might substantially contribute to the maintenance of global environment observation systems.

The project results were discussed at 24 international congresses, conferences and workshops. The consortium published 35 scientific papers and produced a new series of 24 image-based maps representing glacier changes in the study regions. A new course of lectures on "Satellite rheology of ice fields" was prepared and given to students at the Helsinki University of Technology in Finland. Main output products can be accessed at the project homepage. Some of them were made also available in the regional reference database REGARD (<http://www.legos.obs-mip.fr/fr/equipes/glacio/integral.html>).

Interferometric Evaluation of Glacier Rheology and Alterations

II LIST OF PARTNERS

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- I GAMMA Remote Sensing Research and Consulting AG, Switzerland
- I Environmental Earth Observation Information Technology GmbH, Austria
- I Norwegian Polar Institute, Norway
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INTEGRAL: Interferometric Evaluation of Glacier Rheology and Alterations
Specific Targeted Research Project
Contract no: SST3-CT-2003-502845
Starting date: 01/04/2004
Duration: 39 months
EU Contribution: € 1.120.000
Estimated total cost: € 2.190.000



LIMES Global Monitoring for ENVIRONMENT & SECURITY



Land and Sea Integrated Monitoring
for Environment and Security

II DEVELOPING SERVICES IN SUPPORT OF SECURITY APPLICATIONS

The LIMES project supports the Global Monitoring for Environment and Security initiative by providing expertise and developing services for security applications, applying innovative solutions based on Earth observation technology and on its integration with satellite telecommunication and navigation capacities where relevant.

The applications mainly concern maritime surveillance, land border management, surveillance of critical infrastructure, Non Proliferation Treaty monitoring and support to humanitarian missions. The LIMES project has the following main objectives:

- I Define, develop and validate a pre-operational set of services to support security management at EU scale adding value to the present information chains in the field of security. The services will exploit the full capabilities of satellite and in-situ technologies.
- I Close the research gaps in terms of information tools to improve the use of Earth observation and other space technologies for security applications, by enabling decision support tools and developing a platform for the provision of the services.
- I Set up a framework for cooperation between Member States and EU bodies, in order to develop common operational procedures to improve access, archiving, exchange and processing of information according to secure access policies.

Developments are in progress and demonstrations of pre-operational services are foreseen in the following three clusters.

II MARITIME SURVEILLANCE

Services are developed in collaboration with coast guards, customs and FRONTEX for:

- I Coastal and open-water surveillance, including surveillance of maritime border and over the Exclusive Economic Zone of the EU. The test areas are: North and Baltic seas, Atlantic approaches to the EU and the Mediterranean Sea.
- I Sensitive cargo surveillance (e.g. cargoes containing hazardous material, fuel, weapons, precious goods, etc.) at EU level. Services will be tested in the Mediterranean Sea.
- I Area surveillance outside the EU including non-EU coasts and sensitive hot spots.

II LAND AND INFRASTRUCTURE SURVEILLANCE

- I For land border management, services are developed in collaboration with FRONTEX and relevant border guards. The test areas are situated along the Eastern EU land borders.
- I For critical infrastructure surveillance, a set of services is being developed in Spain for gasification plants and pipeline in collaboration with ENAGAS, future developments include port security. Services are also supporting event planning (Zaragoza expo).
- I In support of Non Proliferation Treaty (NPT) monitoring, the objective is to improve information products to respond to the needs of users such as the International Atomic Energy Agency.

II HUMANITARIAN RELIEF AND RECONSTRUCTION SUPPORT

In this domain, the main users are civil protection agencies, NGOs active in the humanitarian aid sector, the Red Cross family and UN Agencies.

- I The information services support aid planning, resource allocation (food, water, infrastructure, etc) and population monitoring. Information products will be provided for actions in Yemen, Nigeria and Darfur.
- I For emergencies and crisis management, the fast provision of updated geospatial information is foreseen combined with the appropriate use of emergency satellite communication and navigation mobile systems.



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II LIST OF PARTNERS

- | Telespazio S.p.A., Italy
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- | Deutsches Zentrum für Luft- und Raumfahrt e.V., Germany
- | Thales Alenia Space Italy, Italy
- | Thales Alenia Space France, France
- | GMV S.A., Spain
- | QinetiQ Ltd, UK
- | Astrium SAS, France
- | Istituto Affari Internazionali, Italy
- | Kongsberg Satellite Service AS, Norway
- | THALES Communication SA, France
- | D'Appolonia, Italy
- | Definiens, Germany
- | GAF AG, Germany
- | Infoterra Ltd, UK
- | Norwegian Defence Research Establishment, Norway
- | Joanneum Research Forschungsgesellschaft m.b.H, Austria
- | Paris Lodron Universität Salzburg ZGIS, Austria
- | Université Louis Pasteur Strasbourg I, France
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- | University of Rome “La Sapienza”, Italy
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- | Università degli Studi di Trento, Italy
- | Universitat Politècnica de Catalunya, Spain
- | Hellenic Coast Guard, Greece
- | Centre for Research & Technology - Hellenic Institute of Transport, Greece
- | Spot Image S.A., France
- | Coastal and Marine Resource Centre, University College Cork, Ireland
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- | ATOS Origin Sociedad Anonima Española, Spain
- | Technische Universität Bergakademie Freiberg, Germany
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II PROJECT INFORMATION

LIMES: Land and Sea Integrated Monitoring for European Security Integrated Project
Contract no: SIP5-CT-2006-031046
Starting date: 01/12/2006
Duration: 42 months
EU Contribution: € 11.980.000
Estimated total cost: € 21.248.000

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MERSEA Global Monitoring for ENVIRONMENT & SECURITY



Marine Environment and Security for
the European Area

II OCEAN MONITORING AND FORECASTING

The objective of MERSEA was to develop an integrated European operational system for the global monitoring and forecasting of the ocean and a coordinated network of regional systems for European waters. This system delivers now a set of basic and generic information products based on physical and bio-geochemical state variables. It provides an integrated service to intermediate users and policy makers in support of safe and efficient off-shore activities, environmental management, security and sustainable use of marine resources.

Although the services are developed primarily to fulfil the reporting, monitoring and forecasting requirements of European agencies and stakeholders, they do have a global scope. The provision of services is based on access to ocean products and information, such as long-running data sets to define the mean, fluctuations, and past trends in the state of the marine environment; to record its evolution; and, through predictions of future change, to establish baselines for effective environmental management.

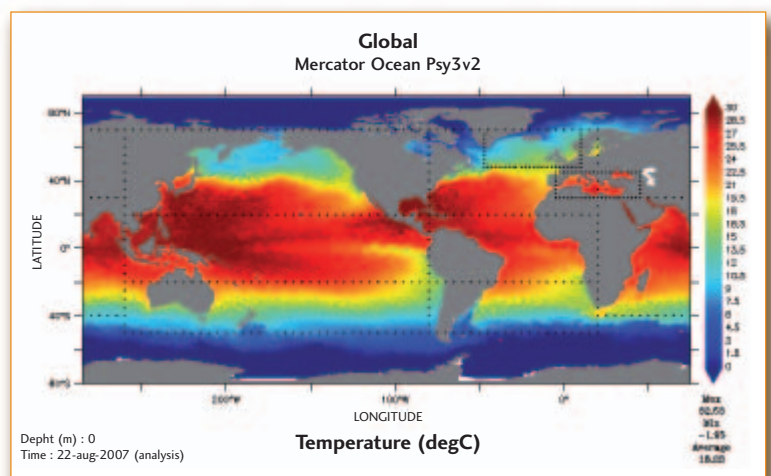
The system is a contribution to GMES, which will lead to the establishment of a Marine Core Service.

In the project, research and development were undertaken in multidisciplinary fields relevant to the system: delivery of fully validated multi-sensor data sets (satellite and in situ), information management, system design and implementation, advances in ocean circulation and marine ecosystem modelling, data assimilation, development of user products. Particular attention is paid to the full validation of the systems from the points of view of scientific quality and skill of the forecasts, operational requirements, and fitness for the purposes of users.

II MODELLING OCEAN PHYSICS

The basic method is to merge and assimilate diverse data from space-borne sensors and in situ measurement networks into high-resolution ocean models in order to monitor the ocean physics, bio-geo-chemistry and ecosystems and to provide forecasts on prediction time scales ranging from days to months. The pre-operational system integrated in the course of the project comprises global and regional (Arctic, North-Atlantic and European shelves, Baltic, and Mediterranean) centres; Data Assembly Centres for satellite altimetry, ocean colour, sea-ice, sea-surface temperature, and forcing fields; and in situ data. Atmospheric analyses and forecasts are provided by ECMWF (European Centre for Medium Range Weather Forecasting) and National Weather Services.

The system produces regular and systematic reference information on the state of the ocean, of known quality and accuracy for the global and regional European seas. The information delivered presently covers physical ocean state variables. The number of environmental variables produced will increase over the period 2008-2013. The products include observational and model data, real time mapping and forecasting. Ocean bulletins, indicators, synthesis, and statistics are elaborated.



Sea Surface Temperature provided by a Global Ocean model which assimilates satellite (altimetry and SST) and in-situ (Argo) observations.

Copyright: Mercator-Ocean

Marine Environment and Security for the European Area

II LIST OF PARTNERS

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- I Hamburg Institut fuer Meereskunde, Germany
- I Joint Research Centre, Italy
- I BOOST Technologies, France
- I Collecte Localisation Satellites, France
- I Centre National de la Recherche Scientifique, France
- I Instituto Canario de Ciencias Marinas, Spain
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- I United Kingdom Met Office, UK
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II PROJECT INFORMATION

MERSEA: Marine Environment and Security for the European Area
Integrated Project
Contract no: SIP3-CT-2003-502885
Starting date: 01/04/2004
Duration: 48 months
EU Contribution: € 14.048.000
Estimated total cost: € 24.420.940

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MONRUK

Monitoring the marine environment in Russia, Ukraine and Kazakhstan using satellite Synthetic Aperture Radar

II ENVIRONMENTAL MONITORING OF THE CASPIAN SEA, THE BLACK SEA AND THE BARENTS SEA

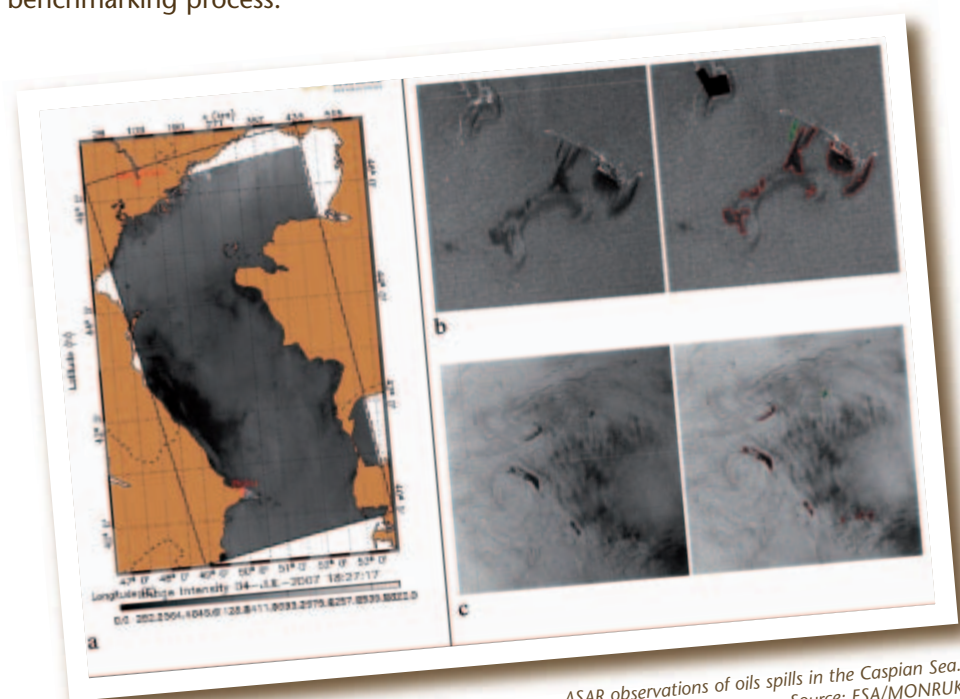
The overall objective of MONRUK is to develop and implement satellite Synthetic Aperture Radar (SAR) monitoring of the marine environment in Russia, Ukraine and Kazakhstan (the RUK area) as a component of the Global Monitoring for Environment and Security (GMES).

Satellite SAR images for the study areas in the Black Sea, the Caspian Sea and the Barents/Kara Sea are collected to develop and validate retrieval algorithms for ocean and sea ice parameters. The SAR data are mainly collected from ENVISAT ASAR and will be analysed in combination with optical and infrared satellite data, met-ocean data from models and in-situ observations from an offshore platforms. The main tools in the SAR analysis will be the Radar Imaging Model (RIM) and the Atmospheric Boundary Layer (ABL) model provided by NIERSC and the SARTool provided by BOOST Technologies. These tools will be further developed and validated in order to retrieve more quantifiable parameters from SAR. The performance of existing algorithms for retrieval of oil slicks, wind, waves, and sea ice parameters will be investigated as part of a benchmarking process.

SAR monitoring exercises will be conducted in the three study areas with support from other met-ocean and satellite data. The data analysis will result in geophysical information (wind, waves, currents, fronts, slicks, sea ice parameters). Identified users will receive and assess the information and provide feedback to the service providers. MONRUK will develop and implement a web map server system for the distribution of data to users. The monitoring exercise will test the functioning of the service chain starting with input data and resulting in products delivered to users. The lessons learned from this exercise will be used to develop fully operational systems for SAR monitoring in the context of GMES.

II OIL SPILL DETECTION IN THE CASPIAN SEA

The ASAR wide swath image from 4 July 2007 covers most of the Caspian Sea (a), and two examples of slicks are extracted from this image by use of the SARTool software provided by BOOST Technologies. The example in (b) shows a real oil spill event where the area of the spill is marked by red in the image to the right. The example in (c) shows several small slicks which can be natural slicks or real oil spills.



ASAR observations of oil spills in the Caspian Sea.
Source: ESA/MONRUK

Monitoring the marine environment in Russia, Ukraine and Kazakhstan using satellite Synthetic Aperture Radar

|| LIST OF PARTNERS

- | Nansen Environmental and Remote Sensing Center, Norway
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- | BOOST Technologies, France
- | Nansen International Environmental and Remote Sensing Center, Russia
- | Federal State Unitary Enterprise "Russian Institute of Space Device Engineering", Russia
- | Marine Hydrophysical Institute of the Ukrainian National Academy of Sciences, Ukraine
- | Center of Astrophysical Research, Ministry of Education and Science of Republic of Kazakhstan, Kazakhstan
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|| PROJECT INFORMATION

MONRUK: Monitoring the marine environment in Russia, Ukraine and Kazakhstan using satellite Synthetic Aperture Radar
Specific Targeted Research Project
Contract no: SST5-CT-2006-031001
Starting date: 01/07/2007
Duration: 24 months
EU Contribution: € 632.314
Estimated total cost: € 1.044.228



MOTIIVE Global Monitoring for ENVIRONMENT & SECURITY



Marine Overlays on Topography for Annex II Valuation and Exploitation

II OPEN STANDARDS TOOLS FOR COASTAL DATA

The marine domain is a large application area for space-based earth observation (EO) applications and the political interest in realising operational oceanography systems is a major driver. Operational oceanography and the capacity for global marine and coastal observation are reliant on the effective exchange of data and information between scientists, engineers and ultimately environmental managers. However, EO data have a number of limitations, which make their use in practice difficult.

MOTIIVE supports the development of the European Commission's INSPIRE Directive (Infrastructure for Spatial Information in Europe) and of the Global Monitoring for Environment and Security by demonstrating how interoperability technology, using international open standards, aids in integrating multiple data sources from multiple disciplines.

The INSPIRE Directive contains a set of harmonised core spatial data - described in 'Annex I' of the document - and thematic data - listed in Annex 'II'. MOTIIVE addresses the harmonisation requirements between the INSPIRE thematic data component 'Elevation', comprising terrestrial, bathymetric and coastal elevation data; and marine and coastal thematic data for 'sea regions', 'oceanic spatial features' and 'coastal zone management areas'. Non-proprietary spatial data standards and interoperability tools as defined by Open Geospatial Consortium (OGC) and International Organization for Standardization (ISO) are expected to help promote data integration at lower cost.

II RAISING AWARENESS ON DATA HARMONISATION

MOTIIVE has demonstrated open standards in the deployment of real services required by the coastal community on open source technology platforms. The project communicated with three main groups of users:

- coastal and marine user communities;
- satellite and information communities acting as intermediaries capable of addressing large communities; and
- data standards communities – the providers of services.

MOTIIVE deliverables include a global marine ontology, marine data model, a feature catalogue, and a business case to create an OGC Working Group to formalize the results of the project on completion. During the life of MOTIIVE, the project staff has also participated in the OGC Working Groups that focus on earth observation data, metadata, and natural resources and environment data. The project has also engaged in activities aimed at raising awareness on the benefits of data harmonisation across different themes and promoting, within the coastal user community, the data harmonisation objectives of INSPIRE.



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Marine Overlays on Topography for Annex II Valuation and Exploitation

|| LIST OF PARTNERS

- | HR Wallingford, UK
- | ARGOSS b.v., The Netherlands
- | Council for the Central Laboratory of the Research Councils - CCLRC, UK
- | University of Edinburgh - EDINA, UK
- | The Coastal Union - EUCC, The Netherlands
- | IDG (UK) Ltd, UK
- | Nansen Environmental and Remote Sensing Centre - NERSC, Norway
- | Social Change Online Ltd, UK
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|| PROJECT INFORMATION

MOTIIVE: Marine Overlays on Topography for Annex II Valuation and Exploitation
Specific Support Action
Contract no: SSA4-CT-2005-012337
Starting date: 01/09/2005
Duration: 24 months
EU contribution: € 760.190
Estimated total cost: € 760.190



Global Monitoring for ENVIRONMENT & SECURITY

NAVOBS

NAVOBS

A support measure to boost the business prospects of GMES and Telecom satellites through innovative RTD work involving SMEs

II SUPPORTING THE PARTICIPATION OF SMEs IN RESEARCH PROJECTS

The NAVOBS project aimed at enhancing the participation of SMEs in research and development projects related to Global Monitoring for Environment and Security (GMES) and satellite telecommunication (SATCOM).

The NAVOBS consortium consisted of 19 organisations, most of them belonging to ESINET, the European Network of Space Incubators, which joined to implement four objectives:

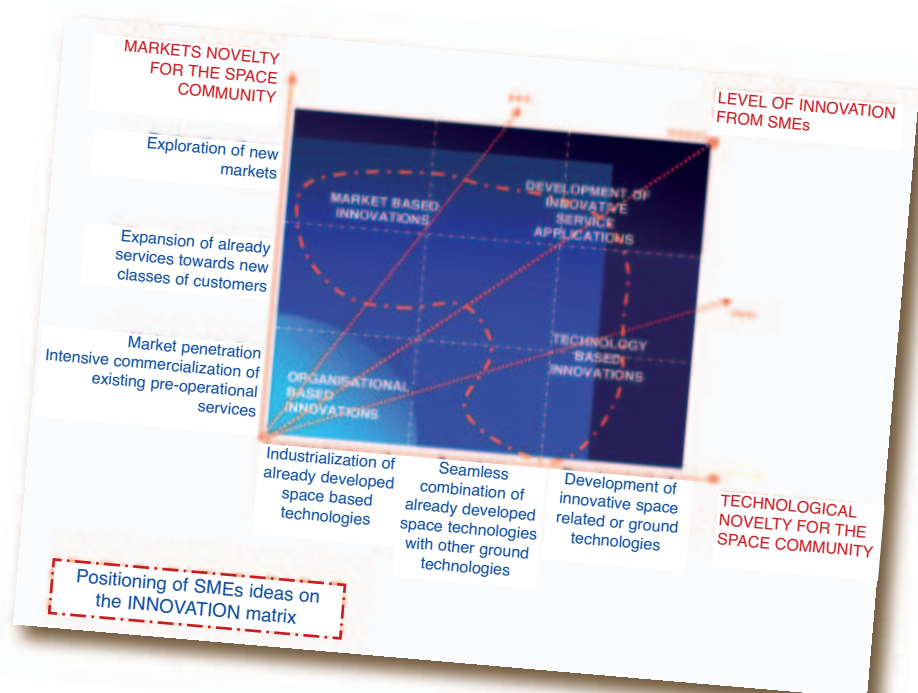
- an assessment of SMEs' research needs for development of new and innovative services using satellite generated data or transmission capabilities;
- the identification of research and technological development (RTD) projects prepared by large industrial organisations, where there was a need for SMEs' expertise;
- selection of the most promising projects proposed by SMEs with the support of an advisory group;
- support proposal building using SMEs' ideas as part of an Integrated Project or as a full collaborative research proposal.

The NAVOBS work led to a noticeable increase of SME participation in RTD proposals:

- A community of more than 150 SMEs, active in the development of service related to satellite telecommunication, earth observation and navigation facilities, has been created under the NAVOBS project;
- 54 SMEs were integrated into RTD projects consortia;
- NAVOBS has developed and used networking tools making the web based NAVOBS Platform the market place for SMEs being GMES or SATCOM service providers or end-users;
- Regional incubators turned out to be key in acting as 'Innovation Catalysers': they supported SMEs in building competitive business models for the development of innovative GMES or SATCOM services, while providing ad-hoc awareness workshop at regional and international levels.

II SMEs AS A SOURCE OF INNOVATIVE APPLICATION

The 150 SMEs registered within the NAVOBS data base provide a broad and comprehensive mix of skills. A large majority of them have business activities in non-space related businesses. They thus bring innovative application ideas from outside the space sector, as shown on the diagram:



Global Monitoring for NAVBOBS ENVIRONMENT & SECURITY

A support measure to boost the business prospects of GMES and Telecom satellites through innovative RTD work involving SMEs

II LIST OF PARTNERS

- I Wallonia Space Logistics, Belgium
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- I T4TECH S.r.l., Italy
- I TECHNOFI, France
- I European Community Business and Innovation Centre of Attika, Greece
- I Birmingham Technology Limited, UK
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- I Polspace Sp., Poland
- I Centre de Recherche Public Henri Tudor, Luxembourg
- I Yuzhnoye State Design Office, Ukraine
- I WISTA management GmbH, Germany
- I EADS ASTRIUM SAS, France
- I ALCATEL ETCA S.A., Belgium
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II PROJECT INFORMATION

NAVBOBS: A support measure to boost the business prospects of GMES and Telecom satellites through focused and innovative RTD work involving SMEs
Specific Support Action
Contract no: SSA3-CT-2003-502903
Starting date: 01/11/2003
Duration: 24 months
EU contribution: € 736.220
Estimated total costs: € 1.060.890



NAVOSBS PLUS

Global Monitoring for ENVIRONMENT & SECURITY



Expanding the existing NAVOSBS network of GMES users to help SMEs become more competitive

II PROVIDING SUPPORT TO SMES

The NAVOSBSPLUS project aims to improve the participation of small and medium-sized enterprises in research and technological development (RTD) activities related to innovative services based on Global Monitoring for Environment and Security (GMES).

Coordinated by the European Business & Innovation Centre Network (EBN) the NAVOSBS PLUS project is an initiative of the European Space Incubator Network (ESINET). NAVOSBS PLUS objectives include:

- Detect new regional SME service providers ready to use GMES core services to meet regional market demands;
- Convince more customers to become clients of SME service providers;
- Bundle existing or future geo-information services to reach new clients with more competitive services in EU and beyond;
- Cross fertilize expertise gained from pioneering regional markets initiated by SMEs in order to extend the market penetration towards other customers;
- Stimulate the development of innovative technologies for the new generation of space systems.

NAVOSBSPLUS will help stakeholders to:

- Get access to a large number of innovative SMEs and regional institutions, build partnerships and enter new markets;
- Link with major GMES players;
- Detect opportunities to participate in EC-financed RTD proposals;
- Acquire technological and marketing expertise in GMES market development.

II ACTIVE NETWORKING

The NAVOSBSPLUS partners have boosted the participation of SMEs in RTD proposals and are helping them in responding to future calls. In 2007, the main activities included:

- various lobbying actions toward project leaders with more than 55 SME profiles being proposed to project leaders and about 10 selected as part of consortia;
- 30 Meetings have taken place with potential end-users to discuss the added value of the GMES services;
- 20 local public authorities have been consulted to assess their needs;
- 10 Regional workshops have been organised in partner regions gathering SMEs and GMES users, with a special focus on public authorities.

The NAVOSBS PLUS database is online at www.navosbs.com with SMEs and end-users profiles.



Source: EBN

Global Monitoring for NAVBOBS PLUS ENVIRONMENT & SECURITY

Expanding the existing NAVOBS network of GMES users to help SMEs become more competitive

II LIST OF PARTNERS

- I European Business & Innovation Centre Network (EBN), Belgium
- I Capital High Tech, France
- I Technofi, France
- I D'Appolonia, Italy
- I ControlWare, Belgium
- I Spacebel, Belgium
- I Wallonia Space Logistics, Belgium
- I Polspace, Poland
- I Centre de Recherche Public Henri Tudor, Luxemburg
- I BIC Lazio, Italy
- I SRI-BAS, Bulgaria
- I BIC Attika, Greece
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II PROJECT INFORMATION

NAVOBS PLUS: Expanding the existing NAVOBS network of GMES users in order to factor out common needs and to instigate economies of scale in service delivery which will help SMEs (GMES service providers or customers) become more competitive
Specific Support Action
Contract no: SSA5-CT-2006-030980
Starting date: 01/01/2007
Duration: 24 months
EU contribution: € 845.700
Estimated total cost: € 1.073.590



PEARL

Port Environmental information
collector

II SPACE DATA FOR PORT MANAGEMENT

The primary objective of PEARL is the development of a Port Environmental Management System Platform capable of optimal exploitation of space and in situ data products and models.

PEARL aims at providing, for the first time, a tailor made platform focusing on ports and their environmental problems for user friendly access to in situ and space data, models, and means for their efficient combination.

To attain the overall objective, PEARL has set out the following aims:

- Acquire a good understanding of environmental needs of various port authorities;
- Review existing space data products, services, and in situ sensors; and select the most relevant ones for port authorities;
- Achieve the operational use of space data in the port sector;
- Consider existing environmental in situ sensors for the use in the port areas;
- Achieve an effective integration of space and in-situ data and models to provide the most relevant information for ports;
- Develop an integrated effective platform, capable of ingesting future data products and models;
- Provide the port environmental manager with a user friendly tool for accessing and interpreting all relevant information;
- Achieve a good degree of market integration of the service.

PEARL will also seek to exploit synergies with other EU research initiatives, and will educate the user community on the information available from space and in-situ instruments.

II DEVELOPMENT OF SERVICES

So far, the PEARL project has provided an overview of the port sector market and of the requirements for marine environmental data. PEARL has also reviewed the existing space data products and services, models and in situ sensors used in ports and other sectors, and selected the most relevant ones suitable for the port authorities. The in situ sensors considered were those typically available at harbours, as well as new and forthcoming sensors for physical oceanography and pollution monitoring. Regarding space data, sources as ESA, NOAA, PODAAC, ORBIMAGE, AVISO, SSMI and model sources like ECMWF, MERSEA, and local meteorological model outputs were considered.

PEARL services will enable port authorities to access earth observation based information efficiently with respect to pollution. Oil and other types of marine pollutants could be monitored through the system. This will lead to improved enforcement for a cleaner marine environment.



Port Environmental infoRmation collector

II LIST OF PARTNERS

- I Atos Origin, Spain
- I BOOST Technologies, France
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PEARL: Port Environmental infoRmation collector
Specific Targeted Research Project
Contract no: SST4-CT-2005-012290
Starting date: 01/01/2006
Duration: 36 months
EU contribution: € 890.000
Estimated total cost: € 1.717.700





II GEO-INFORMATION SERVICES FOR RISK MANAGEMENT

PREVIEW aims at providing new or enhanced information services for risk management on a European scale. The PREVIEW consortium gathers 58 partners from 15 countries with key representatives from the area of risk management: research centres, universities, meteorological institutes, industrial companies and users, mainly the civil protection bodies from Member States.

In supporting regional, national and European civil protection units, PREVIEW draws on the most advanced research and technological developments using satellite observation in combination with other data and scientific models, that will help to better prevent, anticipate and manage different types of disasters, such as floods, forest fires, windstorms, earthquakes, landslides and man-made disasters. Specific examples include:

- New early warning systems to better anticipate short-term risk - for instance, floods and landslides;
- Crisis support services to allow more effective rescue operations, e.g. fire monitoring and rapid mapping;
- Building 'risk maps' for different types of hazards, in order to improve prevention and preparedness measures.

Users are actively participating to define services at the local level on the test sites and to enable a better harmonisation at the European level through the Eurorisk User Group (network of European users in the risk domain).

II CIVIL PROTECTION IN THE EURO-MEDITERRANEAN REGION: MED2007 EXERCISE, AIX-EN-PROVENCE, FRANCE, 27-29 MARCH 2007

The European Union is financing a Euro-Med Bridge Programme in the field of civil protection within the framework of its external cooperation. The main objective is to contribute to political and security confidence-building in the Euro-Mediterranean area as well as to further promote and support the establishment of a Euro-Mediterranean system of Civil Protection.

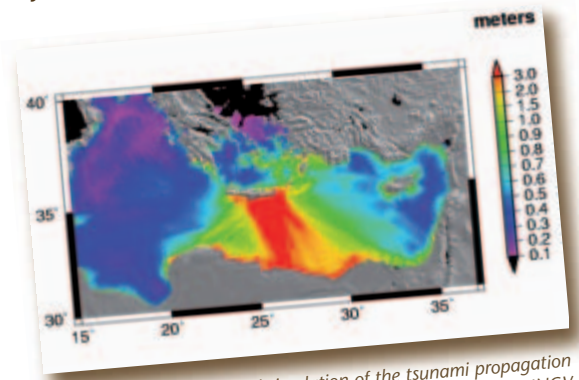
The purpose of the MED2007 Exercise was to activate National Operational Centres of all 10 Mediterranean States, 27 EU Member States

PREVENTION, INFORMATION and EARLY WARNING pre-operational services to support the management of risks

and the MIC (Monitoring and Information Centre) in order to test their reactivity and the efficiency of the Euro-Mediterranean Civil Protection coordination, in particular as regards the actions of the relief teams of the international assistance on the Mediterranean basin.

II TSUNAMI SIMULATION MODEL

PREVIEW has contributed to MED2007 with two models simulating an earthquake followed by a tsunami in the Mediterranean Sea.



Modelling and simulation of the tsunami propagation
Source: INGV

II DAMAGE ASSESSMENT AND ASSET MAPPING

Asset mapping products provide updated information on assets and improve the knowledge about areas prone to risks and the impact of natural and technological hazards. During the MED2007 Exercise, a large number and different kinds of asset mappings have been used to identify the areas with a high risk of tsunami.

The following asset mapping product developed by PREVIEW for the MED2007 Exercise shows the potential impact of the tsunami on the low altitude areas and the sea side areas. The flood extent of a tsunami wave on the coastal areas has been estimated through Digital Elevation Models (DEM).



Localisation of areas prone to a tsunami wave
Source: SERTIT/CNES

PREVENTION, INFORMATION and EARLY WARNING pre-operational services to support the management of risks

II LIST OF PARTNERS

- INFOTERRA France, France
- Direction de la Défense et de la Sécurité Civile – Ministère de l'Intérieur, France
- Meteo France, France
- TELESPAZIO, Italy
- Swedish Rescue Services Agency, Sweden
- Presidenza del Consiglio dei Ministri – Dipartimento della Protezione Civile, Italy
- Swedish Meteorological and Hydrological Institute, Sweden
- Met Office, UK
- European Centre for Medium range Weather Forecast, UK
- Istituto Nazionale di Geofisica e Vulcanologia, Italy
- Università di Firenze- Dipartimento di Scienze della Terra, Italy
- Joint Research Center, International Organisation
- Centre National d'Etudes Spatiales, France
- Ingeniería y Servicios Aeroespaciales, S.A., Spain
- Infoterra GmbH, Germany
- Centro di Ricerca Interuniversitario in Monitoraggio Ambientale, Italy
- Consiglio Nazionale delle Ricerche, Italy
- Advanced Computers Systems, Italy
- Agenzia Regionale Prevenzione e Ambiente dell'Emilia Romagna, Italy
- Agenzia Regionale Prevenzione e Ambiente della Liguria, Italy
- Bundesanstalt für Gewässerkunde, Germany
- Bayerisches Landesamt für Wasserwirtschaft, Germany
- Critical Software, Portugal
- Stichting Waterloopkundig Laboratorium, The Netherlands
- DEIMOS Engenharia, Portugal
- EADS Defence and Security Systems SA, France
- Deutscher Wetterdienst, Germany
- European Mediterranean Seismological Center, International Organisation
- Finnish Meteorological Institute, Finland
- Universidad de Valladolid - Remote Sensing Laboratory, Spain
- Geoapikonisis, Greece
- Geomer GmbH, Germany
- GMV S.A., Spain
- GeoSciences Consultants, France
- Universität Karlsruhe (TH), Germany
- Leibnitz Institute für Oekologische Raumentwicklung e.V, Germany
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- Bogazici University - Kandilli Observatory and Earthquake Research Institute, Turkey
- Université Joseph Fourier Grenoble 1 : Laboratoire d'étude des Transferts en Hydrologie et Environnement, France
- Meteoswiss (Federal Office for Meteorology and Climatology), Switzerland
- LANTMÄTERIET METRIA, Sweden
- Meteorologisk Institut, Norway
- National Observatory of Athens, Greece
- NOVELTIS, France
- PLANETEK, Italy
- Regione Lombardia, Italy
- Université Louis Pasteur (Service Régional de Traitement d'Images et de Télédétection), France
- Swedish Geotechnical Institute, Sweden
- TECHNOSYLVA, SL, Spain
- Universidad de Alcala de Henares (Department of Geography), Spain
- Universidad Complutense de Madrid, Spain
- Environmental Protection and Water Management Research Institute, Hungary
- Agenzia Regionale per la Protezione Ambientale del Piemonte, Italy
- United Nations Office for Project Services (UNOSAT), International Organisation
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II PROJECT INFORMATION

PREVIEW: PREVENTION, INFORMATION and EARLY WARNING pre-operational services to support the management of risks
Integrated Project
Contract no: SIP4-CT-2005-516172
Starting date: 01/04/2005
Duration: 45 months
EU contribution: € 14.334.000
Estimated total cost: € 22.911.000



RISE Global Monitoring for ENVIRONMENT & SECURITY



Reference Information Specifications
for Europe

II GMES DATA HARMONISATION

RISE addresses the issue of 'data harmonisation' in Europe, which is widely considered as a prerequisite for interoperability among spatial information systems. This will allow Europe to fulfil its objectives for INSPIRE (Infrastructure for Spatial Information in Europe) and support the development of interoperable Global Monitoring for Environment and Security (GMES) services. The project illustrates why the use of application schema based on service represents an innovative approach to many of the content and information processing challenges that the European governments are facing today.

The primary aim of RISE was to produce a methodology and guidelines for the creation of geospatial data product specifications in line with the international standards for development of application schema and data product specifications. The activity was supported by detailed user-case analysis and the development of sample Unified Modelling Language (UML) and Geography Markup Language (GML) application schemas and associated data product specifications. A web-based RISE Test Environment was also implemented to test the data product specifications and shows how harmonised data products can be generated "on-the-fly" through schema translation without the necessity to re-engineer the underlying datasets.

The RISE outputs form a valuable information resource for INSPIRE implementing rules.

II METHODOLOGY FOR DEVELOPING HARMONISED DATA PRODUCTS

The project has developed a methodology for developing harmonised data product specifications and tested it through practical cases in the fields of hydrology, land cover and elevation in Sweden and Norway. Examples of harmonised data product specifications have been produced and sample data products tested in the RISE Test Environment.

The methodology is applicable to European harmonisation initiatives and to national, regional or local needs (e.g. for cross-border river-basin scenarios). RISE has also analysed the requirements of potential stakeholders and the added value of the project results. These issues are discussed in the RISE Exploitation Guidelines and the RISE Cost Benefit Report.



Reference Information Specifications for Europe

|| LIST OF PARTNERS

- | Eurogeographics, France
- | QinetiQ – Technical Project Management, UK
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RISE: Reference Information Specifications for Europe
Specific Support Action
Contract no: SSA4-CT-2005-012141
Starting date: 01/09/2005
Duration: 24 months
EU contribution: € 1.129.000
Estimated total cost: € 1.129.000



SCHEMA Global Monitoring for ENVIRONMENT & SECURITY



II EARTH OBSERVATION DATA FOR ANALYSIS OF TSUNAMI THREATS

The SCHEMA project explores the use of earth observation techniques to elaborate a generic method helping experts in building vulnerability and hazard impact maps associated with tsunamis and disaster scenarios.

The vulnerability map creation technique takes into account the vulnerability characteristics of the systems facing a hazard (types of buildings, categories of inhabitants, etc.), of the environment (location of buildings in old areas, access conditions, etc.) and of crisis organisation which support efficient rescue operations.

The hazard scenario prepared by SCHEMA will be reviewed by end-users and stakeholders in countries recently impacted by coupled earthquake-tsunami events.

Information from the 2004 tsunami in Asia will be used for extraction of relevant vulnerability, hazard and crisis management factors, including indicators from earth observation data. After a first fine-tuning against the data from Asia, the methodology will be deployed for 5 test sites in Portugal, Morocco, France, Italy and Bulgaria. The results of the methodology will be presented within a Geographic Information System to allow interrogation of a primary database by different end-users. A more accurate picture of the spatial and temporal patterns of vulnerability should be obtained for any type of coastal areas.



SCenarios for Hazard-induced Emergencies Management

The resulting work flow will be embedded within existing hazard and exposure analysis techniques to provide risk evaluation of tsunami and related phenomena.

II SPECIFIC OBJECTIVES TO BE ACHIEVED BY SCHEMA

The project goal has been split into six sub-objectives:

- I To draw, from the recent Asian tsunami, post disaster studies, the input and output data required for hazard modelling, vulnerability / damage assessment and emergency management;
- I To specify rules that provide hazard intensity vulnerability and damage scenario descriptions to support relief managers, rescue planners and policy makers;
- I To design and develop a scenario elaboration methodology;
- I To propose tsunami-based disaster scenarios in five selected test sites;
- I To validate the generic scenario development methodology based on a review of the results obtained for the test sites;
- I To disseminate the resulting methodology through relevant workshops and by using web portals.

SCenarios for Hazard-induced Emergencies MAnagement

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- I HIDROMOD, Portugal
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- I National Observatory of Athens, Institute of Geodynamics, Greece
- I Centre Royal de Télédétection Spatiale, Morocco
- I ACRI-ST, France
- I Bulgarian Academy of Science, Space Research Institute, Bulgaria
- I Joint Research Centre, Institute for the Protection and Security of the Citizen, International Organisation
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SCHEMA: SCenarios for Hazard-induced Emergencies MAnagement
Specific Targeted Research Project
Contract no: SST5-CT-2006-030963
Starting date: 01/08/2007
Duration: 36 months
EU contribution: € 1.193.000
Estimated total cost: € 1.933.000



SEOS Global Monitoring for ENVIRONMENT & SECURITY



Science Education through Earth
Observation for High Schools

II EARTH OBSERVATION AS AN EDUCATIONAL TOOL

The aim of the SEOS project is to support the integration of earth observation and remote sensing as an element of science education in high schools encouraging the sensibility of students to their natural environment. The knowledge may concern daily weather data, long-term climatic conditions, land cover changes, marine pollution or environmental hazards and their interconnection.

The project covers many disciplines such as physics, biology, geography, mathematics and engineering, focusing on the interdisciplinary character of remote sensing. Students will combine personal observations with global perspectives, and will gain an understanding of the techniques needed for receiving and interpreting the data. The project aims to convey scientific literacy, which belongs to the key education standards.

II eLEARNING TUTORIALS

With more than 250 members, many of them university institutes, the European Association of Remote Sensing Laboratories (EARSEL), one of the project partners, has high expertise in earth observation using remote sensing techniques. Based on the research results, internet-based eLearning tutorials will be prepared on selected topics in earth observation. During the two-year project period the eLearning tutorials will be developed and tested in co-operation with several partner high schools.

Integrating earth observation with remote sensing provides a basis for further use of environmental monitoring in work life. Therefore, the tutorials will meet also the requirements for training courses for users of GMES services. The UNESCO will use the produced material for educational purpose in selected developing countries extending the benefits of this project to an even larger audience.



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Science Education through Earth Observation for High Schools

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- | United Nations Educational Scientific and Cultural Organization (UNESCO), France
- | Mediterranean Agronomic Institute of Chania (International Center for Advanced Mediterranean Agronomic Studies - CIHEAM), Greece
- | Institute for Science Networking Oldenburg GmbH, Germany
- | Ghent University, Belgium
- | Vrije Universiteit Amsterdam, The Netherlands
- | University of Aarhus, Denmark
- | Belgian Federal Science Policy Office, Belgium
- | Natural Environmental Research Council, UK
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Coordination Action
Contract no: SCA5-CT-2006-030849
Starting date: 01/08/2007
Duration: 24 months
EU contribution: € 774.900
Estimated total cost: € 774 900



Global Monitoring for ENVIRONMENT & SECURITY

VGT4Africa



Distribution of VEGETATION data in Africa through EUMETCast

BRINGING ADVANCED ENVIRONMENTAL EARTH OBSERVATION DATA TO AFRICA

The VGT4AFRICA project aimed at setting up an operational and timely distribution system of VEGETATION data from the SPOT satellites and creating high level derived products to all African countries.

The first task ('get it there') was to make the production and near-real time distribution of 10 products fully operational. The data is provided, free-of-charge, to all non-commercial users all over Africa. In order to reach out remote areas and areas lacking internet connectivity, the EUMETCast satellite telecommunication system, operated by EUMETSAT, complements the deliveries via the web and on fixed media. EUMETCast has been used in various research projects and is rapidly becoming the global GEONETCast data dissemination system.

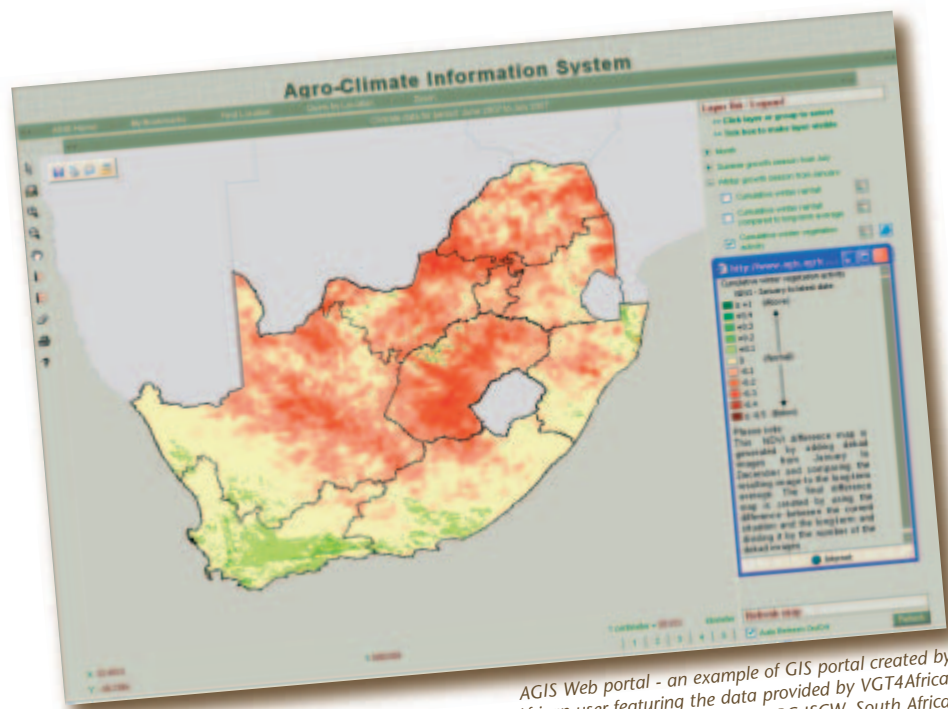
Delivering state-of-the-art environmental data on the desks of the experts in the area of earth observation in Africa has, however, not been enough. That is why the second objective of the project was to 'get the data used' in Africa. The project has achieved this by organizing 4 international training workshops, as well as several user support activities and follow-on projects.

DATA PROVIDED TO MORE THAN 100 USERS

VGT4Africa operationally produces and provides data to 11 EUMETCast receivers (other 5 in preparation), in total to over 100 users in more than 20 different countries, including international organizations like the Food and Agriculture Organization (FAO) and the World Food Programme (WFP), and 4 regional environment research and education centers. The data is now used, for example, for a GIS web portal in South Africa (see picture), food security early warning systems in the Sahel and crop monitoring and livestock research in Kenya.

FOLLOW-UP RESEARCH

VGT4Africa inspired a number of follow-on projects. Its user support and training activities will continue through an FP7 project: "GEONETCast for and by developing countries" that will extend this approach to South America and China. Certain follow-up projects focus on international cooperation and application development, like Endeleo and VGT@Work, and further pave the way for the African Union's African Monitoring of the Environment for Sustainable Development (AMESD) project and other similar activities in Europe and Africa.



AGIS Web portal - an example of GIS portal created by a South African user featuring the data provided by VGT4Africa. Copyright: ARC-ISCW, South Africa.

Distribution of VEGETATION data in Africa through EUMETCast

II LIST OF PARTNERS

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II PROJECT INFORMATION

VGT4Africa: Distribution of VEGETATION data in Africa through EUMETCast
Specific Support Action
Contract no: SSA4-CT-2004-012302
Starting date: 01/01/2005
Duration: 36 months
EU contribution: € 562.200
Estimated total cost: € 562.200



AFSAGA Satellite Communication TELECOMMUNICATION



II SATELLITE APPLICATIONS IN SUPPORT OF AFRICA

The purpose of AFSAGA is to develop awareness of the latest telecommunication technologies and their potential use in the southern African region. The project analyses the potential applications available from Galileo and satellite communications in South Africa as well as in the Southern African Development Community (SADC) region.

South Africa and its neighbouring countries have a combination of well-equipped telecommunication urban centres with a large area of less-equipped telecommunication infrastructure density. It is this combination which makes the use of satellite applications a clear advantage in national development. Galileo combined with other satellite applications is clearly an enabler towards sustainable development in the SADC region.

AFSAGA will demonstrate to the SADC community that satellite applications can support efficiently economical sectors, such as industry, farming, marine, mining, tourism, construction, road infrastructure, civil aviation, but also events, such as the 2010 FIFA World Cup.

II INFORMING KEY USERS

The possibilities offered by combined Galileo and satellite-based telecommunication applications, as well as what has already been carried out in other regions, will be communicated to selected user communities.

II ANALYSING USER NEEDS

The second step is an analysis and consolidation of identified user needs. This consolidation process will include the cross-checking and justification of a proposed satellite-based solution. This process will be used to analyse the regional barriers to the implementation of such applications as well as the establishment of an action plan to be discussed with regional stakeholders.

African SATellite communication & Galileo Applications

II TALKING TO USERS...

AFSAGA workshops are the main tool to achieve the objectives of the project. They are designed to improve the awareness of satellite systems that are available in the region and discuss specific needs among potential users within the Southern African Development Community (SADC).

Several far-reaching possible applications and benefits of satellite navigation were identified by delegates at the first AFSAGA workshop that took place in August 2007. As a result of the workshop a range of satellite applications was identified.

A thorough analysis and a consolidation of identified user needs together with an action plan will be disseminated to regional stakeholders through a number of dedicated meetings in SADC countries.



Source: Thales Alenia Space France/ESA

African SATellite communication & Galileo Applications

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II PROJECT INFORMATION

AFSAGA: African SATellite communication and Galileo Applications
Specific Support Action
Contract no: SSA5-CT-2006-030933
Starting date: 01/03/2007
Duration: 12 months
EU Contribution: € 281.825
Estimated total cost: € 281.825





II TELE-EDUCATION TO REACH REMOTE REGIONS

BASE² aims to provide end-to-end tele-education services through an integrated satellite and terrestrial wireless and wired broadband infrastructure. The project is performing pioneering work on network integration and on investigating the suitability of integrated satellite and wireless network technologies for tele-education use, such as video conferencing, webinars, webcasts and access to learning repositories. The project is deploying a network and service architecture and is evaluating it in the context of isolated learner communities who participate in tele-education programmes. The users come from agrarian and maritime communities in Greece and Cyprus.

BASE² aims to cover real needs and considers the agricultural communities (farmers etc.) and the maritime communities (ship crew etc.) as two important sample groups for piloting satellite-based educational systems. Users representing those economic activities can greatly benefit from a wider deployment and use of satellite communications essentially due to usually large distances which separate them from broadband terrestrial telecom infrastructures.

II THE BASE² NETWORK

The final end-to-end system consists of satellite communication technologies and various terrestrial network infrastructures. This hybrid network is implemented in order to provide tele-education services to remote, distributed and isolated rural areas and vessels (maritime community).

A specific methodology was followed for the deployment of the network and service architecture. It involved identification of potential services that might be of interest to geographically isolated communities and evaluation of each identified service in the context of distance learning through active involvement of potential users. Subsequently, specific service scenarios were elicited and a hybrid network architecture based on satellite and wireless technologies was designed and implemented.

II THE USER COMMUNITIES

User communities have been intensively taking advantage of the services provided by BASE² familiarising themselves with edge technologies, having the opportunity to attend lessons prepared by experts and giving feedback about their experiences and additional needs. This feedback, the analysis of the learning efficiency and the lessons learned during the pilot phase will significantly contribute to the future improvement of services.

It is also expected that the tele-training of the initial 500 approximately users will establish a precedent and create a critical mass of remote agrarian and maritime users ready to use the new technologies in order to train themselves on various topics. Dissemination from this critical mass is to play a very active role in the wide spreading of e-learning to traditional layers of the Greek remote community, thus creating a positive side-effect to basic computer literacy in non-technologically privileged communities as well as providing high level professional training.



Broadband Access Satellite Enabled Education

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- I Brunel University, UK
- I FOKUS - Fraunhofer Gesellschaft zur Foerderung der angewandten Forschung e.V, Germany
- I Universidad Politécnica de Madrid, Spain
- I University of Cyprus, Cyprus
- I General Confederation of Greek Agrarian Association, Greece
- I Superfast Ferries, Greece
- I Hellenic Aerospace Industry S.A, Greece

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II PROJECT INFORMATION

BASE²: Broadband Access Satellite Enabled Education
Specific Targeted Research Project
Contract no: SST4-CT-2005-516159
Starting date: 01/09/2005
Duration: 33 months
EU contribution: € 1.339.337
Estimated total cost: € 2.152.163





Standard and Interoperable satellite solution to deploy HEALTH care services over Wide AREa

II TELECOMMUNICATION IN SERVICE OF MEDICINE

Healthcare today makes extensive use of information and communication technologies and (secured) broadband networks are often used to exchange medical information like reports and X-ray images. Furthermore care can be extended to mobile patients and to the patient's homes by using telemonitoring and teleconferencing facilities. The collaboration between health professionals is improved by teleconsulting and related services. In addition teaching of students and further education of health professionals benefit from real-time transmission of medical interventions and results.

Real-time teleconsulting, diagnosis from a remote location and the transmission of clinical data and multimedia medical content are particularly needed when the access to medical services is difficult like in geographically dispersed locations. This is the starting point for the HEALTHWARE project. The project validates and promotes the use of a light and cost effective satellite technology (DVB-RCS – combining the DVB-S norm for TV broadcast with an efficient return link) in areas lacking sufficient terrestrial telecommunication for interactive applications based on videoconferencing, like staff meetings, tele-expertise, teleconsultation and medical training.

The main objective is to demonstrate the added-value of satellite communications for a better delivery of healthcare for example in the fields of chronic respiratory diseases, oncology and cardiology. The use of DVB-RCS technology and the availability of performing and adapted e-health applications offer remote areas with increased connectivity and interactivity, and improve the comfort of patients and efficiency of medical staff.

II HEALTHWARE PILOT APPLICATIONS ARE SUPPORTING MEDICAL STAFF AND PATIENTS

- In Cyprus, acutely injured patients seen in the Larnaca General Hospital often have to be transferred to the Nicosia New General Hospital which is better staffed and equipped for serious injuries. HEALTHWARE has enabled teleconsultation and now transfers are needed in more limited cases.
- In Greece medical staff working in isolated rural primary care centres can join Continuous Medical Education courses via HEALTHWARE satellite links.
- In the Czech Republic, lectures and interactive sessions with students and young radiologists located in remote sites, sharing the content of university knowledge database are realised.
- In Poland, a district hospital gets a second opinion for pulmonology cases by sending patients' radiology images to experts in a university hospital by videoconferencing.
- In the UK, cancer patients in one hospital are treated based on the second opinion obtained from a specialist from another administrative area, to which data cannot not be securely transmitted without the HEALTHWARE satellite link.
- In France, HEALTHWARE supports the coordination of emergency rescues ("Plan Rouge") and training of Fire Brigade medical staffs; teleconsultation for psychiatric patients in a given isolated town; and videoconferencing in support of general practitioners.
- In Italy, a group of patients are monitored and video-teleconsulted at home.



Standard and Interoperable satellite solution to
deploy HEALTH care services over Wide AREa

|| LIST OF PARTNERS

- | Thales Alenia Space France, France
- | Eutelsat, France
- | D'Appolonia, Italy
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- | Telemedecine Technologies, France
- | Forth, Greece
- | CNES, France
- | Telespazio, Italy
- | Thales Alenia Space Espana, Spain
- | United Bristol Healthcare NHS Trust, UK
- | Medes, France
- | CHU Toulouse, France
- | Total Care Network, Greece
- | Telbios, Italy
- | Ehtel, Belgium
- | Jagiellonian University, Poland
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HEALTHWARE: Standard and Interoperable satellite solution to deploy HEALTH care services over Wide AREa
Integrated Project
Contract no: SIP4-CT-2004-516171
Starting date: 01/05/2005
Duration: 36 months
EC Contribution: € 3.703.400
Estimated total cost: € 5.490.400





II MOBILE BROADBAND SERVICES FOR TRAIN, BOAT AND AIRCRAFT

The rapid growth of broadband internet for personal and professional use shows a clear trend towards increased band-width demand, high speed services and applications. The provision of cost-effective mobile broadband services to airborne, maritime and high-speed train passengers seems feasible only via a satellite system.

The MOWGLY project studied the implementation of DVB-S2/DVB-RCS standards for broadband access (internet and streaming applications) to users of collective mobile vehicles (aircraft, trains and vessels) with the objective of offering a quality of service similar to the traditional terrestrial networks.

The project started in January 2005 and successfully ended in March 2007 after two years of technical development and several experimentations on boat, train and aircraft. Gathering leading actors of transportation and telecommunication industry as well as SMEs and universities, the MOWGLY consortium has levered up this challenge.

MOWGLY focused on business case analysis, engineering studies and performance evaluation targeting trials on a prototype communication chain with the objective of validating the technological development, assessing the services offered to potential customers and defining a business model.

The new DVB-S2/DVB-RCS standard has a potential of an efficient open approach for broadband access. MOWGLY investigated innovative solutions for satellite terminals in mobile environments, such as advanced transmission solutions for a group of passengers using collective terminals with quality of service control and networking technologies.

II TRIALS PROVE SUCCESS OF MOWGLY TRANSMISSION TECHNIQUES

All proof of concept trials were successfully performed and have demonstrated that a common system may be used for different applications. MOWGLY transmission techniques and user oriented services have confirmed their capability to fully support broadband transmission in maritime, aeronautical and terrestrial environment.

Thanks to a good collaboration with the RENFE Spanish Railway Company, the train team has demonstrated the stability and robustness of the AAS DVB-S2 / DVB-RCS broadband satellite access solution in the highly disturbed train environment. The trial was performed on a regular Madrid-Seville railway line (a 900 km round trip). During the 5 hour experiment and despite the electrical environment, the poles and the high speed, the broadband internet connection was never interrupted and remained at top quality throughout the trip. In addition, the switch from satellite connection to terrestrial 3G in tunnels was also successfully experienced in more than 10 tunnels crossed between Madrid and Seville, with no service interruption.

The maritime team has also deployed a demonstration of Maritime Wideband Link System and the aircraft team a demonstration of an Aero Broadband system based on A9780 DVB RCS product.



MOBILE Wideband Global Link sYstem

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- I Alastom Transport, Spain
- I Alcatel CIT, France
- I MBI, Italy
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Contract no: SIP4-CT-2004-516135
Starting date: 01/01/2005
Duration: 24 months
EU contribution: € 6.605.000
Estimated total cost: € 12.157.000





New Technologies to Avoid Digital
Division in e-Divided areas

II HYBRID SATELLITE – WIRELESS TECHNOLOGIES FOR DEVELOPING COUNTRIES

NeT-ADDeD aims at developing and validating technical features for improved performance of operation of hybrid satellite-wireless technologies, in line with the growing demand for broadband communication within the 'International Cooperation' (INCO) countries, as well as with their evolution in Europe.

The following axes contribute to improved conditions for use of the hybrid satellite-wireless technologies:

- I The specification, implementation and validation of self-installation process usable by customers;
- I The implementation of compact transportable terminals, easy to deploy and adapt to the conditions in the INCO countries;
- I The development and validation of remote satellite control capabilities for reduction of operating costs;
- I The development and validation of mechanisms of service differentiation on the satellite component.

The above features are validated under real conditions in more than ten validation sites in North and Central Africa (Morocco, Burkina Faso, Benin), Turkey, Cambodia and Europe, which were selected with the support of national and regional public authorities. The sites correspond to different profiles of rural communities and cover domains, such as healthcare, education, agriculture, tourism, corporate and residential services.

II NET-ADDED SUPPORTS e-LEARNING IN AFRICA

NeT-ADDeD provides innovative applications that meet specific requirements of rural user communities in specific countries.

The project activities in Central Africa aim at sustaining two main e-learning actions: basic education for illiterate population in the most isolated areas of Burkina Faso and specific medical training in Benin. For this, the Groupement des Retraités Educateurs sans Frontières (GREF) is working on the development of specific contents for alphabetization and improving socio-economical activity dedicated to the rural communities. Furthermore, the Université Médicale Virtuelle Francophone (UMVF), an institutional medical training organisation, is adapting French medical university content to the African conditions (hygiene, prevention of venereal diseases, nutritional education, public health, etc.).



A course session for women at Diepergou village in Burkina Faso.
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New Technologies to Avoid Digital Division in e-Divided areas

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NeT-ADDeD: New Technologies to Avoid Digital Division in e-Divided areas
Specific Targeted Research Project
Contract no: SST5-CT-2006-030960
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Duration: 24 months
EU contribution: € 1.899.643
Estimated total cost: € 3.083.000





Spreading the Wings of Knowledge:
Bringing Rural Communities Closer

II SATELLITE TECHNOLOGY ENABLES LEARNING IN REMOTE AREAS

The strategic objective of RURAL WINGS is to provide end-to-end satellite telecommunication (SATCOM) systems for tele-education applications in remote areas and rural areas where the existing communication architecture does not support broadband applications.

The project will offer e-learning services by installing satellite terminals equipment into 128 pilot sites in 13 European countries (Greece, Spain, Sweden, France, Romania, Cyprus, Estonia, Poland, UK, Israel, Armenia, Georgia, and Switzerland).

Harvesting recent developments in the field of networking technologies, RURAL WINGS is now offering the opportunity to offer broadband services due to the unique capability of satellite communication to provide high quality wireless broadband connectivity to groups of people outside densely populated regions.

The project exploits new networking technologies such as Digital Video Broadcasting – Return Channel Satellite (DVB-RCS) incorporating in parallel SATCOM technology and terrestrial local area wireless networks to achieve the provision of broadband services of tele-education.

RURAL WINGS promotes a user-centred methodological approach, based on innovation practices and techniques. The ultimate goal is the transfer of knowledge and the adjustment of these practices in different knowledge spaces (learning@school, learning@work, learning@home) as a means for interaction between user needs and technological developments. The project encourages the users to add their contributions to new emerging applications, engaging them into productive activities which respond to special needs of various target groups.

II FIRST PILOT SITES RUNNING...

The first 32 pilot sites have been fully equipped and are operating. Each of the pilot sites has the necessary equipment for the user to be able to access the internet backbone via satellite.

Through the RURAL WINGS project, the pilot site user is also able to access specific e-learning applications covering a full range of knowledge items such as elementary education subjects, scientific experiments, farmers' training, health training, business and corporate training and local municipalities issues.

All e-applications and learning scenarios are being used and tested by local users connected to those pilot sites set up in, for example, Mesta, a village on Chios island in Greece; on Piirissaare island in Estonia or in the Israeli Bedouin community in the Negev desert. Finally, on extensive validation of the accessibility and the effectiveness of the learning process will be carried out.



Children from Israeli Bedouin community in Negev desert - one of the RURAL WINGS sites. Source: ICCS, RURAL WINGS

At the end of the project a large number of various types of users will be able to access in pilot sites the web in a fast and easy way entering all the above applications. The RURAL WINGS vision of providing e-learning services to the users being @school, @work or @home is the ultimate goal of the project while providing simultaneously a unique perspective and added value to remote villages and locations. By this way every pilot site will turn into a "Learning Hub", a learning centre minimizing the 'digital gap' of the specific rural areas with the Information Society and Learning Community.

Spreading the Wings of Knowledge: Bringing Rural Communities Closer

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Integrated Project
Contract no: SIP4-CT-2005-516161
Starting date: 01/01/2006
Duration: 48 months
EU contribution: € 5.400.000
Estimated total cost: € 8.826.736



SATMAC

Satellite Telecommunication Market Assessment and Cost Benefit

II ANALYSING THE EVOLUTION OF SATELLITE TELECOMMUNICATION

It is widely acknowledged that satellite communication is a critical technology, delivering services to the European citizen such as audio and video broadcasting, telecommunication services, mobile and more recently broadband services. The provision of broadband is of particular interest in that satellite services can be delivered to regions of poor telecommunication infrastructure, thus assisting in the closing of the digital divide between those regions with available broadband access and those without.

SATMAC was set up to assist the European Commission in analysing the evolution of satellite telecommunication up to 2030 and to propose directions for Research and Development (R&D) programmes by providing answers to five key questions:

- I Given the growing role of satellite communication in the global information infrastructure, what should the European vision be for satellite communication to 2030?
- I What applications and services will be universally required for each stakeholder group across the Union and what impact will this have on the industrial base?
- I How far can terrestrial technology advance before it becomes technically, commercially or economically non-viable, in the short and long term to 2030? How far can satellite technology close the gap and offer complementary and cost effective solutions in comparison with terrestrial technology?
- I What are the competitive and regulatory pressures on satellite communication systems and how can they be relieved?
- I Where should the research focus be placed to maximise the benefit to the industrial base and to develop the infrastructure that will enable a thriving downstream industry capable of competing on the global stage?

II THE APPROACH

The evolution of satellite communication is influenced by three primary factors: (1) applications and the services needed to deliver them, (2) markets and (3) technologies.

SATMAC addressed these three factors and established a comprehensive view of the state of the satellite communication industry in Europe with both a medium and long term perspective. The general approach that has been taken was to divide the view of the evolution of satellite communication into two timeframes: now to 2015 and 2015 to 2030. For the first period, most new applications, services and technologies which will be introduced are in development or early implementation now and so it is possible to be specific about the developments. For the second period, it is not possible to identify specific applications and technologies which will appear and so the SATMAC consortium has looked at trends and where current research and development might lead.

The work included a cost benefit analysis related to the use of satellite technology to access/develop applications and services. The competitive position of the technology in relation to developing terrestrial communication has been considered. In a number of instances, both satellite and terrestrial delivery are needed together to provide an effective solution, in this case the two technologies complement one another and this has also been investigated.

SATMAC has organised a workshop to disseminate its findings, which resulted in valuable discussions with representatives from the industry, the research community, the European Space Agency and the European Commission. The key output of the SATMAC support action has been to develop guidelines for R&D policy for satellite communication.



Satellite Telecommunication Market Assessment and Cost Benefit

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Specific Support Action
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Starting date: 01/12/2005
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EU contribution: € 499.935
Estimated total cost: € 499.935





The Satcoms In Support of Transport on European Roads

BETTER ROAD TRANSPORT APPLICATIONS THROUGH SATELLITE TELECOMMUNICATION

The SISTER project promotes integration of satellite and terrestrial communication with Galileo in order to enable mass market take-up by road transport applications.

The transport market is extremely attractive because of its scale as well as the potential for location based services combined with communications to provide innovative solutions to transport problems.

SISTER brings together major players in transport telematics applications with key actors in the space infrastructure and service delivery industries.

Designed to investigate, validate and develop crucial areas that will affect the adoption of satellite communications (SATCOM) systems in the transport sector, SISTER covers three main streams of activity:

- An analytical stream: to provide a comprehensive assessment of the full range of Galileo Intelligent Transport System (ITS) applications and their communication requirements from both technical and business operation perspectives;
- A practical stream: to produce a prototype of an integrated satellite/terrestrial/Galileo transceiver and perform demonstrations of applications to prove and measure the effectiveness of satellite communication;
- A standardisation stream: to work to add a satellite component to the ISO CALM (Continuous Air Interface for Long and Medium Distance) standard, as well as other relevant standards identified during the course of the project.

The diagram below shows a possible architecture for the SISTER communications services.

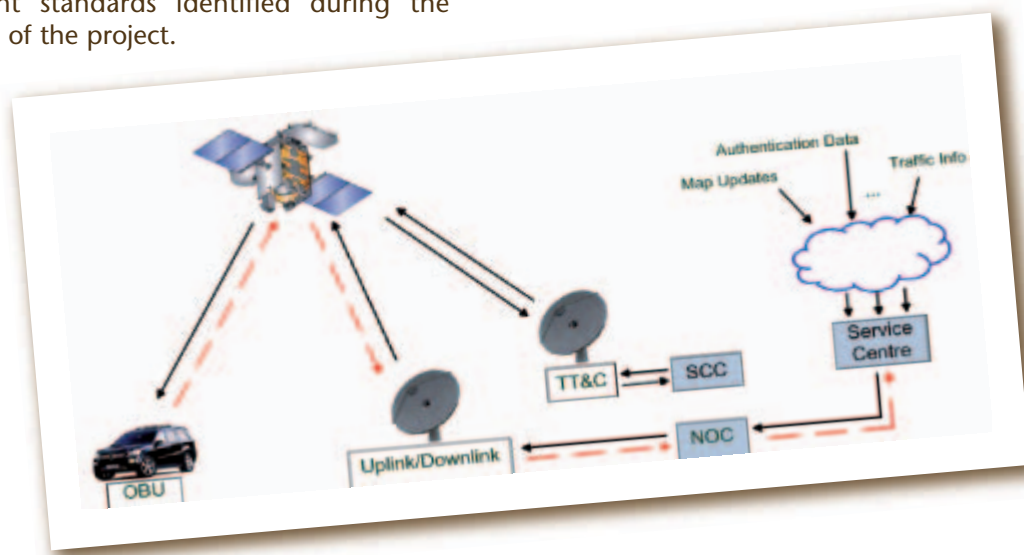
ANALYSIS OF COMMUNICATION SERVICES

ITS applications have been grouped into three main clusters: Safety and Security; Dynamic Navigation and Fleet Management.

Two communication services have been defined and underwent a detailed analysis:

- Satellite Data Broadcast Service (SDB) is conceived to broadcast data files to telematic units including map updates, points of interest, traffic information and weather. It will also deliver services such as real time kinematic corrections, GNSS authentication and GNSS assistance services.
- Satellite Narrowband Service (SNB) is designed to provide the facility for bi-directional communications with individual users to support either a small number of simultaneous users involved in emergency related communications (emergency call, theft detection) or a larger number of users transmitting small amounts of data.

Architecture for the delivery of these services is under development and two options are being considered: either leasing a third party satellite capacity or using a dedicated ITS satellite.



The Satcoms In Support of Transport on European Roads

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- I EFKON AG, Austria
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- I NAVTEQ B.V, The Netherlands
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- I The University of Nottingham, UK
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SISTER: The Satcoms In Support of Transport on European Roads
Integrated Project
Contract no: SIP5-CT-2006-031022
Starting date: 01/11/2006
Duration: 36 months
EU contribution: € 5.375.600
Estimated total cost: € 10.527.193





II IDENTIFYING THE NEEDS FOR SATELLITE TELECOMMUNICATION

The TANGO project focuses on the use of satellite telecommunication solutions to serve the needs of the Global Monitoring for Environment and Security (GMES) community. It aims at supporting their future operational information services and the associated end-users when expressing their telecommunication needs in the domain of risk and crisis management, maritime services, land cover, atmosphere, security and humanitarian aid.

With a large involvement of GMES key players, TANGO implements a bottom up approach to identify the requirements to further adapt, develop, integrate and demonstrate satellite telecommunication innovative solutions. The TANGO solutions are developed to meet various needs, such as improved and faster data collection, fast data dissemination, provision of GMES data products to the end-users, early warning systems and ad-hoc networking.

II TANGO COMMON TELECOMMUNICATION SERVICE PLATFORM (CTSP)

The project is developing TANGO "Common Telecommunication Service Platform", a unique interface for GMES service providers, which will enable fast access to various telecommunication solutions and optimise capacity sharing among the GMES users. The project will define the conditions for an operational exploitation of the TANGO platform, based on adequate partnership.

TANGO demonstrations will contribute to marine and emergency response core services. Demonstrations will also integrate satellite telecommunication solutions with on-going developments in the framework of risk and crisis management, fisheries management, maritime surveillance, support to humanitarian aid and security. This covers the generic demonstrations planned within TANGO, and actual support to other GMES projects demonstrations. In both cases, TANGO will bring to the GMES service providers the telecommunications and CTSP offer.

The interfaces between the CTSP and the telecommunications solutions adapted within the project are defined. The core functions of the CTSP prototype are specified. A prototype will be used during specific demonstrations to validate key objectives: cost reduction and facilitated access to telecommunications solutions.

TANGO has completed the collection of telecommunication requirements through contacts with major GMES projects. A systematic approach for assessing the needs has been established, relying on the definition of a clear and agreed terminology and TANGO reference architecture. The requirements were added to a database through a dedicated web interface developed within the project. As a result, a public document summarising the key benefits expected from telecommunications in the various themes is now available.



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Telecommunications Advanced Networks for GMES Operations

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- I Infoterra GmbH, Germany
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- I SPOT IMAGE S.A., France
- I Politecnico Di Torino (Turin Polytechnic University), Italy
- I Collecte Localisation Satellites SA (CLS), France
- I Worldspace France, France
- I Univerzita Karlova v Praze (Charles University), Czech Republic
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- I SkyCat Group Limited, UK
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TANGO: Telecommunications Advanced Networks for GMES Operations
Integrated Project
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Starting date: 01/11/2006
Duration: 36 months
EU contribution: € 4.995.500
Estimated total cost: € 8.883.300





Terrestrial Wireless Infrastructure
integrated with Satellite
Telecommunications for e-Rural

II SATELLITE COMMUNICATIONS TO CONNECT RURAL REGIONS

Today, broadband connectivity is a feature as important for everyday life as the quality of roads and public transport networks. Through their immediate and far-reaching connectivity, satellite communications allow the extension of the broadband networks to rural and isolated areas.

The TWISTER project supported the development and widespread application of bi-directional satellite services combined with wireless local networks to provide reliable and sustainable broadband internet access to rural regions.

Over a period of more than 3 years TWISTER deployed and operated 105 satellite access points in 9 different countries, of which 69 have been combined with wireless local loops. The deployed broadband solutions have been used to provide innovative applications to more than 900 users in the domains of agriculture, education, community services, health care and e-business.

TWISTER has investigated and validated a number of hybrid satellite-wireless system architectures and has analysed the results of the deployed sites in terms of network usage and performance. TWISTER provided recommendations on how to provide an optimal trade-off between quality of service to the end-user and cost effective network operations.

The project has also provided a return of experience on network management methods allowing the efficient monitoring, operation and supervision of a large number of hybrid satellite-wireless sites deployed in different regions of Europe.

II HYBRID NETWORKS PROVED SUCCESSFUL

TWISTER has proven the technical and operational maturity of hybrid networks integrating satellite solutions with wireless terrestrial technologies.

Close cooperation with local and regional authorities as well as with service and technology providers have ensured the sustainability of the TWISTER project developments. More than 40% of all sites continue with satellite broadband access on a commercial basis indicating that even three years after the start of the project (in February 2004) terrestrial ADSL solutions have not progressed as promised and showing the satisfaction of the end-users with the solutions that have been proposed by TWISTER.

The project has concluded with the identification of a number of target areas for further enhancement of the satellite broadband services, such as increased mutualisation factor, combined broadband internet and TV, easy access to public authorities and reduced satellite bandwidth costs.

The TWISTER hybrid satellite-wireless solution can also provide an immediate and wide reaching answer to the needs of the remote and isolated regions in Africa, South-America as well as Eastern European & Balkan countries.



Satellite backhauling and central wireless base station
Source: TWISTER

Terrestrial Wireless Infrastructure integrated with Satellite Telecommunications for e-Rural

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TWISTER: Terrestrial Wireless Infrastructure integrated with Satellite Telecommunications for e-Rural
Integrated Project
Contract no: SIP3-CT-2003-502928
Starting date: 01/02/2004
Duration: 39 months
EU contribution: € 4.981.600
Estimated total cost: € 8.512.617





Soyuz at CSG Programme Management and Launch System Telemetry and Remote Control Adaptations

II ENFORCING EUROPE'S POSITION IN LAUNCH SERVICES

The SOYMANTRY project forms an integral element of the Soyuz at CSG ('Centre Spatial Guyanais') programme. The European Space Agency, together with Russia, is installing a launch base for the Russian Soyuz launcher at the European spaceport in French Guiana in South America. The Soyuz launcher will thus benefit from the geographical location of the base close to the equator, which increases significantly its payload capacity compared to Baikonour. Under the project SOYMANTRY the European Commission is contributing to the implementation this programme.

Soyuz will complement the two launchers developed by the European Space Agency (ESA), i.e. Ariane 5, the European workhorse guaranteeing Europe's independent operational access to space, and Vega, a small launcher presently under development.

The Soyuz at CSG programme covers three main elements:

- The construction of the Soyuz launch facilities at the European spaceport;
- The adaptation of the Soyuz launch vehicle to the conditions for its exploitation from the CSG;
- The development of an upgraded version of the launcher with a more powerful upper stage.

The CSG programme directly contributes to the strengthening of the long-term cooperation with Russia in the space sector and will reinforce the European position in the commercial launch services domain through the provision of a reliable and cost efficient medium-class launch vehicle.

II ADAPTATION OF THE SOYUZ LAUNCHER

The SOYMANTRY project focuses on the overall management of the Soyuz at CSG programme and encompasses also key launcher adaptations in the telemetry and telecommand domains by European industry to support Soyuz operations from the European spaceport.

Main developments supported by SOYMANTRY:

- Adaptation of the Soyuz launcher and Fregat upper stage telemetry systems to S-band, compatible with existing CSG systems and the downrange network, through the development of the remote control receiver;
- Development of the on-board safety system for the Soyuz launch vehicle based on Ariane equipment, in particular through the development of the power supply switchbox.

II ACHIEVEMENTS

The Soyuz at CSG programme has progressed steadily with the aim to conduct the first launch by mid-2009. The work in Guiana is close to completion and the launcher adaptations are proceeding according to schedule. Qualification tests were passed successfully. The management approach has been consolidated by a better interaction between all parties (ESA, CNES, ARIANESPACE, Russian partners and industry). The programme can rely on a coherent and updated set of documentation.



Source: ESA - S. Corvaja

Soyuz at CSG Programme Management & Launch System Telemetry & Remote Control Adaptations

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SOYMANTRY: Soyuz at CSG Programme Management and Launch System Telemetry and Remote Control Adaptations
Specific Support Action
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Duration: 40 months
EU contribution: € 4.987.484



FURTHER INFORMATION IS AVAILABLE AT:

<http://www.gmes.info/> || <http://ec.europa.eu/enterprise/space/> || <http://cordis.europa.eu/>