

SPACE RESEARCH

A European Journey

Space Research projects under
**the 7th Framework Programme
for Research**

GMES SERVICE ACTIVITIES

SPACE EXPLORATION

SPACE WEATHER

SPACE DEBRIS

SPACE DATA EXPLOITATION

DEVELOPING CRITICAL TECHNOLOGIES

COORDINATION AND SUPPORT ACTIONS

SPACE RESEARCH projects under the 7th Framework Programme for Research

Natalia Rashevskaya © Fotolia.com

A EUROPEAN JOURNEY

Space is one of the most stimulating areas of scientific research and technological development, and full of endless possibilities.

The 76 projects featured in this brochure take us on a journey through the solar system. Global Monitoring for Environment and Security (GMES) service activities progressively take shape, facilitating enhanced monitoring of nature sites in Europe, developing new tools to monitor scarce water resources in dry regions, assisting marine scientists to forecast harmful algal blooms along the Atlantic coast, and monitoring the rain forests across the Earth's tropical belt to combat deforestation.

Near Earth, scientists strive to understand more about space weather, and to protect the International Space Station (ISS) and satellites from harmful space debris.

Further out, space exploration projects prepare for mankind's next big journey, exploring landing conditions on Mars, and examining how bacteria behave in closed space environments that will be home to astronauts on interplanetary flights.

In space, we are curious, and with new projects devoted to space data exploitation, researchers take an extra look at data from past space missions whilst developing better data mining tools, some of which will provide easy access to European and Russian data sets.

Also, efforts continue to develop critical technologies that are of strategic importance for Europe's industry, in order for it to stay competitive and innovative, breaking new technological barriers and securing high quality jobs for citizens.

SPACE RESEARCH update

IPHONE APPLICATION

Information about all of the EU's space projects is now available in the palm of your hand! With the swipe of a finger, you can access rich multimedia content and much more. Simply download the "Let's embrace space" application for the iPhone from the Apple App Store.



LET'S EMBRACE SPACE

Over 448 illustrated pages, the book "Let's embrace space – Space Research achievements under the 7th Framework Programme" presents the first EU Space Research results mid way through the FP7 programme. Order your copy of this book online from the EU bookshop: <http://bookshop.europa.eu>.



ABOUT FP7 SPACE

Under the Seventh Framework Programme for Research (FP7), 2007 – 2013 the European Commission has made **EUR 1.4 billion** available in support of the establishment of Global Monitoring for Environment and Security (GMES) services, and support for **Space Foundations**.

"LET'S MAKE A EUROPEAN JOURNEY TOGETHER"

Natalia Rashevskaya © Fotolia.com

Listed below are projects co-financed by the European Commission under the 7th Framework programme for Research in the areas of GMES services, Space Exploration, Critical Technologies and Coordination and Support Actions.

GMES SERVICE ACTIVITIES

- ASIMUTH
- BIO_SOS
- CoBiOS
- CryoLand
- DOLPHIN
- ENDORSE
- EUFODOS
- FreshMon
- GLOWASIS
- GRAAL
- HELM
- ISAC
- MAIRES
- MALAREO
- MEDEO
- MOCCASIN
- MS.MONINA
- MyWater
- NEREIDS
- OPERR
- PanGeo
- PRE-EARTHQUAKES
- RECOVER
- REDDAF
- REDD-FLAME
- REDDINESS
- SeaU
- SEMEP
- SIDARUS
- SIMTISYS
- SIRIUS
- WatPLAN

SPACE EXPLORATION

- BIOSMHARS
- ESAIL
- FOSTERNAV
- HYSP
- LIROC
- Microthrust
- RITD
- ROV-E
- SACOMAR
- SPARTAN
- SpWRT
- TransHyBeriAN
- ZAPÁS

SPACE WEATHER

- AFFECTS
- ATMOP
- COSMESEP
- EURISGIC
- PLASMON
- SIDER
- SPACECAST
- SWIFF

SPACE DEBRIS

- BETs
- CLEANSPACE
- DEORBITSAIL
- P2-ROTECT
- ReVus

SPACE DATA EXPLOITATION

- ECLAT
- ESPACE
- EUNAWE
- HESPE
- IMPEX
- POPDAT
- SEPServer
- SPACE-DATA ROUTERS

DEVELOPING CRITICAL TECHNOLOGIES

- CESAR
- DSPACE
- E-SQUID
- HarmLES
- MAGDRIVE
- SMARTTEES
- SOC2

COORDINATION AND SUPPORT ACTIONS

- ACCORD
- DORIS_Net
- SPA

A European Journey is the fourth in a series of brochures featuring EU Space Research projects.

The first edition, *Space Research – Developing applications for the benefit of the citizens*, reviews FP6 projects, whilst the second edition, *Let's embrace space – Space Research projects under the 7th Framework Programme for Research*, is devoted to projects from the 1st FP7 space call. *Desire for space* features projects from the 2nd FP7 space call.

Electronic versions of these brochures are available online at:

<http://ec.europa.eu/embrace-space>

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ASIMUTH

Applied simulations and Integrated modelling for the understanding of toxic and harmful algal blooms

COUNTERING HARMFUL ALGAL BLOOMS

Harmful algal blooms (HABs) make shellfish toxic and can sometimes kill farmed fish throughout Europe. Part of nature, they cannot be prevented but with the right technology and knowhow they can be predicted. The project ASIMUTH takes on this forecasting challenge.

These blooms occur periodically along EU shores, and cause devastation for Europe's aquaculture industries. However, in the future reliable predictions of where and when such blooms might occur is set to help mitigate their negative impact, enabling aquaculturalists to take preventive measures, e.g. planning protective harvesting operations or altering husbandry practices at finfish sites temporarily while a HAB passes through a particular area. Using a combination of both modelling and satellite image analysis, the ASIMUTH project is set to respond to the demand for short-term forecasts of harmful algal events along the European Atlantic coasts. The project foresees to deliver such forecasts directly to aquaculturalists by means of mobile phone and internet technology.

Using remote sensing satellite data, monitoring images of chlorophyll and water temperature, the project is set to track the origins of algal blooms, since knowing the conditions that bring about algal blooms are essential to successfully forecasting such blooms in the future, not only along the Atlantic shores of Europe, but potentially along the shores of all of Europe.

Bringing together a consortium of scientific institutions and businesses from along all of Europe's Atlantic shore, this project is set to develop services that foster the competitiveness of the European fish-shellfish industry, and demonstrate the potential of downstream services in the GMES marine domain.



JULIE MAGUIRE
IS PROJECT COORDINATOR



Aerial view of red tide off the Portuguese coast © ASIMUTH

ASIMUTH is set to develop short-term forecasts of harmful algal blooms along Europe's Atlantic coast.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We would like to have an operational early warning system for harmful algal blooms. This will allow fish and shellfish farmers to adapt their culture and harvesting practices in time, in order to reduce potential losses and in turn increase their productivity.

Why is this project important for Europe?

The impacts of harmful algal blooms are felt across the European wide aquaculture industry. Blooms do not respect borders therefore success of the project very much depends on co-operation between countries.

How does your work benefit European citizens?

The project will have a positive socio-economic impact for aquaculture in peripheral coastal regions where jobs have historically been lost due to a decrease in fishing effort. For the consumer, the project may stabilise price fluctuations of fish.

ASIMUTH

Applied simulations and Integrated modelling for the understanding of toxic and harmful algal blooms



LIST OF PARTNERS

- Daithi O' Murchu Marine Research Station Ltd., Ireland
- Marine Institute, Ireland
- FREMER, France
- Instituto Español de Oceanografía, Spain
- The Scottish Association for Marine Science, United Kingdom
- Instituto Superior Técnico, Portugal
- Instituto Nacional de Recursos Biológicos I.P. INRB, Portugal
- Hocer SAS, France
- Nowcasting International Ltd., Ireland
- Starlab Barcelona SL, Spain
- Numerics Warehouse Ltd., Ireland

COORDINATOR

**Daithi O' Murchu Marine Research Station Ltd.,
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PROJECT INFORMATION

Applied simulations and integrated modelling for the understanding of toxic and harmful algal blooms. (ASIMUTH)
Contract no: 261860
Starting date: 01/12/2010
Duration: 36 months
EU Contribution: € 2.485.244
Estimated total cost: € 3.237.137



CoBiOS

Coastal Biomass Observatory Services

BRINGING LIGHT TO DEATH ZONES IN SEAS

During the past 50 years, the concentration of nitrogen and phosphorus in aquatic environments has exceeded sustainable levels, creating the phenomenon of eutrophication that may lead to dead zones in the seas. Agriculture, industry and population growth represent the leading causes of such water quality destruction. Recognising the importance of monitoring these challenges, CoBiOS aims at creating a new monitoring system where ecological models use high quality satellite images for predicting developments within the eutrophicated ecosystems.

When nutrients caused by human activities penetrate coastal systems a number of reactions follow within the ecosystem. Initially, the impact of nutrient presence leads to excessive growth of microalgae and phytoplankton, causing eutrophication.

At global level, the areas that experience such developments are known, yet at regional level the degree of localised information varies significantly, causing state-of-the-art information gaps in many regions. The majority of these regions face similar environmental challenges in the wake of the nutrients, such as hypoxia (oxygen-depleted waters) and dead zones which in turn can lead to ecosystem collapse.

The services foreseen by the CoBiOS project will enhance our understanding of future developments within such zones, providing more reliable and homogeneous data across regions. This would allow for better assessments of the negative impacts that nutrients have on our seas.

In order to establish such predictive models, CoBiOS will use a combination of satellite images and ecological models, which describe and predict ecological processes and distributions of organisms' phytoplankton, nutrients and dissolved oxygen. The CoBiOS project harmonizes and validates a water transparency service based on satellite images adapted to a large variety of coastal types, and which combines information from GMES maritime services.

CoBiOS is set to develop services that foster enhanced competitiveness of European aquaculture companies and shows the potential of downstream services in the GMES marine domain



STEEF W.M. PETERS
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The CoBiOS team wants to achieve a system to identify high biomass algal blooms before they cause disruption of aquacultural and recreational use and dead zone formation in coastal seas. Using Earth observation and ecological models we want to predict the fate of these blooms.

Why is this project important for Europe?

With increasing pressures on Europe's coastal seas and global warming it is important to know the short-term and long term trends in biomass development. The CoBiOS system will provide important information to help implementing European guidelines such as the Marine Strategy.

How does your work benefit European citizens?

CoBiOS will set up low threshold information services accessible to all European citizens. Tourists, divers, fishermen, policy makers and industries etc. may use the information on high biomass blooms to anticipate and prepare for bloom events and to prevent damage and losses.



Green algae over beach © Adem Demir - Fotolia.com

CoBiOS intends to monitor and predict high biomass blooms in coastal waters along Europe's Northern and Baltic shores.

CoBiOS

Coastal Biomass Observatory Services



LIST OF PARTNERS

- Vereniging voor Christelijk Hoger Onderwijs Wetenschappelijk Onderzoek en Patientenzorg, The Netherlands
- Universität Hamburg, Germany
- Suomen Ymparistokeskus, Finland
- Water Insight BV, The Netherlands
- DHI, Denmark
- Brockmann Consult GmbH, Germany
- Institut Royal des Sciences Naturelles de Belgique, Belgium
- Geographic Resource Analysis & Science A/S, Denmark
- Stichting Deltares, The Netherlands

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**Vereniging voor Christelijk Hoger Onderwijs
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PROJECT INFORMATION

Coastal Biomass Observatory Services (CoBiOS)
Contract no: 263295
Starting date: 01/01/2011
Duration: 36 months
EU Contribution: € 2.499.025
Estimated total cost: € 3.285.000



CryoLand

GMES Service Snow and Land Ice

OBSERVING CHANGES IN ICE

Climate change has an enormous impact on glacier ice and snow cover based environments. Rising temperatures lead to retreat of snow and ice, with dramatic effects on the surrounding environments. Taking on these challenges, CryoLand develops new services for monitoring the extent and state of snow cover, glacier ice and lake/river ice.

Snow and ice melt plays a crucial role for water discharge, being one of the most vital elements of Earth's water cycle. During the past two decades, the importance of monitoring these phenomena has become increasingly clear. Indeed, reliable intelligence on snow accumulation and depletion will provide a valuable tool for assisting the effective management of water resources.

Moreover, changes in winter snow-cover have a number of socio-economic impacts. The impact on winter tourism and skiing resorts from changes in snow cover and snow depths is one critical example of such effects.

The project CryoLand responds to these new challenges, providing a set of tools for spatially detailed observa-

tions of snow cover and glaciers based on satellite data, integrated with ground based measurements. In doing so, the project facilitates automatic processing of critical environmental data. CryoLand services thereby assist European public authorities and affected industries in dealing more effectively with the climate change challenge by means of fast and cost effective remote sensing techniques for snow and ice monitoring.

CryoLand services adhere to INSPIRE guidelines and use data from GEOSS satellite images.

The project brings together relevant players in the field that hold valuable experience in operating pre-operational snow and ice services. Indeed, CryoLand is set to establish a pioneering snow and land ice service, which will provide important information also at the benefit of the water and hydropower sector.



THOMAS NAGLER
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

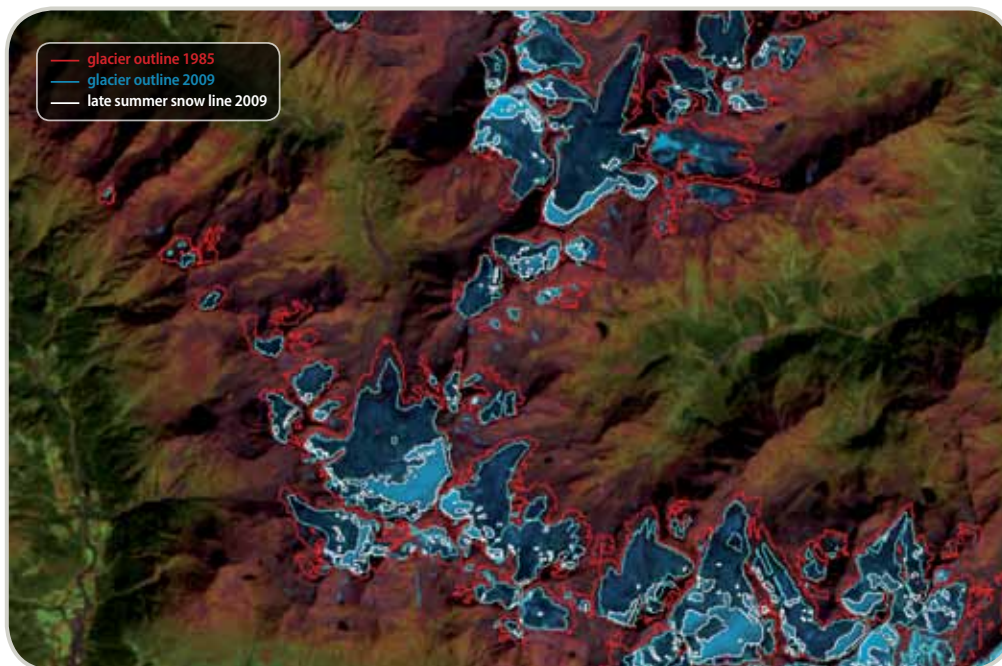
CryoLand will be a service for geospatial products on seasonal snow, glaciers, and lake and river ice derived from Earth observation satellite data. Advanced information technology will be applied to process and distribute snow and ice products in near real time, tailored to the customer needs.

Why is this project important for Europe?

Snow cover and glaciers are valuable resources, supplying many parts of Europe with water for human consumption, agriculture, hydropower generation and other economic activities. Lake and river ice is also important for water management, hydrology and traffic.

How does your work benefit European citizens?

The CryoLand services to be developed in the project are not only of interest for users at national level, but also intend to support EC policies related to water supply and quality, renewable energy, agriculture, traffic, flood hazards, and climate change.



Extent of glaciated areas in Stubai Alps derived from satellite data © CryoLand

CryoLand aims to develop near-real-time sustainable services for monitoring snow and land ice.

CryoLand

GMES Service Snow and Land Ice



LIST OF PARTNERS

- Daithi O' Murchu Marine Research Station Ltd., Ireland
- ENVEO Environmental Earth Observation IT GmbH, Austria
- EOX IT Services GmbH, Austria
- Suomen Ymparistokeskus, Finland
- Ilmatieteen Laitos, Finland
- Kongsberg Satellite Services AS, Norway
- Norsk Regnesentral Stiftelse, Norway
- Northern Research Institute Tromso AS, Norway
- Administratia Nationala De Meteorologie R.A., Romania
- Gamma Remote Sensing Research and Consulting AG, Switzerland
- Sveriges Meteorologiska och Hydrologiska Institut, Sweden

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PROJECT INFORMATION

GMES Service Snow and Land Ice (CryoLand)
Starting date: 02/02/2011
Duration: 48 months
EU Contribution: € 2.201.182
Estimated total cost: € 2.828.859



ENDORSE

Providing energy components for GMES

GETTING THE MOST OF RENEWABLE RESOURCES

Green energy is a growth sector, yet more reliable estimates of the potential of renewable resources as well as user-orientated tools are needed to optimise Europe's return on green investments. The ENDORSE project is set to deliver such valuable information to European businesses and public authorities.

The potential of new solar, wind and biomass technologies for energy is dependent on local and regional climate factors. Their effective exploitation requires careful intelligence analysis in terms of power system planning and operations. Information from satellites has the potential to further enhance the reliability of such data.

The ENDORSE project combines information from the GMES atmosphere, land and emergency response service projects MACC, Geoland2 and SAFER with a view to providing public authorities and private investors with accurate evaluation and forecasts of renewable resources.

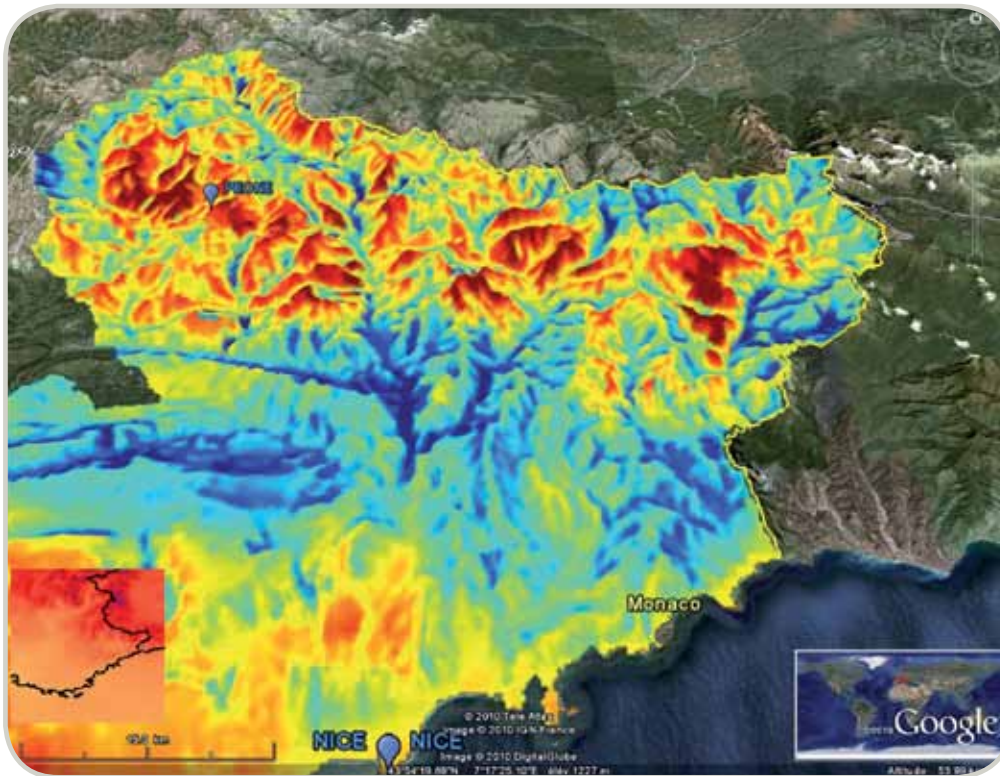
Reliable intelligence on resources determines where investments are profitable and how much the plants may produce. It helps in detecting failures in plant operation and issuing early warning to managers, thereby preventing large losses in production.

The operators of electricity distribution grids face increasing shares of renewable sources in their grids. Accurate and locally-detailed forecasts of resources within the next few hours are a prerequisite to prevent grid instability and subsequent local blackouts.

Low-energy buildings rely on a large use of daylight to reduce the use of artificial light. Accurate evaluation of available daylight is essential to optimize the use of daylight with control systems in building design or retrofitting as well as energy regulation policies.



LUCIEN WALD
IS PROJECT COORDINATOR



© ENDORSE

ENDORSE provides critical intelligence on renewable resources: solar, wind and biomass energy, to promote them in buildings, electricity production and grid management.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

Advances in environmental modelling will be achieved with a focus on solar radiation and air temperature at surface. Methods and user-orientated services will be developed, demonstrating the value of the GMES Services and stimulating their use in the renewable energy sector.

Why is this project important for Europe?

ENDORSE will realise tools aiming at an increasing use of renewable sources, with a decreasing dependency of Europe on fossil fuels and non-European suppliers. It supports the efforts towards a sustainable Europe and contributes to the European excellence in the space sector.

How does your work benefit European citizens?

Reliable intelligence on renewable sources yields a greater efficiency in the production of energy, thus a decrease in costs of renewable energy for citizens. ENDORSE will also support the economic sustainability of this sector, thus indirectly contributing to employment.

ENDORSE

Providing energy components for GMES



LIST OF PARTNERS

- DLR (Deutsches Zentrum für Luft- und Raumfahrt e.V.), Germany
- iCons, Italy
- Transvalor, France
- Flyby, Italy
- Ulm University of Applied Sciences, Germany
- University of Genoa, Italy
- Ecole Nationale des Travaux Publics de l'Etat, France
- 3E, Belgium
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PROJECT INFORMATION

Providing energy components for GMES - Energy
DownstReam Services (ENDORSE)

Contract no: 262892

Starting date: 01/01/2010

Duration: 36 months

EU Contribution: € 2.409.500

Estimated total cost: € 3.176.340



EUFODOS

European Forest Downstream Services – Improved Information on Forest Structure and Damages

KEEPING OUR FORESTS GREEN

Europe's forests are paramount for our environment. Yet climate change may lead to increased forest damages. The project EUFODOS responds to this challenge with timely information to forest authorities to mitigate such risks.

Once forests covered Europe from the Arctic to the Mediterranean. Until 90 percent of the continent was covered in green. Today, more than half of this ancient forest is gone, and forest cover currently average 30 percent in Europe. Whilst deforestation has been stopped during the past decades, climate change poses a new risk for Europe's forests. Infestations and other biotic damages caused by climate change could lead to increased forest damage across the continent.

In order to mitigate this challenge, timely information on the state of our forests is demanded by European forest authorities.



Bark beetle © EUFODOS

EUFODOS takes a closer look at forest damage across Europe, providing timely information to mitigate negative impacts of climate change.

The project EUFODOS is set to respond to this demand with a set of GMES Forest Downstream Services (FDS) in the form of forest degradation assessment and forest functions parameter mapping.

Combining data from satellites and in situ measurements in the forests, EUFODOS promises to deliver services that refine the use of existing GMES land service projects such as forest area, forest classes, forest density and forest change detection.

The FDS programme is based on 3 foundations: technical/methodological developments which will be based on an approach that combines Earth Observation (EO) and in-situ data as well as the GMES Forest Core products; the formation of a functional Service Network (SN) which includes effective representation/involvement of the user community, the service providers and the research community; and the assessment of the economic feasibility of developing the service cases such that they are sustainable.

Moreover, using remote sensing, the project also aims at producing rapid mapping of forest degradation and damage in high resolution.

Another aspect of the new services anticipated by EUFODOS is the derivation of forest functional parameters for proper planning of protection forests stability. To achieve this goal it is essential to process high resolution data which also can deliver information on vertical structure and understorey within forests. In order to fulfil these demands LIDAR technology will be used.



MATHIAS SCHARDT
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

It is the aim of EUFODOS to develop specific Forest Downstream Services (FDS) that are urgently required by European users in an economically viable manner. The specific FDS are related to assessment of forest damage and mapping forest functional parameters.

Why is this project important for Europe?

There is a strong need of European users to gather information on forestry in a fast and reliable way after disastrous events and for planning measures. The EUFODOS pre-operational FDS are assigned to deliver methods and software which can be applied within European countries.

How does your work benefit European citizens?

The monitoring of forest areas is an important task in the European context in order to achieve a sustainable and efficient development. EUFODOS is delivering an operational service for the benefit of the European citizens in terms of cost-efficiency, accuracy and reliability.

EUFODOS

European Forest Downstream Services –
Improved Information on Forest Structure and Damages



LIST OF PARTNERS

- Joanneum Research, Austria
- Valitonen Teknillinen Tutkiuskeskus, Finland
- Gesellschaft für Angewandte Fernerkundung, Germany
- Albert Ludwigs Universität Freiburg, Germany
- Accademia Europea di Bolzano, Italy
- RapidEye, Germany
- Remote Sensing Application Center, Bulgaria
- Umweltbundesamt GmbH, Austria

COORDINATOR

Joanneum Research, Austria

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PROJECT INFORMATION

European Forest Downstream Services – Improved
Information on Forest Structure and Damages
(EUFODOS)

Contract no: 262786

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 2.499.723

Estimated total cost: € 3.402.150



FreshMon

High Resolution Freshwater Monitoring: FreshMon GMES Downstream Services

PROTECTING INLAND WATERS

Europe is home to thousands of rivers and lakes, yet across the continent, these rich ecosystems are under significant pressure from agriculture, economical development and climate change. The project FreshMon is set to deliver new tools that authorities need to protect our inland waters.

The EU is dedicated to protecting the quality of Europe's water. Most importantly, the EU Water Framework Directive obliges regional and national authorities to implement monitoring programmes in order to obtain a coherent and comprehensive overview of the state of each lake and river in order to sustain these aquatic ecosystems.

The FreshMon project will implement and provide water quality services for rivers and lakes based on the integration of Earth Observation, in-situ measurements of biological parameters and hydrodynamic modelling components.

In this respect, the project will respond to the demand from authorities for reliable information about water constituents and water depth in Europe's fresh water system.



elbe © Dreadlock - Fotolia.com

FreshMon will offer Earth Observation (EO) based water quality services to support national and European authorities responsible for inland water quality in rivers and lakes.

Adding space data to in-situ measurements facilitates the establishment in Europe of a coherent and comprehensive overview of the state of each river and lake, thereby facilitating comparisons and the exchange of best practices amongst authorities responsible for the protection of these ecosystems.

Further to the development and marketing of services, FreshMon also intends to establish a European business network of European water service providers and end-users. A long-term self-sustainability of the GMES downstream service may only be achieved by a clear and precise separation of public-funded services and customer-driven downstream services. In this context, FreshMon will develop an operational business model for value-adding SMEs and provide stimuli to the economic exploitation of GMES technology worldwide.



CLAUDIUS MOTT
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

FRESHMON will establish a network of service providers for satellite based monitoring of water quality and bathymetry in inland waters, rivers and coastal zones. As a GMES downstream service, the demands of both, industry and public sector, are taken into account.

Why is this project important for Europe?

FRESHMON will enlarge the European User community and improve the acceptance of Earth Observation products by integrating modelling and in-situ components. Further, the efficient exploitation of the upcoming European satellite programme Sentinel will be prepared.

How does your work benefit European citizens?

By providing operational up-to-date monitoring, the implementation of European environmental legislation will be promoted. On the long-term this will provide stimuli to the economic exploitation of GMES technology worldwide and strengthen European competitiveness.

FreshMon

High Resolution Freshwater Monitoring:
FreshMon GMES Downstream Services



LIST OF PARTNERS

- Brockmann Consult GmbH, Germany
- Water Insight BV, The Netherlands
- Suomen ympäristökeskus (SYKE), Finland
- Eidgenössische Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz (EAWAG), Switzerland

COORDINATOR

EOMAP GmbH&Co.KG, Germany

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PROJECT INFORMATION

High Resolution Freshwater Monitoring: FreshMon GMES
Downstream Services (FreshMon)
Contract no: 263287
Starting date: 01/12/2010
Duration: 36 months
EU Contribution: € 2.155.367.40
Estimated total cost: € 2.714.300



OPERR

Operational Pan-European River Runoff

MONITORING THE IMPACT OF CLIMATE CHANGE ON RIVER DISCHARGE

All populated areas in the world experience changes in river discharge due to climate change. Some areas face large increases in flood flows whilst others experience water scarcity. A hydrological model that can provide hind-cast data as well as predict daily river-runoff data is therefore necessary. The OPERR project takes on this challenge.

Climate change has vast consequences to the hydrological cycle. It causes increasing temperatures, which leads to extreme precipitation, for instance when large amounts of rain fall instead of snow; causing floods, or when rain does not fall at all, leading to droughts. In order to be prepared and able to predict the timing, the frequency and magnitude of flood and droughts in the often very populated areas where rivers run into seas, a daily hydrological model that produces river-runoff measurements is necessary.

In this respect, the OPERR project is set to provide two-fold support. Firstly, the project will provide data for monitoring and warning of flooding events, as well as data on predicted high concentrations of nutrients in flood water, which may have negative effects on coastal ecosystems. Secondly, the project will validate and apply

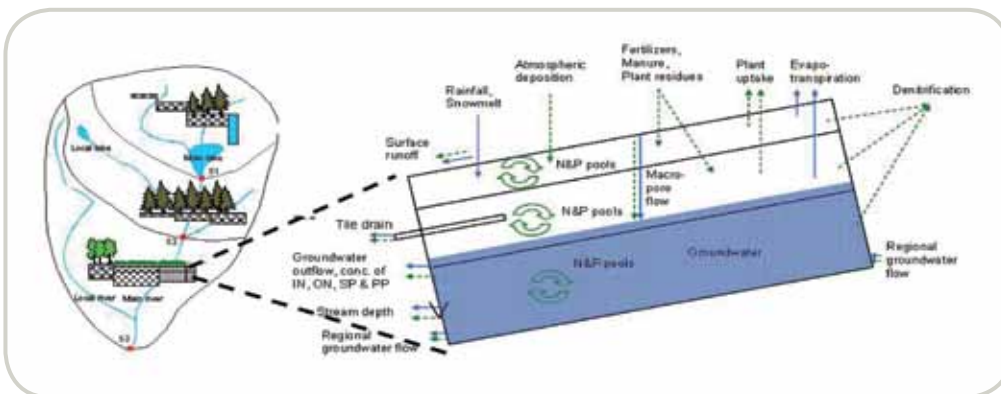
data for shelf sea models, supporting the performance of regional ocean models, which are effected by the relative degree of river discharge.

OPERR is based on an already running river discharge model, HYPE, developed by the GMES Geoland2 service project for the Baltic Sea. The new OPERR system will add value to this existing capability by responding to GMES downstream service needs to enhance coastal ocean models, and the work of regional environmental commissions such as HELCOM and OSPAR. Moreover, OPERR will add value to the existing model by integrating other parameters linked to soil type and land cover data taken from other GMES products and the CORINE database.



LENNART FUNKQUIST
IS PROJECT COORDINATOR

Applying such an integrated approach, OPERR will develop a GMES service that can be used by both environmental institutes and small businesses dealing with coastal management and operational shelf sea modelling.



© SMHI

OPERR will develop an operational real-time river discharge model covering all of Europe.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The result of the OPERR project will fill in an important gap in the availability of forecast and hindcast data of river discharge to both land areas and shelf seas. It addresses a pressing need for reasonable estimates of runoff and nutrient loads to coastal areas.

Why is this project important for Europe?

Several parts of Europe are affected by flooding events and increasing nutrient loads. This also affects coastal areas leading to increased blooming of harmful algae and oxygen-depleted bottoms. Hindcast data from OPERR can be used for climate scenarios and coastal management.

How does your work benefit European citizens?

Forecasts of river discharge can be used for warnings of severe flooding and water quality changes.

OPERR

Operational Pan-European River Runoff



LIST OF PARTNERS

- Sveriges Meteorologiska och Hydrologiska Institut, Sweden
- Meteorologisk Institut, Norway
- Havforskningsinstituttet, Norway
- Fundacion AZTI/AZTI Fundazioa, Spain
- Marine Hydrophysical Institute - Ukrainian National Academy of Sciences, Ukraine

COORDINATOR

SMHI, Sweden

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PROJECT INFORMATION

Operational Pan-European River Runoff (OPERR)

Duration: 24 months

EU Contribution: € 396.031

Estimated total cost: € 591.653



PanGeo

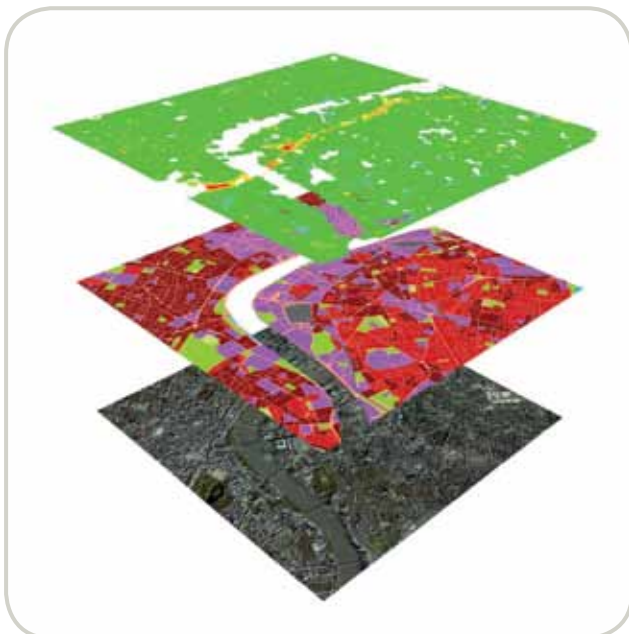
Enabling access to geological information in support of GMES

ENABLING IMPROVED ACCESS TO INFORMATION ABOUT URBAN GEOHAZARDS

Urban geohazards – subsidence, landslides, earthquakes, - can kill and injure people and cause substantial financial and environmental losses. However, the extent of these losses can be limited significantly given improved information on the nature and location of such geohazards. The PanGeo project aims to provide that improvement.

Across Europe, the GMES Urban Atlas provides detailed information about the composition of hundreds of cities. Such data are not only useful for urban planning, enabling better comparisons between cities, and subsequent detection of best practices for sustainable development, they may also be used as an effective tool for implementing better mitigation against geohazards.

In this respect, the PanGeo project is set to provide free and open access to geohazard information through a validated geohazard data layer for the 52 largest towns, encompassing some 13% of the EU's total urban population, thereby adding further value to the GMES Urban Atlas maps.



Optical USA PSI integration 3d display printout © PanGeo

PanGeo intends to enable free and open access to geological hazard information for the 52 largest towns in Europe.

Over the past decades, economic losses due to geohazards have increased, mainly due to urban expansion. To implement effective mitigation means improving knowledge about such hazards and making such information more accessible.

PanGeo responds to the demand within the EU for good quality geodata which can be used by people and organisations across the continent for better planning control and mitigation strategies subject to state-of-the-art service design, evaluation and validation.

The project will improve the Urban Atlas in the cities it covers, enhancing the availability of preliminary geohazard information as a means to progress towards the effective implementation of the INSPIRE directive. Also, PanGeo will support existing and ongoing work by the GMES service projects SAFER and Geoland2, adding value to their services.

Local authorities concerned with managing development risk, geological surveys who are obliged to collect geohazard data for public benefit, as well as policy makers concerned with assessing and comparing European geological risk are foreseen to become the primary users of PanGeo data.



REN CAPES
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to bring about an overall improvement in general knowledge about, and access to, information on geohazards. Also, there are GMES services for the sea, the air and land surfaces, but not for what's beneath the land – the geology. PanGeo helps to bring geology into GMES.

Why is this project important for Europe?

Geohazards cost the EU billions of Euros per year. PanGeo is not a panacea but can certainly help to alleviate some of these huge losses by facilitating better-informed decisions. PanGeo also exploits specific EU expertise in Earth observation InSAR technology.

How does your work benefit European citizens?

PanGeo can allow improved planning and development control by better-informing decision-makers and regulators who until now have little access to any information concerning geohazards. Also, individuals will be able to freely access information on geohazards within their locale.



LIST OF PARTNERS

- Fugro NPA Ltd, United Kingdom
- Natural Environment Research Council (British Geological Survey), United Kingdom
- Landmark Information Group, United Kingdom
- Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek (TNO), The Netherlands
- Systèmes d'Information à Référence Spatiale (SIRS), France
- Consorci Institut de Geomatica (Institute of Geomatics), Spain
- Bureau de Recherches Géologiques at Minières (BRGM), France
- EuroGeoSurveys, Pan-European
- Federation Europeenne des Geologues, EU
- AB Consulting, United Kingdom
- Tele-Rilevamento Europa, Italy
- Gamma Remote Sensing, Switzerland
- Altamira Information, Spain
- Geologische Bundesanstalt, Austria
- Institut Royal des Sciences Naturelles de Belgique, Belgium
- Ministry of Environment and Water, Bulgaria
- Ministry Agriculture, Natural Resources and Environment of Cyprus
- Ceska Geologicka Sluzba, Czech Republic
- Geological Survey of Denmark and Greenland, Denmark
- Eesti Geoloogiakeskus OÜ, Estonia
- Geologian tutkimuskeskus, Finland
- Bundesanstalt für Geowissenschaften und Rohstoffe, Germany
- Instituto Geologikon Kai Metalleytikon Ereynon, Greece.
- Magyar Állami Földtani Intézet, Hungary
- Department of Communications, Energy and Natural Resources, Ireland
- Istituto Superiore per la Protezione e la Ricerca Ambientale, Italy
- Latvijas Universitate, Latvia
- Lietuvos geologijos tarnyba prie Aplinkos ministerijos, Lithuania
- Administration des Ponts et Chaussées Direction, Luxembourg
- Malta Resources Authority, Malta
- Panstwowy Instytut Geologiczny, Poland
- Laboratório Nacional de Energia e Geologia, Portugal
- Institutul Geologic Al Romaniei, Romania
- Statny Geologicky Ustav Dionyza Stura, Slovakia
- Geološkega zavoda Slovenije, Slovenia
- Instituto Geológico y Minero de España, Spain
- Sveriges Geologiska Undersokning, Sweden

COORDINATOR

Fugro NPA Ltd, United Kingdom

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PROJECT INFORMATION

Enabling access to geological information in support of GMES (PanGeo)

Contract no: 262371

Starting date: 01/02/2011

Duration: 36 months

EU Contribution: € 2.404.925

Estimated total cost: € 3.225.066



SeaU

Multisensor Satellite Technologies for Oil Pollution Monitoring and Source Identification

PROTECTING MARINE ECOSYSTEMS

Oceans and seas are fundamental for sustainable development. However, the fragile balance of the marine environment is disrupted by human activities. The SeaU project is determined to improve and further develop the state of the art technology for monitoring the main pollutant - oil.

Seventy one per cent of Earth's surface is covered by water. The EU is determined to preserving these precious environmental assets. By 2021, the Union aims to achieve healthy marine environments by means of the Marine Strategy Framework Directive and the related Water Framework Directive. This legal framework requires monitoring programmes with a view to obtaining a comprehensive assessment of the state of the marine environment.

The SeaU project will provide new techniques to improve oil spill detection and assess environmental impact services at sea. In particular, the project aims to reduce the number of false alarms that are currently associated with the processing and interpretation of satellite image data in the marine domain.



Oil spill at sea © SeaU

SeaU will improve the current state-of-art methodology for Earth Observation based marine oil spill monitoring.

In doing so, SeaU will enhance the functionality of the CleanSeaNet (CNS) a pan European satellite based oil monitoring service run by the European Maritime Safety Agency (EMSA), which was launched in 2007. The project will assist in the further development and amelioration of this service.

Adding space data to in-situ measurements, the project is set to have significant positive economic impacts on the work of offshore oil producers, oil transporters as well as governments responsible for the protection of the marine ecosystems.

SeaU is led by a strong consortium, including leading European providers of operational oil spill monitoring services, and the project has strong synergies with the MyOcean GMES Marine Service project.



GUNNAR PEDERSEN
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

SeaU shall improve the current state-of-the-art methodology for satellite based oil spill detection and introduce the service to new user groups. SeaU will also work towards a harmonised pan-European service which will take full advantage of products from Marine Core Service (MyOcean).

Why is this project important for Europe?

Feedback from European users will be used to develop, demonstrate and validate new methods for satellite based oil spill detection. Results from the project will improve and enhance the functionality of the European oil spill detection service provided by EMSA.

How does your work benefit European citizens?

The aim is to establish a more reliable and accurate satellite based oil detection service. Swift and accurate warning of spills are crucial to initiate actions before the oil drifts on shore. Money can be saved and damages to the environment reduced if spills can be dealt with off-shore.

SeaU

Multisensor Satellite Technologies for Oil Pollution Monitoring and Source Identification



LIST OF PARTNERS

- Kongsberg Satellite Services, Norway
- e-GEOS, Italy
- Collecte Localisation Satellites, France
- Norwegian Computing Centre, Norway
- Nansen Environmental and Remote Sensing Centre, Norway
- EDISOFT, Portugal
- ACRI-ST, France

COORDINATOR

Kongsberg Satellite Services, Norway

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PROJECT INFORMATION

Multisensor Satellite Technologies for Oil Pollution Monitoring and Source Identification (SeaU)

Contract no: 263246

Starting date: 01/02/2011

Duration: 36 months

EU Contribution: € 1.982.400

Estimated total cost: € 3.078.441



SIDARUS

Sea Ice Downstream Services for Arctic and Antarctic Users and Stakeholders

EYES ON THE ARTICS

The Arctic regions are more affected by climate change than other parts of the globe. Temperature is increasing, sea ice is retreating during the summer and land ice decreases.

SIDARUS develops new ice services for climate research, marine safety and environmental monitoring.

Growing human activities combined with climate change have significant impact on the vulnerable environment both in the Arctic and Antarctic. To ensure sustainable development in these regions it is necessary to improve the monitoring and forecasting systems for the ice-covered seas. On this background SIDARUS develops new services for climate research, marine safety and environmental monitoring.

The services will focus on improved sea ice and iceberg mapping and forecasting as well as provision of sea ice thickness data. The melting of land ice combined with warming of the oceans lead to increased sea levels, which can have severe long term effects on populations in coastal areas.

Climate change in polar regions can also bring new opportunities such as new sailing sea routes in the Arctic and improved access to natural resources.

Increased ship traffic in polar regions will require higher standards of marine safety. The risk of environmental damage caused by an oil spill from a tanker, platform or pipeline should be minimized.

SIDARUS will also provide a method to monitor how marine mammals - whales and seals - cope with the new environmental challenges, by combining ARGOS satellite tracking with detailed sea ice images from satellites.

Bringing together some of the leading organisations in Europe in this challenging field, SIDARUS proposes an innovative and sustainable ice service which will enhance our understanding of some of the most extreme areas of the world we live in.



STEIN SANDVEN
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

SIDARUS will implement a set of sea ice downstream services in the area of climate research, marine safety and environmental monitoring. SIDARUS will extend the present GMES services with new satellite-derived sea ice products, ice forecasting from regional models and validation of sea ice products using non-satellite data.

Why is this project important for Europe?

The demand for improved sea ice information in the Arctic and Antarctic by many user groups is growing as a result of climate change and its impact on the environment and human activities. Europe will contribute to the global observing system (GMES, GEO) using European satellites.

How does your work benefit European citizens?

European operational agencies, companies and scientists working with sea ice monitoring and forecasting, sea ice operations and development of Arctic technology will benefit from the services because new, high-resolution data on sea ice and icebergs will be provided.



© z576 - Fotolia.com

SIDARUS seeks to establish a set of sea ice services for climate research, marine safety and environmental monitoring in the Arctic and Antarctic regions.

SIDARUS

Sea Ice Downstream Services for
Arctic and Antarctic Users and Stakeholders



LIST OF PARTNERS

- Nansen Environmental and Remote Sensing Center (NERSC), Norway
- Alfred Wegener Institute for Polar and Marine Research (AWI), Germany
- Collecte Localisation Satellites SA (CLS), France
- University of Bremen, Institute of Environmental Physics UB), Germany
- University of Cambridge, Department of Applied Mathematics and Theoretical Physics (UCAM), United Kingdom
- Norwegian Meteorological Institute (met.no), Norway
- Nansen International Environmental and Remote Sensing Center (NIERSC), Russia
- B.I. Stepanov Institute of Physics (IP-NASB), Belarus

COORDINATOR

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PROJECT INFORMATION

Sea Ice Downstream Services for Arctic and Antarctic
Users and Stakeholders (SIDARUS)
Starting date: 01/01/2011
Duration: 36 months
EU Contribution: €2.498.507
Estimated total cost: € 3.474.730



BIO_SOS

BIOdiversity Multi-Source Monitoring System: From Space TO Species

CATCHING ENVIRONMENTAL OFFENDERS FROM SPACE

Detecting and managing change is always a challenge but particularly so when change takes place in an area targeted to become a protected NATURA 2000 site, since many changes are gradual and their character and impact differ significantly.

Areas bordering protected NATURA 2000 sites and set to become such sites are particularly prone to illegal environmental abuse, including higher than average rates of forest fires, logging, mining, poaching and spillage of waste. Countering such 'sunset' or 'spillover' activities is difficult without high resolution maps that establish exactly where such activities change the landscape.

The BIO_SOS project will respond to this challenge by providing 'change maps' through an operational system based on high definition satellite technology combined with in-situ data, which will enable local authorities to take appropriate action against environmental offenders.

By comparing 'before' and 'after' images of such events, impacts on current and proposed NATURA 2000 sites can be identified in a timely manner.

For such a service, BIO_SOS will develop operational methodologies beyond the current state-of-the-art in Europe as novel, operational and automated procedures based on high and very high spatial and spectral resolution EO data to generate better maps of habitats and land cover change. The procedures will sit within a modelling framework for automated provision of biodiversity indicators which will allow for a deeper understanding of the impacts of human-induced pressures.

Particular emphasis will be placed on the Mediterranean region, which has been subject to an increased number of forest fires and other environmental abuses in recent years, some of which are linked to criminal activities

Moreover, BIO_SOS results are set to have a positive impact that goes beyond the Mediterranean and the EU by means of inclusion of test sites in the Amazon forest of Brazil and the inclusion in the project consortium of a partner from India.



PALMA BLONDA
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The development of an operational automatic ecological modeling system suitable for effective and timely monitoring of NATURA 2000 sites and their surroundings in areas exposed to combined types of pressures on Biodiversity.

Why is this project important for Europe?

BIO-SOS will strongly support the reporting for the CBD, the European Biodiversity Strategy and the Habitat Directive in close cooperation with on-going FP6/FP7 projects. The proposed operational system will provide an original contribution to GEOSS and GMES international programmes.

How does your work benefit European citizens?

BIO-SOS will become central to the whole process of managing biodiversity and its services, which are at the base of citizens' health and well-being. The participation of stakeholders will ensure that relevant information will also be delivered to national and local authorities.



Dalyan Wetland Turkey © anemone - Fotolia.com

BIO_SOS provides high definition land cover and habitat maps for change detection and biodiversity monitoring in areas next to, or waiting to become NATURA 2000 sites.

BIO_SOS

BIOdiversity Multi-Source Monitoring System: From Space TO Species



LIST OF PARTNERS

- Consiglio Nazionale delle Ricerche, Italy
- University of Ioannina - Department of Environmental and Natural Resources, Greece
- Centre for Research and Technology Hellas, Greece
- Alterra, Stichting Dienst Landbouwkundig Onderzoek, The Netherlands
- Ashoka Trust for Research in Ecology and the Environment, India
- Planetek Italia s.r.l., Italy
- Altamira Information SL, Spain
- Università degli Studi di Bari Aldo Moro - Dipartimento di Scienze delle Produzioni Vegetali, Italy
- Instituto de Ciencias e Tecnologias Agraria e Agro-Alimentares, Portugal.
- Università degli Studi di Milano-Bicocca, Dipartimento di Scienze dell'Ambiente e del Territorio, Italy
- Aberystwyth University, Institute of Geography and Earth Sciences, UK
- Institute de Recherche pour le Développement, France
- Planetek Hellas e.p.e., Greece
- Italian Space Agency, Italy
- Baraldi Consultancy in Remote Sensing, Italy

COORDINATOR

**Consiglio Nazionale delle Ricerche.
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PROJECT INFORMATION

BIOdiversity Multi-Source Monitoring System:
From Space TO Species (BIO_SOS)
Contract no: 263435
Starting date: 01/12/2010
Duration: 36 months
EU Contribution: € 2.476.363,71
Estimated total cost: € 3.102.083,77



GLOWASIS

A collaborative project aimed at pre-validation of a GMES Global Water Scarcity Information Service

DEALING WITH WATER SCARCITY IN EUROPE

In Europe, water scarcity is a growing problem. Increased demand collides with strains on supply exacerbated by climate change, creating critical situations in many regions, in particular in the Mediterranean. The GLOWASIS project therefore supports climate, drought and water demand studies, and strengthens support for preparatory activities that pave the way for future European water scarcity and droughts policies.

“Water is life”, so for most of us it is hard to imagine that safe, clean and enough water is not something that can be taken for granted. However, water scarcity is no longer confined to developing countries in the South is a new reality in Europe. Today, all Mediterranean countries, and almost a third of the EU’s population are affected by water scarcity and droughts.

At European level, the EU’s Water Framework Directive was the first piece of legislation that addressed both water quantity and quality. The directive requires that actions are taken, which ensure a sustainable balance be-

tween water abstraction and the replenishment of supplies. Effective implementation of this directive requires dedicated monitoring of progress in each Member State. The GLOWASIS project provides valuable assistance in this respect as it is set to help evaluate the implementation of the Water Framework Directive in all Member States, whilst bringing us new insights into our most important environmental resource, water, and how it is affected by climate change.

Water scarcity and droughts have negative effects on all ecosystems and public health in Europe. Hence reliable and easy to use data monitoring this situation are needed. GLOWASIS answers to this need with the provision of open-standard model, EO and in-situ data, adding further value to existing sources of information provided by the GMES land and marine service projects Geo-land2 and MyOcean.



ROGIER WESTERHOFF
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

GLOWASIS will be a dedicated water scarcity information portal where governmental and statistical water demand data are combined with standardized in-situ and satellite data and hydrological forecasting models for water managers, researchers and the public.

Why is this project important for Europe?

Europe’s GMES data on a diverse range of water parameters will be combined and presented for easy and interoperable use in water scarcity assessments and short term and climate forecasting on a European and global scale.

How does your work benefit European citizens?

GLOWASIS will aim for provision of water scarcity information with open standards, thus providing a transparent user friendly information portal. European citizens will profit from this valuable data when combating droughts without being hindered by unnecessary data format negotiation delays or other transboundary data issues.



© GLOWASIS

GLOWASIS combines in-situ satellite data and hydrological forecasting models to create an open-standard European information portal on global water scarcity information.

GLOWASIS

A collaborative project aimed at pre-validation of a GMES Global Water Scarcity Information Service



LIST OF PARTNERS

- Stichting Deltares, Netherlands
- Consiglio Nazionale Delle Ricerche, Italy
- European Centre for Medium-range Weather Forecasts, United Kingdom
- JRC – Joint Research Centre – European Commission, Belgium
- Netherlands Geomatics & Earth Observation B.V, Netherlands
- Universiteit Utrecht, Netherlands
- Technische Universitaet Wien, Austria
- Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek – TNO, Netherlands
- Universidade de Santiago de Compostela, Spain
- Instytut Meteorologii i Gospodarki Wodnej, Poland
- University of Kwazulu-Natal, South Africa

COORDINATOR

Stichting Deltares, Netherlands

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PROJECT INFORMATION

A collaborative project aimed at pre-validation of a GMES Global Water Scarcity Information Service (GLOWASIS)

Contract no: 262255

Starting date: 01/01/2011

Duration: 24 months

EU Contribution: € 2.315.525

Estimated total cost: € 2.983.402



ISAC

Information Service on Agricultural Change

DEALING WITH DROUGHTS IN AN ERA OF CLIMATE CHANGE

Humans have always made use of land to obtain food and other essentials, yet the last two decades has seen unprecedented and rapid changes in Earth's terrestrial surface. Taking on this challenge, the ISAC project intends to improve the current state-of-the-art for agricultural monitoring.

Today extensive use of Earth's terrestrial surface is about to change the face of our planet, deforestation being an important characteristic of these dramatic developments. In Europe, agriculture is regulated through the Common Agricultural Policy (CAP), and private agricultural insurances provide means for drought risk management and mitigation, which is gaining importance as a result of climatic changes.

Meanwhile, in the developing world droughts and other natural disasters make populations more vulnerable to famines and starvation. EU development policy and the Union's emergency response mechanism are means that

aim to mitigate the negative impact of these changes outside Europe.

The ISAC project will develop services in support of such efforts to deal more effectively with climate change. It is designed at the benefit of authorities in Europe and in developing countries, such as in Africa, and, of the insurance sector. Hence the project covers a broad range of sites from mild risk (Belgium) over severe (Spain) to extreme risk (Ethiopia) drought conditions.

Based upon high resolution satellite data from recent DMC/Deimos sensors that are set to expand the capabilities of the GMES Land Monitoring Service and the GMES Emergency Response Service in the agro environment domain, ISAC complements the outputs from existing GMES service projects Geoland2 and SAFER.



ISABELLE PICCARD
IS PROJECT COORDINATOR



© ISAC

ISAC supports European and African authorities and the insurance sector in monitoring agriculture.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

ISAC aims to develop information services on drought stress and agricultural change in support of the needs of the authorities and insurers involved. Existing methodologies will be significantly improved through the use of frequently available satellite data with high spatial detail.

Why is this project important for Europe?

There is a clear need for transparent and reliable information on our changing agro environment in Europe. Further, the EU made commitments to provide assistance to developing countries, such as in Africa where climate change is expected to have the most impact.

How does your work benefit European citizens?

Climate change is a concern of every citizen. ISAC will provide governments and insurance companies, development planners and humanitarian actors with spatial information concerning drought risks and agricultural productivity according to various climate change scenarios.

ISAC

Information Service on Agricultural Change



LIST OF PARTNERS

- Vlaamse Instelling voor Technologisch Onderzoek (VITO) N.V., Belgium
- Deimos Imaging S.L., Spain
- Internationales Institut für Angewandte Systemanalyse (IIASA), Austria
- GeoSAS Consulting Service PLC, Ethiopia
- Infoterra Limited, United Kingdom

COORDINATOR

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PROJECT INFORMATION

Information Service on Agricultural Change (ISAC)
Contract no: 262937
Starting date: 01/01/2011
Duration: 30 months
EU Contribution: € 1.250.757
Estimated total cost: € 1.656.762



MS.MONINA

Multi-scale Service for Monitoring NATURA 2000 Habitats of European Community Interest

MONITORING EUROPE'S MOST PRECIOUS ECOSYSTEMS

1992 in Rio, the world united for enhanced nature conservation, adopting the Convention on Biological Diversity (CBD). In Europe, the NATURA 2000 network of natural areas and eco-systems of community interest has become one of the world's most effective means to achieve these goals. MS.MONINA develops services to further enhance this positive record.

Protecting nature and biodiversity in the European Union follows a multi track approach, integrating local, national, and European policies and instruments. At European level, the Habitats and Birds Directives form the legal basis of the NATURA 2000 network, which provides a continent wide green infrastructure that safeguards numerous ecosystem services and ensures that Europe's natural systems remain healthy and resilient. Today, the NATURA 2000 network covers some 18 percent of the EU.

Every six years, EU member states have to report on the state of natural habitats within their NATURA 2000 sites. Therefore, services that enable objective, operational and economically priced information about the state of the environment within such sites is on demand.

The MS.MONINA project is designed to provide such services, not only at the benefit of national authorities, but

also aimed at local authorities that manage these sites, and EU authorities that oversee the overall development of the NATURA 2000 programme. Hence the project is designed to provide three different kinds of services; integrating data from satellites and in-situ measurements at the sites.

At the local level the project will support site monitoring with information products meeting the requirements of site managers. These products are derived from high resolution satellite images and reflect habitat status and changes.

At the national level, the project engages in complete reporting on sensitive sites and habitats, delivered to national authorities responsible for reporting on the implementation of the Habitats Directive.

At European level MS.MONINA supports region wide reporting on the implementation of the Convention on Biological diversity within the EU.



STEFAN LANG
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The project shall use EO technology to effectively monitor nature sites of community interest and thus fostering environmental legislation in Europe. Our tools will also observe precious habitats outside the existing network of protected areas to reduce the loss of biodiversity.

Why is this project important for Europe?

The integrated multi-level service concept helps ambitious instruments such as NATURA 2000 succeed on different levels of implementation. Europe's outstanding EO-based monitoring tools will encourage other countries for such environmental legislation in the spirit of the CBD.

How does your work benefit European citizens?

Citizens will realise that EO is a powerful tool for biodiversity monitoring. It is one of the critical societal benefit areas of this technology. In the longer term the conservation of precious ecosystems will ensure an integral part in supporting life for every single citizen.



© MS.MONINA

MS.MONINA supports European, national and local authorities in monitoring the state of European nature sites of 'community interest'.

MS.MONINA

Multi-scale Service for Monitoring
NATURA 2000 Habitats of European Community Interest



LIST OF PARTNERS

- Paris-Lodron-Universität Salzburg, Austria
- Universidad de Málaga, Spain
- Centre national du machinisme agricole, du genie rural, des eaux et des forets (CEMAGREF), France
- Vlaams Gewest (INBO), Belgium
- EFTAS Fernerkundung Technologietransfer GmbH, Germany
- Vlaamse Instelling voor Technologisch Onderzoek n.v., Belgium
- National Observatory of Athens, Greece
- Accademia Europea per la Ricerca Applicata ed il Perfezionamento Professionale Bolzano, Italy
- Rheinische Friedrich-Wilhelms-Universität Bonn, Germany
- Instytut geodezji i kartografii, Poland
- Technische Universität Berlin, Germany
- Eovision GmbH, Austria
- Specto Natura Limited, United Kingdom
- Mouseio goulandri fysikis istorias, Greece
- Lup-Luftbild Umwelt Planung GmbH, Germany
- Landesamt für Landwirtschaft, Umwelt und Ländliche Räume des Landes Schleswig-Holstein, Germany
- Conservatoire des espaces naturels du Languedoc Roussillon Association, France

COORDINATOR

**Paris-Lodron University Salzburg, Centre for
Geoinformatics, Austria**

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PROJECT INFORMATION

Multi-scale Service for Monitoring NATURA 2000
Habitats of European Community Interest (MS.MONINA)
Contract no: 263479
Starting date: 01/12/2010
Duration: 36 months
EU Contribution: € 1.963.037,20
Estimated total cost: € 2.528.215,70



MyWater

Merging Hydrologic models and EO data for reliable information on Water

IN A DRY WORLD, MAKING THE MOST OF SCARCE WATER RESOURCES

21st century reality sees 2.5 billion people without adequate access to water, whilst climate changes lead to dramatically changing water resources needs. The MyWater project responds to these challenges, implementing a new information platform that combines different types of information to better assess hydrological processes.

Throughout the world, population growth, expansion of irrigated agriculture, climate change and economic development drive important changes in land use. Such changes impact the three watershed variables - evapotranspired water, biomass production and soil organic matter content. Therefore, reliable assessment of the consequences of land use changes requires the capability to integrate the effect of these variables.

Such information is valuable for decision makers, who are aware that water availability is essential for socio-economic activities, and that citizens expect necessary measures to be taken in order to assure availability of water for human production and consumption.

The MyWater project is set to provide such critical information through the implementation of an information platform that will combine different types of information, taking into account the watershed variables, in order to assess hydrological processes and phenomena in the challenging context of enhanced crop water demand and limited water supply for irrigation and consumption purposes.

In doing so, the project will develop a water management system that integrates satellite data models and in situ data, improving knowledge and enhancing forecasting capabilities, whilst at the same time optimizing the cost/benefit ratio for water resources monitoring.

In the future, hydrological changes will influence all citizens, and authorities will need more reliable information to adapt to the new situation. MyWater provides an important information tool in support of this challenge.



PAULO GOMES
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

With MyWater every local user will have easy access to accurate and accessible tools or services to support informed decision making in the field of water usage. It's generalized usage will play a major role in relation to the final goal of achieving the good ecological status of water bodies.

Why is this project important for Europe?

In the framework of the WFD the European countries are now implementing River Basin Districts Management Plans to provide water managers with tools to help them in having a global view of basin problems and best solutions. MyWater can give a major contribution on this matter.

How does your work benefit European citizens?

MyWater will support European citizens by providing accurate and accessible tools and services to support water managing in Europe achieving at the same time a good ecological balance and without compromising on local human activities.



flowering of dandelions over mountain lake © Julia Britvich - Fotolia.com

MyWater implements an information platform devoted to providing reliable information on water quantity, quality and usage for appropriate water management.

MyWater

Merging Hydrologic models and EO data
for reliable information on Water



LIST OF PARTNERS

- GMVIS Skysoft SA, Portugal
- Instituto superior técnico, Portugal
- Hidromod modelacao em engenharia LDA, Portugal
- UNESCO-IHE Institute for Water Education, The Netherlands
- Hydrologic research BV, Netherlands
- Joint Research Centre - European Commission, EU
- Instituto nacional de pesquisas espaciais, Brazil
- Pannon egyetem, Hungary
- Αριστοτελειο πανεπιστημιο θεσσαλονικης, Greece
- Universidade eduardo mondlane, Mozambique

COORDINATOR

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PROJECT INFORMATION

Merging Hydrological models and EO data for reliable
information on Water (MyWater)

Contract no: 263188

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 2.273.832

Estimated total cost: € 2.915.842



RECOVER

Science based remote sensing services to support REDD and sustainable forest management in tropical region

FOREST INTELLIGENCE TO SAVE TREES

Deforestation and forest degradation is responsible for more than 15 percent of global greenhouse gas emissions. Fighting these phenomena, the ReCover project is set to develop state-of-the-art service capabilities for enhanced forest monitoring.

The Reducing Emissions from Deforestation and Forest Degradation (REDD) initiative is an integral part of global climate change negotiations; as such, it is expected to play a crucial role as part of the successor regime to the current Kyoto Protocol. In recent years, the global importance of forests as planetary carbon sinks has been acknowledged. The ReCover project supports the REDD initiative. Its main research focus is to develop a sound statistical concept and accuracy assessment procedure that enables the generation of more reliable estimates for forest degradation and change, as well as enhanced biomass estimates. The project will use optical and radar remote sensing data from satellites, together with in situ measurements in order to generate forest intelligence products.

Indeed, obtaining more precise measurements of the carbon storage “services” provided by forests is paramount in particular in the world’s tropical region when furthering sustainable forest management. Socio-economic, ethical and cultural factors often contribute to deforestation and forest degradation. Forest intelligence services by ReCover may play a major role in countering those factors.

Moreover, if successful, ReCover will also constitute a major step towards the future sustainability and competitiveness of European Earth Observation services for the green economy, such as the carbon market, sustainable forest management, and environmental management in general.



TUOMAS HÄME
IS PROJECT COORDINATOR



foret, laos © J-F Perigois - Fotolia.com

ReCover supports the fight against deforestation and forest degradation in the tropical region.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to create a novel concept for the monitoring of tropical forest and its biomass by improving the accuracy and reliability. The satellite data based system will help the users to fight deforestation and forest degradation and to practise sustainable forest management.

Why is this project important for Europe?

ReCover will improve the international position of Europe as the forerunner of sustainable development. It also increases the competitiveness of the European value added services in Earth Observation.

How does your work benefit European citizens?

Sustainable development globally in natural resources management is in everybody’s interest. The sustainability will improve both business and employment opportunities as well as the stability of the societies thus decreasing the likelihood of conflicts.

RECOVER

Science based remote sensing services to support REDD and sustainable forest management in tropical region



LIST OF PARTNERS

- VTT Technical Research Centre of Finland, Finland
- Albert-Ludwigs-Universität Freiburg, Germany
- Arbonaut, Finland
- Colegio de Postgraduados, Mexico
- El Colegio de de la Frontera Sur, Mexico
- GMV Aerospace and Defence SA Unipersonal, Spain
- Northern Research Institute Tromsø, Norway
- University of Wageningen, Netherlands

COORDINATOR

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PROJECT INFORMATION

Science based remote sensing services to support REDD and sustainable forest management in tropical region (ReCover)

Contract no: 263075

Starting date: 01/11/2010

Duration: 36 months

EU Contribution: € 2.499.560

Estimated total cost: € 3.592.028



REDDAF

Reducing Emissions from Deforestation and Degradation in Africa

GMES IN THE CONGO BASIN

Tropical forests are important ecosystems that have systemic impacts on biodiversity, water cycles, micro-and macroclimates at regional and global levels. Threats to these forests are posed by changes in land use, forest fires, legal and illegal logging, which all lead to a loss in biomass and the related increase of carbon dioxide (CO₂) emissions. In the context of climate change mitigation, the United Nations Framework Convention on Climate Change (UNFCCC) is introducing a Post-Kyoto Protocol mechanism to reduce deforestation and forest degradation (REDD).

The Congo Basin is the site of the world's second largest tropical forest: a carbon sink of global importance. The countries in the Congo Basin require support to implement REDD activities. More specifically they need improved monitoring systems based on spatially accurate and timely data for forest management. Responding to this challenge, the REDDAF project aims to develop pre-operational forest monitoring services in Cameroon and Central African Republic. The main activities proposed are:

- Country specific user requirements to identify the needs of stakeholders in terms of instituting REDD projects;

- Carbon stock accounting: research and development of methods for improved EO/ in-situ data applications to estimate areal extent of deforestation and forest degradation as well as biomass stock;

- Technology Transfer and Capacity Building to the country to ensure that project results, methodologies and lessons learned are provided in a manner to best support the work of national and regional counterparts.

The services and products that will be delivered to the user community include forest cover maps and forest cover change maps for 1990–2000 and 2000–2009/10, land use changes based on six IPCC compliant land use classes; degradation maps, biomass maps and the relevant digital datasets.



THOMAS HÄUSLER
IS PROJECT COORDINATOR



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REDDAF supports countries in the African Congo Basin in monitoring deforestation and forest degradation more effectively.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

REDDAF will establish innovative services based on EO and in-situ measurements which respond to the needs of the users in the Congo Basin Region. The services are related to the Monitoring, Reporting and Verification (MRV) requirements within the new REDD policy process.

Why is this project important for Europe?

REDDAF will provide important research and operational results on the implementation of REDD in the Congo Basin; in this way the project brings Europe into the forefront of development of technologies and their transfer for REDD implementation in Africa.

How does your work benefit European citizens?

It is expected that REDD services will support the tropical countries in preserving their natural resources and providing one of the most immediate impact on carbon emission reduction. In this sense all citizens in Europe and worldwide will benefit from climate change mitigation.

REDDAF

Reducing Emissions from Deforestation and Degradation
in Africa



LIST OF PARTNERS

- GAF AG, Germany
- MESAconsult, Germany
- SIRS, France
- University Paul Sabatier Toulouse III, CESBIO, France
- Joanneum Research, Austria
- Geospatial Technology Group SARL, Cameroon
- University of Bangui, Central African Republic

COORDINATOR

GAF AG, Germany

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PROJECT INFORMATION

Reducing Emissions from Deforestation and
Degradation in Africa (REDDAF)

Contract no: 262775

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 2.469.597

Estimated total cost: € 3.638.915



SIRIUS

Sustainable Irrigation water management and River-basin governance: Implementing User-driven Services

GROWING FOOD IN HOT AND DRY ENVIRONMENTS

Climate change directly impacts food production. As temperatures rise, irrigation water is increasingly needed to keep crops growing during the warm summer months. Yet water too is a scarce resource. Therefore efficient water resource management is paramount to sustainable agriculture. The SIRIUS project takes on this challenge.

Water is a critical resource worldwide and water conflicts are arising in many regions, with available resources diminishing in quantity and quality and the range of uses in competing sectors increasing. Water for food production represents by far the largest share among all uses and its demand keeps growing with increasing population and changing diets. Lack of water can adversely affect the economic and social stability of entire regions.



Campo irrigato con riflesso di colore © Robbic - Fotolia.com

SIRIUS will develop efficient water resource management services in support of food production in water-scarce environments.

In the coming decades, dealing with the effects of climate change is foreseen to become a significant challenge for Europe's farmers. Dealing with hot and dry forecasts for the summers ahead, the agricultural industry needs irrigation water to keep food production at its current levels. However, in Europe as in other parts of the world, water is increasingly a scarce resource. Getting the balance right between rising demand and a limited supply of water is a major challenge. Indeed, efficient water resource management in water-scarce environments is key to the long-term sustainability of Europe's agricultural sector.

The SIRIUS project is set to provide new insights and operational tools into this particular field of resource management, addressing the water challenge in accordance with the vision of bridging and integrating sustainable development and economic competitiveness.

The project will develop new services for water managers and food producers, including maps detailing irrigation water requirements in different areas, crop water consumption estimates, and a range of additional further products for sustainable irrigation, water use and management under conditions of water scarcity, and drought.

Applying an integrated approach, SIRIUS will develop a GMES service that takes into account the economic, environmental, technical, social and political dimensions of the food-water challenge.



ANNA OSANN
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

SIRIUS will implement innovative water saving technologies, using methodologies and tools that encourage local participation. It seeks to improve irrigation management using adaptive measures to safeguard food security, revitalize the irrigation sector and boost agribusiness.

Why is this project important for Europe?

SIRIUS will contribute to the sustainability and competitiveness of value-adding services, including developing European GMES business infrastructure. Europe's water footprint is significantly externalised, and increasing self-sufficiency is therefore a desirable goal.

How does your work benefit European citizens?

SIRIUS will make GMES more visible to Europe's citizens with regards to food security in the context of increasing water scarcity in many parts of Europe. A participatory process will involve local communities, decision-makers, water managers, agribusinesses and farmers.

SIRIUS

Sustainable Irrigation water management and River-basin governance: Implementing User-driven Services



LIST OF PARTNERS

- Integrated Resources Management (IRM) Company Limited, Malta
- Fundação da Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Portugal
- Infoterra Limited, United Kingdom
- Istituto Nazionale di Economia Agraria, Italy
- ARIESPACE SRL, Italy
- Universidad Politécnica de Valencia, Spain
- Diputación de Alicante, Spain
- Institut de Recherche pour le Développement, France
- Institutul National De Cercetare - Dezvoltare Pentru
- Imbunatatiri Funciare - I.N.C.D.I.F. - "ISPIF" Bucuresti, Romania
- Institute of Agricultural Economics, Romania
- Sveriges Meteorologiska och Hydrologiska Institut, Sweden
- EA-TEK Uluslararası Arastırma Gelistirme Mühendislik Yazılım ve Danışmanlık Limited Şirketi, Turkey
- Ministry of Water Resources and Irrigation, Egypt
- Colegio de Postgraduados, Mexico
- Servicios de Estudios en Ingeniería y Sistemas S.A. de C.V., Mexico
- Bangalore University, India
- Instituto Nacional de Pesquisas Espaciais, Brazil

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PROJECT INFORMATION

Sustainable Irrigation water management and River-basin governance: Implementing User-driven Services (SIRIUS)

Contract no: 262902

Starting date: 01/10/2010

Duration: 36 months

EU Contribution: € 2.499.997

Estimated total cost: € 2.934.817



DOLPHIN

Development of Pre-operational Services for Highly Innovative Maritime Surveillance Capabilities

BETTER LAW ENFORCEMENT AT SEA

The European Union is committed to enhancing safety and security at sea along its maritime borders. New technologies are needed to address this challenge. The DOLPHIN project paves the way for their development.

Effective maritime surveillance is needed in order to address multiple contemporary challenges, from efficient fisheries control, and marine environmental protection, to law enforcement activities along the EU's maritime borders.

Satellite technologies provide important means to facilitate such surveillance. Yet the current state-of-the-art in this field of remote sensing at sea may be enhanced through the development of technologies enabling a more interoperable surveillance system.

Interoperability at sea means bringing together existing monitoring and tracking systems used for maritime security and safety, fisheries control, protection of the marine environment, control of external borders and other law enforcement activities.

The project DOPHIN explores how maritime situational awareness can be enhanced by the use of space as-

sets that support operations carried out by civilian and military authorities such as monitoring of sea pollution, maritime traffic, and the fight against illegal trafficking of human beings and drugs.

Indeed, DOLPHIN aims at filling the identified technological gaps in current operational surveillance systems, in accordance with specific policy-driven requirements and scenarios arising from the EU. In particular, DOLPHIN will facilitate the detection of "small and non-cooperative maritime objects" by means of innovative radar satellite technologies in response to such policy needs.

Bringing together a consortium of partners with a solid background and expertise in the marine surveillance domain, DOLPHIN builds upon the achievements of previous projects in the area of GMES marine security, such as LIMES.



SERGIO PROIETTI
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

DOLPHIN aims at developing new tools providing effective improvements of the state of art capabilities in Maritime Surveillance with respect to users' needs, in particular by filling present Technological Gaps and by developing new algorithms and Decision Support Modules.

Why is this project important for Europe?

DOLPHIN allows the whole of Europe to be updated to face the already known and incoming issues related to the maritime field, implementing technological solutions at the forefront within the maritime services based on space assets. It involves reference European maritime Users.

How does your work benefit European citizens?

Public authorities' institutional tasks in maritime surveillance for security and environmental purposes will be enhanced by DOLPHIN innovation and policy driven Decision Support Modules. Citizens will then directly benefit from DOLPHIN results.



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The DOLPHIN project addresses technological shortfalls that limit effective law enforcement at sea.

DOLPHIN

Development of Pre-operational Services for
Highly Innovative Maritime Surveillance Capabilities



LIST OF PARTNERS

- e-GEOS Spa, Italy
- Kongsberg Satellite Services As, Norway
- Qinetiq Limited, United Kingdom
- Syseco Sprl, Belgium
- Space Hellas S.A., Greece
- Collecte Localisation Satellites, France
- Forsvarets Forskninginstitut, Norway
- Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek – TNO, The Netherlands
- Deutsches Zentrum Fuer Luft - Und Raumfahrt Ev, Germany
- Selex Sistemi Integrati Spa, Italy
- Edisoft-Empresa De Serviços E Desenvolvimento De Software As, Portugal
- European Union Satellite Centre, EU
- Thales Alenia Space France, France
- Aster, Italy
- Universita Degli Studi Di Napoli Federico II, Italy
- Università Degli Studi Di Roma La Sapienza, Italy
- Instituto De Telecomunicacoes, Portugal
- Oceanwaves Gmbh, Germany
- Thales Alenia Space Italia Spa, Italy
- Gauss Gesellschaft Fur Angewandten Umweltschutz Und Sicherheit Im Seeverkehr Mbh, Germany

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PROJECT INFORMATION

Development of Pre-operational Services for
Highly Innovative Maritime Surveillance Capabilities
(DOLPHIN)

Contract no: 263079

Duration: 30 months

EU Contribution: € 3.992.375

Estimated total cost: € 7.053.006



NEREIDS

New Service Capabilities for Integrated and Advanced Maritime Surveillance

SPACE FOR A MORE EFFECTIVE AND CAPABLE EUROPE AT SEA

Space is a means for a safer world, and the S in GMES an important outlet for harvesting this potential. The NEREIDS project explores new ways to enhance security through maritime surveillance.

From the mid-Atlantic through the Mediterranean to the Horn of Africa, the European Union is faced with important security challenges at sea. Illegal drugs smuggling, trafficking of human beings and piracy constitute key threats to the EU and its Member States, and have been recognised as such in the EU's 2003 and 2008 security strategies (ESS).

With the world economy relying on sea routes for 90 percent of its trade, enhancing the effectiveness of maritime surveillance is a pivotal part of making Europe "more effective and capable" in dealing with contemporary security challenges – a stated aim of the ESS.

Maritime situational awareness by means of remote sensing data from satellites is a promising means for enhancing such surveillance, with the potential to integrate such technological achievements into Europe's Global

Monitoring for Environment and Security (GMES) system, set to become operational by 2014.

The NEREIDS project will explore how such efforts may become part of an operational S in GMES. In this respect, the project will develop an open architecture toolbox for such integration, which may be used to simplify the process of defining, implementing, testing and running live demonstrations with new Earth observation (EO) based capabilities for maritime surveillance in the GMES context. NEREIDS will persecute the best utilisation of existing Space infrastructure for maritime surveillance. Moreover, responding to concrete contemporary challenges, the project will undertake a series of demonstrations, applying remote sensing technologies to combat piracy and illegal fishing, address trafficking of drugs and human beings, and undertake traffic monitoring of vessels in real time.



CELESTINO GÓMEZ-CID
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The overall Objective of the NEREIDS project is to make a step forward in the utilisation of space based technologies in the support of Maritime Surveillance activities. NEREIDS will bring required tools, techniques and products to users in the context of an integrated maritime policy.

Why is this project important for Europe?

Europe is strongly linked to the sea and maritime resources are critical to Europe's economy. Better understanding of the maritime domain and its utilisation is a key to warranty maritime sustainable economy. NEREIDS will bring improved information for a better management of seas.

How does your work benefit European citizens?

NEREIDS activities will bring improved information on different maritime domains: fisheries, border control, maritime traffic, environment, illegal trafficking control. This information will be used to bring a more secure and more sustainable environment to all EU citizens.



structure d'un navire © Daoud - Fotolia.com

NEREIDS develops a toolbox for the use of GMES in the context of maritime surveillance

NEREIDS

New Service Capabilities for Integrated and Advanced Maritime Surveillance



LIST OF PARTNERS

- GMV Aerospace and Defence S.A.U, Spain
- Eosphere Limited, United Kingdom
- Aratos Anonymos Eteria Anaptyxis, Paragogis & Emporias Proionton Pliroforikis & Ipsilis Technologias (Aratos Technologies S.A.), Greece
- JRC –Joint Reasearch Centre – European Commission, Belgium
- Universitat Politecnica de Calalunya, Spain
- Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti, Slovenia
- GMVIS Skysoft SA, Portugal
- Nederlandse Organisatie voor Toegepast Natuurwetenschaoppelijk Onderzoek – TNO, Netherlands
- NATO Undersea Research Centre, Italy
- Thales Communications S.A., France
- Fraunhofer-Gesellschaftzur Foerderung Der Angewndten Forschung E.V, Germany
- European Union Satellite Centre, Spain
- Advanced Computer Systems A.C.S. S.P.A., Italy
- Guardia Civil Española, Spain
- Active Space Technologies GmbH, Germany
- Aerospace Innovation GmbH, Germany

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PROJECT INFORMATION

New Service Capabilities for Integrated and Advanced Maritime Surveillance (NEREIDS)
Contract no: 263468
Duration: 36 months
EU Contribution: € 3.999.852
Estimated total cost: € 6.015.352



SIMTISYS

Simulator for Moving Target Indicator System

SPACE SUPPORT TO MAJOR TOM

Space-borne radars mounted on single or formation-flying satellites play a pivotal role for enhancing the EU's service capabilities to undertake efficient maritime surveillance. SIMTISYS supports their development.

Above the open waters of the oceans and seas, radars mounted on satellites flying in Low Earth Orbit (LEO) may become invaluable means for enhanced policing of these challenging environments, and a source of critical information during rescue operations.



Dangerous world © Argus - Fotolia.com

SIMTISYS supports the development of next generation Radar satellite capabilities to improve the Service Quality level for citizen security and environmental monitoring.

The development of European capabilities for effective Moving Target Indication by Space Based Radar (MTI SBR) technologies is a priority, which could be exploited in a range of policy purposes, from border surveillance, to maritime traffic monitoring, environmental protection and fishery control. Actually, the FP7 space research project NEWA has initiated a review of the state of the art in EU competences for MTI SBR technologies.

The SIMTISYS project is based on NEWA's work, and it will develop and implement a simulator for an MTI system, which is an important precursor for the development of advanced operational services in the area of moving target identification.

SIMTISYS will provide a useful and powerful tool, which helps the users, such as civil protection and coast guard authorities, with the detection and tracking of small vessels in defined scenarios.

Indeed, the involvement of these user groups, through the interviews conducted in NEWA, allows SIMTISYS to explore technological solutions in response to concrete user demands, rendering the output of this Project very valuable in both technological and practical terms.



CLAUDIO CATALLO
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

A global and integrated Maritime Surveillance System should, in particular, allow dual use. It should also support the recovery activities after a natural disaster.

Why is this project important for Europe?

The MTI technique can support the European Union in the monitoring of both cooperative and non cooperative vessels, natural and human disasters, etc. SIMTISYS is the first step in the configuration of an MTI system and can be expanded including all different space sensors. It can also integrate other platform data correctly dimensioned.

How does your work benefit European citizens?

Focussed on Maritime Surveillance, SIMTISYS will help the users and the service providers to improve the quality of the space data and support the integration of data coming from different platforms in a unique and clear way.

SIMTISYS

Simulator for Moving Target Indicator System



LIST OF PARTNERS

- Thales Alenia Space Italia, Italy
- Università di Roma "La Sapienza" dept. DIET, Italy
- Universitat Politecnica de Catalunya, Spain
- DEIMOS Space, Spain
- Sistemica SpA, Italy
- VEGA Space, United Kingdom
- D'Appolonia, Italy

COORDINATOR

Thales Alenia Space Italia, Italy

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PROJECT INFORMATION

Simulator for Moving Target Indicator SYstem
(SIMTISYS)

Contract no: 263268

Duration: 30 months

EU Contribution: € 1.643.701

Estimated total cost: € 2.489.926



MAIRES

Monitoring Arctic Land and Sea Ice using Russian and European Satellites

SPACE FOR A MORE EFFECTIVE AND CAPABLE EUROPE AT SEA

Climate change will increase the temperature in the Arctic, but it is unknown how much this will effect the land and sea ice. The MAIRES project will use data from Russian and European satellites to disclose the changes of the ice cover.

In recent summers commercial European ships have travelled through the fabled Northeast Passage along Russia's Arctic shore. This sailing route between Europe and Asia is some 6000 km shorter than the route through the Suez channel. In the next decades it might be shortened even further if most of the Arctic Ocean becomes icefree in the summer.

However, this sailing route has significant risks of environmental and human disasters, due to collision with

large ice floes or icebergs. Moreover, whilst facilitating new trading routes, the melting Arctic icecap remains an important indicator of the seriousness of the climate change.. In order to understand the variability of the sea ice and glaciers in the Arctic, it is necessary to monitor sea ice, icebergs and glaciers in the Arctic by use of satellites.

The MAIRES project will seek new ways to enhance the quality of such monitoring by combined use of satellites from the European and Russian space agencies, ESA and RKA. – The project will demonstrate the benefits of combining high-resolution radar and optical satellite images for operational mapping and development of better forecasts of land and sea ice in the Eurasian Arctic.



STEIN SANDVEN
IS PROJECT COORDINATOR



© MAIRES

MAIRES is set to develop new methodologies for satellite monitoring of Arctic glaciers, sea ice and icebergs, using Russian and European satellites.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The project will develop new methods for mapping of sea ice, icebergs and glaciers in the Arctic. By joint analysis of high-resolution images from European and Russian satellites obtained in the last decades, we expect to obtain significant new knowledge about ice in the Arctic.

Why is this project important for Europe?

The European Space Agency has developed leading capability in Earth Observation through the ERS and ENVISAT programmes. It is important to demonstrate that data from these programmes, combined with Russian satellite data, can be useful for research in the Arctic.

How does your work benefit European citizens?

Arctic sea ice and land ice are sensitive indicators of global climate change which has impact on climate in Europe. Reduction of the Arctic sea ice has also economic impact on Europe through future oil and gas exploration and ship traffic in the Arctic.

MAIRES

Monitoring Arctic Land and Sea Ice using
Russian and European Satellites



LIST OF PARTNERS

- Nansen Environmental and Remote Sensing Center (NERSC), Norway
- Joanneum Research Forschungsgesellschaft mbH (JR), Austria
- Scientific foundation Nansen International Environmental and Remote Sensing Centre (NIERSC), Russia
- Moscow State University of Geodesy and Cartography (MIIGAiK), Russia

COORDINATOR

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PROJECT INFORMATION

Monitoring Arctic Land and Sea Ice using Russian and
European Satellites (MAIRES)
Contract no: 63165
Duration: 36 months
EU Contribution: € 499.990
Estimated total cost: € 639.563



MALAREO

EO in Malaria Vector Control and Management

STRIKING MALARIA FROM SPACE, BEFORE MALARIA STRIKES PEOPLE ON EARTH

Every year in Africa, more than 600 million people are at risk from malaria. Yet this deadly disease is preventable, and African nations are committed to halving mortality. Remote sensing technologies from satellites provide important tools in this respect. The MALAREO project is set to explore this potential.

Malaria is a heavy burden, which is most unevenly distributed. From the approximately 225 million annual cases of malaria, some 212 million happen in Africa, killing close to 800,000 people every year. Within Africa, 90 percent of these cases happen in the sub-Saharan part of the continent.

While the climate is largely determining the malaria territory, anthropogenic factors like deforestation, irrigation, urbanization, movements of populations and economic changes determine where it eventually emerges. Carefully monitoring these features in the affected areas may therefore be part of the solution to winning the fight against this deadly killer.

Indeed, one can not see mosquitoes from satellites, but from space it is possible to observe vast landscapes,

monitor the areas that are under vector control and identify where conditions are prone for malaria to occur.

The MALAREO project supports African efforts to halve malaria mortality on the continent, by developing technologies, and implementing Earth observation (EO) capacities within malaria vector control and management programs in southern Africa.

Detailed monitoring of malaria risk areas from space may feed into malaria vector control and management programmes, increasing their impact, range and efficiency.

MALAREO seeks both to facilitate capacity development in Africa with a view to applying EO insights within a permanent EO monitoring cell supporting the daily work of existing national malaria control programmes, and further refine the parameters used to identify the localisation of the optimal breathing conditions for malaria.



IDES BAUWENS
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

MALAREO wants to integrate EO techniques and knowhow in the malaria control programmes in Southern Africa, because we believe that this can increase their efficiency, effect and range. We are combining European GMES EO capacity with African malaria experience to achieve this.

Why is this project important for Europe?

MALAREO aligns with the Lisbon process on "GMES and Africa" and the Strategic Partnership between South Africa and the EU. The project stimulates the movement from political dialogue to active cooperation towards a strong and sustainable cooperation in health and space areas.

How does your work benefit European citizens?

MALAREO supports the control and elimination of malaria. Reducing malaria will benefit European citizens. Not only in the case where we are travelling to malaria-risk areas, but also because malaria is hampering African sustainable development, which would benefit us all.



People from the South-Africa Malaria Vector Control Programme are preparing for IRS (Indoor Residual Spraying). IRS is a proven and highly effective malaria control measure that involves the coordinated, timely spraying of the interior walls of homes with insecticides. In 2009, IRS protected 75 million people in sub-saharan Africa. © South-African Medical Research Council.

MALAREO will implement Earth Observation (EO) capacities within malaria vector control and management programs in southern Africa.

MALAREO

EO in Malaria Vector Control and Management



LIST OF PARTNERS

- Eurosense, Belgium
- South African Medical Research Council, South Africa
- Ministry of Health, Swaziland
- Remote Sensing Solutions GmbH, Germany
- University of Kwazulu-Natal, South Africa
- Schweizerisches Tropen- und Public Health-Institut, Switzerland

COORDINATOR

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PROJECT INFORMATION

EO in Malaria Vector Control and Management
(MALAREO)

Contract no: 262887

Starting date: 01/02/2011

Duration: 24 months

EU Contribution: € 497.326

Estimated total cost: € 580.279



MEDEO

Methods and tools for dual access to the EO databases in the EU and Russia.

EU AND RUSSIA, OBSERVING OUR PLANET TOGETHER

Earth observation (EO) is a driving force for innovation, with growing market opportunities. Yet currently, technical barriers challenge the efficient exchange of valuable EO data sets between Russia and the EU. The MEDEO project seeks to bridge this divide.

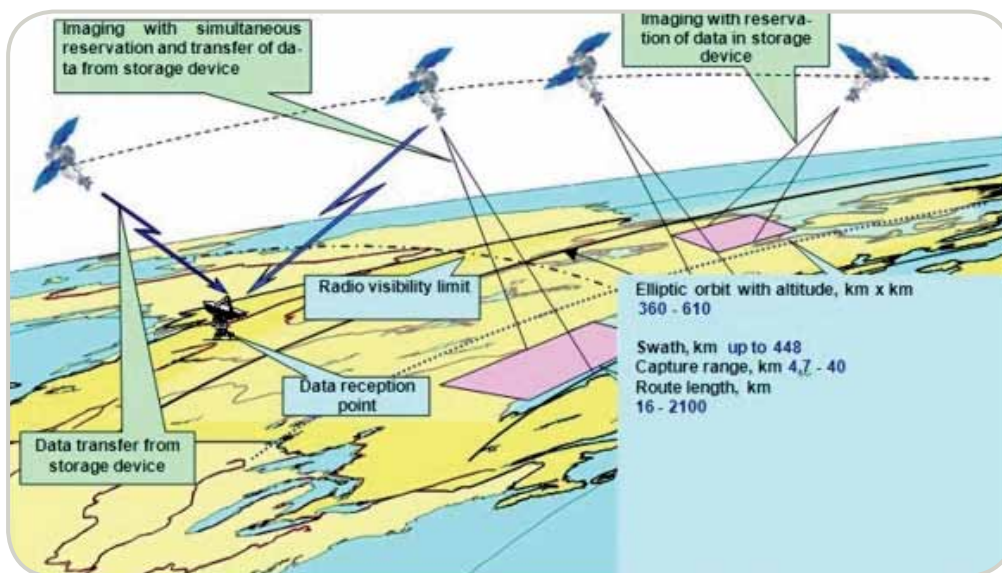
European and Russian satellites orbit our planet every day, obtaining valuable information about the state of the Earth, which are useful for a great deal of societal applications, from crisis management to agricultural monitoring. Yet, whilst looking at the same planet – our Earth - Europe's and Russia's eyes in the sky have had a blind eye to each other. Today, efficient exchange of this valuable information is still subject to significant technical challenges.

Seeking to enhance the framework conditions for the development of joint Russian and European cooperative scientific and application programmes, the MEDEO project sets out to break down this existing technological divide.

Thereby, the project will support the market for EO services, which is growing rapidly and constitutes a source of innovation in Russia and the EU. The project will do this by developing the data format conversion tools, allowing for reciprocal access by users to existing EO data sets in Russia and Europe in the areas of fire-crisis management, and agriculture/crop monitoring. Built around a consortium of EO experts who have been the driving forces behind the Russian civil EO satellite system Resurs-DK, and leading representatives of the European EO community, the MEDEO project facilitates data exchange between the current and future Russian Resurs satellites, and ESA EO missions. In practice, such data exchange will be facilitated by means of comparable web interfaces, allowing for search for EO images in the EU's and Russian datasets.



KLAUS BRIESS
IS PROJECT COORDINATOR



© MEDEO

MEDEO will develop tools and methods to allow for reciprocal access to existing Earth Observation (EO) data bases in the EU and Russia.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The MEDEO project is aiming at bridging the gap between the Earth Observation data format standards applied in Europe and Russia. This will technically enable users (e.g. GEOSS service companies) to access to and use of the extensive datasets of EO data gathered in both regions.

Why is this project important for Europe?

The project will create the technological preconditions for availability of new datasets for European users in various applications (e.g. hazard situations management, environment protection, agriculture, etc.). This makes Europe more innovative, competitive and secure.

How does your work benefit European citizens?

Diversification of EO data sources and getting access to better quality EO data will enable the European public services and industry to provide enhanced services to the citizens and be more competitive on the global markets of GEOSS related services.

MEDEO

Methods and tools for dual access to the EO databases
in the EU and Russia.



LIST OF PARTNERS

- Technical University of Berlin, Germany
- Engineering, Consulting and Management Office, Germany
- Aratos Technologies S.A., Greece
- State Research and Production Space-Rocket Center of the Russian Space Agency "TsSKB-Progress", Russia
- Ryazan State Radiotechnical University, Russia

COORDINATOR

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PROJECT INFORMATION

Methods and Tools for dual access to the EO databases
of the EU and Russia (MEDEO)
Contract no: 261952
Starting date: 01/01/2011
Duration: 24 months
EU Contribution: € 499.436
Estimated total cost: € 619.468



MOCCASIN

Monitoring Crops in Continental Climates through Assimilation of Satellite Information

PREVENTING TORTILLA RIOTS

In 2007, imbalances in global agricultural production lead to the 'food crisis'. As market prices rose, the poorest were hit the hardest. The MOCCASIN project contributes to improving food stability by enhancing our ability to predict winter-wheat yield in continental climates, such as in Russia.

Food stability is paramount for political stability and economic growth. Imbalances in global food production can have devastating consequences for the poorest people in the poorest countries, when market prices for basic commodities suddenly rise. In the past, such phenomena have caused 'tortilla riots' in some developing countries. According to the World Bank, the risks of price spikes in countries with a high burden of poverty and malnutrition will need to be even more closely monitored and managed. Indeed, in 2010, a 56% rise in global wheat prices following output interruptions in Russia had knock-on impacts on other commodities such as rice, maize, and sorghum.

Hence the state of Russia's wheat production has a global impact.

The MOCCASIN project takes on the challenge of facilitating improved quantitative predictions of this country's winter-wheat yield.

Bringing together scientists from the EU and Russia, the project aims at improving the existing MARS Crop Yield Forecasting System (MCYFS), which is operated by the EU's Joint Research Centre (JRC).

In Russia, low temperatures during winter negatively impact the country's wheat production during summer. However, the effects of such 'winter-kill' are currently not adequately integrated into the MCYFS forecasting model.

MOCCASIN addresses this shortfall, using data from both Russian and European Earth Observation satellites to produce maps of winter-kill damage and update crop models that assess impact on yield. In doing so, the project provides a positive contribution to the EU-Russia Space Dialogue, as it facilitates a win-win transfer of knowledge between European and Russian scientists, whilst providing food security planners across the continent with enhanced tools for food production forecasts.



ALLARD DE WIT
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

MOCCASIN will be successful if we can combine European knowledge about crop modelling and yield forecasting with Russian knowledge about their agricultural system. Satellite observations will be a vital input for real-time impact assessment and yield prediction.

Why is this project important for Europe?

Knowledge that can be gained in this project is applicable over most of Central Asia and China as well and therefore contributes to European capacity for global agricultural monitoring. Moreover, ties between European and Russian researchers will be enhanced through this project.

How does your work benefit European citizens?

European citizens have not directly suffered from recent food crises, although rising prices on commodity markets will impact the prices in the super-markets. MOCCASIN improves European capacity to monitor global crop production which helps to stabilize consumer prices.



© MOCCASIN

MOCCASIN provides for improved quantitative predictions of Russian winter-wheat yield.

MOCCASIN

Monitoring Crops in Continental Climates through Assimilation of Satellite Information



LIST OF PARTNERS

- Alterra, Wageningen University & Research Centre, The Netherlands
- Université catholique de Louvain, Belgium
- Russian Institute of Agricultural Meteorology, Russia.
- Space Research Institute of the Russian Academy of Sciences. Russia

COORDINATOR

**Alterra, Wageningen University & Research Centre,
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PROJECT INFORMATION

Monitoring Crops in Continental Climates through
Assimilation of Satellite Information (MOCCASIN)
Starting date: 01/12/2010
Duration: 30 months
EU Contribution: € 495.659
Estimated total cost: € 685.410



PRE-EARTHQUAKES

Processing Russian and European EARTH observations for earthquake precursors Studies

TOGETHER FOR BETTER EARTHQUAKE PREDICTION

The Sakhalin region in Far Eastern Russia, Italy and Turkey are all highly seismic regions. They will be the test areas where the PRE-EARTHQUAKES project will concentrate its effort striving to evaluate how much the real-time integration of different observational methods could improve present short-term earthquake prediction capabilities at the benefit of citizens.

Earthquakes are a major hazard for citizens in many countries throughout the world. Hence international cooperation is paramount to jointly take on the earthquake challenge. Independently, the European Space Agency (ESA), and the Russian Space Agency (ROSCOSMOS) have established extensive satellite archives full of Earth Observation data. Combining these data may generate important new insights at the benefit of all countries that face the destructives powers that earthquakes unfold. The PRE-EARTHQUAKES project aims to facilitate cross-validation of ESA and ROSCOSMOS data. Bringing together scientists from the EU, Russia and Turkey, the project will explore the high potential of such cooperation in the frontier research field of earthquake precursors. PRE-EARTHQUAKES' aim is to demonstrate the

feasibility and extent to which such systematic integration of independent parameters can improve the reliability and precision of short-term earthquake prediction until a pre-operational level. Aiming for an enhanced degree of precision, the project also intends to reduce the false alarms rates that impact negatively on the public perception of this field, and represent important costs for society.

PRE-EARTHQUAKES has identified and selected the Sakhalin region in Russia's Far East, and Italy and Turkey in Europe – all highly seismic and well monitored regions – as suitable test areas, where the project's proposed integration of different observations and methodologies will yield the best results.

In the longer term, PRE-EARTHQUAKES' results may further the development of a worldwide Earthquake Observation System (EQuOS) as a dedicated component of the Global Earth Observation System of Systems (GEOSS).



VALERIO TRAMUTOLI
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

PRE-EARTHQUAKES is a first attempt to join researchers of different countries to face rigorously and without prejudices the study of preparatory phases of earthquakes. Observations, before, during and after earthquakes, will be the focus of the project.

Why is this project important for Europe?

The project will exploit and strengthen the European long and prestigious tradition in seismology and geophysics offering to it the opportunity to play a central role in the worldwide Earthquake Observation System (EQuOS) that the project want to start to built as part of GEOSS.

How does your work benefit European citizens?

To build safe houses is presently the best prevention action against earthquake danger. However, waiting for that, the study of earthquakes preparatory phenomena will surely increase our knowledge and perhaps open new opportunities of protection for European citizens.



© PRE-EARTHQUAKES

PRE-EARTHQUAKES will cross-validate European and Russian Earth Observation data, enhancing short-term earthquake prediction capabilities.

PRE-EARTHQUAKES

Processing Russian and European EARTH observations
for earthquake precursors Studies



LIST OF PARTNERS

- Universita' degli Studi della Basilicata, Italy
- TUBITAK Marmara Research Center, Turkey
- Deutsches Zentrum Für Luft - Und Raumfahrt, Germany
- Fiodorov Institute of Applied Geophysics, Russian Federation
- Russian Space Systems, Russian Federation
- Geospazio Italia s.r.l., Italy
- Pushkov Institute of terrestrial magnetism, ionosphere and radio wave propagation of the Russian academy of sciences Western Department, Russian Federation

COORDINATOR

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PROJECT INFORMATION

Processing Russian and European EARTH observations
for earthquake precursors Studies (PRE-EARTHQUAKES)

Contract no: 263502

Starting date: 01/01/2011

Duration: 24 months

EU Contribution: € 499.490

Estimated total cost: € 745.658



REDD-FLAME

REDD Fast Logging Assessment & Monitoring Environment

MONITORING TROPICAL FORESTS

Unmanaged logging represents a critical threat to biodiversity, and to the sustainability of the large tropical and sub-tropical forests that allow Earth to breathe. The REDD-FLAME project will assess such threats from space.

The immense forests in the world's tropical and sub-tropical belts are home to hundreds of thousands of species, many of which we have yet to discover. Yet this immense biodiversity is at risk from deforestation and forest degradation, which also contribute to global greenhouse gas emissions and exacerbate the effects of climate change. In response to this, the United Nations has initiated the UN-REDD (Reducing Emissions from Deforestation and Forest Degradation) Programme, which aims to assign a financial value to the carbon stored in forests.

The REDD-FLAME project supports this global effort to combat deforestation by developing a system to quickly identify the first signs of illegal logging and thus allow earlier intervention by the authorities and better management of these fragile and valuable environments to prevent lasting damage. Using very high resolution data from radar satellites such as COSMO-SkyMed and TerraSAR-X, the project will add value to existing forest satellite monitoring systems that use lower resolution imagery. Implementing the enhanced system, REDD-FLAME will monitor logging hot spots on three continents, from Brazil in South America and Mozambique in Africa to Indonesia in South East Asia, where the threat from illegal logging is currently very significant.



TIM PEARSON
IS PROJECT COORDINATOR



Jungle © Galyna Andrushko - Fotolia.com

Focussing on logging activities, REDD-FLAME will design and implement a satellite system for monitoring tropical and sub-tropical forests.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

Through collaboration with experts in European and tropical countries, we hope to gain new insights into the management of tropical forests and deforestation, whilst developing new and transferrable capabilities for forest monitoring using high resolution radar data.

Why is this project important for Europe?

As well as contributing to UN-REDD, the project will also help to strengthen GMES, through its contribution to the definition of the GSE Forest Monitoring service portfolio, and be of immediate relevance for the control of timber certification under the EU Action Plan, FLEGT.

How does your work benefit European citizens?

The project will contribute to ongoing global efforts to bring under control the emission of greenhouse gases – therefore moderating the effects of climate change – and limit future deforestation, actions which will have far-reaching benefits for the citizens of the whole World.

REDD-FLAME

REDD Fast Logging Assessment & Monitoring Environment



LIST OF PARTNERS

- Remote Sensing Applications Consultants Ltd, United Kingdom
- SarVision B.V., The Netherlands
- TerraSphere Imaging & GIS B.V., The Netherlands
- Wageningen Universiteit, The Netherlands
- Remote Sensing Solutions GmbH, Germany
- Amazon Conservation Team (Equipe de Conservacao da Amazonia), Brazil
- Borneo Orang-utan Survival Foundation (Yayasan Penyelamatan Orang-utan Borneo), Indonesia
- Universidade Eduardo Mondlane, Mozambique

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PROJECT INFORMATION

REDD Fast Logging Assessment & Monitoring Environment (REDD-FLAME)

Contract no: 263142

Duration: 24 months

EU Contribution: € 498.901

Estimated total cost: € 620.678



REDDINESS

Support EO-driven forest and carbon monitoring in Central Africa for REDD

FIGHTING CLIMATE CHANGE IN AFRICA

By 2017, Gabon and the Republic of Congo have committed themselves to reducing the annual rate of deforestation from 0.19 to 0.10 percent. The REDDINESS project helps monitoring this development.

As part of international efforts to combat global warming, securing the preservation of Africa's big forests is part of the solution to the climate change challenge. Recognised as world treasures of biodiversity, these forests also serve as important carbon sinks.

The governments of Gabon and the Republic of Congo have committed themselves to almost halving the annual rate of deforestation from 0.19 percent today to 0.10 percent by 2017. In order to reach this goal, enhanced monitoring and more accurate estimates of the value of Africa's forests are needed.

The REDDINESS project takes on this challenge, aiming to enhance the existing capabilities within national forest monitoring centres in Gabon and the Republic of Congo in undertaking forest assessments, forest mappings and carbon trend estimations. International agreements on Reducing Emissions from Deforestation and forest Degradation -REDD- must rely on operational national and regional forest monitoring systems that accurately measure, map, report and verify (MRV) timely changes in forest state and carbon emission. Up-to-date Earth Observation (EO) techniques are seen as essential tools in MRV systems. A development project, REDDINESS will also undertake knowledge transfers and work to increase the readiness of the countries to join the carbon trade market, with a view to enhancing their ability to negotiate potential carbon transactions.



NICOLAS DOSSELAERE
IS PROJECT COORDINATOR



chopping wood © Sergey YAKovlev - Fotolia.com

REDDINESS assists Gabon and the Republic of Congo in undertaking accurate reporting on the rate of deforestation.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

REDDiness relies on African regional actors to assist Gabon and the Republic of Congo in improving their readiness to join potential carbon payment schemes. We aim to transfer optimal robust EO methods in monitoring forest changes and assessing deforestation and forest degradation.

Why is this project important for Europe?

REDDiness responds to the EC call for increased collaboration between African and European partners through this Specific International Cooperation Action (SICA). REDDiness refers to existing EC expertise in the region such as the FORAF project and the regional observatory.

How does your work benefit European citizens?

REDD negotiations for climate change mitigation aim to better manage our forest resources. Fast growing global demand has increased the risk of unsustainable forestry practices, illegal logging and corruption. REDDiness is a European attempt to improve this situation.

REDDINESS

Support EO-driven forest and carbon monitoring
in Central Africa for REDD



LIST OF PARTNERS

- EUROSENSE, Belgium
- Faculty of Geo-Information Science and Earth Observation of the University of Twente, The Netherlands
- Institut de Recherche pour le Développement, France
- Observatoire Satellital des Forêts d'Afrique Centrale, The Democratic Republic of Congo
- Centre National d'Inventaire et d'Aménagement des Ressources Forestières et Fauniques, Republic of the Congo
- Ministère des eaux et forêts, Gabon

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PROJECT INFORMATION

Support EO-driven forest and carbon monitoring
in Central Africa for REDD (REDDINESS)

Contract no: 263005

Starting date: 01/02/2011

Duration: 24 months

EU Contribution: € 499.769

Estimated total cost: € 642.501



SEMEP

Search for Electro-Magnetic Earthquake Precursors
combining satellite and ground-based facilities

LISTENING OUT FOR EARTHQUAKES

Earthquakes are notoriously difficult to predict. Yet reliable short-term earthquake forecasts could save thousands of lives. The SEMEP project will investigate the electromagnetic precursors to earthquakes by combining in-situ measurements and space data from satellites.

Throughout the world, thousands of citizens live with the constant risk of being hit by an earthquake. In the EU, Southern-Europe is a highly seismic-region. Previous attempts to develop reliable short term earthquake forecasting based on in-situ measurements. Yet, combining such measurements with space observations from satellites may pave the way for a new methodology enabling such forecasting.

The main concept of the SEMEP project is the investigation of electromagnetic phenomena related to large earthquakes in the global lithosphere-atmosphere-ionosphere coupled system using simultaneous satellite and ground-based observations. The seismo electromagnetic effects are the electric and magnetic perturbations

caused by natural geophysical activity such as earthquakes and volcanic eruptions. The combined analysis of satellite and ground-based datasets, together with theoretical modelling enables SEMAP to investigate the occurrence and propagation of electromagnetic phenomena observed as precursors to earthquakes.

The project brings partners together from across the world, in particular Europe and Russia, in a joint effort aimed at cross-validating existing methodologies using and processing both Russian and European Earth Observation data.

Whilst the risk of failure is high in the controversial domain of attempted earthquake prediction, in case the SEMAP approach is valid, its results would constitute a major breakthrough with enormous consequences and benefits to populations.



SIMON WALKER
IS PROJECT COORDINATOR



terremoto abruzzo 10 © puckillustrations - Fotolia.com

SEMEP will investigate precursor electromagnetic phenomena related to earthquakes.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The idea behind the project is to investigate observations of electromagnetic perturbations within the ionosphere and the possible generation as a precursor to earthquake activity. Currently, the occurrence of such a link is unclear. If a link can be solidly established, it may be possible to use such observations as a forecasting tool.

Why is this project important for Europe?

REDDiness responds to the EC call for This project is important to Europe because a reliable method for prediction could help to save lives and mitigate the effects that large earthquakes have on the infrastructure of our modern lifestyle such as occurred in l'Aquila, Italy.

How does your work benefit European citizens?

A reliable forecast methodology would allow mitigation action plans to be put into operation to reduce the impact that earthquakes have on the infrastructure and lives of citizens living in seismically active zones.

SEMEP

Search for Electro-Magnetic Earthquake Precursors
combining satellite and ground-based facilities



LIST OF PARTNERS

- University of Sheffield, United Kingdom
- Institute of Physics of the Earth RAS, Russia
- Laboratoire de Physique et Chimie de l'Environnement et de l'Espace, France
- Institute of Marine Geology and Geophysics of Far Eastern Branch of RAS, Russia
- Space Research Institute of RAS, Russia

COORDINATOR

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PROJECT INFORMATION

Search for Electro-Magnetic Earthquake Precursors
combining satellite and ground-based facilities (SEMEP)

Contract no: 262005

Starting date: 01/01/2011

Duration: 24 months

EU Contribution: € 452.515

Estimated total cost: € 728.376



WatPLAN

Spatial earth observation monitoring for planning and water allocation in the international Incomati Basin

EYE ON THE INCOMATI RIVER

Located within an area of intense development pressure, demand for water from Southern Africa's Incomati river outstrips supply. The WatPLAN project undertakes 'water accounting', paving the way for sustainable use of the river's limited resources.

From the cool and dry Highveld 2000 meters above the ocean in eastern South Africa, to the hot and humid plains of southern Mozambique, the Incomati river runs through the Kingdom of Swaziland on its decent towards the sea. Hence it forms one of 15 international river basins that are shared by southern African countries. The Incomati river basin covers an area of approximately 47,000 km².

Entirely situated within the summer rainfall region – October to March – mean annual precipitation in the basin is estimated at 740 mm, whilst potential evaporation amounts to some 1,900 mm. This water deficit puts significant pressure on the waters from the Incomati, which, especially in the dry lowlands are needed as a source for irrigation, facilitating crop production.

However, the waters of the Incomati are limited too, so enhanced 'water accounting' measures are needed in order to secure that the Incomati's resources are used in a sustainable manner.

The WatPLAN project is set to implement such an advanced 'water accounting system'. By means of medium and high resolution satellite data – including data obtained from Chinese satellites – this joint EU-Africa GMES earth observation project will provide weekly updates on the state of the Incomati waters. Five indicators – water use and evaporation, rainfall, land use, soil moisture and biomass production – will be monitored by satellites, providing the data needed for effective water accounting to be undertaken. WatPLAN will build an online platform to effectively share such data among water users and authorities in the Incomati basin, and also feed its findings into the Global Earth Observation System of System (GEOSS) database.



WIM BASTIAANSEN
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to develop and implement an operational earth monitoring system that supports transparent and rational decision making on water allocation and sustainable water utilization in the context of an international river basin.

Why is this project important for Europe?

After implementation in the Incomati catchment, the WatPLAN project may be repeated for European river basins, in which water allocation and verification of water use are key issues for sustainable utilization of water.

How does your work benefit European citizens?

Carrying out a project similar to WatPLAN in Europe will benefit European citizens in ways such as greater water security, more equitable and efficient water allocation, poverty alleviation, and environmental sustainability.



Mangrove tree, Mozambique © EcoView - Fotolia.com

WatPLAN will contribute to facilitating the sustainable use of water from the Incomati river.

WatPLAN

Spatial earth observation monitoring for planning
and water allocation in the international Incomati Basin



LIST OF PARTNERS

- Basfood B.V., the Netherlands
- Prezent Internet B.V., the Netherlands
- Hidrosoph Lda., Portugal
- WE Consult Lda., Mozambique
- University of KwaZulu-Natal, South Africa
- GeoTerralimage (Pty) Ltd, South Africa

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PROJECT INFORMATION

Spatial earth observation monitoring for planning
and water allocation in the international Incomati Basin
(WatPLAN)

Contract no: 262949

Starting date: 01/02/2011

Duration: 30 months

EU Contribution: € 491.571,60

Estimated total cost: € 575.581,20



GRAAL

GMES for Regions: Awareness and Access Link

A DATE WITH GMES

Linking supply and demand for GMES downstream services is a challenging task. The GRAAL project aims at establishing such connections at the European local and regional levels.

Europe's Global Monitoring system for Environment and Security (GMES) has a lot to offer local and regional authorities across the continent. Whether GMES services take the form of local air quality forecasts and alerts, refined land cover maps, or water quality measurements, GMES helps decision makers and authorities make informed choices in areas concerning the environment, health, safety and security.

However, awareness of the benefits that GMES brings at local level needs to be further enhanced and a balance between the Offer and Demand sides must be reached. GRAAL takes on these challenges.

GRAAL's objective is to help potential regional and local users of GMES downstream services to understand what GMES is and how they can eventually benefit from it i.e. become an end user of GMES. By means of a web portal and by engaging in a targeted awareness campaign, GRAAL will reach out to local and regional authorities that currently have little or no knowledge about the potential of GMES downstream services. A matching function will notably link users with particular needs to GMES service suppliers that are able to offer solutions to such needs. In addition, and among other "tools", a Virtual GMES Academy will serve the interaction between users, service providers and academia.

Through GRAAL, you can indeed get a date with GMES.



STÉPHANE OUREVITCH
IS PROJECT COORDINATOR



© GRAAL

GRAAL will act as matchmaker between European local and regional authorities and Europe's Global Monitoring for Environment and Security (GMES) programme.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The essentials of GMES are now understood by decision-makers at Member State level. However, the downstream level is still to be discovered by many European Local and Regional Administrations (LRA). GRAAL wants to make it easier for LRAs to comprehend and use the GMES downstream services while fostering their development.

Why is this project important for Europe?

GMES is at the crossroad of many EU policies. However, the contribution of GMES, and especially that of the downstream sector, will only be optimal when European LRAs become involved as stakeholders. Only then GMES will fully contribute to the various EU policies and strategies.

How does your work benefit European citizens?

GMES is now considered a public good and European LRAs constitute the most important "reservoir" of downstream users. The development of downstream services benefiting the LRAs will eventually contribute to the improvement of EU citizens' day-to-day life.

GRAAL

GMES for Regions: Awareness and Access Link



LIST OF PARTNERS

- SYSECO, Belgium
- Planetek, Italy
- Starlab, Spain
- France Développement Conseil (FDC), France
- Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany
- ISTITUTO SUPERIORE PER LA PROTEZIONE E LA RICERCA AMBIENTALE, ISPRA, Italy
- European Regions Research and Innovation Network, ERRIN, International
- Paris-Lodron-Universität Salzburg, PLUS, Austria
- GISAT, Czech Republic
- Specto Natura, United Kingdom

COORDINATOR

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PROJECT INFORMATION

GMES for Regions: Awareness and Access Link (GRAAL)

Contract no: 263186

Starting date: 01/02/11

Duration: 24 months

EU Contribution: € 999.000

Estimated total cost: € 1.272.854,60



HELM

Harmonised European Land Monitoring

TOGETHER FOR BETTER LAND MONITORING IN EUROPE

In Europe, land monitoring is performed both at local, national and European levels. More coordination of efforts is needed, and HELM addresses this challenge.

Monitoring of the land surface and its use is important when assessing the state of the environment, and human impacts on it. In order for such monitoring to be well managed, it is necessary to regularly generate up to date information, which may be refined and take the form of thematic maps, based on the interpretation of areal photography, satellite imagery and further sources. Such maps aid efforts to foster the sustainable development within a range of fields, such as spatial planning, nature protection, agricultural policy, forestry, tourism, and water catchment area management.

In order to address the risk of duplication between actors at local, national and European levels, and exploit the potential that exists for enhanced mutual cooperation,

HELM is set to initiate the establishment of a coherent European land monitoring system. The project, which comprises a network of authorities concerned with land monitoring, will initiate efforts in order to increase the maturity of European land monitoring by means of enhanced knowledge exchange, identification of possible joint tasks, technical harmonisation of systems, and better data sharing.

The objective of this project is to pave the way towards an effective European land monitoring system, which combines the broad range of specific expertise and resources that exist in EU Member States, enabling the exploitation of give and take between the different actors, and harvesting the potential of coordinated and interoperable approaches to land monitoring in Europe.



HERBERT HAUBOLD
IS PROJECT COORDINATOR



© HELM

A network of European authorities responsible for land monitoring, HELM will enhance coordination between sub-national, national and European actors in this field.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We will initiate a move that will make European land monitoring more productive. National and sub-national level land monitoring endeavours will be enabled to collaborate more than they do now, to support each other and to jointly contribute to a coherent European data set.

Why is this project important for Europe?

One of the major shortcomings of GMES is the lack of systematic bottom up participatory processes. HELM will be a first attempt to install a lasting participatory process in the field of land monitoring and thereby transform the pertinent GMES core service.

How does your work benefit European citizens?

Managing the land surface in a sensible way is a prerequisite for human well-being, we live on it after all. Knowledge about its state and changes thereof aids drawing a balance between land use by settlements, agriculture, traffic etc, and preserving ecosystems humans depend on.

HELM

Harmonised European Land Monitoring



LIST OF PARTNERS

- Environment Agency Austria, Austria
- CENIA –Czech Environmental Information Agency, Czech Rep.
- Finnish Environment Institute, Finland
- Institute of Geodesy, Cartography and Remote Sensing, Hungary
- European Centre for Research and Financing, Israel
- Geoville Environmental Services, Luxembourg
- Norwegian Forest and Landscape Institute, Norway
- Portuguese Geographic Institute, Portugal
- National Geographic Institute, Spain
- ETC Land Use and Spatial Information, EU
- European Forestry Institute, EU
- FOTEC Research- and Technology Transfer, Austria
- Flemish Geographical Information Agency, Belgium
- Remote Sensing Application Centre, Bulgaria
- GISAT S.R.O., Czech Republic.
- French National Mapping Agency, France
- Federal Agency for Cartography and Geodesy, Germany
- Informus, Germany
- National Land Survey, Island
- Institute for Environmental Protection and Research, Italy
- European Academy Bozen/Bolzano, Italy
- Stichting Service for Agricultural Research, Netherlands
- Danube Delta National Institute for Research and Development, Romania
- Federal Office for the Environment, Switzerland
- Swiss Federal Institute for Forest, Snow, and Landscape Research, Switzerland
- Specto Natura, United Kingdom

COORDINATOR

Environment Agency Austria, Austria

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PROJECT INFORMATION

Harmonised European Land Monitoring (HELM)

Contract no: 261562

Starting date: 01/01/11

Duration: 36 months

EU Contribution: € 1.000.000

Estimated total cost: € 1.207.912



BIOSMHARS

BIOcontamination Specific Modeling in Habitats Related to Space

EYE ON BACTERIA IN SPACE

When humans go to space, so do bacteria. On manned spacecraft, there is a need for effective biocontamination control measures. The BIOSMHARS project takes on this new challenge.

When organic life goes to space, it takes new forms. On board the International Space Station (ISS), bacteria have developed an existence alongside astronauts and science equipment. In order for such co-existence to remain harmonious, there is a need to monitor biologic developments in space, and foresee effective biocontamination control measures when necessary.

Failure to adhere to sound contamination control may result both in a risk for the health of the crew and for the on-board equipment.. The BIOSMHARS project represents the first phase of a joint EU-Russia research effort, which aims at developing the scientific and technological tools that are needed in order to establish an adequate and comprehensive approach to the challenging issue of biocontamination inside manned spacecrafts.

The project will develop and calibrate a mathematical model, which will allow predicting the transportation of bioaerosols in a closed environment, and to develop appropriate countermeasures. The BIOSMHARS biocontamination model will be calibrated in the Russian BIOS-3 confinement facility at Krasnoyarsk.

Composed of a consortium of leading Russian and European scientists, the results of this project have a high potential, possibly establishing joint EU-Russia global leadership in the area of environmental biocontamination modelling, control, and countermeasures.

Whilst directly relevant for life in the space environment, insights gained in this field may also potentially have a range of terrestrial applications in the fields of health and security.



AUDREY BERTHIER
IS PROJECT COORDINATOR



gloved hands with the laboratory tubes © Alexander Rath - Fotolia.com

BIOSMHARS seeks to facilitate better biocontamination control strategies for manned spacecraft.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The BIOSMHARS consortium intends to develop, to calibrate and to validate a mathematical model to predict the transportation of bioaerosols in a closed environment and the concurrent spread of biocontamination, first on-ground, without human activities.

Why is this project important for Europe?

This project will first increase the competitiveness of Europe. It will indeed undertake innovative research and development for biocontamination strategies and help to maintain European and Russian scientists at leading positions in this field.

How does your work benefit European citizens?

This work will benefit to European citizens first through the application potential both for the health sector and for security. The preliminary predictive model resulting from the project may help as well to define strategies against biocontamination related to biological terrorist attacks.

BIOSMHARS

BIOcontamination Specific Modeling in Habitats
Related to Space



LIST OF PARTNERS

- MEDES, France.
- Belgian Nuclear Research Centre (SCK-CEN), Belgium
- Institute of Biophysics, Russia
- IBMP, Russia
- University of Eastern Finland, Department of Environmental Science, Finland
- VTT, Finland

COORDINATOR

**MEDES, Institut de Médecine et Physiologie
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PROJECT INFORMATION

BIOcontamination Specific Modeling in Habitats
Related to Space (BIOSMHARS)
Contract no: 263076
Duration: 24 months
EU Contribution: € 493.345
Estimated total cost: € 742.342



ESAIL

Electric sail propulsion technology

SSF TRANSPORTATION

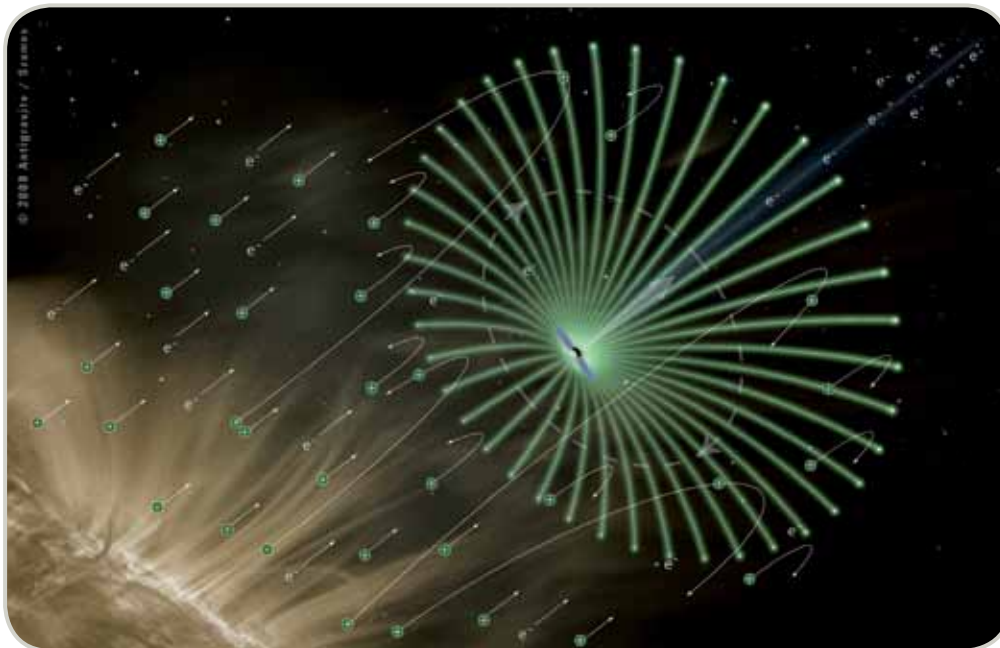
Just like the wind took Europeans to America in the past, in the future the solar wind may take European spacecraft to new worlds. The Electric Solar Wind Sail (ESAIL) project is set to develop a prototype for a new kind of spacecraft powered by the solar wind.

Outside Earth's magnetosphere there is a different kind of wind; the solar wind consists of a stream of charged particles that are ejected from the Sun. This wind mostly consists of electrons and protons that have escaped the Sun's gravity because of their high kinetic energy, or motion. Harvesting the power of this natural source of energy may pave the way for a very different kind of spacecraft, smaller, lighter and faster than those powered by fuels, which has the potential to take space missions further all the way to the heliopause where the solar wind is believed to end at the outer limit of our solar system.

The E-sail project sets out to harvest the power of the solar wind, as it aims to develop this enabling technology to a prototype level, which would allow for a decision to build and fly a first E-sail demonstration mission. It is estimated that E-sail technology would have the potential to improve state-of-the-art space propulsion systems by two to three orders of magnitude, whilst also being a truly green means of space transportation. Substituting fuel for in-space propulsion powered by the solar wind paves the way for lighter and less costly space missions. Because of their reduced mass, such missions would also be environmentally sound, as much less chemical propellant would need to be burnt to take them through Earth's atmosphere and into space.



PEKKA JANHUNEN
IS PROJECT COORDINATOR



© 2008 Antigravite - Szames

ESAIL will develop prototypes for the key components of a new space propulsion system - the electric sail, E-sail powered by the solar wind.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to advance the electric sail concept to laboratory prototype level so that the method could be thereafter tested in its authentic environment, that is, in the solar wind.

Why is this project important for Europe?

Compared to the prospects offered by electric sail propulsion, our present methods to move around in the solar system are slow, limited and expensive. The electric sail could open up the scientific and economic treasures of the solar system in an unforeseen way.

How does your work benefit European citizens?

We will be thrilled by the new science prospects: e.g. sample return from many targets and measurements in the interstellar space. The electric sail may also enable asteroid resource utilisation that could be used e.g. to help the construction of large solar power satellites.

ESAIL

Electric sail propulsion technology



LIST OF PARTNERS

- Ilmatieteen laitos, Finland
- Helsingin yliopisto, Finland
- Jyväskylän yliopisto, Finland
- Deutsches Zentrum für Luft- und Raumfahrt, Germany
- Uppsala Universitet, Sweden
- NanoSpace, Sweden
- Tartu Observatory – Estonian Ministry of Education and Research, Estonia
- Università di Pisà, Italy
- Alta SPA, Italy

COORDINATOR

Ilmatieteen laitos, Finland

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PROJECT INFORMATION

Electric sail propulsion technology (ESAIL)
Contract no: 262733
Duration: 36 months
EU Contribution: € 1.747.393
Estimated total cost: € 2.413.184



FOSTERNAV

Flash Optical Sensor for Terrain Relative Robotic Navigation

SOFT AND PRECISE TOUCHDOWN ON OTHER TERRESTRIAL BODIES

Imagine a spacecraft landing on another planet or an asteroid. Touchdown must be precise, soft and swift. FOSTERNAV will develop sensor technology that may pave the way for landing spacecrafts in the most challenging environments.

Europe is committed to exploring our solar system. In the future, the Moon, Mars and even asteroids are amongst possible destinations for European space exploration missions.

Touchdown in such extreme environments is a major challenge. Precise and soft landings on the surface of other planets, moons and near-Earth objects (NEOs) are paramount for the success of such missions, carrying expensive and vulnerable assets designed to enhance our understanding of the universe we live in.

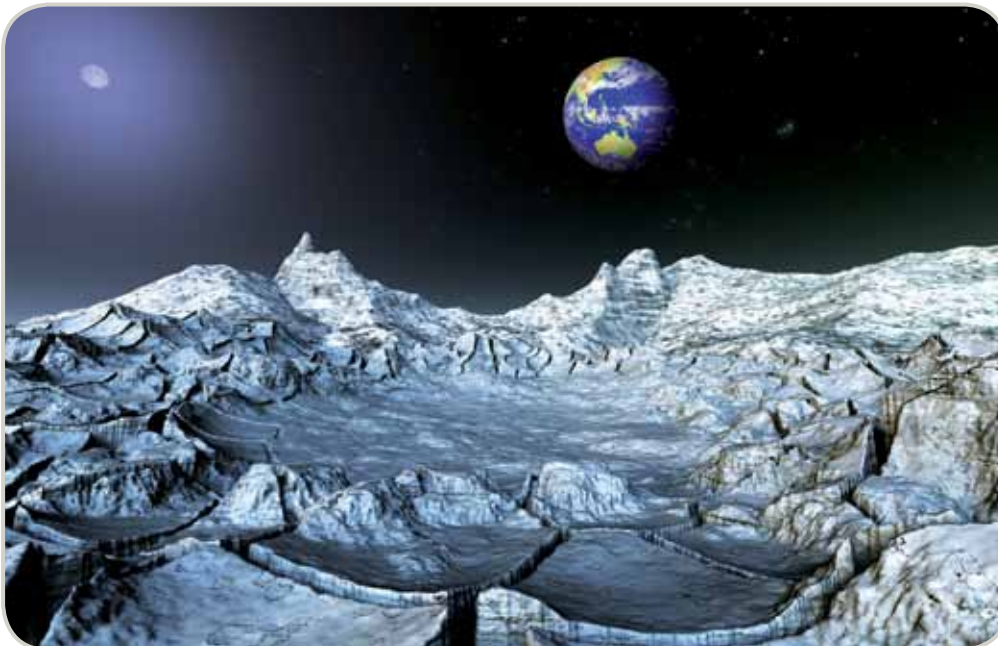
The FOSTERNAV project is designed to improve the level of miniaturization and robustness of spacecraft position and altitude control systems used to land softly and precisely and to deploy sensitive scientific payloads on

extraterrestrial bodies. In doing so, the project undertakes the development and the assessment of a prototype of a Guidance Navigation and Control (GNC) sensor: a flash optical sensor. FOSTERNAV's proposed concept consists of the merger of previously separated technologies into one sensor architecture; the project intends to integrate research concepts developed for laser rangefinder or Light Detection and Ranging device (LiDAR) with new elements, which have demonstrated technological supremacy in other fields such as robotics and security applications. The resulting prototype of a new beyond state-of-the-art flash optical sensor will be demonstrated and assessed in FOSTERNAV.

If successful, the project's innovative optical sensor is set to increase the competitiveness of the partners, whilst also strengthening European non-dependence in this area of critical technologies for space exploration.



ALEXANDRE POLLINI
IS PROJECT COORDINATOR



space © Stephen Coburnes - Fotolia.com

FOSTERNAV will develop a novel optical sensor for on-board guidance, navigation and control of spacecraft.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The objectives of the FOSTERNAV project's consortium are to design, realize and assess a miniaturized and robust system architecture for vision sensor. Its characteristics should allow future GNC systems to fulfill forthcoming exploration missions' term of requirement.

Why is this project important for Europe?

The project offers a chance to achieve several steps forward in a number of engineering domains. Securing new knowledge and solving challenges in these areas - for space applications - will allow the European industry to maintain a leading role in the domain of GNC systems.

How does your work benefit European citizens?

The sensor's architecture is interesting not only for spacecrafts but also for unmanned air, water, or ground vehicles GNC systems. It has also other applications such as: environmental resources mapping, urban landscape monitoring, etc that can benefit the European society.

FOSTERNAV

Flash Optical Sensor for Terrain Relative Robotic Navigation



LIST OF PARTNERS

- Swiss Center for Electronics and Microtechnology, Switzerland
- Technical Research Center of Finland, Finland
- EADS Astrium, France
- Deutsches Zentrum für Luft- and Raumfahrt, Germany
- Modulight, Finland

COORDINATOR

**Swiss Center for Electronics and Microtechnology,
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PROJECT INFORMATION

Flash Optical Sensor for Terrain Relative
Robotic Navigation (FOSTERNAV)
Duration: 36 months
EU Contribution: € 1.953.289
Estimated total cost: € 2.662.263



HISP

High Performance Solid Propellants for In-Space Propulsion

SPEEDING UP SPACECRAFT

The space race takes a new dimension with high performance propellants for interplanetary travel. The HISP project is set to improve propulsion systems on future exploration missions.

It's a race towards far away planets; as Europe sets out for future space exploration journeys, new propellants are needed to power the spacecraft that would take us there. Today, time and mass are significant limiting factors for space exploration missions. Our spacecraft are too slow and too heavy, which in turn also makes them very costly. Thus the challenge is to develop new and more effective propellants.



Solid propellant is considered for the Mars ascend vehicle.
© NASA/JPL

HISP will develop a solid propellant, with 10% higher performance compared to the solid propellants used today.

The HISP project responds to this challenge with a novel concept for the development of a new solid propellant. HISP believes that the way to significantly improve the performance of a propulsion system is to develop propellants with higher specific impulse. Correspondingly, the objective of this project will be met by the development of a high performance solid rocket propellant with performance that is similar or higher than existing state-of-the-art liquid bi-propellants, and about 10 percent higher compared to the most efficient existing solid propellants.

In this respect, the project explores the potential of advanced chemical propulsion technologies, in particular advanced high energy density fuels that could power spacecraft on interplanetary flights.

HISP's concept for the new propellant is already well advanced. The aim of this project is thus to make theory come true, and produce 7 kg new propellant, which at the end of the project will be fired in a test motor.



NIKLAS WINGBORG
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The objective of HISP is to increase the scientific return from future space exploration missions by significantly reducing time, cost and mass required for spacecrafts to reach their destinations. This will be achieved by developing more efficient propellants.

Why is this project important for Europe?

Propulsion and propellants are key technologies for all space missions. Developing new propellants will strengthen the European space propulsion industry and increase its competitiveness, and will increase the effectiveness of future European space exploration missions.

How does your work benefit European citizens?

Increasing the scientific return from space exploration missions will increase the knowledge of the solar system and the universe and, in the long run, the knowledge of ourselves.

HISP

High Performance Solid Propellants for In-Space Propulsion



LIST OF PARTNERS

- Totalförsvarets forskningsinstitut (FOI), Sweden
- Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V (ICT), Germany
- The Inner Arch (TIA), France
- Politecnico di Milano (POLIMI), Italy
- Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek (TNO), Netherlands
- Sibtermokhim (STK), Russian Federation
- EURENCO Bofors AB (EUB), Sweden
- Avio S.p.A. (AVIO), Italy
- EURENCO France (EUF), France

COORDINATOR

Swedish Defence Research Agency (FOI), Sweden

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PROJECT INFORMATION

High Performance Solid Propellants for In-Space Propulsion (HISP)
Contract no: 262099
Starting date: 01/03/2011
Duration: 36 months
EU Contribution: € 1.975.683
Estimated total cost: € 2.823.326



LIROC

Laser Ignition Technology for Rocket Engines

LAUNCHING ROCKETS MORE EFFECTIVELY

Seen from Earth, a rocket is fired once. Yet, beyond the scope of the human eye, in the upper atmosphere it takes the form of a series of further launches. The LIROC project explores how new laser technology can enhance the quality of these “upper stage launches” further.

Minutes after its launch, travelling through the upper stages of the atmosphere, modern rockets are fired numerous times. Indeed, a rocket is a series of rockets stabled on top of each other, and the firing of the upper stages of such rockets is a challenging exercise.

In order to secure that these upper stage launches are undertaken precisely when it is most optimal for the spacecraft to be deployed safely in its orbit, laser technologies have emerged as possible means to enhance current state-of-the-art.



rocket takeoff © Stephen Sweet - Fotolia.com

LIROC explores how laser ignition may be initiate combustion during the upper stages of rocket launches.

Ignition processes are complex as they occur during engine transient phases during which flow behaviour is constantly undergoing changes. Mastering such processes is of paramount importance to ensure successful ignitions which are repeatable within minimal margins. As launcher upper stages soar through the upper layers of the atmosphere, environmental conditions change, inducing changes in the stage engine. Re-ignition becomes challenging as each ignition occurs under different conditions but must satisfy the same stringent requirements.

Laser technologies have emerged as possible means to solve this challenge. The LIROC project therefore addresses such technologies with a view to exploring how they may be used to initiate combustion in the cryogenic upper stages of launch vehicles.

LIROC explores how lasers may be focused inside the main rocket combustion chamber, in order to initiate the firing of the upper stages of the rockets.

Even a slight increase in the performance of upper stages launches will have a significant impact on how much payload a rocket is able to carry into orbit.



MICHAEL OSCHWALD
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

To examine how a laser system can be implemented to successfully ignite upper stage liquid rocket engines both reliably as well as reproducibly, and in doing so to pave the way for the implementation of laser systems to improve current European launch capabilities and thus enhance Europe's leading role.

Why is this project important for Europe?

Unlimited and reliable access to space is of fundamental importance to ensure the sovereignty of Europe in the world. Scientific advances and economic proliferation are of utter importance and space related research plays an important role in ensuring the latter. LIROC aims at enhancing and improving Europe's access to space.

How does your work benefit European citizens?

In today's world, European space technologies both directly as well as spin-offs enhance the quality of life of Europe's citizens. Improving of ignition systems is of fundamental importance to improving of launcher capabilities and thus ensuring and improving this quality of life.

LIROC

Laser Ignition Technology for Rocket Engines



LIST OF PARTNERS

- Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany
- Aerospace Propulsion Research (APP), The Netherlands
- SSC Keldysh Research Centre (KeRC), Russian Federation
- Konstruktorskoe Buro Khimavtomatiky (KBKhA), Russian Federation

COORDINATOR

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PROJECT INFORMATION

Laser Ignition Technology for Rocket Engines (LIROC)
Contract no: 262874
Duration: 24 months
EU Contribution: € 481.827
Estimated total cost: € 831.645



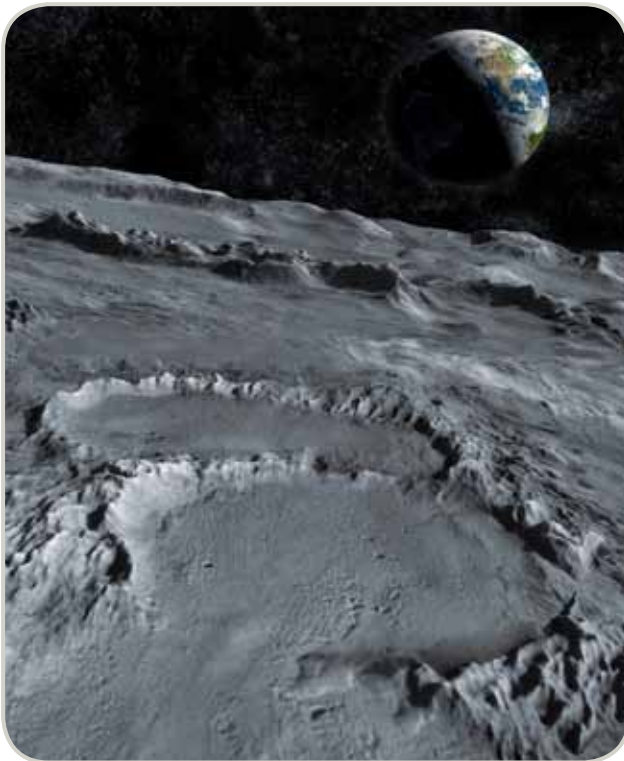
MicroThrust

MEMS-Based Electric Micropropulsion for Small Spacecraft to Enable Robotic Space Exploration and Space Science

SMALL SIZE MOON FLIGHTS

Believing that less is more, the MicroThrust project is set to develop new ways to reach into space with smaller and less expensive means, lowering the stakes should a failure occur.

Since the beginning of the space age, space exploration has been undertaken by the privileged few. Associated with national prestige, major powers have reached into space, deployed thousands of satellites, and engaged in expensive, audacious and high stakes space exploration missions to the Moon and even beyond our solar system. Whilst the risks that a generation of explorers have taken in space have been fascinating, high cost and high risks have limited the scope of space exploration activities. Indeed, in order to take the space age to its next stage, and share the endless possibilities that space offers with more actors, new systems are needed that make space missions cheaper, and thereby allow for many more missions that will be smaller but high-risk.

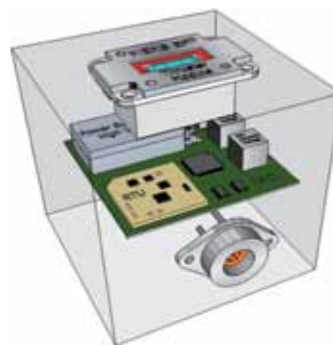


moon surface © innovari - Fotolia.com

MicroThrust will develop a low-cost miniaturized electric propulsion system for small-scale exploration missions.

The MicroThrust project responds to this need for more lower-cost space exploration missions, as it sets out to design a very small, yet highly performant electrical propulsion system. The MicroThrust system would be able to propel small micro and nano-satellites to any location between Earth and the Moon, and even beyond to nearby planets and asteroids. Small-size missions would cost a fraction of current conventional missions, and carry as little as a single instrument, thereby limiting the negative impact if a failure occurs.

The MicroThrust concept involves a microfabricated colloid thruster with a high degree of subsystem integration: all elements are co-designed to allow for the highest level of miniaturization and efficiency. Using micromachining technology, the thruster head can be shrunk to the size of a postage stamp. The project works towards the ultimate goal of developing a 'thruster-on-a-chip' for the smallest and most flexible missions imaginable.



Monolithic InP-HBV chip mounted in a waveguide block © MicroThrust



HERBERT SHEA
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We will develop a miniaturized propulsion system to allow small satellites to accomplish missions till now unimaginable. Debris cleanup, going from Earth orbit to lunar orbit or to a Lagrange point become possible for the first time at low cost for satellites weighing 1-100 kg.

Why is this project important for Europe?

Our miniaturized highly efficient thruster will allow Europe to independently and rapidly develop new missions based on constellations of small satellites. Europe will not rely on any specific launch vehicle, and will be free to lead novel exploration missions at very low cost.

How does your work benefit European citizens?

By making it possible for a few small European countries to build ambitious science missions, MicroThrust allows many more European citizens to be directly involved in space exploration. More missions mean more exciting science data, and a deeper understanding of our universe.

MicroThrust

MEMS-Based Electric Micropropulsion for Small Spacecraft
to Enable Robotic Space Exploration and Space Science



LIST OF PARTNERS

- Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- Queen Mary and Westfield College, University of London, United Kingdom
- Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek – TNO, The Netherlands
- Nanospace AB, Sweden
- SystematIC design bv, The Netherlands

COORDINATOR

Ecole Polytechnique Fédérale de Lausanne (EPFL),
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PROJECT INFORMATION

MEMS-Based Electric Micropropulsion for Small
Spacecraft to Enable Robotic Space Exploration and
Space Science (MicroThrust)

Contract no: 263035

Starting date: 01/12/2010

Duration: 36 months

EU Contribution: € 1.992.906

Estimated total cost: € 2.842.535



RITD

Re-entry: inflatable technology development in Russian collaboration

NEW WAYS FOR A SAFE JOURNEY HOME

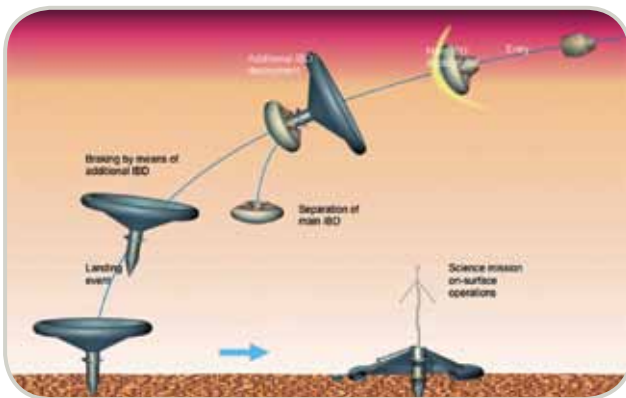
Contemporary Earth re-entry systems are heavy, expensive and sometimes, they are unsafe. The RITD project takes on the challenge of designing more practical and flexible solutions for bringing small payloads and materials safely back to Earth.

Future space missions are set to rely on smaller and more flexible spacecraft systems. Reducing spacecraft mass saves both cost and fuel, facilitating more environmentally friendly and better focused space exploration missions.

New and smaller spacecraft designs provide for re-thinking of all the elements onboard spacecraft, including the systems that make re-entry into Earth's atmosphere, and a subsequent safe landing of small payloads and loads of material on our planet possible. Today, such systems are heavy and cumbersome.

Indeed, moving on to the next stage of exploration, new solutions are needed.

Inspired by the inflatable MetNet Lander (MNL) system, which has been developed for planetary exploration missions to Mars, the RITD project will explore the feasibility of customizing such inflatable technologies, in order to also profit from them when returning spacecraft to Earth.



moon surface © innovari - Fotolia.com

As on Mars, objects re-entering Earth's atmosphere from space require systems to slow down during the decent, as well as protection against temperatures of several hundred degrees that are caused by the atmospheric friction. The focus of RITD's study of the MNL system will therefore focus on analyzing and measuring dynamical stability in the transonic phase when a spacecraft enters Earth's atmosphere and descends at high speed. These forces, of course are specific for Earth's atmosphere, so adaptation is needed if the MNL system is to be used successfully. RITD will therefore seek to preserve some of the added value features of the MNL system, such as its low mass, which is a result of it being inflatable, whilst making it robust enough for the challenging near Earth environment.



ARI-MATTI HARRI
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to demonstrate the feasibility of scaling a Martian atmospheric entry system for the purposes of re-entry to Earth. This would provide a flexible-to-use and cost effective system to deploy small payloads and loads of materials down to the surface of Earth from space.

Why is this project important for Europe?

RITD will enhance the European capabilities and know-how in the field of re-entry systems in particular and space technology in general. RITD will also enhance the cooperation between the Russian and European space organizations, both in the field of scientific research and commercial space technology.

How does your work benefit European citizens?

The RITD-project will enhance the European activity in the fields of space research and technology. It will also provide new possibilities for European scientists and engineers to work on space technology, as well as it will give additional opportunities for cooperation with space organizations outside Europe.



MNL systems © RITD

RITD aims to customize an inflatable entry system developed for Mars Landers for Earth re-entry.

RITD

Re-entry: inflatable technology development
in Russian collaboration



LIST OF PARTNERS

- Finnish Meteorological Institute, Finland
- Lavochkin Association, Russia
- Instituto Nacional de Técnica Aeroespacial, Spain
- The Bauman Moscow State Technical University, Russia

COORDINATOR

Finnish Meteorological Institute, Finland

CONTACT

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PROJECT INFORMATION

Re-entry: inflatable technology development
in Russian collaboration (RITD)
Contract no: 263255
Duration: 36 months
EU Contribution: € 494.651
Estimated total cost: € 736.013



ROV-E

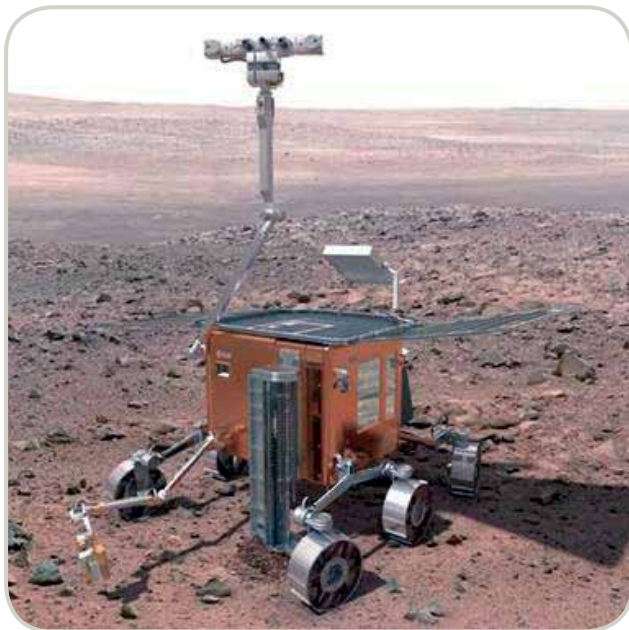
Lightweight technologies for exploration rovers

RE-DESIGNING LIGHTWEIGHT EXPLORATION ROVERS

Flexibility is paramount for successful scientific exploration of the surfaces of the Moon and Mars. We need exploration rovers, and in the future, if the ROV-E project proves successful, they might be lighter than ever before.

In 1971, the first Lunar Rover took Apollo 15 astronauts across the surface of the Moon. Whilst on previous missions, man had been constrained to exploring the Moon walking, with the Rover, the range lunar exploration was extended enormously, and some 27 km were covered during the course of a few days.

Similarly, on the surface of Mars, rovers have enabled scientists to examine more territory and perform examinations of interesting features, such as rocks.



© ROV-E

ROV-E will develop technologies required for lightweight exploration rovers.

Hence Europe's future ExoMars mission to the red planet is foreseen to take the form of a rover.

Yet, with rising scientific demands, rovers risk being overloaded and become too heavy. Therefore, new and lighter designs are needed.

The ROV-E project responds to this challenge with a proposal for lightweight exploration rovers. Without compromising on the rovers' ability to perform, the project is set to explore how lightweight advanced materials may replace existing rover components to make the rovers both lighter and flexible at once. By developing the technologies required to obtain such lightweight fully integrated equipments for exploration rovers, based on multifunctional structures, ROV-E in a sense puts existing rover concepts on a diet, making them fit for the challenges of future space missions.

Indeed, in space each extra kilo is costly, as it requires more fuel to reach the destination. Re-designing rovers with lightweight materials and multifunctional technologies may therefore also contribute to lowering the cost of future space missions.



GARBINE ATXAGA
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The main objective of ROV-E is the development of technologies required to obtain lightweight—fully integrated equipments based on multifunctional structures (MFS), where additional functions as health monitoring, shielding, power and storage could be integrated in a component.

Why is this project important for Europe?

ROV-E will enhance European aerospace industry competitiveness. MFS have proved to be a disrupting technology. However, work is still required to implement this approach in flight components. ROV-E will allow Europe to reach an advanced position as technology provider.

How does your work benefit European citizens?

Developments carried out in ROV-E are directly applicable to sectors where mass and volume play a key role. Outputs of this project could be translated to aeronautics reducing aircraft weight, fuel consumption and therefore, providing cheaper and environmentally friendly solutions.

ROV-E

Lightweight technologies for exploration rovers



LIST OF PARTNERS

- TECNALIA, Spain
- Thales Alenia Space Italia, Italy
- Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany
- Yuzhnoye SDO, Ukraine
- Advanced Composites Group, United Kingdom
- University of Southampton, United Kingdom

COORDINATOR

TECNALIA, Spain

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PROJECT INFORMATION

Lightweight technologies for exploration rovers
(ROV-E)

Contract no: 262744

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 1.478.412

Estimated total cost: € 2.214.618



SACOMAR

Technologies for Safe and Controlled Martian Entry

LANDING SAFELY ON MARS

Spacecraft descending towards the surface of Mars have to navigate through an extremely challenging environment before landing. SACOMAR performs detailed investigations with a view to improve spacecraft design for future Mars entry missions.

Safely landing on a planet is one of the most challenging parts of any space missions. In the case of our own planet Earth, spacecrafts risk to burn up in the atmosphere if their Thermal Protection Shields prove inadequate to deal with heat fluxes that are sometimes extreme. Although Mars has an atmosphere with lower density, for a safe touch down of spacecraft on the Red Planet is still very challenging. The main reasons for this being the presence of different gas compositions and significant dust content of the atmosphere.

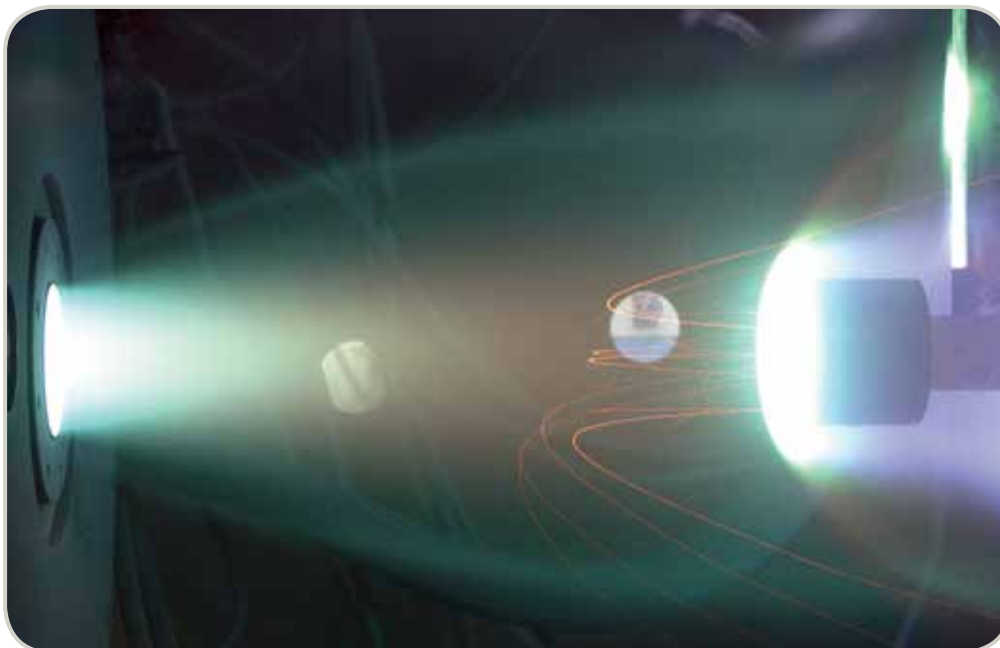
The SACOMAR project is set to enhance our understanding of the environment near Mars that a spacecraft has to

travel through safely, for future European space missions to be successful. Given the geographical distance to Mars, Computational Fluid Dynamics (CFD) research has proven to be a valuable means to enhance our knowledge of this alien environment. CFD is a branch of fluid mechanics, which makes use of numerical methods and algorithms with a view to solving and analyzing problems that involve fluid flows. Computers are used to perform the calculations required to simulate the interaction of liquids and gases with surfaces defined by boundary conditions.

In this respect, SACOMAR will seek to perform an experimental and numerical study of gas surface interaction phenomena in the high enthalpy flow field behind the bow shock in front of a model at Martian entry flow conditions.



ALI GÜLHAN
IS PROJECT COORDINATOR



© SACOMAR

SACOMAR will perform experimental and numerical investigations on Martian entry conditions.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The main objectives of the SACOMAR project are the improvement of experimental and numerical design tools for a safe Martian entry. This project should intensify the cooperation between the key institutions of EU and Russia in the field of Martian entry technologies.

Why is this project important for Europe?

Until now Europe did not succeed in performing a successful Martian entry, and landing a rover on Mars. The reason of the loss of the European lander Beagle 2 is still unknown. SACOMAR tries to support a better understanding of problems and improve the design of a spacecraft.

How does your work benefit European citizens?

Obtained knowledge from the SACOMAR project will be transferred for future European interplanetary missions. A new generation of researchers will take advantage of working on future activities that can meet the future needs of aerospace science and engineering.

SACOMAR

Technologies for Safe and Controlled Martian Entry



LIST OF PARTNERS

- Deutsches Zentrum für Luft- und Raumfahrt, Germany
- ASTRIUM, Germany
- CIRA, Italy
- Thales Alenia, Italy
- TsNIImash, Russia
- IPM, Russia
- TsAGI, Russia
- ITAM, Russia

COORDINATOR

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PROJECT INFORMATION

Technologies for Safe and Controlled Martian Entry
(SACOMAR)
Contract no: 263210
Starting date: 01/01/2011
Duration: 18 months
EU Contribution: € 499.484,94
Estimated total cost: € 690.530,85



SPARTAN

SPAcE exploration Research for Throatable Advanced eNgine

SOFT AND PRECISE LANDING ON OTHER PLANETS

Imagine a spacecraft touching down on the surface of the Moon with the aim of establishing a permanent Lunar Outpost. Whether it carries robots or people, a soft and precise landing is paramount for success. The SPARTAN project develops new technologies in support of just that.

In the next decades, European space exploration missions are set for exotic destinations about our solar system. The surfaces of new worlds, such as the Moon, Mars and the even Jupiter's moon Europa, discovered 1610 by Galileo, may soon feel the impact of our landing spacecrafts.

The success of such future robotic missions - and eventually the success of future manned missions - depends from technologies that enable spacecrafts to land softly and precisely under extremely difficult conditions with and without the presence of an atmosphere.

Throatable propulsion technology presents promising features that make such landings possible.

The SPARTAN project explores this potential, exploiting both the throttling capability of the propulsion system and the peculiar characteristics of hybrid engine technology. In doing so, the project aims at implementing and strengthening the technological base in view of future space missions.

SPARTAN research focuses on three major objectives, including the hybrid engine design, the development of an oxidizer throttling device, and the design of the spacecraft landing system validation. Hence the project proposes the development of a comprehensive spacecraft landing concept, the efficiency of which it will assess by a landing test, that allows for the demonstration of the soft landing capabilities of throatable hybrid propulsion technology.



ENRICO GAIA
IS PROJECT COORDINATOR



© SPARTAN

SPARTAN will develop throatable propulsion technology for planetary soft and precision landing.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

Demonstrate that throatable hybrid propulsion technology with its very high (10:1) thrust adjustability ratio is capable in combination with an advanced Guidance and Navigation system to provide for secure, precise and soft landing.

Why is this project important for Europe?

Space Exploration can only be a shared enterprise between the space faring nations. Europe's capability to bring in the negotiation technologies that are key for these missions would put her at the level of USA and Russia.

How does your work benefit European citizens?

Contribute in effectively opening a new frontier by enabling the construction of permanent planet bases that can be used by first pioneer scientists but also later by other people interested in taking advantage of the available resources and maybe also for tourism.

SPARTAN

SPAcE exploration Research for Throatable Advanced eNgine



LIST OF PARTNERS

- Thales Alenia Space Italia S.p.A, Italy
- Università degli Studi di Padova, Italy
- NAMMO Raufoss SA, Norway
- Bradford Engineering B.V., The Netherlands
- Vysoke uceni technicke v Brne, Czech Republic
- Politecnico di Milano, Italy
- GMV Aerospace and Defence SA Unipersonal, Spain
- STUDIEL, France

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PROJECT INFORMATION

SPAcE exploration Research for Throatable Advanced eNgine (SPARTAN)

Contract no: 262837

Starting date: 01/02/2011

Duration: 36 months

EU Contribution: € 1.926.631

Estimated total cost: € 3.034.339



SpWRT

SPACEWIRE-RT

JOINING TECHNOLOGIES TO DO MORE WITH LESS

With the growing trend towards “Operationally Responsive Space”, demand is increasing for more flexible spacecraft that can be assembled to meet a specific mission requirement and launched quickly. The SpWRT project responds to this demand, paving the way for enhanced cooperation between the EU and Russia in this exciting technology field.

The success of future space missions is linked closely to our ability to design spacecraft that are both flexible and able to be assembled rapidly to meet specific customer demands. Flexibility in this respect is a synonym for the ability to build spacecraft that can be adapted from one mission to another, in order to respond to mission specific needs. Rapid assembly implies fast integration of pre-build components that can be configured to meet a wide range of space mission requirements.

Striving to achieve more, rapidly and at lower cost, spacecraft designers see a need for enhancing the degree of joint technology standards between space faring nations.

The SpWRT project is set to promote such interoperability between EU and Russian space technologies. The project aims to provide a flexible, robust, responsive, deterministic and durable standard network technology for spacecraft avionics i.e. spacecraft onboard data-handling and control electronics.

SpWRT will improve the existing SpaceWire protocol in a number of ways, such as adding a quality of service layer.

Such developments may pave the way for a new EU-Russia standard in spacecraft plug-and-play network technologies, thereby creating a strong technical platform for further joint advances at the payloads and avionics level.



STEVE PARKES
IS PROJECT COORDINATOR



SpaceWire Router Testing © SpWRT

SpWRT promotes the development of a new joint EU-Russia standard in spacecraft onboard networking technologies.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

An enhanced SpaceWire network technology that provides quality of service capabilities suitable for spacecraft data-handling and control applications, and which is able to support rapid assembly of spacecraft. A strengthened technological collaboration between Europe and Russia.

Why is this project important for Europe?

SpaceWire is a European technology used by the world's space agencies and space industry on many spacecraft. The SpaceWire-RT project aims to take this technology to the next level, enabling it to support rapid spacecraft assembly and making it applicable to other applications.

How does your work benefit European citizens?

Space technology is now a part of everyday life: weather images, satellite navigation, broadcast TV, and telecommunications. SpaceWire-RT will provide a standard networking technology for use onboard satellites, reducing their cost, and enabling them to be built more quickly.

SpWRT

SPACEWIRE-RT



LIST OF PARTNERS

- University of Dundee, United Kingdom
- St Peterburg University of Aerospace Instrumentation, Russia
- Submicron, Russia
- ELVEES, Russia
- Astrium GmbH, Germany

COORDINATOR

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PROJECT INFORMATION

SPACEWIRE-RT (SpWRT)

Contract no: 263148

Duration: 18 months

EU Contribution: € 499.997

Estimated total cost: € 683.233



ZAPÁS

Assessment and Monitoring of Forest Resources in the Framework of the EU-Russia Space Dialogue

SIBERIAN INSIGHTS ON GLOBAL WARMING

In a time of climate change, the forests of Central Siberia act as valuable carbon sinks. The ZAPÁS project brings Russian and European partners together, aiming to enhance the procedures and products in the field of Earth observation for forest resource assessment and monitoring.

Forests play a pivotal part in Earth's carbon balance. Hence our ability to fully understand and quantify the impact that vast forests have on the global environment is important for the monitoring of international agreements aimed at CO2 reductions.

In Eurasia, the forests in Central Siberia are important carbon sinks. The EU and Russia share an interest in generating a better understanding of the biological processes that are at play across these immense lands.



Drought © David Hands - Fotolia.com

Earth observation data provide valuable solutions in this respect, since remote sensing from satellites enables monitoring of large and remote land areas and the production of biophysical products.

Specifically, radar satellites facilitate the generation of biomass maps. Such maps may be used to obtain information about biomass change over several years, and feed into advanced carbon accounting models.

The ZAPÁS project responds to the demand for better carbon forestry data. The project brings European and Russian researchers together, and jointly they intend to exploit the richness of Earth observation data from European and Russian satellites, such as ENVISAT MERIS and ASAR, and METEOR-M and RESURS-DK1. This collaboration is set to lead to the development of first biomass maps, and biomass change maps for the years 2007, 2008, and 2009 on a local scale, as well as improved biomass and land cover maps at regional scale. Moreover, the project will generate a 1 km scale land cover map as input to a carbon accounting model, which will facilitate improved European-Russian reporting on the implementation of the Kyoto Protocol.

Indeed, ZAPÁS' foreseen development and validation of a terrestrial ecosystem Full Carbon Account for a large area is promising.



CHRISTIANE SCHMULLIUS
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The ZAPÁS project will speed up transition to sustainable development in European countries as well as in Russia via improving the information exchange and joining the efforts in order to increase scientific credibility of Earth Observation for the environmental sciences.

Why is this project important for Europe?

Russia, the European Union's largest neighbour, is considered by the European Parliament as a key player in its efforts to protect the global climate and environment. An important international agreement, to which ZAPÁS will contribute, is the Kyoto Protocol, providing mechanisms to reduce greenhouse gases and tackle global warming.

How does your work benefit European citizens?

The intensification of collaboration between the EU and Russia on environmental issues is necessary to step forward in bringing ecological sustainability and social responsibility to the forefront in economic dealings. Such responsibility is vital in industrial investments, in cooperation on energy issues, and in the farming, forestry and fisheries sectors.

ZAPÁS paves the way for enhanced forestry Carbon Accounting from space, joining European and Russian expertise.

ZAPÁS

Assessment and Monitoring of Forest Resources in the Framework of the EU-Russia Space Dialogue



LIST OF PARTNERS

- Friedrich-Schiller University, Department for Earth Observation, Jena, Germany
- Internationale Institute for Applied Systems Analysis, Austria
- Space Research Institute of Russian Academy of Sciences, Russia
- V.N.Sukachev Institute of Forestry, Siberian Branch of the Russian Academy of Sciences, Russia
- Joint Stock Company "Russian Space Systems", Russia

COORDINATOR

**Friedrich-Schiller University, Department for Earth
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PROJECT INFORMATION

Assessment and Monitoring of Forest Resources
in the Framework of the EU-Russia Space Dialogue
(ZAPÁS)

Duration: 36 months

EU Contribution: € 499.990

Estimated total cost: € 669.609



TransHyBerIAN

Characterization of Wall Temperature Effect during Transition of Hypersonic flow over a Cone By Experiments And Numerical Simulations

BRINGING OUR ASTRONAUTS SAFELY HOME

Returning home to Earth is one of the most dangerous stages of any space mission, and in the past inadequate thermal protection has led to disasters. The TransHyBerIAN project will study how Thermal Protection Systems (TPS) in spacecraft can be made more effective and safe.

Descending towards Earth at speeds faster than five times the speed of sound, for astronauts the difference between life and death is equal to the strength of the Thermal Protection System (TPS) in their re-entry vehicle. At such speeds, the distribution of heat towards the protection shield can be very volatile; sometimes a flux will increase heat sharply three fold or more. In the past, disasters have happened, when spacecraft have burned up in the atmosphere during this difficult re-entry stage. Therefore there is a need to design stronger and safer TPS for future European space missions.

The TransHyBerIAN project will examine new ways to enhance the level of protection that TPS offer in spacecraft, which will help design future re-entry vehicles that are

adequately protected against the extreme heat levels they might experience in the atmosphere.

Bringing together Russian and European researchers in a joint effort to undertake detailed and careful research into the physics involved in hypersonic transition, TransHyBerIAN project findings might prove pivotal for the design and development of the next generation of re-usable re-entry vehicles. Indeed, such designs require that spacecraft can withstand extreme heat numerous times.

Pursuing its research, the project will make use of six hypersonic facilities, and several numerical codes and databases in the EU and Russia. In this respect, TransHyBerIAN is set to bring together both valuable human and world class technical resources from Russia and the EU.



PATRICK RAMBAUD
IS PROJECT COORDINATOR



The plane © Kovalenko Inna - Fotolia.com

TransHyBerIAN will explore new ways to enhance the Thermal Protection System in re-entry vehicles.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We are expecting to highlight the mechanism of hypersonic transition and specially the role played by a local wall temperature variation on the most unstable mode of instability. Ultimately, delaying the amplification of this mode will allow us to keep a laminar boundary layer.

Why is this project important for Europe?

The guaranty for a human crew to access Space with the certitude of its secure return to Earth is crucial to confirm the leading European expertise in the technological Space challenge. The design of a safe vehicle requires mastering its boundary layer transition in hypersonic.

How does your work benefit European citizens?

European citizens will benefit of this knowledge with the development of a new generation of a hypersonic civil airplane. The current EU project LAPCAT expects to connect Paris to Sidney in less than four hours. To this aim the understanding of hypersonic transition will be imperative.

TransHyBerIAN

Characterization of Wall Temperature Effect during Transition of Hypersonic flow over a Cone By Experiments And Numerical Simulations



LIST OF PARTNERS

- Von Karman Institute for Fluid dynamics, Belgium
- Federal State Unitary Enterprise Central Research Institute for Machine Building, Russia
- Deutsches Zentrum für Luft-und-Raumfahrt e.V., Germany
- Khristianovich Institute of Theoretical and Applied Mechanics, Russia
- Federal State Unitary Enterprise Aerohydrodynamic Institute, Russia

COORDINATOR

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PROJECT INFORMATION

Characterization of Wall Temperature Effect during Transition of Hypersonic flow over a Cone By Experiments And Numerical Simulations (TransHyBerIAN)

Duration: 24 months

EU Contribution: € 499.999

Estimated total cost: € 651.373



AFFECTS

Advanced Forecast For Ensuring Communications Through Space

24 HOUR WARNING FOR SPACE WEATHER EVENTS

The next solar maximum will occur around 2012, raising the risks that extreme space weather events could damage communication networks and power grids on Earth. AFFECTS develops an advanced space weather forecasting system to prepare for this challenge.

Solar activity affects the entire Earth environment from the magnetosphere down to the ionosphere, and even to the lower atmosphere climate system. The natural hazards of space weather do not only modify the atmosphere. They also have the potential to catastrophically disrupt the operations of many technological systems, such as communication systems and power grids on Earth. Hence the impact of space weather for people's lives and jobs is very real, and as we approach the next solar maximum around 2012 such risks increase.

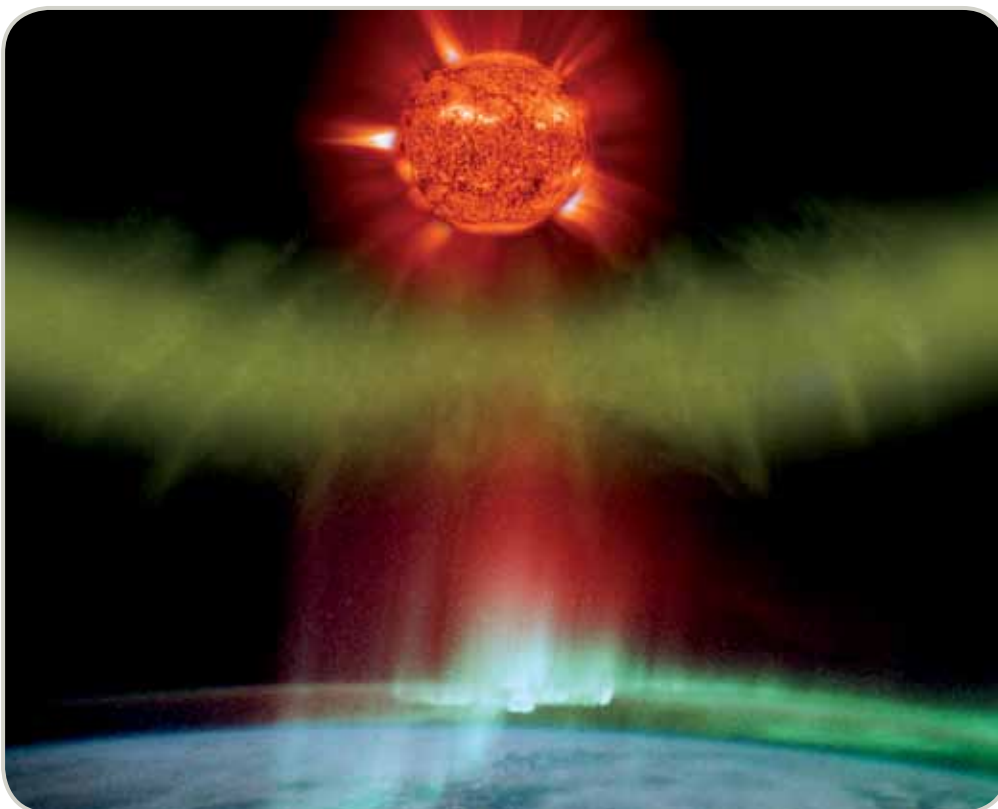
Hence an advanced early warning and space weather forecasting system is needed.

The AFFECTS project addresses these risks, and sets out to develop such a system, thereby mitigating the impact of space weather both in space where spacecraft are also vulnerable, and on Earth. The project undertakes state-of-the-art modelling of the Sun-Earth Chain of Effects on the Earth's ionosphere and their subsequent impacts on communication systems by means of measurements from satellites in different orbits and ground-based monitoring of auroral electrojet and ionospheric activity. AFFECTS brings together some of the world's leading space weather experts from Europe and the US.

Together, ready in time for the next solar maximum around 2012, these AFFECTS scientists are determined to establish a functioning space weather forecasting system. AFFECTS' "Forecast System Ionosphere" is expected to provide forecasts of total electron content (TEC) 24 hours in advance of space weather events.



VOLKER BOTHMER
IS PROJECT COORDINATOR



© AFFECTS

AFFECTS will provide advanced early space weather warning to protect communication systems.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

AFFECTS will establish the first dedicated space weather forecast system for ionospheric applications in an operational manner.

Why is this project important for Europe?

The AFFECTS space weather forecast system is an entirely new capability in Europe and elsewhere, providing advanced prediction, assessment and early warning capabilities of disruptive space weather events.

How does your work benefit European citizens?

The AFFECTS early warning and space weather forecast system will help protect critical infrastructures of European citizen's communication systems.

AFFECTS

Advanced Forecast For Ensuring Communications Through Space



LIST OF PARTNERS

- University of Göttingen, Germany
- Royal Observatory of Belgium, Belgium
- Space Research Institute of National Academy of Sciences and National Space Agency of Ukraine, Ukraine
- Fraunhofer Institute for Physical Measurement Techniques IPM, Germany
- University of Tromsø, Norway
- German Aerospace Center Neustrelitz, Germany
- Astrium ST Friedrichshafen, Germany

COORDINATOR

University of Göttingen, Germany

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PROJECT INFORMATION

Advanced Forecast For Ensuring Communications Through Space (AFFECTS)

Contract no: 263506

Starting date: 01/03/2011

Duration: 36 months

EU Contribution: € 1.999.893

Estimated total cost: € 2.550.245



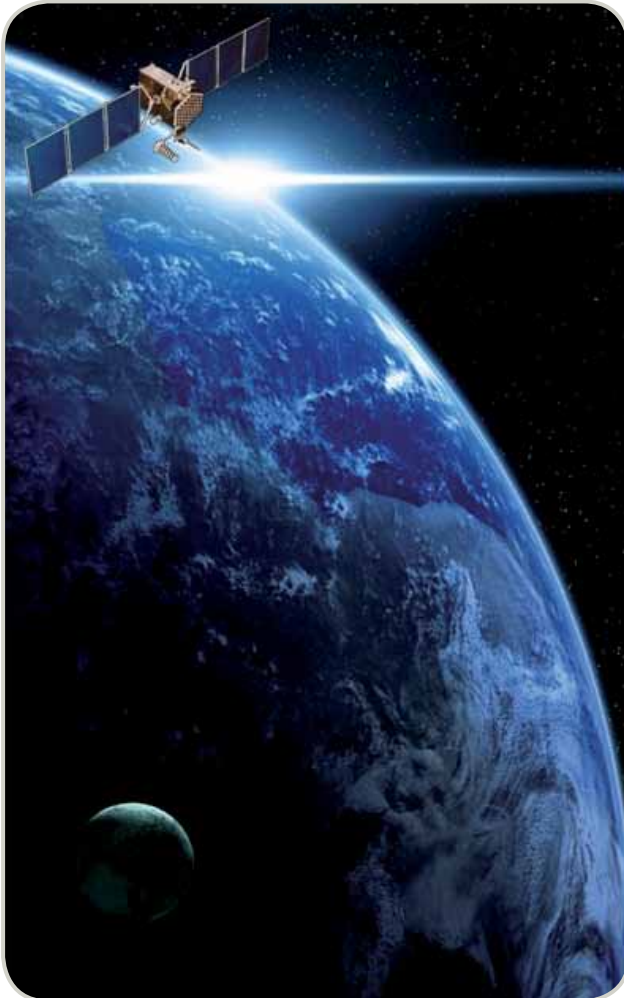
ATMOP

Advanced Thermosphere Modelling for Orbit Prediction

SECURING OUR SATELLITES

Between Earth and space, the thermosphere is home to thousands of satellites and the International Space Station. Here space weather changes rapidly, yet our ability to monitor and predict it lacks precision. The ATMOP project addresses this shortfall, developing a new thermosphere space weather model.

Bigger than any other part of Earth's atmosphere, the thermosphere is a hostile environment that varies rapidly in response to solar and geomagnetic activity. Space weather directly impacts life on the International



© ATMOP

ATMOP works towards the creation of a new thermosphere model, enabling more precise space weather forecasts.

Space Station, which orbits in the middle of the thermosphere some 300 km above us. It also affects the functioning of satellites that may be lost or collide with other space objects. In order to protect these valuable assets, and limit the risk of further space debris, which is caused by colliding satellites, it is paramount to develop better models for space weather 'nowcasting' and forecasting.

The ATMOP project is set to develop such advanced models of the thermosphere, as it brings together scientists who are leading in the world in the areas of semi-empirical thermosphere modelling, and physical modelling of the atmosphere. The aim is to develop a new Drag Temperature Model (DTM), which may ultimately become the successor to existing semi-empirical models, and enable Europe to undertake real-time thermosphere prediction and provide operational services for space weather forecasts.

In this respect, ATMOP contributes to ensuring the security of European space assets from space weather events, thereby also reducing the risk that space weather poses for Earth based networks that are dependent on satellites, such as emergency response services and communication networks.



NOELIA SANCHEZ-ORTIZ
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The main objective of ATMOP is to give Europe a strategic advantage in precise thermosphere modelling and predictive satellite drag computation by developing an advanced semi-empirical thermosphere model and bringing it into a pre-operational state.

Why is this project important for Europe?

Currently Europe lacks of an independent near real time model of the thermosphere to enable precise drag computation and orbit propagation. This project focuses on the development of this European capability to reduce dependence of space operations on the US.

How does your work benefit European citizens?

A large number of activities rely on satellites. Precise air drag computation is mandatory for improved survey and precise tracking of space objects and the initiation of appropriate measures to minimise risks to satellites (track loss, collisions) and ground assets (re-entry).

ATMOP

Advanced Thermosphere Modelling for Orbit Prediction



LIST OF PARTNERS

- DEIMOS Space S.L.U., Spain
- Centre National de la Recherche Scientifique, France
- Collecte Localisation Satellites, France
- Met Office, United Kingdom
- Centre National d'Etudes Spatiales, France
- University College London, United Kingdom
- Kybertec S.R.O, Czech Republic

COORDINATOR

DEIMOS Space S.L.U., Spain

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PROJECT INFORMATION

Advanced Thermosphere Modelling for Orbit Prediction
(ATMOP)

Contract no: 261948

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 1.563.980

Estimated total cost: € 2.219.205



COMESSEP

Coronal Mass Ejections and Solar Energetic Particles: forecasting the space weather impact

INSIGHTS FOR BETTER SPACE WEATHER FORECASTS

Towards the maximum of the Sun's solar cycle, our nearest star commonly engages in explosive releases of mass, magnetic flux and energetic particles, characterising our local space weather. Events such as coronal mass ejections (CME) and solar energetic particles (SEP) are common during such periods.

The COMESSEP project will develop new tools for better forecasting of such events.

SEP and CME events are a well known risks for satellites and astronauts onboard the International Space Station (ISS). In extreme cases the effects of these events may even impact the effective functioning of pipelines and power-grids on Earth through the magnetic storms caused by Earth-bound CMEs.

The development of an operational European Space Weather Alert system would be a valuable means to mitigate the negative effects of such extreme space weather,

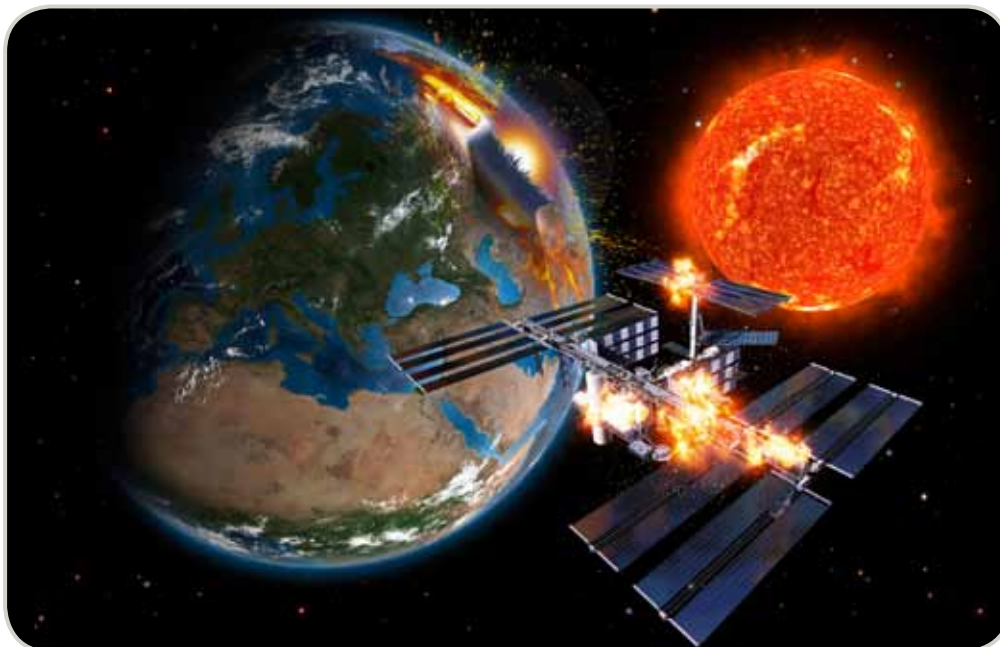
thereby safeguarding valuable space and terrestrial infrastructures, and the lives of our astronauts.

Responding to this challenge, the COMESSEP project is set to undertake extensive data analysis and modelling, aiming at developing forecasting tools for both SEP radiation storms and geomagnetic storms. By means of analysis of historical data, complemented by the extensive data coverage of solar cycle 23, the key factors that lead to such extreme space weather events will be identified, providing for more precise forecasting, and better countering of false alarms.

Moreover, COMESSEP is set to enhance our understanding of the 3D kinematics and interplanetary propagation of CMEs, which may provide valuable insights for the optimisation of future space weather forecasting tools. In parallel, the sources and propagation of SEPs will be examined and modelled.



NORMA B. CROSBY
IS PROJECT COORDINATOR



deep impact 4 © apfelweile - Fotolia.com

COMESSEP will develop new tools to mitigate the negative impacts of geomagnetic storms and solar energetic particle events.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The development of an operational European Space Weather Alert system to forecast SEP radiation storms and magnetic storms, based on data analysis, modelling, and tool development.

Why is this project important for Europe?

Scientific results from COMESSEP will contribute to reducing the vulnerability of space assets to the dynamic space environment. Additionally they will provide more reliable scenarios for human space travel.

How does your work benefit European citizens?

Space weather is a global problem and affects everybody. We are all either directly or indirectly dependent on the reliable functioning of modern technology that relies on satellites that can tolerate the space weather.

COMESSEP

Coronal Mass Ejections and Solar Energetic Particles:
forecasting the space weather impact



LIST OF PARTNERS

- Institut d'Aeronomie Spatiale de Belgique, Belgium
- Universitaet Graz, Austria
- Koninklijke Sterrenwacht van België, Belgium
- Hvar Observatory, Faculty of Geodesy, University of Zagreb, Croatia
- Technical University of Denmark, Denmark
- National Observatory of Athens, Greece
- University of Central Lancashire, U.K.

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PROJECT INFORMATION

Coronal Mass Ejections and Solar Energetic Particles:
forecasting the space weather impact (COMESSEP)
Contract no: 263252
Starting date: 01/02/2011
Duration: 36 months
EU Contribution: € 1.798.718
Estimated total cost: € 2.518.021



EURISGIC

European Risk from Geomagnetically Induced Currents

PROTECTING CRITICAL INFRASTRUCTURE IN EUROPE

Geomagnetically induced currents (GICs) from solar storms pose a major risk to the operation of power transmission grids in Europe and across the globe. The EURISGIC project seeks to mitigate this natural hazard, developing European capability for GIC forecasting and warning.

With the progressive integration across Europe of interconnected and geographically wide power transmission grids, the risk from fallout caused by GICs during solar storms is exacerbated. Hence there is a need for a greater scientific understanding of phenomena in the solar-terrestrial environment that lead to GICs, and the development of a capability in GIC modelling, forecasting and mitigation.

The EURISGIC project takes on this major challenge, modelling GIC in power transmission grids throughout Europe, with a view to establishing a European capability for 30-60 minute lead time forecasts of GIC events.

Indeed, the project will produce the first European-wide real-time prototype forecast service of GIC in power

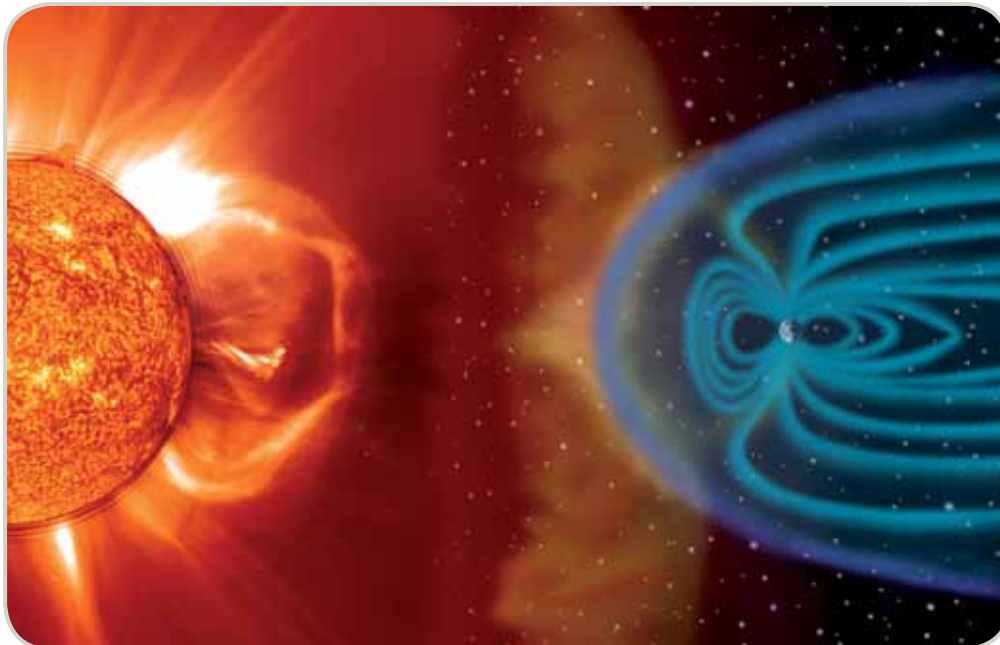
systems, based on in-situ solar wind observations and comprehensive simulations of Earth's magnetosphere. Moreover, by utilising geomagnetic recordings, EURISGIC will derive the first map of the statistical risk of large GIC throughout Europe.

In combination, early warning forecasts, risk maps and worst-case scenario assessments provided by EURISGIC will contribute to mitigating the risk that GICs represents, thereby avoiding destruction of transformers and enhancing the protection of Europe's critical infrastructure.

Partners from the US, Russia, and several European countries will work together in this project to achieve EURISGIC's ambitious goals, which have the potential to enhance the security of critical infrastructure worldwide.



ARI VILJANEN
IS PROJECT COORDINATOR



sunearth © EURISGIC

EURISGIC will develop 30-60 minute forecast warnings of geomagnetically induced currents (GIC) threatening critical infrastructure, such as power grids.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

EURISGIC will integrate the best international expertise to provide capability in forecasting geomagnetically induced currents on a Pan-European scale. We will also analyse the valuable long-term archives of geomagnetic recordings to assess statistically the GIC risk in Europe.

Why is this project important for Europe?

Geomagnetically induced currents do not respect national borders, but they do affect the whole Earth during severe space weather storms. Due to the increasing interconnection between power grids, the risk from harmful continental-scale GIC effects is larger than before.

How does your work benefit European citizens?

The EURISGIC project will improve the European awareness of space weather effects on ground-based infrastructures. A special target audience is power industry which will exploit the results of EURISGIC to help mitigate problems in power transmission.

EURISGIC

European Risk from Geomagnetically Induced Currents



LIST OF PARTNERS

- Finnish Meteorological Institute, Finland
- British Geological Survey, Natural Environment Research Council, United Kingdom
- NeuroSpace, Sweden
- Swedish Institute of Space Physics, Sweden
- Geodetic and Geophysical Research Institute, Hungary
- Polar Geophysical Institute of the Kola Scientific Center of Russian Academy of Sciences, Russia
- The Catholic University of America, United States

COORDINATOR

Finnish Meteorological Institute, Finland

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PROJECT INFORMATION

European Risk from Geomagnetically Induced Currents
(EURISGIC)

Contract no: 260330

Starting date: 01/03/2011

Duration: 36 months

EU Contribution: € 1.056.184

Estimated total cost: € 1.561.175



PLASMON

A new, ground based data-assimilative modelling of Earth's plasmasphere – a critical contribution to Radiation Belt modelling for Space Weather purposes

IN THE PLASMASPHERE, LOOKING FOR HIDDEN SECRETS

The security of space assets is affected by the high energy charged particle environment in Earth's radiation belts. The plasmasphere strongly impacts this environment, yet currently, we lack adequate knowledge regarding its structure. The PLASMON project attempts to uncover hidden properties of the plasmasphere.

During a geomagnetic storm, satellites and humans in space face grave danger. Such extreme space weather pose risks for Europe's space infrastructure. Pursuing security in space, enhanced space weather forecasting is a priority for the EU, which is determined to protect its growing space infrastructures, in particular the foreseen Galileo and GMES satellite constellations.

The PLASMON project represents a coordinated international effort undertaken by a consortium of world renowned scientific institutions from Europe, America, Africa and New Zealand, aimed at enhancing our understanding of Earth's plasmasphere.

Situated just underneath the magnetosphere in the upper atmosphere, the plasmasphere is a region that consists of low energy plasma. It is believed that the plasmasphere impacts the nature of wave activity in Earth's radiation belts, known as the Van Allen belts. During a geomagnetic storm the length and time during which space assets are endangered by radiation is determined by loss mechanisms, particularly the phenomenon of relativistic electron precipitation (REP) that are governed by the properties of the plasmasphere.

The PLASMON project therefore undertakes regular longitudinally-resolved measurements of plasmaspheric electron and mass densities, in an attempt to monitor the composition of the plasmasphere from Earth. Using a network of observation stations, operating in the ULF and VLF ranges and deployed worldwide, PLASMON attempts to pave the way for enhanced space weather forecasts needed to secure our space assets.



JANOS LICHTENBERGER
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The main objective of PLASMON is to extend and fully establish the AWDANet, EMMA and AARDDVARK networks to provide real-time data for mapping and modelling the plasmasphere and the REP phenomenon in the Radiation Belts.

Why is this project important for Europe?

The modern civilization, including Europe relies on high tech satellite systems that are sensitive to the effects of Space Weather. EU – though it has an increasing number of satellites – has no own Space Weather forecasting service. PLASMON is intended to be an important step towards such a service.

How does your work benefit European citizens?

The European citizens' everyday life is invisibly shot by satellite technology – navigation, telecommunication, air travels, etc. –, the security and the smooth operation of this technology will be supported in the future by the results obtained in PLASMON project.



plasma ball © Schiller Renato - Fotolia.com

PLASMON will measure plasmaspheric electron and mass densities to monitor the changing composition of the plasmasphere.

PLASMON

A new, ground based data-assimilative modelling of Earth's plasmasphere – a critical contribution to Radiation Belt modelling for Space Weather purposes



LIST OF PARTNERS

- Eötvös Loránd University, Hungary
- Natural Environment Research Council, British Antarctic Survey, UK
- Eötvös Loránd Geophysical Institute, Hungary
- University of L'Aquila, Italy
- University of Oulu, Sodankyla Geophysical Observatory, Finland
- University of Otago, New Zealand
- National Research Foundation, Hermanus Magnetic Observatory, South Africa
- New Mexico Institute of Mining and Technology, USA
- Institute of Geophysics, Polish Academy of Sciences, Poland
- University of Washington, USA
- Los Alamos National Security LLC, USA

COORDINATOR

Eötvös Loránd University, Hungary

CONTACT

Dr. János LICHTENBERGER

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PROJECT INFORMATION

A new, ground based data-assimilative modelling of Earth's plasmasphere – a critical contribution to Radiation Belt modelling for Space Weather purposes (PLASMON)

Starting date: 01/02/2011

Duration: 42 months

EU Contribution: € 1.972.050

Estimated total cost: € 2.626.263



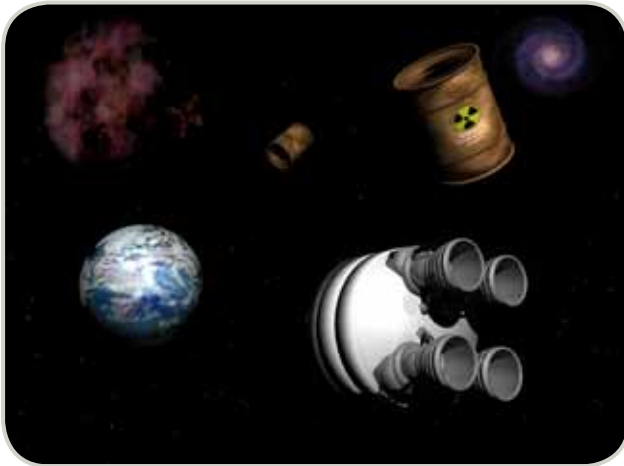
SIDER

Radiation shielding of composite space enclosures

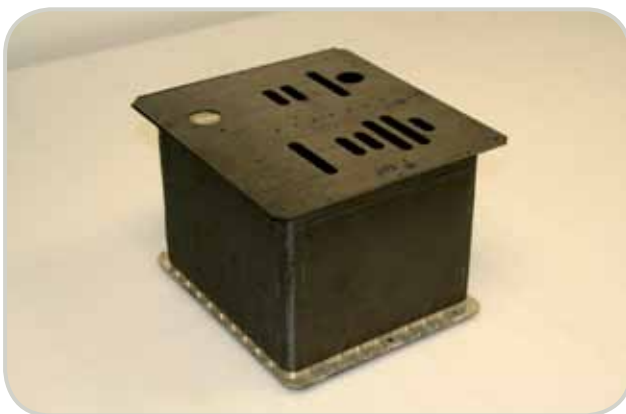
BETTER PROTECTION AGAINST RADIATION

Radiation is a risk for satellites and humans in space, and shielding against such radiation is a cost. SIDER addresses this challenge with research into improved composite structures for better and lighter radiation shields.

Depending on mission altitude and inclination, and the dose rating of electronics, the thickness of aluminium necessary for shielding can substantially exceed that required for structural strength, resulting in significant weight penalties.



contaminacion espacial © juanjo tugores - Fotolia.com



© SIDER

SIDER proposes to improve the radiation shielding behaviour of composite structures and develop improved composite structures to protect against radiation in space.

Electronic housings are a massive part on the spacecraft. New concepts for lightweight satellites show the possibilities of using advanced designs based on composite housings. However, conventional graphite epoxy composites are not as efficient radiation shielding materials as aluminium - composites provide 30 to 40 % less radiation attenuation, which is considered a primary design driver. The SIDER project aims at paving the way for such lighter radiation shields by developing the technologies and tools required to obtain lightweight, safe, robust and reliable composite structures.

In doing so, the project is set to evaluate the protective potential of alternative materials such as tungsten layers and nano-conductive materials.

Potential benefits from succeeding in this endeavour are numerous. Further to making lighter spacecraft possible that may travel further into deep space on future space exploration missions, the European satellite industry might also profit from the development of better composite structures, sustaining Europe's global leadership on the market for communication satellites.

Moreover, better radiation protection directly benefits people on Earth, since such technology may be transferred into domains outside the space sector, in particular at the benefit of improved health care technology.

Indeed, potential SIDER discoveries hold a great potential for commercial exploitation well beyond the space sector.



GARBINE ATXAGA
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

Organic composite materials are a promising solution to many space applications, where mass is really a concern. Nevertheless, these materials provide a poor radiation shielding. This project intends to solve this issue understanding and improving composite structures' behaviour.

Why is this project important for Europe?

This study will allow surpassing the last obstacle to get a broad use of composite materials in space applications. The developments will benefit commercial and utilitarian space missions thus generating a very significant impact on Europe's capability to access and exploit space.

How does your work benefit European citizens?

Findings and results obtained in the SIDER project could also be transferred to other sectors and markets such as the nuclear and pharmaceutical industry. Technologies and tools are essential to increase the European market, offering opportunities for the employment of skilled professionals.

SIDER

Radiation shielding of composite space enclosures



LIST OF PARTNERS

- TECNALIA, Spain
- Aalto-Korkeakoulusaatio, Finland
- Anturikeskus OY, Finland
- Yuzhnoye Design Office named after Mikhail Yangel, Ukraine
- Université de Liège, Belgium

COORDINATOR

TECNALIA, Spain

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PROJECT INFORMATION

Radiation shielding of composite space enclosures
(SIDER)

Contract no: 262746

Starting date: 01/12/2010

Duration: 36 months

EU Contribution: € 1.067.329

Estimated total cost: € 1.440.726



SPACECAST

Protecting space assets from high energy particles by developing European dynamic modelling and forecasting capabilities

IN 2012, FORECASTING SOLAR STORMS

2013-2014 will see a climax in solar activity, potentially causing damage to satellites, and terrestrial communication systems. The SPACECAST project will deliver European space weather forecasts to help protect a growing space industry.

Between 2013-2014, the solar cycle is expected to reach its climax, bringing solar activity to its highest level. Solar activity is a security threat for space assets, such as satellites and the International Space Station (ISS). Moreover, solar storms may also impact terrestrial communication systems, satellite TV, satellite navigation and electricity grids, potentially interfering with the smooth running of major events such as the 2012 London Olympic Games.

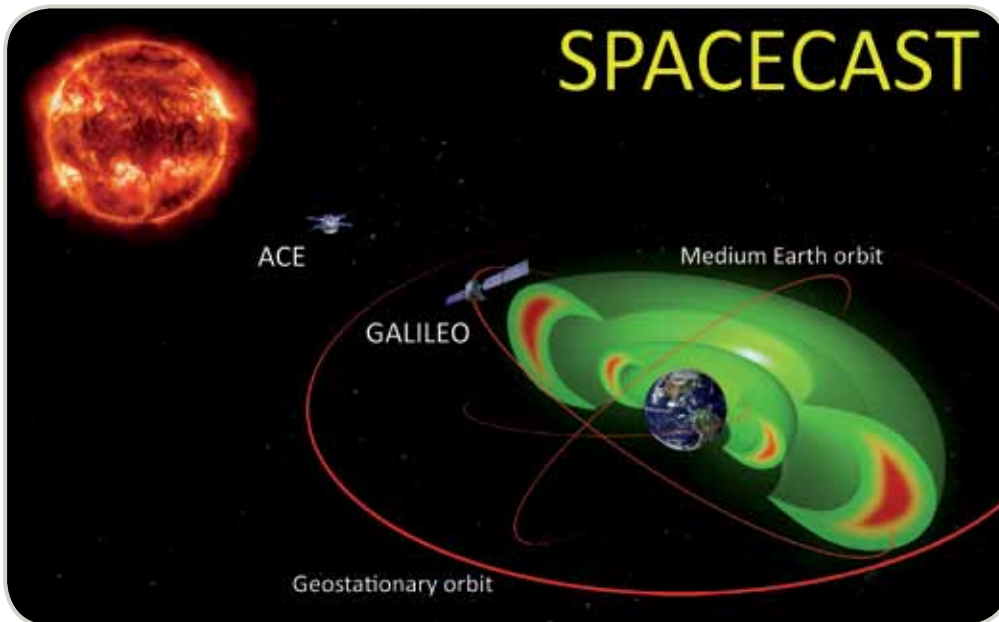
In the past Europe has relied heavily on the USA for space weather which is notoriously difficult to predict. But by bringing together satellite data with new computer models Europe could develop forecasts of the high en-

ergy particles that damage spacecraft. These forecasts would enable satellite operators to be alert for problems, limit the damage by switching off non-essential systems or re-schedule operations such as orbit manoeuvres.

The SPACECAST project will deliver such a space weather forecasting capability that will continue beyond the lifetime of the project, and which will lay the foundation for an operational European space weather forecasting system. In doing so, the project will undertake targeted studies of particle source, transport, acceleration and loss processes in Earth's radiation belts, with a view to improving our understanding of how the particles respond to solar activity. Securing such physical insights, this research constitutes a necessary step that will allow the project to implement the first near real time forecasting model for space weather in the radiation belts.



RICHARD HORNE
IS PROJECT COORDINATOR



© SPACECAST

SPACECAST will deliver a European space weather forecasting capability.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

SPACECAST will help protect spacecraft from high energy particles from the Sun and the Earth's radiation belts by developing European models and forecasting periods of high risk. The project addresses two of the most important hazards for space vehicles and manned spacecraft.

Why is this project important for Europe?

Europe has invested heavily in space and is developing new space programmes such as Galileo and GMES for strategic, economic and security reasons. It is important that Europe develops the means to protect these space assets from all forms of space weather hazards.

How does your work benefit European citizens?

European citizens will benefit from an improved delivery of satellite services, a more competitive space industry from the knowledge gained, and new research which will lay the foundation for future applications.

SPACECAST

Protecting space assets from high energy particles by developing European dynamic modelling and forecasting capabilities



LIST OF PARTNERS

- British Antarctic Survey, United Kingdom
- Helsingin Yliopisto, Finland
- Ilmatieteen Laitos, Finland
- Office National d'Etudes et de Recherches Aérospatiales, France
- Universitat de Barcelona, Spain
- Katholieke Universiteit Leuven, Belgium
- DH Consultancy, Belgium

COORDINATOR

British Antarctic Survey, United Kingdom

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PROJECT INFORMATION

Protecting space assets from high energy particles by developing European dynamic modelling and forecasting capabilities (SPACECAST)

Contract no: 262468

Starting date: 01/03/2011

Duration: 36 months

EU Contribution: € 1.965.071

Estimated total cost: € 2.539.991



SWIFF

Space Weather Integrated Forecasting Framework

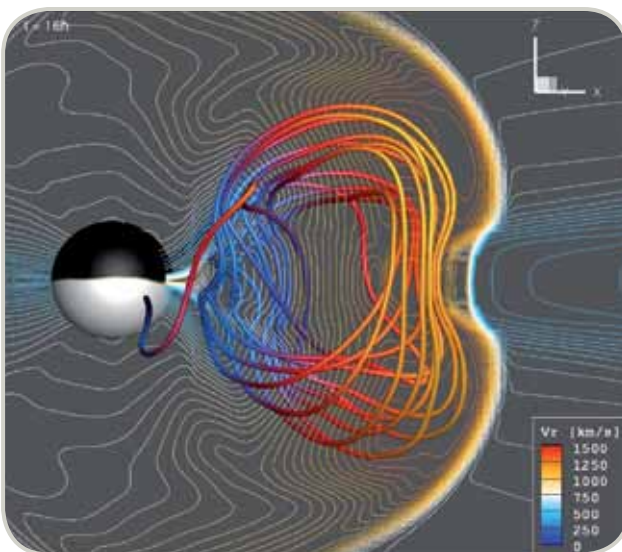
FORECASTING THE SUN

Space weather rarely makes it into the evening news, yet increasingly the Sun's activities are understood to impact life on Earth. The SWIFF project is set to establish a model for better space weather forecasting.



Solar activity © Ig0rZh - Fotolia.com

What happens between the Sun and Earth is space weather, and our knowledge about it lacks precision. Existing models for space weather forecasting do not create an adequate basis for sound and solid space weather forecasting. Whilst space weather is understood to impact the functioning of major communication systems, such as GPS and major electricity grids, the fundamental physics that drive this phenomenon still need to be further understood.



c3D MHD simulation following a CME from the lower solar corona up to the orbit of the Earth. © SWIFF

SWIFF will develop a physics-based simulation basis for space weather forecasting.

The project SWIFF takes on this challenge. It is determined to go back to basics – that is back to physics – and develop an integrated framework for the modelling of space weather. Thus starting from the fundamental physics, the projects will develop first mathematical models of space weather processes. Then in a second step, SWIFF will proceed to develop computational algorithms target to the models at hand, and finally implement a common integrated software infrastructure for enhanced space weather forecasting. The ultimate aim of the project is to form the equivalent of what is now commonplace in regular meteorological models, yet applied in the context of space weather.



GIOVANNI LAPENTA
IS PROJECT COORDINATOR

SWIFF will cover all aspects of the evolution of space weather from the Sun to the effects it has on Earth, and in doing so the project will be aided by experts from across Europe, who have extensive experience in supercomputing facilities, which is needed for space weather forecasting to be effective.

The project also engages in extensive outreach activities aimed at raising awareness about the importance of space weather, and has undertaken to organise a space weather modelling school two years after its start in order to disseminate project findings.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

SWIFF will develop mathematical models of the physics of space weather. Based on these models, SWIFF will produce computational methods and design software to form the basis for space weather forecasting in Europe.

Why is this project important for Europe?

Europe needs to be at the forefront in space technology. One aspect of this is the ability to simulate with accuracy the processes developing in space to predict the impact on the space assets and on the human activities in space.

How does your work benefit European citizens?

In our competitive global economy the Europeans need to lead rather than be led in two of the most important areas of modern technology: high performance computing and space industry. SWIFF pushes forward the state of the art on computer models of the space environment

SWIFF

Space Weather Integrated Forecasting Framework



LIST OF PARTNERS

- Katholieke Universiteit Leuven, Belgium
- Belgian Institute for Space Aeronomy, Belgium
- Università di Pisa, Italy
- Københavns Universitet, Denmark
- Astronomical Observatory Turin - Istituto Nazionale di Astrofisica, Italy
- Astronomical Institute, Academy of Sciences of the Czech Republic, Czech Republic
- University of St Andrews, Scotland, UK

COORDINATOR

Katholieke Universiteit Leuven, Belgium

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PROJECT INFORMATION

Space Weather Integrated Forecasting Framework
(SWIFF)

Starting date: 01/02/2011

Duration: 36 months

EU Contribution: € 1.559.005,56

Estimated total cost: € 1.991.474,08



BETs

Propellantless deorbiting of space debris by bare electrodynamic tethers

SAFE RETIREMENT FOR SATELLITES

Waste is a growing problem in space. Old satellites collide and create increasing amounts of debris, which is a risk for functioning satellites and the International Space Station (ISS). The BETs project proposes an innovative deorbiting system for future satellites.

Since 1958, some 6000 satellites have been launched into space. Today, only about 800 are still in operation. So thousands of retired satellites orbit Earth; out of fuel, most are out of control, and as such represents hazards for functioning satellites and the crew on the International Space Station (ISS). Moreover, collisions between such satellites multiplies the space waste challenge, creating larger amounts of smaller yet still potentially very harmful space debris.

The need to implement an effective deorbiting system for satellites that retire in order to limit the sources of future space debris has been recognised, and the BETs project responds to this demand with a proposal for an efficient deorbiting system that can be carried on future spacecraft.

The project is focused on a single but ambitious long term objective: the study and design of an electromagnetic tether to be deployed by spacecraft at the end of their useful lives to remove orbital energy, and thereby decrease altitude, leading the faster re-entry and subsequent destruction of the old satellite in Earth's atmosphere.

BETs proposed system involves magnetic drag on a current-carrying conductive tether. The system uses no propellant and no power supply.

The project is determined to develop its concept onto Technology Readiness Level 4-5, undertaking ground tests in a representative environment. It would pave the way for the eventual design and deployment of an operational tether in space, which would have the length of some 4-10 km when unfolded.



JUAN R. SANMARTÍN
IS PROJECT COORDINATOR



Crowded Space © Paul Fleet - Fotolia.com

BETs aims at developing an efficient deorbit system for future spacecrafts.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

To provide a deorbiting system, which is both passive as enhanced air-drag but 10000 times smaller in Front-Area \times Deorbit-Time, and active as rocket/electrical-thrusters, but 30 times lighter

Why is this project important for Europe?

Europe will be at the forefront of a technology development of universal application. Europe will head a technical, social, and political movement culminating in approval by the UN Committee on the Peaceful Uses of Outer Space.

How does your work benefit European citizens?

European citizens will find space clean for use in multiple ways, which otherwise would be dangerously filled with debris originated in increasing proportion in other political entities.

BETs

Propellantless deorbiting of space debris by bare electrodynamic tethers



LIST OF PARTNERS

- Universidad Politécnica de Madrid, Spain
- Università di Padova, Italy
- ONERA-Toulouse, France
- Colorado State University, United States
- Emxys, Spain
- DLR-Bremen, Germany
- INASMET, Spain

COORDINATOR

Universidad Politécnica de Madrid, Spain

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PROJECT INFORMATION

Propellantless deorbiting of space debris by bare electrodynamic tethers (BETs)
Contract no: 262972
Starting date: 01/11/2010
Duration: 36 months
EU Contribution: € 1.772.801
Estimated total cost: € 2.337.317



CLEANSPACE

Small debris removal by laser illumination and complementary technology

TIME FOR A CLEAN UP IN SPACE

A screw, a glove, a piece of an antenna broken off from an old satellite. Thousands of small seized pieces of space waste orbit Earth. Such debris is hazardous for satellites. The CLEANSPACE project anticipates using laser technology to do a proper clean up.

Only a few hundred kilometres above us, the population of small seized space debris is increasing. The trend is for more and smaller pieces of space junk as existing pieces collide, leading the increase to become exponential. The vast majority of such space debris is between 1 and 10 centimetres.

In order to address the proliferation of space waste, and protect Europe's space infrastructure, such as future Galileo and GMES satellites, the development of effective space debris removal technologies is paramount.

The CLEANSPACE project addresses this challenge, and proposes to develop a concept which would allow for the safe removal of small seized space waste – between 1

and 10 centimetres – by means of powerful laser pulses. A system of ground-based laser stations would create a very small thrust on space debris by ablating its surface. Ultimately, the impact of such lasers would modify the velocity of the junk, which would lead it into a lower orbit. Hence, the concept would allow both for changing the course of a piece of debris, thereby avoiding a predicted collision with valuable space infrastructure, and ultimately the removal of the waste as its new course takes on a course to atmospheric re-entry.

Further to developing the concept for such a system, CLEANSPACE will also tackle safety regulation aspects of its development. The insights gained in this project will allow Europe to be a key actor for laser debris removal that could contribute constructively to the development of future global rules and regulations governing the safe removal of space waste.



CHRISTOPHE JACQUELARD
IS PROJECT COORDINATOR



Space Junk © Paul Fleet - Fotolia.com

CLEANSPACE will develop a concept allowing for removal of small-seized space waste.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

I want to define an affordable architecture (including surveillance, identification and tracking) for an innovative ground-based laser solution which can remove hazardous medium debris around selected space assets to protect European satellites and launchers.

Why is this project important for Europe?

Because securing long term space commercial activity is essential for Europe. It will also allow Europe to be a key actor for laser debris removal system able to discuss the subject with the USA and Russia, and able to guide future ESA work and regulations.

How does your work benefit European citizens?

By its dissemination strategy and its demonstration day, the CLEANSPACE study will provide to European citizens a better view on laser propulsion and momentum coupling to debris objects, and will allow the development of a European capacity to protect space assets from space debris.

CLEANSPACE

Small debris removal by laser illumination
and complementary technology



LIST OF PARTNERS

- CILAS, Compagnie Industrielle des Lasers, France
- Deutsches Zentrum für Luft- und Raumfahrt, DLR, Germany
- Astrium – Space Transportation, France
- Rovira i Virgili University, Spain
- Laboratoire de Physico-Chimie des Matériaux Luminescents, France
- Institute of Low Temperature and Structure, Poland
- Adam Mickiewicz University, Astronomical Observatory, Poland
- Université de Limoges, France
- Astri-Polska, Poland

COORDINATOR

CILAS, Compagnie Industrielle des Lasers, France

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PROJECT INFORMATION

Small debris removal by laser illumination
and complementary technology (CLEANSPACE)
Contract no: 263044
Starting date: 01/05/2011
Duration: 36 months
EU Contribution: € 1.958.962
Estimated total cost: € 2.868.723



DEORBITSAIL

De Orbiting of Satellites using Solar Sails

TAKING SPACECRAFT HOME

Historical practice of abandoning satellites at the end of their lifetime has left 8,500 tones of space waste in Low Earth Orbit. In the future, this practice must change. DEORBITSAIL proposes an innovative system, allowing the safe de-orbiting of spacecraft at the end of their lifetime.

Increasingly, space debris poses a risk for spacecraft. Hundreds of old satellites and thousands of pieces of space junk orbit Earth. Such debris collide, which in turn increases the amount of debris, as pieces of old satellites break off when hit by pieces of other retired spacecraft. Indeed, without a change of practice and the establishment of effective systems for safe de-orbiting of spacecraft at the end of their lifetime, it is estimated that the number of debris particles will grow with a growth rate in the order of 5 percent per year – a percentage which would raise over time as the number of possible collisions increase.



Satellite in orbit © Terry Morris - Fotolia.com

DEORBITSAIL develops and tests a novel device for de-orbiting of Low Earth Orbit spacecraft.

The DEORBITSAIL project addresses this challenge, as it is set to develop a novel low cost low risk de-orbiting device for smaller spacecraft with a mass less than 500 kg that circulate Earth in Low Earth Orbit less than 900 km above us.

DEORBITSAIL proposes to develop a 25 square metre Solar Sail, which would weight no more than 3 kg. Upon the end of its lifetime, the retired spacecraft would deploy this sail. Within 25 years, the solar wind would drive the spacecraft downwards, taking the spacecraft home into Earth's atmosphere, where it would burn off safely.

The 25 year de-orbiting period adheres to established recommendations by the European Space Agency (ESA), and deployed on all new small size spacecraft, the proposed concept has the potential to reduce future debris by 70 percent.



VAIOS LAPPAS
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The DEORBITSAIL project is a low cost end-to-end space mission, which will demonstrate satellite deorbiting through the deployment of an ultra light 5x5m sail, which will fit in a 3 kg cubesat nanosatellite platform.

Why is this project important for Europe?

DEORBITSAIL will be the first comprehensive European space mission to demonstrate the ability to deorbit space junk using a low cost, ultra light solar sail as a drag sail, bringing debris closer to Earth so they can eventually burn up through friction in Earth's atmosphere.

How does your work benefit European citizens?

DEORBITSAIL will demonstrate a unique capability to deorbit space junk in Low Earth Orbit, thus protecting astronauts and European space assets from space collisions, and protecting the environment. It will also contribute towards reducing the number and mass of debris in orbit.

DEORBITSAIL

De Orbiting of Satellites using Solar Sails



LIST OF PARTNERS

- University of Surrey, United Kingdom
- California Institute of Technology, U.S.A.
- Astrium S.A.S. , France
- Deutsches Zentrum für Luft und Raumfahrt e.v., Germany
- Stellenbosch University, South Africa
- University of Patras, Greece
- Athena Research and Innovation Center in Information Communication & Knowledge Technologies, Greece
- Middle East Technical University, Turkey
- Surrey Satellite Technology Limited, United Kingdom
- Innovative Solutions In Space BV, Netherlands

COORDINATOR

University of Surrey, United Kingdom

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PROJECT INFORMATION

De Orbiting of Satellites using Solar Sails (DEORBITSAIL)

Starting date: 01/02/2011

Duration: 36 months

EU Contribution: € 1.997.342

Estimated total cost: € 2.830.721



P2-ROTECT

Prediction, Protection & Reduction of Orbital Exposure to Collision Threats

PROTECTING EUROPE'S SATELLITES

Progressively, Europe is building its satellite infrastructure in Low and Medium Earth Orbit, as well as in High Geostationary Orbit. The risk from space debris to satellites varies between these different environments. The P2-ROTECT project will provide comprehensive insights to make Europe's satellites safer everywhere they fly.

In the coming years, Europe is set to expand its satellite infrastructure with the launch of a series of Earth observation and navigation satellites. The flagship Galileo and GMES space initiatives will open new market opportunities for EU businesses and help us deal with climate change.

In order to harvest the full potential of such valuable infrastructure, the satellites that are its building blocks must be protected against hazardous space debris. Better space situational awareness of the risks that satellites are faced with both in Low Earth Orbit (LEO), Medium Earth Orbit (MEO) and Geostationary Orbit (GEO) is a precondition for such protection to be most effective.

The P2-ROTECT project responds to this challenge, aiming to assess the risks associated with collisions between satellites and space debris in these different orbits.

Whether a satellite is flying in LEO some 100 and 2000 km above us, or is geostationary at an altitude of some 35,786 km, P2-ROTECT will assess its degree of vulnerability, providing access to sensitive terms of collision probability or severity. The aim is to improve existing methods for collision prediction, thus enhancing Europe's capability to undertake effective space surveillance. Moreover, the project will also provide recommendations into new designs that would limit the negative impacts satellites colliding with small scale space debris.



THÉRÈSE DONATH
IS PROJECT COORDINATOR



Trackable objects in Low Earth Orbit © ESA

P2-ROTECT calculates the risks that space debris poses for Europe's satellite infrastructure, and proposes new means to mitigate such risks.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The P²-ROTECT project will assess the risks due to space debris collisions in LEO, MEO and GEO and will recommend possible solutions - better prediction, better protection or action on debris environment - to reduce vulnerability of future space missions.

Why is this project important for Europe?

The strategic importance of space systems is growing in Europe, for civil and defence applications. Recent examples have shown that on-orbit collisions due to space debris are actual threats. This project will assess the risks depending on orbits and will recommend better ways of reducing them.

How does your work benefit European citizens?

Life of European citizens is depending more and more on space systems. This work, recommending better ways of reducing their vulnerability with trade-offs made between efficiency and cost, will contribute to the reliability of future space systems.

P2-ROTECT

Prediction, Protection & Reduction of OrbiTal Exposure to Collision Threats



LIST OF PARTNERS

- Onera, France
- OHB-System AG, Germany
- Thales Alenia Space – Italia, Italy
- Fraunhofer EMI (Ernst-Mach-Institut), Germany
- TUBITAK Uzay, Turkey
- Technische Universität Braunschweig, Germany
- TELINT RTD Consultancy Services, United Kingdom

COORDINATOR

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PROJECT INFORMATION

Prediction, Protection & Reduction of OrbiTal Exposure to Collision Threats (P2-ROTECT)

Contract no: 262820

Duration: 30 months

EU Contribution: € 1.995.781

Estimated total cost: € 2.933.485



ReVus

Reducing the Vulnerability of Space Systems

BETTER SHIELDS AGAINST SPACE DEBRIS

Space waste is a hazard for satellites. In spite of efforts to clean up in space, and avoid collisions between spacecraft and debris, ultimately new design rules or better shielding of satellites are also needed to protect them when impact cannot be avoided. ReVuS addresses this challenge.

Today's satellites are robust enough to resist impact from debris which is smaller than 0.1 cm, and systems exist whereby spacecraft can be steered out of harm's way when a collision with space waste larger than 10 cm is foreseen.

Yet for space junk sized between 0.1 cm and 10 cm, there is currently not a system in place to mitigate the risk of impact, although space debris in this size-range can cause significant damage.

With the population of space debris foreseen to increase in the years to come, as collisions between existing space waste create more and smaller pieces of debris, the probability of damage caused by such debris could reach an unacceptable level, which would force manufacturers of

satellites in Low Earth Orbit (LEO) to introduce new and more robust designs.

The ReVuS project undertakes a study in support of such efforts to provide solutions i) at system level (fractionating the functions), ii) at architecture level (routing/segregation design rules), iii) or a better shielding for LEO satellites.

In doing so, ReVuS is set to define new design rules and test new shielding materials, carry out resilience analysis, and evaluate the proposed solutions and recommendations.

Given that currently such a systematic approach to reduce the vulnerability of spacecraft has not yet been undertaken, the project is foreseen to generate results that may be extremely useful for Europe's world class satellite manufacturers.



CLAUDE COUGNET
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

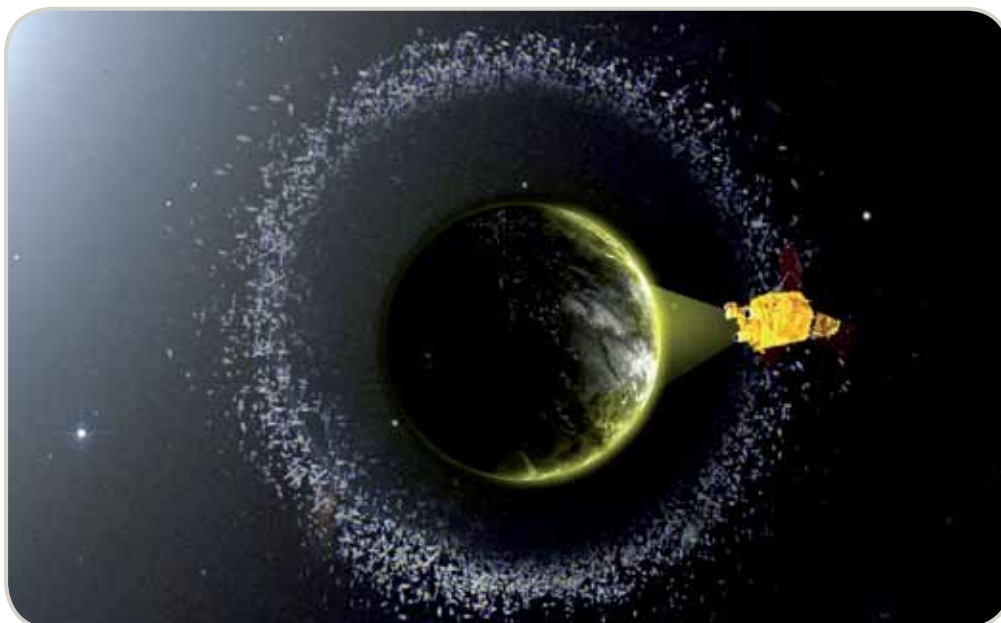
With this project, Astrium, as satellite manufacturer, will define and assess different satellite architecture solutions to minimise the impacts of small debris on satellites. In particular, new shielding materials and new shielding arrangements will be developed and tested.

Why is this project important for Europe?

The ReVuS results will allow enhancing the performance and competitiveness of the European space systems, thanks to new design rules and protection concepts. They will benefit to user stakeholder, European agencies, research institutes, universities and satellite manufacturers.

How does your work benefit European citizens?

Europe is using Low Earth Orbit to provide services like Earth observation, resources monitoring, defense and security systems, that at the end benefit to citizens. Reducing the satellite vulnerability to debris allows to maintain the continuity of these services to the citizens.



© ReVus

ReVuS undertakes a study to reduce vulnerability of satellites against small space debris.

ReVus

Reducing the Vulnerability of Space Systems



LIST OF PARTNERS

- Astrium SAS, France
- Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V., Germany
- Technische Universität Braunschweig, Germany
- University of Southampton, United Kingdom
- University of Surrey, United Kingdom
- Astrium GmbH, Germany
- PHS Space Limited, United Kingdom
- Ten Cate Advanced Composites BV, The Netherlands
- Hiscox Assurances Services, France
- Astri Polska Sp. Z.o.o., Poland

COORDINATOR

Astrium SAS, France

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PROJECT INFORMATION

Reducing the Vulnerability of Space Systems (ReVus)

Starting date: 01/03/2011

Duration: 28 months

EU Contribution: € 1.971.271

Estimated total cost: € 3.191.058



ECLAT

European Cluster Assimilation Technology

BETWEEN SUN AND EARTH, A CLOSER LOOK AT THE MAGNETOSPHERE

Shielding Earth from the solar wind, the magnetosphere is believed to be paramount for Earth's climate. It is home to the best observed space plasma environment in the universe. The ECLAT project aims to provide data and develop new tools to further enhance our understanding of this critical space where Earth interacts with the forces of the Sun.

Earth's magnetosphere was discovered 1958 by the US Explorer 1 satellite. Baptised 1959 by Austrian astrophysicist Thomas Gold, it is "the region above the ionosphere in which the magnetic field of the earth has a dominant control over the motions of gas and fast charged particles".

Today, some 50 years later the magnetosphere is subject to intense attention from scientists throughout the world, who are exploring the environmental impact of the Sun-Earth connection. Now the best observed space plasma environment, the sheer volume of scientific data from the magnetosphere generates new challenges as scientists engage with in situ measurements, remote-sensing observations, and modelling on micro-, meso-, and global scales.

Yet given the variety of observational methods and measurement types, fully exploiting this incredible source of data is extremely difficult.

The ECLAT project takes on this challenge, as it intends to provide better tools for coordinated analysis. The project is set to facilitate scientists' aspirations to develop "reanalysis" and assimilation technology in order to marry model output with observations, hence providing a holistic, synoptic 3D time-history of the state of the magnetosphere.

In doing so, ECLAT intends to upgrade the already existing European Space Physics Data Centre and the ESA Cluster Active Archive (CAA), increasing their data holdings and developing new software tools that would facilitate data-mining and data visualization. Thereby ECLAT will provide a contextual framework for interpretation of all magnetospheric data-sets, with a significant positive impact on science in the area of plasma physics.



STEVE MILAN
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The Cluster spacecraft mission has generated an unparalleled dataset for space physicists. We want to improve its science return by providing supporting data from other observatories and developing tools to mine the data.

Why is this project important for Europe?

The Cluster mission was built and is operated by the European Space Agency, its instruments are predominantly European. It is important for Europe to maximise exploitation of its science investment, and ECLAT will do this.

How does your work benefit European citizens?

Cluster helps us understand the influence of the Sun on near-Earth space, the radiation hazard for satellites and other commercial interests, and ultimately our climate. ECLAT will further enhance this understanding.



Clusters_Earth2© ECLAT

ECLAT will provide supporting data for the ESA Cluster Active Archive and develop a toolkit for the analysis of space plasma and solar terrestrial physics

ECLAT

European Cluster Assimilation Technology



LIST OF PARTNERS

- University of Leicester, United Kingdom
- Oesterreichische Akademie der Wissenschaften, Austria
- Finnish Meteorological Institute, Finland
- St. Petersburg State University, Russia
- Institutet för rymdfysik, Sweden

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PROJECT INFORMATION

European Cluster Assimilation Technology (ECLAT)

Contract no: 263325

Starting date: 01/03/2011

Duration: 36 months

EU Contribution: € 1.577.144

Estimated total cost: € 2.045.723,4



ESPACE

European Satellite Partnership for Computing Ephemerides

MODELS OF MOTION IN SPACE

For thousands of years, Man has mapped the orbits of the planets. In the past, ephemerides guided navigation on Earth. Now they also guide spacecrafts on missions to new worlds. The ESPACE project intends initiate a European expertise network in planetary dynamics.

Shipwrecked on Jamaica in 1504, Christopher Columbus used an ephemeris to successfully predict a lunar eclipse for the natives on the island. Indeed, this ancient tool taking the form of a table of values that gives the positions of astronomical objects has been used since Babylonian times some tree millennia ago. Astrometry is the science of stellar measurements and motion.

In the past, such values have always been generated by means of measurements from Earth. Yet with modern day satellites in orbit, and spacecraft travelling further than ever before in our solar system, astrometric data can also be obtained from space measurements.

The ESPACE project plans to profit from such novel sources, and combine these data with classical ground-based

measurements. In doing so, the project intends to generate new dynamical models predicting more precisely the obits of several natural planetary satellites, which will allow even for the integrating of their rotation properties.

Space is motion, and accurate knowledge of the orbits of the Moons of Mars or the course of asteroids is paramount for the planning of future space missions. Indeed, improving the orbits of future spacecraft is comparable to the efforts made by past European explorers to navigate more precisely when discovering the New World.

ESPACE contributes to these efforts by bringing together seven main European research centres involved in space sciences and dynamics in order to strengthen collaborative activities and create an expertise network that matches Europe's ambitious space exploration efforts.



WILLIAM THUILLOT
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

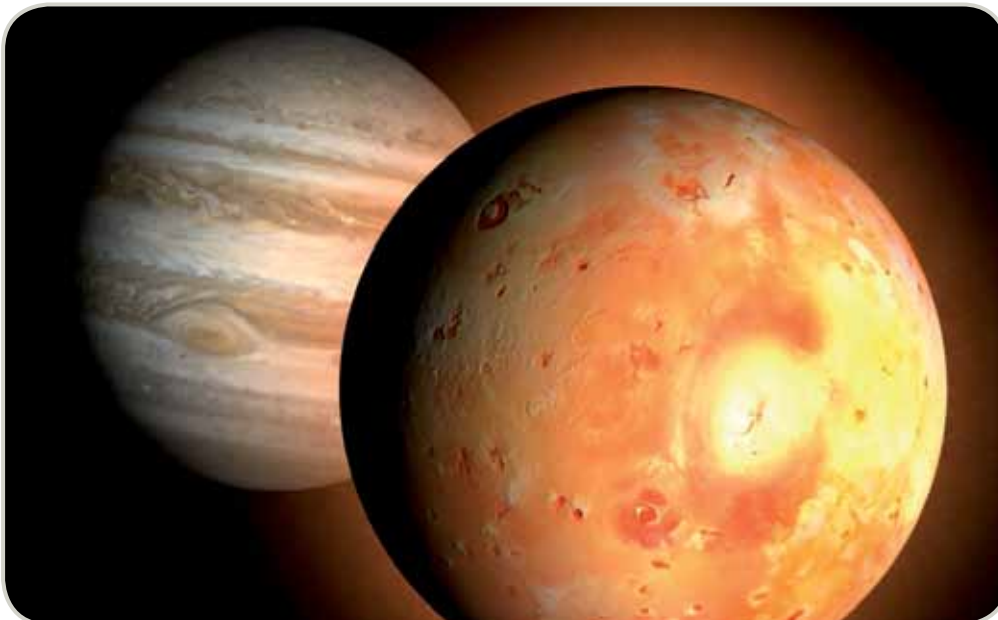
We want to improve our knowledge of the orbital models of some spacecraft and natural satellites, and to apply or experiment new technologies for spacecraft tracking. For these goals we intend to exploit old space data jointly to ground-based ones and to give and fit new models.

Why is this project important for Europe?

We want to improve the efficiency of exchange of expertise in the domain of spacecraft and natural satellites orbital modeling. This project intends to be a first brick for a European network of expertise in the dynamics domain which could provide new tools to space agencies.

How does your work benefit European citizens?

We want to increase the scientific return of space missions. Direct benefit for European citizen is not obvious, but indirect benefit exists. Improving satellite orbital models or the spacecraft tracking may improve the management of the interplanetary mission and can save money!



Artist view of Io's high thermal emission induced by Jupiter's tide © ESPACE

ESPACE will strengthen European collaboration in the domain of ephemerides and reference systems for natural satellites and spacecrafts.

ESPACE

European Satellite PArtnership for Computing Ephemerides



LIST OF PARTNERS

- Institut de mécanique céleste et de calcul des éphémérides, France
- Royal Observatory of Belgium, Belgium
- Technical University of Berlin, Germany
- Joint Institute for VLBI in Europe, The Netherlands
- Centre National d'Etudes Spatiales, France
- Deutsches Zentrum fuer Luft-und Raumfahrt e.V. , Germany
- Technology University of Delft , The Netherlands

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PROJECT INFORMATION

European Satellite PArtnership for Computing Ephemerides (ESPACE)
Contract no: 263466
Duration: 48 months
EU Contribution: € 1.980.967
Estimated total cost: € 2.518.500



EUNAWE

Building on the International Year of Astronomy: Making young children aware of the Universe

INSPIRATION FOR CHILDREN FROM SPACE

Thinking about the Universe and space fascinates children. EUNAWE will use the inspiration and excitement of astronomy and space sciences to interest very young underprivileged children in science and technology, broaden their minds and stimulate European and global citizenship.

The project builds on Universe Awareness (UNAWA), a unique and proven programme for children aged 4 to 10 years. UNAWA is active in 40 countries and was a cornerstone of the successful UN-ratified International Year of Astronomy. EUNAWE will exploit the achievements of European and South African astronomy and space sciences to inspire, excite and stimulate children at an age when their curiosity is high and their value systems are being formed. The project will focus on 5 European countries - Germany, Italy, the Netherlands, Spain, the UK - and South Africa.

Specifically, EUNAWE will:

- Train and empower primary school teachers to include space topics in the classroom.
- Develop and translate hands-on material over the partner countries.

- Provide a network for the exchange of expertise and material between educators of very young children in EU member states, Associated Countries and International Cooperation Partner Countries

- Help stimulate the production of the next generation of European engineers and scientists, particularly girls.

- Contribute to the integration of underprivileged communities in participating countries.

- Strengthen collaboration between Europe and South Africa over mutually beneficial scientific, technological, educational and social topics.

- Lay the groundwork for expansion during FP8 to all EU member states and additional countries in Africa and Asia.



GEORGE MILEY
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

To interest disadvantaged children in science and technology, train teachers and foster international expertise. Our long term goal is to use perspective provided by the beauty and grandeur of the Universe to broaden children's minds and foster tolerance and internationalism.

Why is this project important for Europe?

It will help produce the next generation of European and African engineers and scientists, particularly girls and be a showcase for European astronomy/space and related technologies. It will also contribute to reducing the negative social effects of fanaticism and intolerance.

How does your work benefit European citizens?

It is a bottom-up project that will contribute to education, social stability and innovation in five European countries and South Africa.



Artist view of Io's high thermal emission induced by Jupiter's tide © ESPACE

EUNAWE will use inspirational aspects of space sciences to interest young children in science and technology and stimulate European and global citizenship.

EUNAWE

Building on the International Year of Astronomy:
Making young children aware of the Universe



LIST OF PARTNERS

- Leiden University, The Netherlands
- Ruprecht-Karls-Universitaet Heidelberg, Germany
- Universitat Politècnica De Catalunya, Spain
- Istituto Nazionale di Astrofisica (Arcetri Observatory), Italy
- National Research Foundation (South African Astronomical Observatory), South Africa
- Armagh Observatory and Planetarium, United Kingdom

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PROJECT INFORMATION

Building on the International Year of Astronomy:
Making young children aware of the Universe
(EUNAWE)

Contract no: 263239

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 1.903.577

Estimated total cost: € 2.534.312



HESPE

High Energy Solar Physics Data in Europe

UNCOVERING SECRETS OF THE SUN

Solar eruptions can have direct repercussions on our planet. HESPE takes on this challenge, allowing for a better understanding of the sources of high energy particles escaping from the Sun to Earth.

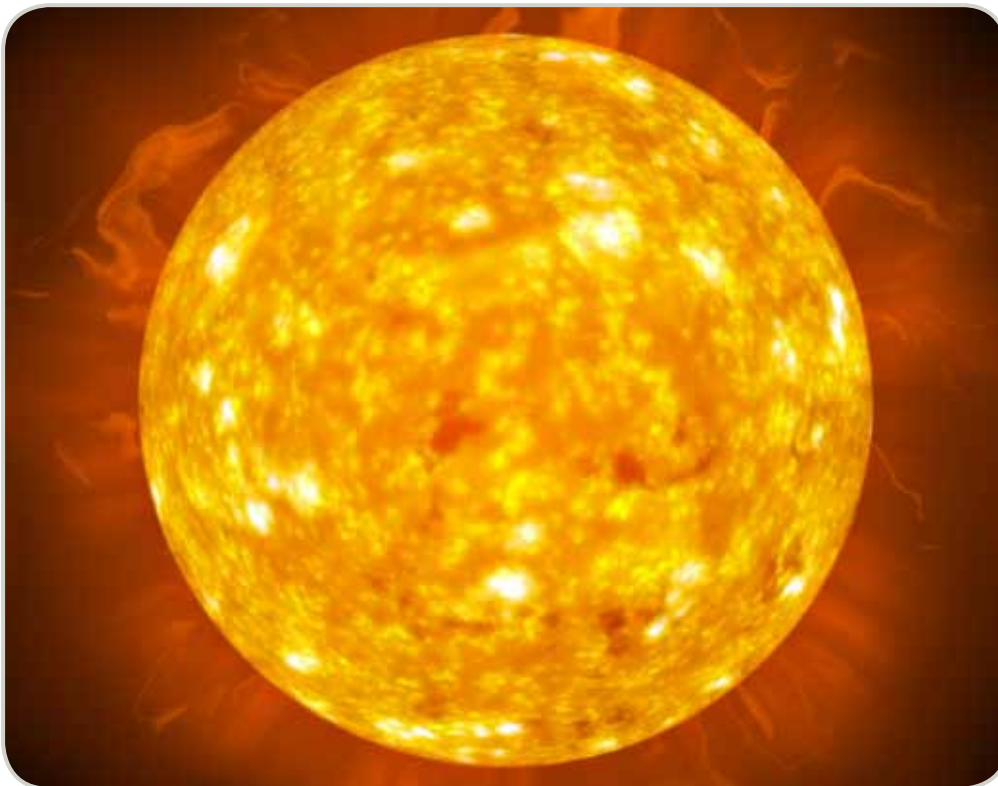
On 28 October 2003, the Earth experienced one of the most dramatic effects of solar eruptive events for many years. Following an intense flare, a halo coronal mass ejection was directed straight towards the Earth, with a velocity of 8 million km/hour. 19 hours after the explosion, strong geomagnetically induced currents caused blackouts of the power distribution grid; the accuracy of satellite navigation systems was degraded; airliners scheduled for trans-polar flights were rerouted to lower latitudes. This one event brought home the reality that modern technology-based societies are becoming increasingly vulnerable to this type of natural threat. And it clearly demonstrated that understanding the physics of these most powerful events is a necessary pre-

requisite to predict their occurrence and their potentially damaging effects in space and on the Earth.

It has been recognized since the early days of the space program that high-energy observations play a crucial role in understanding the basic mechanisms of solar eruptions. Unfortunately, the peculiar nature of this radiation makes it so difficult to extract useful information from it that nonconventional observational techniques together with complex data analysis procedures must be adopted. The rationale of this project is to formulate and implement computational methods for solar high-energy data analysis, and to utilize sophisticated Information and Communication Technology (ICT) tools for providing algorithms and science-ready products to the solar physics community.



MICHELE PIANA
IS PROJECT COORDINATOR



Fiery Glowing Sun © TheSupe87 - Fotolia.com

HESPE aims to mainstream the exploitation of high energy solar physics data in Europe.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

HESPE aims at becoming a home for state-of-the-art high energy solar data and science-ready products that will help to initiate original, challenging solar, helio and space science. To achieve this goal, HESPE will utilize theoretical, computational and technological tools.

Why is this project important for Europe?

HESPE will put the potential of high-energy solar data at disposal of the European solar, helio and space weather scientists and will guarantee a stable and long term positioning of Europe in the sustainable exploitation of such data products.

How does your work benefit European citizens?

HESPE will allow a better understanding of the sources of high energy particles escaping from the Sun to Earth. This will help to forecast geomagnetic storms associated to solar eruptions and eventually to reduce their effects on our technology-based society.

HESPE

High Energy Solar Physics Data in Europe



LIST OF PARTNERS

- Universita di Genova, Italy
- Fachhochschule Nortwestschweiz, Switzerland
- University of Glasgow, United Kingdom
- Centre national de la recherche scientifique (CNRS), France
- Universitaet Graz, Austria
- University of California at Berkeley, USA

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PROJECT INFORMATION

High Energy Solar Physics Data in Europe (HESPE)

Starting date: 01/12/2010

Duration: 36 months

EU Contribution: € 1.569.808

Estimated total cost: € 2.213.164



IMPEX

Integrated Medium for Planetary Exploration

BETTER SHARING AND PROCESSING OF SPACE MISSION RESULTS

Europe prepares to embark on exciting journeys about the vast space of our solar system. Yet, an integrated framework for better processing of the data we would get back from such missions is needed before takeoff. IMPEX prepares to deliver just that.

Look into the sky and sometimes you see Jupiter; the fifth planet from the Sun and the largest planet within the Solar System, Jupiter is amongst the foreseen destinations for future European space exploration missions. Together with Mercury, Venus, Mars, Saturn and Titan, the gas giant is set to be approached by European spacecraft on missions to expand our understanding of the Solar System.

However, in the past, scientific return on even the most expensive and exciting space exploration missions has been limited as a result of the lack of an integrated framework for the processing of the data that are returned to Earth.

The IMPEX project addresses this shortfall, thereby adding value to the European exploration endeavours. IM-

PEX is aimed at the creation of an integrated framework where data from space missions will be interconnected to numerical models providing a possibility 1) to simulate planetary phenomena and interpret spacecraft measurements; 2) to test and improve models versus experimental data; 3) to fill gaps in measurements by appropriate modelling runs; 4) to solve technological tasks regarding mission operations, including preparation of new missions. Via its infrastructure, IMPEX will enhance the efficiency of space mission data exploitation for scientific research, and make the existing data and computational models available for the broad planetary science community. Thereby researchers who may not themselves be part of space mission teams can benefit from such missions too. That will promote the contribution of European space assets to overall scientific and technological knowledge.



MAXIM KHODACHENKO
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

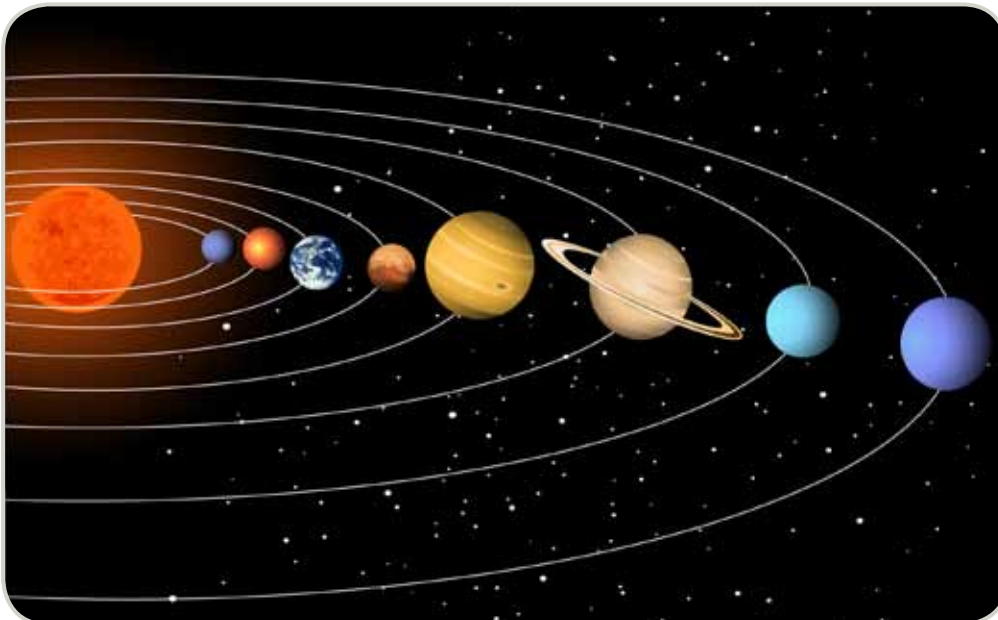
IMPEX will create an infrastructure which bridges the gap between spacecraft data bases and the scientific modelling tools, enabling their joint interconnected operation and serving, therefore, better understanding of related physical phenomena.

Why is this project important for Europe?

IMPEX will ensure longer and more efficient use of European space missions' data in the worldwide research community. This will increase added value of the European space exploration investments and contribute high reputation of the European science and technology.

How does your work benefit European citizens?

The major 'public' impact of IMPEX, as an RTD project aimed at space mission data and numerical models operation, consists in providing its infrastructure for not only professional scientists, but also for public education work at schools, universities, planetaria, etc.



Solar system © matamu - Fotolia.com

IMPEX will create an interactive framework for better exploitation of space missions' data, superimposing them with the advanced computational models.

IMPEX

Integrated Medium for Planetary Exploration



LIST OF PARTNERS

- Institut für Weltraumforschung, Österreichische Akademie der Wissenschaften (IWF-OeAW), Austria
- Finnish Meteorological Institute (FMI), Finland
- Centre National de la Recherche Scientifique (CNRS), France
- Nauchno Issledovatel'skii Institut Yadernoi Fiziki imeni D.V. Skobelitsyna, Moskovskogo Gosudarstvennogo Universiteta imeni M.V., Russia

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PROJECT INFORMATION

Integrated Medium for Planetary Exploration (IMPEX)
Contract no: 262863
Duration: 48 months
EU Contribution: € 1.998.719
Estimated total cost: € 2.564.606



POPDAT

Problem-oriented Processing and Database Creation for Ionosphere Exploration

NEW INSIGHTS INTO THE IONOSPHERE

Data from the ionosphere provide critical insights at the benefit of major European satellite initiatives, including GMES. However, data from past satellite missions to this part of the upper atmosphere are fragmented. The POPDAT projects attempts to facilitate their integration.

Between the thermosphere and the exosphere in the upper atmosphere, in the ionosphere atoms are transformed into ions by radiation from the Sun. The ionosphere is important; it is the scene of atmospheric electricity and developments here influence radio propagation throughout Earth. Also, the ionosphere is a critical environment for attempts to understand and predict Space Weather, and in the context of Europe's Global Monitoring for Environment and Security (GMES) initiative, ionospheric monitoring of natural and man-made disasters also has a potential.

However, our ability to profit fully from insights gained from observational data and past ionospheric satellite missions is currently impeded by the absence of effective and user friendly tools that would allow scientists to perform data-mining within a pool of coordinated datasets.

The POPDAT projects takes on this challenge, as it is set to establish foundations for an enhanced research infrastructure at the benefit of the ionospheric physics community.

Using a problem-oriented approach to data processing from a users' perspective, POPDAT aims to create a database of ionosphere waves catalogues. Accessible through a web portal, this database would constitute an Ionosphere Wave Service, enabling scientists to have a better view of data from the ionosphere, when taking a closer look at the ionosphere to obtain a better understanding e.g. of anomalous data behaviours and ionosphere perturbations.

In doing so, the project is set to overcome a number of existing limitations in the interpretation and procession go ionospheric measurements within scattered data sources, advancing the state-of-the-art in existing rudimentary wave catalogues and fledging statistics.



KLAUS BRIESS
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

POPDAT will develop the set of tools for problem-oriented processing and data mining of ionospheric observational data collected and stored by past ionospheric satellite missions in order to create the database of ionosphere waves catalogues.

Why is this project important for Europe?

European scientific community working in the field of ionospheric research (e.g. Space Weather, space communication, physics of atmosphere, etc.) will be able to reinforce its global leadership and capitalize on previous investments avoiding unnecessary costs for new missions.

How does your work benefit European citizens?

Better knowledge of physical processes in the upper atmosphere will enable a wide community of GMES service providers (e.g. SMES in communication and navigation services, EO services) to offer higher quality services to European citizens, public services and industries.



Background showing Northern lights in the sky © Jörg Hackemann - Fotolia.com

POPDAT creates new data mining tools for better processing of data from Earth's ionosphere.

POPDAT

Problem-oriented Processing and Database Creation
for Ionosphere Exploration



LIST OF PARTNERS

- Technical University Berlin, Germany
- Space and Solar-Terrestrial Research Institute, Bulgaria
- NOVELTIS SAS, France
- Engineering, Consulting and Management Office, Germany
- Eötvös Loránd University, Hungary
- Space Research Institute of Polish Academy of Sciences, Poland
- Lviv Center of Space Research Institute, Ukraine
- Space Research Institute of National Academy of Sciences and National Space Agency of Ukraine, Ukraine

COORDINATOR

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PROJECT INFORMATION

Problem-oriented Processing and Database Creation
for Ionosphere Exploration (POPDAT)

Contract no: 263240

Duration: 24 months

EU Contribution: € 1.374.209

Estimated total cost: € 1.712.528



SEPServer

Data Services and Analysis Tools for Solar Energetic Particle Events and Related Electromagnetic Emissions

UNDERSTANDING EXTREME SPACE WEATHER

The Sun is both a source of all life and significant hazards. Solar energetic particle (SEP) events provoke extreme space weather, putting the functioning of satellites at risk. The SEPServer project will combine fragmented data to better understand such events.

Throughout the world, scientists strive to understand the sometimes extreme behaviour of our nearest star – the Sun. With 2012 and the high of the solar cycle approaching, the number of solar energetic particle (SEP) events is set to increase, provoking more extreme weather conditions. Whilst not noticeable by humans on Earth, space weather is a hazard for satellites, for the astronauts on-board the International Space Station (ISS), and in extreme cases for the aircrew on polar flights. Therefore, scientists observe SEP events. However, short of a coordinated approach and fully open access to SEP data, the value of this immense work is less than optimal.

SEPServer addresses this shortfall; the project aims at adding value to several existing space missions and

Earth based observations by facilitating such coordination by promoting open access to data. In doing so, it will produce a new tool that will greatly facilitate the investigation of SEPs and their origin. This tool is set to take the form as a server that provides SEP data, related electromagnetic (EM) observations and analysis methods, a comprehensive catalogue of observed SEP events, as well as educational outreach material on solar eruptions.

Hence SEPServer integrates scattered data from a number of international sources, enhancing data accessibility, and thereby contributing to better quality evaluation, whilst fertilising the ground for new data analysis and modelling to be performed to better understand the Sun and the space weather that it creates.



RAMI VAINIO
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

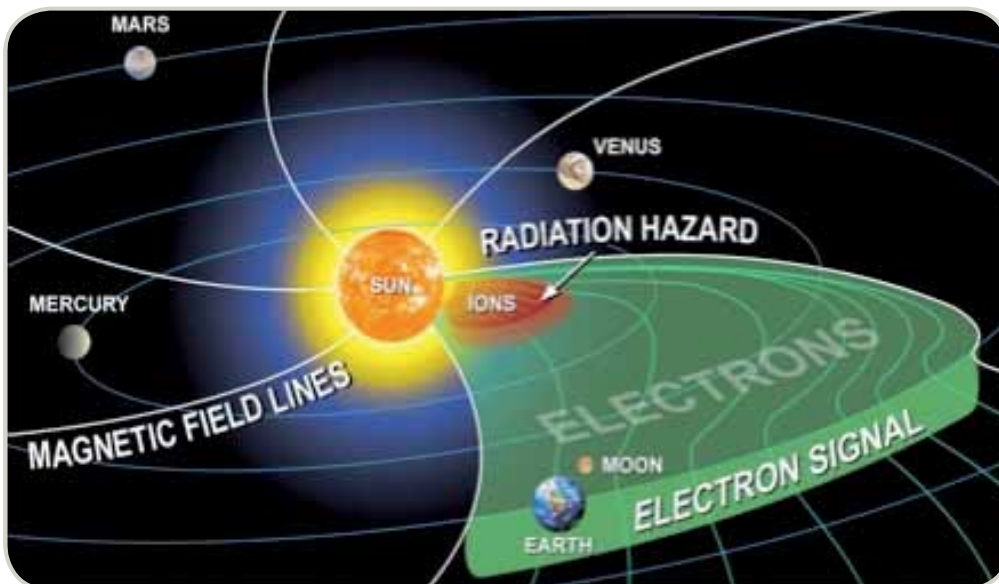
Space weather research and forecasting depend on easy access to data and state-of-the-art tools to analyse them. We want to provide these for solar energetic particle events, which are a major component of space weather.

Why is this project important for Europe?

With the rapidly growing European space fleet, hazards such as solar particle events are becoming increasingly important. We will provide means for the research community to better understand these events and to develop tools for forecasting their occurrence and characteristics.

How does your work benefit European citizens?

Increased security of space assets is in the best interest of all European citizens. In addition, the project will provide exciting new knowledge of the Sun's influence on Earth and space exploration. Our outreach activities will make this knowledge available to the public.



© SEPServer

SEPServer aims to establish an integrated web-based interface to solar energetic particle data and analysis tools.

SEPServer

Data Services and Analysis Tools for Solar Energetic Particle Events and Related Electromagnetic Emissions



LIST OF PARTNERS

- Helsingin yliopisto, Finland
- Christian-Albrechts-Universität zu Kiel, Germany
- Centre national de la recherche scientifique, France
- Universitat de Barcelona, Spain
- Turun yliopisto, Finland
- Oulun yliopisto, Finland
- Julius-Maximilians Universität Würzburg, Germany
- National Observatory of Athens, Greece
- University of Ioannina, Greece
- Astrophysikalisches Institut Potsdam, Germany
- DH Consultancy BVBA, Belgium

COORDINATOR

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PROJECT INFORMATION

Data Services and Analysis Tools for Solar Energetic Particle Events and Related Electromagnetic Emissions (SEPServer)

Contract no: 262773

Starting date: 01/12/2010

Duration: 36 months

EU Contribution: € 1.932.173

Estimated total cost: € 2.484.126



SPACE-DATA ROUTERS

Space-Data Routers For Exploiting Space Data

SHARING SPACE KNOWLEDGE ON EARTH

Inadequate sharing of data from space exploration missions hampers scientific progress. The Space-Data Routers project provides new technological tools to address this failure.

Space missions are costly, challenging and time consuming. Years of preparation culminate in intense anticipation, aspiration, and excitement every time a spacecraft takes off from Europe's spaceport, or from spaceports in other major space powers. Such missions represent global efforts to enhance our understanding of the universe. Yet today the insights we gain in space are not yet exploited to the fullest degree on Earth. Inadequate sharing of space data represents a significant collective failure of the fragmented global space community.

Indeed, the ultimate objective of most space missions is to return space data to Earth with the aim to take human scientific knowledge forward.

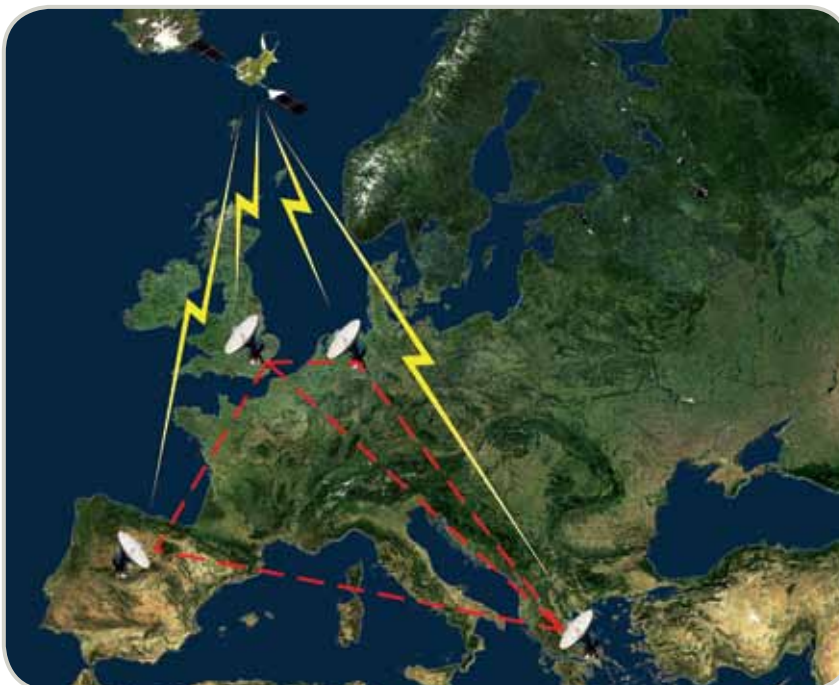
The Space-Data Routers project presents a novel and innovative approach for enhancing such data sharing. Adopted to the needs of the space community, the project proposes a new communication infrastructure for beyond state-of-the-art space data dissemination. Through the development of Space-Data Routers, which integrate administrative instructions and data dissemination policies of individual Space Agencies, the project is set to form an overlay which is suitable for efficient global exploitation of space data.

In doing so, Space-Data Routers is set to impact positively both at European and international level.

Indeed, the project promotes an open source policy that is set to both enhance sharing of data from space missions, and support the dissemination and exploitation of results of research projects that rely on such data.



VASSILIS TSAOUSSIDIS
IS PROJECT COORDINATOR



space data routers contribution © SEPServer

Space-Data Routers establishes a means for enhanced sharing of data from space missions.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The ultimate goal of Space-Data Routers is to boost collaboration and competitiveness of ESA, European Space Industry and European Academic Institutions towards an efficient architecture for exploiting space data. The proposed approach relies on Delay-Tolerant Networking.

Why is this project important for Europe?

Space-Data Router constitutes a pioneering target, allowing for the exploitation of massive data, increasing the return of all scientific missions and bridging the communication gap between Deep Space and internet-networking protocols but also the gap of agency interoperability.

How does your work benefit European citizens?

With Space-Data Routers, ESA will gain a significant advantage in the new era of Space exploration, allowing for missions that observe climatic changes, weather changes, fire alarms or assist other social but also defence objectives – for the benefit of European citizens.

SPACE-DATA ROUTERS

Space-Data Routers For Exploiting Space Data



LIST OF PARTNERS

- Democritus University of Thrace, Greece
- VEGA IT GmbH, Germany
- Space Internetworks Ltd., Greece
- National Observatory of Athens, Greece
- University of Plymouth, United Kingdom

COORDINATOR

Democritus University of Thrace, Greece

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PROJECT INFORMATION

Space-Data Routers For Exploiting Space Data
(SPACE-DATA ROUTERS)

Contract no: 263330

Starting date: 01/11/2010

Duration: 42 months

EU Contribution: € 1.686.477

Estimated total cost: € 2.253.972



CESAR

Cryogenic Electronics for Space Applications and Research

A COOL, SHARPER LOOK AT OUR UNIVERSE

The space environment is a major challenge for the development of cryogenic electronics used for high precision sensors. The CESAR project explores new solutions in this domain.

Today, Ultra-Low temperature sensors ($T < 0.1K$) provide unprecedented performances in X-ray and far Infrared astronomy by taking advantage of physical properties of matter close to absolute zero. In the coming decade, the European Space Agency has scheduled programs in both fields with improved detector arrays, enhancing the number of pixels and signal sensitivity. This is a consequence of the great successes of the XMM-Newton, Planck and Herschel missions launched by ESA in 1999 and 2009.

Nevertheless these developments are slowed down by the restricted amount of available power, at low temperature, in space conditions. The power budget is mainly consumed by the ever-growing number of wires, linking the cooled detectors to the distant (10 m) warm electronics.

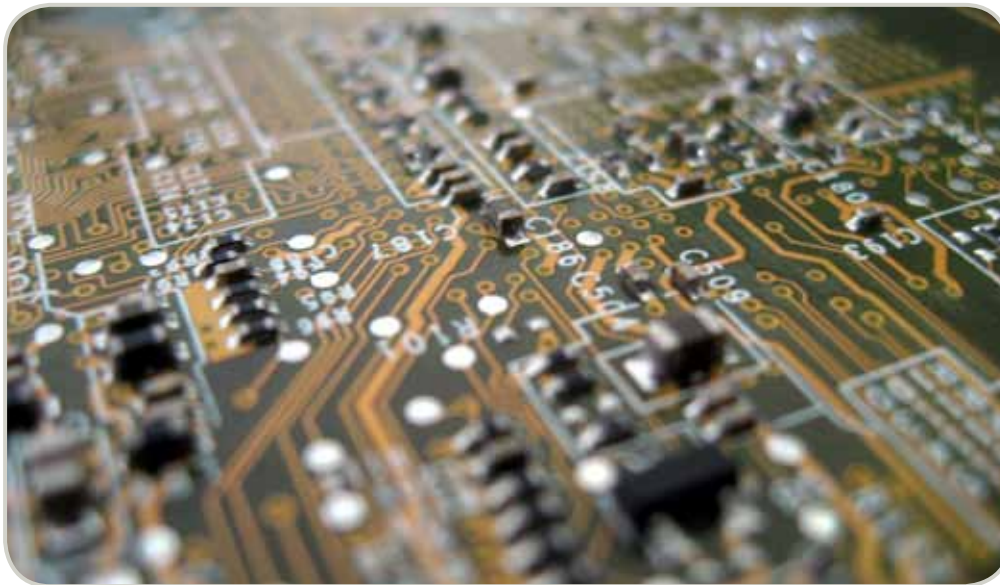
The only solution is the development of the signal processing at the heart, or close to the detectors themselves. The development of such cryogenic and complex electronics is the "three steps" goal of CESAR.

The first step is the manufacture of front-end electronics with intrinsic properties as good as detector ones. The second step is the development of ultralow dissipation complex electronics circuits - amplifiers, filters, multiplexers, DACs and ADCs - working below 4K. The third step is a combination of both developments and end-to-end tests.

CESAR developments have found applications to the medical and scientific domain through the magnetometric brain imaging. The association of the cold electronics circuits with giant magneto-resistive sensors could efficiently compete with current techniques.



LOUIS RODRIGUEZ
IS PROJECT COORDINATOR



carte electronique © LunaVorax - Fotolia.com

CESAR will provide new ultra-low temperature detector arrays with signal processing capabilities at the heart of the detectors.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

Because signal is degraded by transport, our aim is the integration of electronics functions as close as possible to the signal generation. For cryogenic detectors, this must be done by electronics working at very low temperature; this is not the case for the conventional one.

Why is this project important for Europe?

It offers a toolbox in many fields to detector developers, not only in fundamental science, but also in advanced technology and medical applications. As everyday new cryogenic systems enter the public domain - MRI, superconductivity -, CESAR will provide a new expertise in Europe.

How does your work benefit European citizens?

A step in human knowledge is often the consequence of a technological development. With the CESAR development we will contribute to better sensors for astronomy, sharper images for MRI diagnostics, and integrated electronics for plasma control inside future fusion plants.

CESAR

Cryogenic Electronics for Space Applications and Research



LIST OF PARTNERS

- Commissariat à l'Énergie Atomique et Energies Alternatives (CEA), France
- Interuniversity MicroElectronics Centre (IMEC), Belgium
- Centre National de la Recherche Scientifique (CNRS), France
- University of Palermo (UNIPA), Italy
- Konkoly Observatory (KO), Hungary
- Imperial College (IC), United Kingdom

COORDINATOR

Commissariat à l'Énergie Atomique et Energies Alternatives (CEA), France

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PROJECT INFORMATION

Cryogenic Electronics for Space Applications and Research (CESAR)
Contract no: 263455
Duration: 36 months
EU Contribution: € 1.998.050,10
Estimated total cost: € 2.633.933,80



DSPACE

DSP for Space Applications

DEALING BETTER WITH SPACE DATA

In the future, Europe will have to handle increasing data flows from space missions. The development of the next generation of Digital Signal Processors (DSP) is needed. DSPACE addresses this challenge.

New Earth observation missions, atmospheric sounding missions, planetary exploration missions and scientific missions require the capability to handle large amounts of data. Such handling includes the ability to process data on board missions, whilst applying both a first level trigger procedure and a compression algorithm. The ever increasing data flows demands a high on-board numerical calculation capability in order to elaborate the acquired information before sending it to Earth.

Available Digital Signal Processor (DSP) based modules offer a typical computing power of 20 MIPS and more noticeably 20 to 60 MFLOPS. Although it was considered sufficient a few years ago, future applications will require much higher computing power.

This requirement, together with the need to reduce the dependence on critical technologies from outside Europe, makes the development of next the generation of European general-purpose high performance DSPs with

a linked efficient and reliable SW application development environment mandatory.

The DSPACE project responds to this challenge, as it aims to develop a high performance DSP for space application up to 1 GFLOPs that - meeting the scalability, multi-purpose and usability features - is conceived to be used both as stand-alone signal processor into embedded systems and as a building component for increasing the computational capability.

A new DSP Core will be designed taking into account the requirements and limitations of today's European space technology. A complete front/back-end software environment, including a low level code optimiser layer, is expected to be developed together with benchmarks representative of common space scenarios.

The DSPACE core will be housed on a FPGA demonstrator board and made available with a complete SW Development Environment.



ANNAMARIA COLONNA
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The purpose of DSPACE is the development of a new Digital Signal Processor (DSP) component with capability near to 1 GFLOPS, meeting scalability, multi-purpose and usability features, to be used in space and commercial applications.

Why is this project important for Europe?

A condition-sine-qua-non for increasing European competitiveness is to make Europe independent in space technologies. Along this line, the DSPACE data signal processor for space applications will be an important milestone for guaranteeing free and unrestricted access to this technology.

How does your work benefit European citizens?

DSP are widely used within commercial (telephony, electronic music), medical (Diagnosis through images as CT, MRI, ultrasound,...) and scientific (heart observations) applications. All fields where high-capacity on-board calculations and more efficient devices are indispensable.



high technology background © Mike Kiev - Fotolia.com

DSPACE aims to develop a DSP for space applications to be used as a stand-alone signal processor into embedded systems or as building component.

DSPACE

DSP for Space Applications



LIST OF PARTNERS

- SITAEL AEROSPACE, Italy
- INTECS Informatica e Tecnologia del Software, Italy
- Consorzio Pisa Ricerche, Italy
- Space Applications Services, Belgium
- Rheinisch-Westfaelische Technische Hochschule Aachen, Germany

COORDINATOR

SITAEL AEROSPACE, Italy

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PROJECT INFORMATION

DSP for Space Applications (DSPACE)

Duration: 24 months

EU Contribution: € 1.177.067,50

Estimated total cost: € 1.615.865



E-SQUID

Development of SQUID-based multiplexers for large Infrared-to-X-ray imaging detector arrays in astronomical research from space

LOOKING BACK TO THE BEGINNING OF TIME

Looking back into the earliest stages of the Universe, X-ray sensing devices working at temperatures close to absolute zero are indispensable. The E-SQUID project will take Europe to the top in this critical technology domain.

Present astrophysics research focuses on solving the mysterious past and evolution of the Universe, which can be traced by observations of the most distant and faintest objects in the sky. Mission plans seek X-ray sensing devices that can detect the details of the faint glow of the first black holes and the very hot gas in the early Universe after the Big Bang, and the infrared light of cool

objects in outer space, which human made devices have not been able to detect before. For both of these focus areas of modern astronomy, detectors operated at temperatures near absolute zero are by far the only choice fulfilling the requirements of science. For such detectors, the best readout solution is SQUID – the Superconducting Quantum Interference Device.

This has been recognized by developers of high sensitivity cameras for astronomy and other applications all over the world, and a lot of effort is put on squeezing the ultimate performance from such devices. Presently, the European level of expertise is also advanced in this area of critical technology, but is not yet the state-of-the-art in the world. The goal of E-SQUID is to make progress in this area by utilising the best European expertise, and bridge the gap to reach the top.

The practical task includes developing first prototypes of SQUID readout of small image arrays in the required wavelengths with the highest possible signal-to-noise ratio, and then scaling-up the size by methods that allow further upgrades to megapixel size in the future.



JUHANI HUOVELIN
IS PROJECT COORDINATOR



© E-SQUID

E-SQUID will develop an improved SQUID-based readout suitable for large X-ray to Infrared detector arrays in space research.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to develop detector arrays with SQUID readout which perform measurements with the best achievable sensitivity. Applicability for various wavelengths in both space and Earth-based applications, and scalability to large array sizes are our other goals.

Why is this project important for Europe?

This project conducts research and technology development creating collaboration between the best experts in Europe in this critical technology area. It also improves Europe's competitiveness in the global technology market, and enhances the technological independence of Europe.

How does your work benefit European citizens?

Direct benefits to European citizens include improved high technology products, applications and services which will be developed within the EU. Indirect benefits include better employment via better competitiveness of European industry, spreading widely beyond this technology area.

E-SQUID

Development of SQUID-based multiplexers for large Infrared-to-X-ray imaging detector arrays in astronomical research from space



LIST OF PARTNERS

- University of Helsinki, Finland
- University of Leicester, United Kingdom
- SRON, The Netherlands
- MPG, Germany
- VTT, Finland
- IPHT, Germany
- Aivon Oy, Finland
- Supracon AG, Germany

COORDINATOR

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PROJECT INFORMATION

Development of SQUID-based multiplexers for large Infrared-to-X-ray imaging detector arrays in astronomical research from space (E-SQUID)

Contract no: 262947

Starting date: 01/01/2011

Duration: 38 months

EU Contribution: € 1.999.738

Estimated total cost: € 2.582.252,80



HarmLES

Dry lubricated Harmonic Drives for space applications

LESS MASS FOR MORE SPACE

In space mass equals cost, so lower mass means lower cost. The HarmLES project takes on the challenge of developing critical technologies aimed at bringing down the cost and mass of spacecraft.

When Solar Arrays or antennas on spacecraft have to be moved into the right position, and kept there for prolonged periods of time, Harmonic drives are needed. The design and composition of these drives is paramount for the impact they have on the global spacecraft mass. The trend goes for smaller drives, and in this respect, the development of new solid lubricating coatings are needed for harmonic drives. The HarmLES project takes on this challenge.

Further to mass reduction, a major impact of this project is European non-dependence in this area of critical space technologies. Indeed, should HarmLES prove successful, Europe has the potential to obtain world-wide leadership in this technology field. In financial terms, reducing spacecraft mass leads to a strong reduction of launch costs - for a typical satellite with 2-4 units, a cost reduction of EUR 50.000 would be feasible. Lower costs of

satellites for Earth observation programs would provide for enhanced usage of such means for better monitoring of essential climate variables (ECV), and other applications such as monitoring of deforestation.

The use of Harmonic Drives is presently limited by the need of grease lubrication. In space, greases are linked to the risk of outgassing, contamination of other parts of a spacecraft and such gasses also limit the usage under certain temperatures. The use of solid lubricants overcomes all these limits. However, the first trials to apply conventional solid lubricating coatings - partially used in space bearings - did not lead to success in harmonic gears, due to the strongly differing mechanical and contact situation. Therefore, project HarmLES seeks to enhance this record, as it will focus on the development of solid lubricant coatings for Harmonic Drives in space.



ERNST JANOTKA
IS PROJECT COORDINATOR



© HarmLES

HarmLES will develop new solid lubricating coatings for harmonic drives.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

New dry lubricant coatings shall be developed especially for harmonic drives. This would enable to use harmonic drives in much more applications than now and would reduce mass of satellites, and therefore launch costs.

Why is this project important for Europe?

One main European strategy is "non-dependence". US-suppliers export can be blocked by ITAR-regulations, which is a permanent danger to European space activities. Moreover, if the project is successful, Europe would reach world-wide leadership in this specific product.

How does your work benefit European citizens?

Strengthening European space industry secures employment in Europe. Lower costs of satellites for Earth observation improves climate control, forest health, etc. This product may also reduce the need of cooling lubricants in machining.

HarmLES

Dry lubricated Harmonic Drives for space applications



LIST OF PARTNERS

- Austrian Center of Competence for Tribology (AC2T); Austria
- Aerospace and Advanced Composites (AAC), Austria
- Harmonic Drive AG, Germany
- Fundacion Tecnalia Research & Innovation, Spain

COORDINATOR

Austrian Center of Competence for Tribology (AC2T), Austria

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PROJECT INFORMATION

Dry lubricated Harmonic Drives for space applications (HarmLES)

Contract no: 263162

Duration: 36 months

EU Contribution: € 1.166.833

Estimated total cost: € 1.695.464



SMARTEES

Multifunctional components for aggressive environments in space applications

ENHANCING THERMAL PROTECTION FOR SPACECRAFT

Non-dependent access to critical space technologies is required at European level. Therefore, SMARTEES aims to achieve the development of a European autonomous technology for thermal protection systems (TPS).

Withstanding the very high temperatures during re-entry into Earth's atmosphere is a major challenge for any spacecraft. In the space age, striving to enhance thermal protection systems is therefore a continuous challenge.

SMARTEES proposes a new solution in this respect, based on a novel and reusable TPS architecture, which can withstand the extreme environment conditions during atmospheric re-entry. A proof-of-TPS design will be provided within the project. This will be the result of the completion of the validation of the TPS performance and the achievement of a Technology Readiness Level between TRL 4 and 5.

The SMARTEES design will incorporate advanced ceramic composites and porous structures and will be aided by

material modelling. A computed tomography technique will be used to obtain a real model of each part of the system. The thermo-mechanical characterisation of this part will also be carried-out over different temperature ranges. This will help to obtain an accurate and realistic simulation of the insulation capability of the system. The output of this work will help to calculate critical design parameters. In a final stage the technology sample will be tested in a relevant ground facility simulating the re-entry conditions. The testing will determine the fundamental performance and the degradation mechanisms. This final step will give insight into the overall performance of the TPS, identify possible modes of failure, and assess the efficiency of the thermal insulation and the heat fluxes into the sub-structure of a spacecraft. The ground testing outputs will be reviewed in comparison with the outputs of TPS requirements and environment specifications.



JORGE BARCENA
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The project is targeted at obtaining a novel "proof-of reusability" thermal protection system (TPS) concept with multifunctional properties, i.e. insulation and oxidation resistance. The TPS architecture will combine the use of advanced ceramic composites and porous structures.

Why is this project important for Europe?

Europe will benefit from the results of SMARTEES by improving its access to space critical technologies. The next generation launcher (NGL) will take advantage of this concept. Another important asset is the contribution to the creation of an independent industrial supply chain.

How does your work benefit European citizens?

Space exploration in general may take advantage of the novel reusable TPS technologies. There is a high potential for its use in cargo and crew space return vehicles, i.e. for a cost effective, safe and reliable return from the International Space Station (ISS).



Shefex II atmospheric re-entry © DLR

SMARTEES addresses the development of advanced ceramic composites structures for atmospheric re-entry.

SMARTEES

Multifunctional components for aggressive environments
in space applications



LIST OF PARTNERS

- Fundación Tecnalia Research & Innovation, Spain
- Politecnico di Torino, Italy
- Erbicol SA, Switzerland
- National Center for Scientific Research "DEMOKRITOS", Greece
- EADS Deutschland GmbH, Germany
- Scuola Universitaria Professionale della Svizzera Italiana (SUPSI), Switzerland
- Aerospace & Advanced Composites GmbH, Austria

COORDINATOR

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PROJECT INFORMATION

Multifunctional components for aggressive
environments in space applications
(SMARTEES)

Contract no: 262749

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 1.971.938

Estimated total cost: € 2.688.900



SMARTEES

Multifunctional components for aggressive environments
in space applications



LIST OF PARTNERS

- Fundación Tecnalia Research & Innovation, Spain
- Politecnico di Torino, Italy
- Erbicol SA, Switzerland
- National Center for Scientific Research "DEMOKRITOS", Greece
- EADS Deutschland GmbH, Germany
- Scuola Universitaria Professionale della Svizzera Italiana (SUPSI), Switzerland
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PROJECT INFORMATION

Multifunctional components for aggressive
environments in space applications
(SMARTEES)

Contract no: 262749

Starting date: 01/01/2011

Duration: 36 months

EU Contribution: € 1.971.938

Estimated total cost: € 2.688.900



SOC2

Towards Neutral-atom Space Optical Clocks: Development of high-performance transportable and breadboard optical clocks and advanced subsystems

THE CHALLENGE OF TIME

Measuring time is a human activity undertaken since the earliest times; today we use atomic clocks and strive for always higher precision levels to be achieved with new quantum technologies, in particular optical ones. The use of atomic clocks in space is a new challenge, which the SOC2 project takes on by developing compact and reliable designs.

The use of ultra-precise optical clocks in space will allow for a range of new applications covering the fields of fundamental physics, from tests of Einstein's Theory of General Relativity to time and frequency metrology by means of the comparison of distant terrestrial clocks and the operation of a master clock in space. Also, space based atomic clocks serve geophysics through the mapping of the gravitational potential of Earth, as well as potential applications in astronomy – such as local oscillators for radio ranging and interferometry in space.

Undertaking a necessary step towards optical clocks for space, the SOC2 project will develop two "engineering confidence", ultra-precise transportable lattice optical clock demonstrators having relative frequency instability

$< 1 \times 10^{-15}$ at 1 s integration time and inaccuracy $< 5 \times 10^{-17}$. This goal performance is about 1 and 2 orders better than today's best transportable clocks, in inaccuracy and instability, respectively. The devices will be based on trapped neutral Ytterbium and Strontium atoms. One device will be a breadboard. The two systems will be validated in a laboratory environment and performance will be established by comparison with laboratory optical clocks and primary frequency standards.

In order to achieve the goals, SOC2 will develop the necessary laser systems - adapted in terms of power, linewidth, frequency stability, long-term reliability, and accuracy.

Novel solutions with reduced space, power and mass requirements will be implemented. Some of the laser systems will be developed towards particularly high compactness and robustness levels. Also, the project will validate crucial laser components in relevant environments.



STEPHAN SCHILLER
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

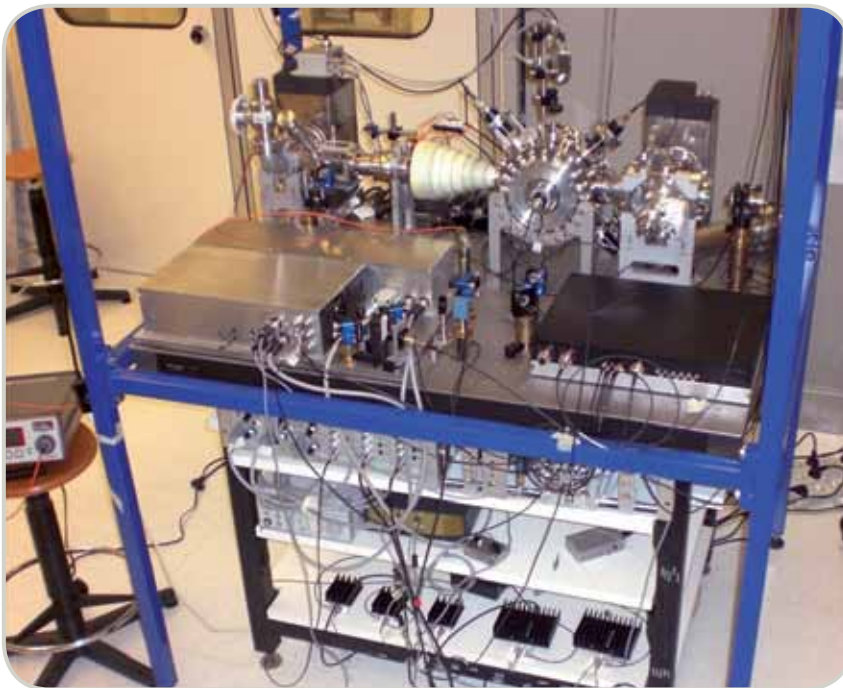
We want to demonstrate that optical atomic clocks can be built in a compact way, thereby opening the way for their future use in space. Our work will build on the experience of a large number of research groups brought together in a synergistic way.

Why is this project important for Europe?

It will further consolidate Europe's leadership in high-performance atomic clocks in space and allow European scientists to perform novel precision experiments in space with future satellite missions.

How does your work benefit European citizens?

A benefit for the population at large can only be expected on the long term. Our work will open up a new approach for measuring distances and the gravitational potentials with high precision, which may one day lead to a deeper understanding of our Earth and possibly contribute to climate research.



© SOC2

SOC2 will demonstrate transportable optical atomic clocks with performance significantly beyond microwave clocks.

SOC2

Towards Neutral-atom Space Optical Clocks: Development of high-performance transportable and breadboard optical clocks and advanced subsystems



LIST OF PARTNERS

- Heinrich-Heine-Universität Düsseldorf, Germany
- Physikalisch-Technische Bundesanstalt, Germany
- Leibniz Universität Hannover, Germany
- Observatoire de Paris, France
- Università degli Studi di Firenze, Italy
- Istituto Nazionale di Ricerca Metrologica, Italy
- University of Birmingham, United Kingdom
- National Physical Laboratory Teddington, United Kingdom
- TOPTICA Photonics AG, Germany
- Kayser-Threde GmbH, Germany
- EADS Astrium Friedrichshafen, Germany
- Menlo Systems GmbH, Germany
- Kayser Italia Srl, Italy
- Université de Neuchâtel, Switzerland
- Centre Suisse d'Electronique et de Microtechnique SA, Switzerland
- Ecole Polytechniques Fédérales Lausanne, Switzerland

COORDINATOR

Heinrich-Heine-Universität Düsseldorf, Germany

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PROJECT INFORMATION

Towards Neutral-atom Space Optical Clocks:
Development of high-performance transportable and
breadboard optical clocks and advanced subsystems
(SOC2)

Contract no: 263500

Starting date: 01/03/2011

Duration: 48 months

EU Contribution: € 1.999.331

Estimated total cost: € 2.719.635,87



MAGDRIVE

Magnetic-Superconductor Cryogenic Non-contact Harmonic Drive

TOWARDS MORE RELIABLE SATELLITE COMPONENTS

Maintenance of critical satellite components such as cryogenic mechanisms in space is a major challenge. MAGDRIVE will develop a harmonic drive, which needs virtually no maintenance.

Onboard spacecraft, the use of reliable cryogenic mechanisms in space is continuously increasing. Such high sensitivity instruments like infrared interferometers work at temperatures close to absolute zero, performing a wide range of remote sensing applications, such as environmental monitoring. However, the combination of very low temperature and the unavailability of maintenance is a hard requirement for these mechanisms.

The MAGDRIVE project will therefore design, build and test a magnetic-superconductor cryogenic non-contact harmonic drive. This kind of mechanism is expected to

prevent wearing and fatigue and to need virtually no maintenance and no lubrication.

In order to achieve this objective magnetic and superconducting materials are to be used. Forces among these elements will be the basis for the device.

Indeed, MAGDRIVE will explore new ways to harvest the potential of natural forces in space, profiting from the harsh space environment instead of being crushed by it.

The project is set to increase the reliability of instruments used on future satellites, and open up new perspectives for high quality instruments for health, industry and environmental applications.



JOSÉ-LUIS PÉREZ-DÍAZ
IS PROJECT COORDINATOR



magnetic earth © artSILENSEcom - Fotolia.com

MAGDRIVE will design, build and test a magnetic-superconductor cryogenic non contact harmonic drive.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to build and test a new kind of non-contact drive suitable for cryogenic and space environment based on magnetic forces. It is intended not to need lubrication or maintenance.

Why is this project important for Europe?

These kinds of mechanisms are needed for highly sensitive instruments like infrared interferometers and other devices. They will improve the performances and reliability and will overpass the working life of the existing drives.

How does your work benefit European citizens?

Firstly, it will help to increase the overall reliability of the instruments in satellites and subsequently to reduce the overall cost of them. Secondly, it will open new perspectives for high quality instruments for health, industry and environmental applications.

MAGDRIVE

Magnetic-Superconductor Cryogenic Non-contact Harmonic Drive



LIST OF PARTNERS

- Universidad Carlos III de Madrid, Spain
- Università degli studi di Cassino, Italy
- CNR-SPIN, Italy.
- CAN Superconductors SRO, Czech Republic
- BPE e. K., Germany
- LIDAX INGENIERÍA S.L, Spain
- SIM -F.C.Universidade de Lisboa, Portugal

COORDINATOR

Universidad Carlos III de Madrid, Spain

CONTACT

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PROJECT INFORMATION

Magnetic-Superconductor Cryogenic Non-contact Harmonic Drive (MAGDRIVE)
Contract no: 263014
Duration: 36 months
EU Contribution: € 1.961.965
Estimated total cost: € 2.475.432



ACCORD

Alignment of Capability and Capacity for the Objective of Reducing Debris

TAKING ON DEBRIS IN SPACE

Space debris is known to represent a significant risk to satellite operations. Nearly 20,000 objects larger than 10 cm are known to exist whilst the number of smaller particles greatly exceeds this. Even impacts from centimetre-size particles can result in the loss of a spacecraft. The ACCORD project addresses this significant challenge.

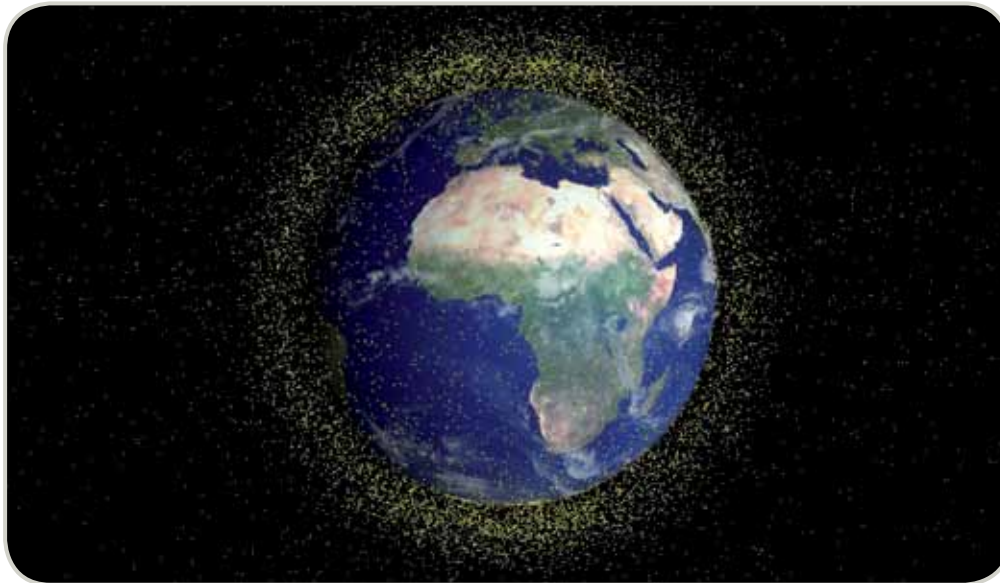
Collisions between large objects in space can produce thousands of potentially hazardous fragments larger than 1 cm, and these events are expected to become the primary source of space debris in the future. Clearly, it is important to protect Europe's space infrastructure and the adoption of space debris mitigation guidelines is a key part of this process. However, the capability of European space industry to apply these guidelines is limited by financial and technological constraints, amongst others. The ACCORD project aims to quantify the effective-

ness of current mitigation efforts, identify the opportunities to strengthen European capability and to communicate these key findings to European and non-European space industry and governments.

The study is a diagnostic and alignment mechanism in support of Europe's space industry. Its objective is to survey and review the capability and capacity of industry's ability to implement measures that reduce debris creation. In doing so, the study will provide useful insights in support of EU policy and possible future international guidelines aimed at curbing debris proliferation with a view to stabilising the near-Earth environment and securing future European access to space.



HUGH LEWIS
IS PROJECT COORDINATOR



DEBRIS_2001_SOUTHAMPTON © ACCORD

ACCORD presents a method to help identify, quantify and remove the barriers to effective space debris mitigation.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

By working closely with European industry, governments and other organisations, we hope to achieve an improved understanding of issues limiting the adoption of mitigation measures and to identify opportunities to improve our capability in this crucial area.

Why is this project important for Europe?

Europe plays a key role in space, in terms of utilisation and guiding policy. Space debris is a challenge in both domains. We expect our ACCORD project to support Europe's role into the future by learning about the obstacles faced by European space industry.

How does your work benefit European citizens?

European citizens depend on space-based services; it is ubiquitous and embedded into everyday life – weather forecasts, sat-nav, for example. Therefore, protecting and improving European space infrastructure through projects such as ACCORD is vital.

ACCORD

Alignment of Capability and Capacity for the Objective of Reducing Debris



LIST OF PARTNERS

- University of Southampton, UK
- PHS Space Ltd, UK

COORDINATOR

University of Southampton, UK

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PROJECT INFORMATION

Alignment of Capability and Capacity for the Objective of Reducing Debris (ACCORD)

Contract no: 262824

Starting date: 01/12/10

Duration: 36 months

EU Contribution: € 425.114,21

Estimated total cost: € 560.744,60



DORIS_Net

Downstream Observatory organised by Regions active
In Space - Network

DEVELOPING EUROPE'S GMES DOWNSTREAM ECONOMY

Across Europe, regional authorities are among the main beneficiaries of GMES products and services. DORIS_Net helps keeping them up to date with new GMES possibilities.

Addressing the key domains – atmosphere, land, marine, emergency response, climate change and security – with a view to facilitate informed decision making at local, regional, national and European levels, Europe's Monitoring for Environment and Security (GMES) initiative is a complex, and multifaceted programme.

In order to secure optimal harvesting of GMES results, the development of a GMES downstream service sector is of great importance. Refining data, products and services from global GMES services in the various domains, GMES downstream services may be customized to individual user needs, many of which are to be found at the regional level.

In support of the development of such a GMES downstream sector, DORIS_Net is set to create a platform that will allow for more effective coordination of individual activities both within and between the regions of Europe, GMES downstream service providers, and the GMES European governance level.

Hence, this project will establish a Downstream Observatory, organised by regional GMES users, which, supported by a network of GMES Regional Contact Offices (RCO) constitutes a European GMES Downstream Service Platform aimed at facilitating a smooth flow of information between GMES users and GMES service providers. Keeping regions up to date with new GMES possibilities, and conversely, keeping GMES service providers in the know on user needs, is pivotal for the successful development of the GMES downstream economy in Europe.



VOLKER SCHUMACHER
IS PROJECT COORDINATOR



View on Europe from a height of satellites © Anton Balazh - Fotolia.com

DORIS_Net will develop a GMES Downstream Service Platform, facilitating information on GMES products and services directly to users, and deepening links between regional and European GMES stakeholders.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

DORIS_Net will put regional users in the driving seat. By facilitating the long process of increasing awareness, demonstrating, educating and training to help make GMES services operational, the Regional Contact Offices shall be the regional link for local stakeholders and GMES.

Why is this project important for Europe?

GMES will only be fully successful on an operational level if regional actors are more involved since they face diverse economic, political and cultural conditions. On the other hand, the DORIS_Net network will allow data/knowledge exchange and optimise synergies between regions.

How does your work benefit European citizens?

Our work will bring GMES to the regional level and closer to the individual needs of European citizens. The project will increase awareness of GMES services by dealing with barriers like language and culture. This will benefit regional economies and the quality of life in Europe.

DORIS_Net

Downstream Observatory organised by Regions active
In Space - Network



LIST OF PARTNERS

- CEON GmbH- Centre for Communication, Earth Observation and Navigation Services, Germany
- University of Leicester (G-STEP), United Kingdom
- Centre d' Études Techniques du Sud-Ouest, France
- Capital High Tech, France
- Secretaria Regional da Ciência Tecnologia e Equipamentos, Portugal
- Consiglio Nazionale delle Ricerche (CNR), Lombardia, Italy
- Tecnologie per le Osservazioni della Terra ed i Rischi Naturali, Italy
- Research in Brussels ASBL, Belgium
- ADEuropa Foundation, Spain
- Madrid Cluster Aerospace, Spain
- Forum Luft und Raumfahrt Baden-Württemberg e.V, Germany
- Pole Mere Bretagne, France
- Guyane Technopole, Fr. Guyana, France

COORDINATOR

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PROJECT INFORMATION

Downstream Observatory organised by Regions active
In Space (DORIS_Net)
Contract no: 262789
Starting date: 01/02/11
Duration: 24 months
EU Contribution: € 999.745
Estimated total cost: € 1.119.837



SPA

Support to Precursor SSA Services

TOWARDS SAFER NAVIGATION IN SPACE

Thousands of objects orbit Earth; above us operational and old satellites mingle. The SPA project takes on a study of orbit tracking, preparing the way for a future European system for enhanced space situational awareness (SSA).

Independent access to space is an integral part of Europe's space policy. SSA is an important element in securing such access. This concept refers to the knowledge of the space environment and the location and function of space objects, including the positioning of operational satellites, space debris, near Earth objects and space weather. All of these elements represent hazards that European satellites have to avoid when entering space and when positioning in orbit. Indeed, with an increasing number of satellites and space debris circling Earth, reliable information on the positioning of such objects is paramount to avoid collisions in space.

The SPA project undertakes a study into the possible functioning of an operational European system for SSA. Undertaken by the European Union Satellite Centre (EUSC), which supports the Common Foreign and Security Policy (CFSP) of the EU, the SPA study benefits from the existing expertise that the EUSC possesses in handling, analysing and disseminating data and derived products within the highest security standards. Through the SPA study, the EUSC is set to enhance the technical definition of SSA and to participate in the validation of critical precursor SSA services, such as satellite conjunction warnings, satellite over-flight alerts and space debris re-entry prediction, by hosting an SSA prototype system to be developed by ESA.



JUAN LUIS VALERO
IS PROJECT COORDINATOR



Bee-Hive-6_H © SPA

The SPA project studies the tracking of space objects, preparing the way for a European system for space situational awareness (SSA).

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The SPA project will contribute to the implementation of the European Space Policy by backing the development of a European capability for the monitoring and surveillance of its space infrastructure and of space debris, initially based on existing national and European assets.

Why is this project important for Europe?

The EU and its Member States, as owners of space assets and future potential owners of the SSA system, will benefit from the experience of operating pre-operational SSA services, providing a smooth transition towards an operational implementation of a European SSA capability.

How does your work benefit European citizens?

Space assets are essential for the activities of modern societies and their proper protection translates into important economic savings for European citizens as well as the ability to have critical space services, including those related to European external operations.

SPA

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LIST OF PARTNERS

- European Union Satellite Centre, Spain

COORDINATOR

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PROJECT INFORMATION

Support to Precursor SSA Services (SPA)

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