

# SPACE RESEARCH

Desire  
for  
space

Space Research projects under  
**the 7<sup>th</sup> Framework Programme  
for Research**

GMES DOWNSTREAM SERVICES  
SPACE EXPLORATION  
DEVELOPING CRITICAL TECHNOLOGIES  
COORDINATION AND SUPPORT ACTIONS

## SPACE RESEARCH projects under the 7<sup>th</sup> Framework Programme for Research

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### SPACE RESEARCH FOR DREAMS, NEEDS AND OPPORTUNITIES

Space Research is both a source of inspiration and innovation, and a means to enhance the quality of citizens' daily lives.

The 27 Space Research projects featured in this brochure reflect this diversity, with Global Monitoring for Environment and Security (GMES) services progressively taking form and bringing better air and marine quality services to citizens, whilst also monitoring natural hazards, and taking on the climate change challenge.

In parallel, **space exploration** projects aim at making dreams a reality, taking Europe to Mars and preparing for safe re-entry into Earth's atmosphere. Past European explorers went beyond the horizon, not because it was easy, but because it was hard. In space, we adopt their curiosity, and in doing so Europe sets out to develop **critical technologies** that are of strategic importance for our industry, in order for it to stay competitive and innovative, breaking new technological barriers and securing high quality jobs in Europe.

In Europe we share a **desire for space**; explore this brochure and learn more.

## SPACE RESEARCH update

### WORLD EXPO 2010

The EU pavilion at World Expo 2010 in Shanghai, China, exhibits selected Space Research projects on site and online from 1 May.



### 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 EMBRACE SPACE VIDEO

More than 10.000 people have watched the two minute Let's embrace space video featuring three excellent Space Exploration projects. Watch the video at [www.youtube.com/eutube](http://www.youtube.com/eutube), or via several video sharing sites from Asia to the US.



"IN EUROPE WE SHARE A **DESIRE FOR SPACE**"

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

### GMES DOWNSTREAM SERVICES

- Closely monitoring climate change (EURO4M)
- Understanding climate change in the Arctic (MONARCH-A)
- Creating a carbon baseline (CARBONES)
- Keeping citizens in the know on local air quality (PASODOBLE)
- Towards more targeted coastal marine forecasts (FIELD\_AC)
- Striving for better water quality assessment (AquaMar)
- With the sea rising, more accurate subsidence estimates needed for coastal lowlands (SubCoast)
- Towards a better understanding of landslides and subsidence (DORIS)
- Seeing emergencies from different angles (GEO-PICTURES)
- Keeping an eye on the world's volcanoes (EVOSS)
- Towards an Africa wide ocean observation system (EAMNet)
- Towards better emergency response in Africa (GARNET-E)
- Building GMES in Africa (SAGA-EO)

### SPACE EXPLORATION

- Prepare for landing on planets (Phys4Entry)
- Giving robotic rovers a sight of their own (PROViScout)
- Preparing for safe Earth return (RASTAS SPEAR)
- Setting the stage for human space exploration (THESEUS)

### DEVELOPING CRITICAL TECHNOLOGIES

- In digital satellite technology, making Europe a world leader (COMETS)
- Harvesting the full potential of radio waves (MIDAS)
- Towards home grown high power space electronics in Europe (EuSiC)
- Harvesting science from radio waves (TeraComp)
- Developing more flexible satellites (SATURNE)
- Observing our borders from space (NEWA)

### COORDINATION AND SUPPORT ACTIONS

- Towards a Space Policy that Europe can be proud of (C-Space)
- A third way in space procurement (SP4ESP)
- Bringing Europe together on the space journey (NordicBaltSat)

*Desire for space* is the third 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.

Electronic versions of these brochures are available online at

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

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# EURO4M

## European Re-analysis and Observations for Monitoring

### CLOSELY MONITORING CLIMATE CHANGE

The decade 2010 – 2020 is set to be the finest hour for the world to act on climate change. Yet to be successful, we need to know in near-real time exactly how the climate is changing. The EURO4M project will monitor the evolution of the Earth system components, potentially paving the way for a GMES service on climate change.

Across the world, the impact of climate change is felt and its devastating potential is known. Europe is committed to leading the efforts taking on the climate change challenge. Therefore, enhancing scientific knowledge about the evolution of climate change is of paramount importance. Policy makers, researchers, and citizens need to know to better adapt, and also to monitor the effects of international agreements dealing with the climate challenge.

EURO4M provides valuable guidance as it is set to develop Europe's capacity to monitor climate change in near-real time, and over extended time periods. Such description

of the evolution of the Earth system components is set to be undertaken by the collection of regional observation datasets of Essential Climate Variables (ECV), such as near surface temperature, and by performing a comprehensive model based regional reanalysis. Thereby Europe's capacity to systematically monitor climate variability and change will be extended in a cost effective manner.

Whilst EURO4M will provide time series showing the changes in climate over time, the project will also be able to report in near-real time during emerging extreme events.

Indeed, as the primary source of timely, targeted and reliable information about the state of the climate in Europe, EURO4M holds the potential to evolve into a future GMES service on climate change.



**ALBERT KLEIN TANK**  
IS PROJECT COORDINATOR



3355m © Fotolia.com

**EURO4M strengthens Europe's capacity to monitor climate variability and change, delivering the most complete time series in this field covering all of Europe, and potentially establishing a foundation for a GMES service on climate change.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

EURO4M aims to become the primary source of timely and reliable information about the state of the climate in Europe. This will help us better understand and predict climate change, extreme conditions and weather related hazards, so that society can respond in the best possible way.

#### Why is this project important for Europe?

Through EURO4M, Europe will improve its climate monitoring capacity. For the first time, atmospheric observations from ground-based sources, satellites and model based regional re-analysis will be combined seamlessly for long-term climate monitoring and adaptation policy support.

#### How does your work benefit European citizens?

Citizens will be able to utilize the innovative and integrated data products and services from EURO4M. These will tell them how the climate is changing in Europe, in their country and in the place they live at the appropriate level of aggregation and standardization.

# EURO4M

European Reanalysis and Observations for Monitoring



## LIST OF PARTNERS

- Royal Netherlands Meteorological Institute, Netherlands
- Met Office, United Kingdom
- University Rovira i Virgili, Spain
- National Meteorological Administration, Romania
- Meteo Swiss, Switzerland
- Deutscher Wetterdienst, Germany
- Swedish Meteorological and Hydrological Institute, Sweden
- University of East Anglia, United Kingdom
- Météo France, France

## COORDINATOR

**Royal Netherlands Meteorological Institute,  
Netherlands**

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## PROJECT INFORMATION

European Reanalysis and Observations for Monitoring  
(EURO4M)  
Contract no: 242093  
Starting date: 01/04/2010  
Duration: 48 months  
EU Contribution: € 3.989.200  
Estimated total cost: € 6.629.960



# MONARCH-A

## Monitoring and Assessing Regional Climate change in High latitudes and the Arctic

### UNDERSTANDING CLIMATE CHANGE IN THE ARCTIC

With permafrost melting, glaciers receding and sea ice disappearing, nowhere on Earth is climate change more present than in the Arctic. However "before and after" photos of glaciers are not enough. The project MONARCH-A seeks to produce a dedicated and comprehensive information package showcasing Arctic climate change in a 30-50 years perspective.

The Arctic is warming, and data from the first decade of the 21st century show that the speed is accelerating. What happens in the Arctic has global consequences, since melting ice sparks raising sea levels, and potentially impacts ocean circulation that transport heat from the tropics to higher latitudes, including Europe.

In this complex context of different data measurements, there is a need for a global overview of Essential Climate Variables (ECVs) over time.

MONARCH-A aims at furthering such an overview, by bringing diverse climate indicators, such as sea levels, permafrost extension, snow cover extension, ice sheet elevation, sea ice drift and volume, and ocean current measurements together into a single information package on climate change in the Arctic. Moreover, by re-analyzing old data, the project will be able to harmonize datasets and establish an overview of changes in terrestrial carbon and water fluxes, sea levels and ocean circulation in the Arctic in a 30-50 years perspective. Such an overview will ensure new scientific input for more informed decisions to be taken at political level, as international environmental policies addressing climate change are progressively fine tuned in years to come.



**JOHNNY JOHANNESSEN**  
IS PROJECT COORDINATOR



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**MONARCH-A provides for enhanced reanalysis of Essential Climate Variables (ECV) in the Arctic region. The retrospective time scale of data analysed is between 30-50 years in this project.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

We aim to generate a dedicated information package tailored to a subset of multidisciplinary Essential Climate Variables and their mutual forcing and feedback mechanisms associated with changes in terrestrial carbon and water fluxes, sea level and ocean circulation, and the marine carbon cycle in the high latitude and Arctic regions.

#### Why is this project important for Europe?

Rapid decreases in Arctic Sea ice concentration and decreases in sea surface carbonate saturation prove that northern hemisphere high latitude regions are highly susceptible to climate change. The scientific rationale of MONARCH-A is to inform Europeans about the consequences of these changes.

#### How does your work benefit European citizens?

MONARCH-A achievements may have strategic benefits for Europe. Recently, the European Commission adopted a Communication on the Arctic region that highlights the effects of climate change and human activities, and alludes to the need for a systematic and coordinated response to rapidly emerging challenges.

# MONARCH-A

Monitoring and Assessing Regional Climate change in High latitudes and the Arctic



## LIST OF PARTNERS

- Stiftelsen Nansen Senter for Fjernmåling, Norway
- The University of Sheffield, England
- Universitat Hamburg, Germany
- Centre National de la Recherche Scientifique, France
- Scientific foundation Nansen International Environmental and Remote Sensing Center, Russia
- Universitetet i Bergen, Norway
- Danmarks Tekniske Universitet, Denmark
- Institut Francais de Recherche pour l'Exploitation de la Mer, France

## COORDINATOR

**Stiftelsen Nansen Senter for Fjernmåling, NERSC, Norway**

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## PROJECT INFORMATION

Monitoring and Assessing Regional Climate change in High latitudes and the Arctic (MONARCH-A)  
Contract no: 242446  
Starting date: 01/03/2010  
Duration: 36 months  
EU Contribution: € 3.888.201,60  
Estimated total cost: € 2.884.484



# CARBONES

30-year re-analysis of CARBON fluxes and pools over Europe and the Globe

## CREATING A CARBON BASELINE

Whilst carbon dioxide (CO<sub>2</sub>) is seen as the main gas responsible for climate change, no comprehensive integrated 30-year-reanalysis of the global carbon cycle has yet been undertaken. The project CARBONES takes on this challenge at the service of climate modellers and citizens worldwide.

Climate change is happening, temperatures are rising, but our ability to have climate models predict different scenarios for just how this process is likely to unfold over the course of the 21st century, depending on which actions we take to deal with this challenge, still needs further refinement.

CARBONES provides a carbon environmental service establishing a first reanalysis of the carbon cycle in a long term (20-30 years) perspective. In doing so, the project seeks to establish a well founded baseline that is designed to be continuously updated. Integrating essential climate variables (ECVs) defined by the Global Cli-

mate Observation System, such as atmospheric carbon dioxide, leaf area and biomass data (e.g., above ground woody biomass stocks, soil carbon content), CARBONES is set to enhance our ability to predict how the carbon cycle of ecosystems respond to greenhouse gas emissions and climate change.

Thereby, policy makers and the public will be able to make more informed decisions in order to best deal with the climate challenge. Hence, whilst the primary users of CARBONES' reanalysis are climate modellers reporting on climate inventories for the United Nations Framework Convention on Climate Change (UNFCCC), the beneficiaries of this service, which might evolve towards an operational integrated carbon monitoring capacity, are indeed citizens throughout the world and the environment writ large.



**PASCAL PRUNET**  
IS PROJECT COORDINATOR



Eric Gevaert © Fotolia.com

**CARBONES provides for enhanced reanalysis of Essential Climate Variables (ECV) from terrestrial and oceanic carbon cycles. The retrospective time scale of data analysed is between 20-30 years in this project.**

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

CARBONES will deliver the first ever consistent, high space and time resolution information system of the history of the carbon cycle, with associated uncertainties and attribution to controlling processes, for long-term reanalysis of carbon fluxes and pools over Europe and the Globe.

### Why is this project important for Europe?

The project forms a natural counterpart to activities in the carbon cycle already undertaken at European level, e.g. MACC and geoland2. It will provide a clear and necessary added value to GMES Services with respect to Climate Users needs, by providing an integrated view of the Carbon cycle.

### How does your work benefit European citizens?

The CO<sub>2</sub> cycle parameterisation is the largest source of uncertainties for modelling future climate. The CARBONES products, publically available to European citizens, will be used by the IPCC climate modellers for improving their simulations of the future coupled climate-carbon cycle system.

# CARBONES

30-year re-analysis of CARBON fluxes and pools over Europe and the Globe



## LIST OF PARTNERS

- NOVELTIS, France
- Commissariat à l'Energie Atomique, CEA-LSCE, France
- Cambridge Environmental Research Consultants Ltd., United Kingdom
- Max Planck Institute for Biogeochemistry, Germany
- Atomic Energy Authority Technology, United Kingdom
- Thales Alenia Space, France
- Federal Institute of Technology, Switzerland
- Alterra, Netherland
- Universitaet Stuttgart, Germany
- Peking University, China
- Aberdeen University, United Kingdom
- UK Met Office Hadley Centre, United Kingdom
- European Forest Institute, Finland
- CLIMMOD Engineering, France

## COORDINATOR

**NOVELTIS, France**

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## PROJECT INFORMATION

30-year re-analysis of CARBON fluxes and pools over Europe and the Globe (CARBONES)

Contract no: 242316

Starting date: 01/04/2010

Duration: 36 months

EU Contribution: € 2.561.699

Estimated total cost: € 3.491.018,07



# PASODOBLE

Promote Air Quality Services integrating Observations  
– Development Of Basic Localised Information for Europe

## KEEPING CITIZENS IN THE KNOW ON LOCAL AIR QUALITY

Polluted air has known negative impacts on the human health. In Europe, particles in the air are estimated to reduce the lifetime of the average citizen by eight months. Therefore air quality is a crucial environmental factor. Assessing and monitoring air pollution is fundamental to increase our welfare. PASODOBLE aims at improving capabilities in air quality information in Europe's regions and cities.

Timely and adequate information on air pollution levels can save lives. In the context of Europe's GMES monitor-



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**PASODOBLE aims at developing local and regional air quality services to improve information for the public, people at risk, tourism and sports, to support the health community and to deliver policy relevant data and advise to local authorities and regional agencies.**

ing system for environment and security, PASODOBLE seeks to provide information on local air quality directly to the public, people at risk and the health care community. Further services aim at the tourist and entertainment industries, providing valuable information for organizers of major public events such as sporting competitions or concerts. PASODOBLE will also support regional environmental agencies in fulfilling their compliance monitoring tasks by providing customized satellite-based products. Thus local action will contribute to mitigating global effects.

PASODOBLE builds on the capacities and lessons learned of the ESA GMES Service Element PROMOTE which has set up 40 user-driven air quality services in Europe. PASODOBLE will analyse existing user requirements and propose improved service designs for new and continued local and regional air quality monitoring and forecasting services.

At the benefit of European citizens the project aims at integrating and promoting best practice tools for local air quality services. In addition PASODOBLE works towards a harmonized European framework for sustainable services. By developing a generic and modular service infrastructure, including quality management, PASODOBLE will increase the implementation efficiency for new services in the future.



**THILO ERBERTSEDER**  
IS PROJECT COORDINATOR

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

PASODOBLE will develop user-driven and sustainable air quality services in more than 35 regions and cities throughout Europe. We aim at improving public air quality information services, the support for people at risk and the supply of policy relevant information for decision makers.

### Why is this project important for Europe?

Air quality is a trans-national problem with local sources. Therefore PASODOBLE combines local action and work towards European harmonisation. By raising awareness, reducing health costs and diminishing morbidity, it will improve quality of life and sustainability of welfare.

### How does your work benefit European citizens?

The services provide a solution to mitigating the harm from air pollution by directly reaching residents who are most vulnerable, allowing them to change their behaviour or to take relief medication in time. This will in the long term reduce morbidity and mortality.

# PASODOBLE

Promote Air Quality Services integrating Observations  
– Development Of Basic Localised Information for Europe



## LIST OF PARTNERS

- Deutsches Zentrum für Luft- und Raumfahrt e.V., Germany
- ACRI – ST, France
- AEA Technology, United Kingdom
- Aristotle University of Thessaloniki, Greece
- BMT ARGOSS, The Netherlands
- Institut d'Aeronomie Spatiale de Belgique, Belgium
- Bulgarian Academy of Sciences, GPhI, Bulgaria
- Cambridge Environmental Research Consultants, United Kingdom
- Carlo Gavazzi Space, Italy
- Centre Hospitalier Universitaire Nice, France
- Medical University of Vienna / European Aeroallergen Network, Austria
- European Medical Association, International
- Finish Meteorological Institut, Finland
- Koninklijk Nederlands Meteorologisch Instituut, The Netherlands
- Norsk Institutt for Luftforskning, Norway
- Rheinisches Institut für Umweltforschung an der Universität zu Köln, Germany
- Thales Alenia Space France, France
- Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, The Netherlands
- Vlaamse instelling voor technologisch onderzoek, Belgium
- Nowcasting International, Ireland
- Outdoor Concepts, Germany

## COORDINATOR

**Deutsches Zentrum für Luft- und Raumfahrt e.V., DE**

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## PROJECT INFORMATION

Promote Air Quality Services integrating Observations –  
Development Of Basic Localised Information for Europe  
(PASODOBLE)

Contract no: 241557

Duration: 36 months



# FIELD\_AC

## Fluxes, Interactions and Environment at the Land-Ocean Boundary. Downscaling, Assimilation and Coupling

### TOWARDS MORE TARGETED COASTAL MARINE FORECASTS

Coastal zones are on the edge of land and ocean. Here rivers mix with salty waters. Here wind-waves approach the shore and become a dominant agent. These effects create special conditions that generate a need for more targeted regional marine forecasts. The project FIELD\_AC takes on this forecasting challenge.

As fresh flood water mixes with the sea, large scale oceanographic models such as the GMES Marine Service prove insufficient when predicting marine conditions in coastal zones. These effects, which hamper informed environmental decision making, generate a need for more targeted regional marine forecasts.

The FIELD\_AC project aims at providing an improved operational service for coastal areas. Through the introduction of more comprehensive land boundary conditions, driving factors and their interactions, the project will advance the state of art (e.g. 3D salt-wedge dynamics or wave-current 3D couplings) and provide higher accuracy

and robustness at beach/harbour scale. The project aims at developing such computations within four “geometrically” restricted domains which cover a representative set of oceanographic conditions in terms of tide, wave, and energy.

By means of enhanced use of in-situ data collected in the coastal areas and remote observation data from satellites, FIELD\_AC seeks to bridge the gap from shelf predictions to small scale local simulations of river mouth and beach-scale conditions. In doing so, the project not only provides enhanced information on environmental conditions in these areas, it also adds value to large scale oceanographic models developed by the GMES Marine Service, casting light on the complex interplay between the waters of lands and seas.



AUGUSTÍN SÁNCHEZ-ARCILLA  
IS PROJECT COORDINATOR



Kevin Bourdeaux © Fotolia.com

**FIELD\_AC assesses the quality of coastal scale oceanographic predictions. It specifically includes free-surface waves and continental discharges, with emphasis on coupling and high resolution.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

We want to include land discharges, both from rivers and distributed run-off to coastal oceanographic predictions. We also want to add wind-waves (sea and swell) to such predictions, focusing on the coupling terms which are so important in coastal areas. This is because high-resolution means more than just decreasing the numerical mesh size.

#### Why is this project important for Europe?

Most coastal problems occur near the coast and in these “restricted” domains present forecasting still shows large errors. We want to reduce those errors for a representative number of coastal cases and, from here, extend the approach to other coastal areas in the EU.

#### How does your work benefit European citizens?

Our work will show citizens of the EU and stakeholders from European Coastal zones how to use oceanographic predictions for leisure (e.g. surfing) or economic (e.g. aquaculture) activities. We also want to show them the limits of predictions in the present state of our technology.

# FIELD\_AC

Fluxes, Interactions and Environment at the Land-Ocean Boundary.  
Downscaling, Assimilation and Coupling



## LIST OF PARTNERS

- Universitat Politecnica de Catalunya, Spain
- Katholieke Universiteit Leuven, Belgium
- Service Hydrographique et Oceanographique de la Marine, France
- GKSS - Forschungszentrum Geesthacht GmbH, Germany
- Instytut Budownictwa Wodnego Polskiej Akademii Nauk, Poland
- Natural Environment Research Council, United Kingdom
- Consiglio Nazionale delle Ricerche, Italy
- DHI, Denmark
- Barcelona Supercomputing Center - Centro Nacional de Supercomputacion, Spain

## COORDINATOR

**Universitat Politecnica de Catalunya, Spain**

## CONTACT

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## PROJECT INFORMATION

Fluxes, Interactions and Environment at the Land-Ocean  
Boundary. Downscaling, Assimilation and Coupling  
(FIELD\_AC)

Contract no: 242284

Starting date: 01/01/2010

Duration: 36 months

EU Contribution: € 3.309.416

Estimated total cost: € 4.229.558



# AquaMar

## Marine Water Quality Information Services

### STRIVING FOR BETTER WATER QUALITY ASSESSMENT

AquaMar constitutes a network of SMEs aiming at establishing a common European reference point for validated water quality services, taking full benefit of services provided by the GMES Marine Service.

In recent years, the EU has established a dedicated focus on water quality throughout Europe. The EU Water Framework Directive, the European Marine Strategy, and the Bathing Water Directive all point towards enhanced water quality protection. Yet in order to be effective, such legislation needs to be rigorously monitored. In this respect, and in the context of Europe's GMES global monitoring for environment and security initiative, water quality services are paramount.

The AquaMar project will implement and provide water quality services based on integration of Earth Observations, in-situ measurements of biological parameters and modelling. The services will rely on the GMES Marine Service production while addressing specific needs ex-

pressed by end-users in the field of coastal water quality in an ambitious attempt to advance the science driving water quality assessment.

Through an open partnership between water quality service providers, AquaMar proposes services that will deliver (1) indicators for the reporting requirement of the Water Framework Directive and the European Marine Strategy, (2) algal bloom forecasting, (3) monitoring the impact of large infrastructure near the coast, (4) services supporting the Bathing Water directive monitoring, and (5) aquaculture precision farming.

Hence the AquaMar project provides enhanced water quality data, enabling more targeted guidance and information for European citizens and stakeholders.



**STÉPHANE PIEROTTI**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

Aquamar shall improve existing EO data use to offer a validated portfolio of products and services dedicated to regional or local applications for water quality monitoring, surveillance and assessment. Aquamar shall establish a network of SME providing marine downstream services.

#### Why is this project important for Europe?

In recent years the awareness of European water quality issues in coastal waters has grown as evidenced by recent directives (WFD, WBD, ..). Aquamar will have an important role in giving effective instruments to EU and National entities to assess the impact of those directives.

#### How does your work benefit European citizens?

On all European beaches, the blue flag that signals good quality of bathing water comforts families. Securing water quality is a key European priority. Beyond health benefits, Aquamar will also bring economical added value (e.g. aquaculture, infrastructure impact at coast).



Salmon Farm Protest Group Marine © www.marinephotobank.org

**AquaMar will offer Earth Observation (EO) based water quality services to support European and national monitoring agencies, and industries operating in coastal waters.**

# AquaMar

Marine Water Quality Information Services



## LIST OF PARTNERS

- ACRI-ST SAS, France
- Brockmann Carsten Wessel, Germany
- Planetek Italia SRL, Italy
- DHI, Denmark
- Institut Royal des Sciences Naturelles de Belgique, Belgium
- Suomen Ymparistokeskus, Finland
- Plymouth Marine Laboratory, United Kingdom
- Starlab Barcelona SL, Spain
- Stiftelsen Nansen Senter for Fjernmaaling, Norway
- Danmarks Meteorologiske Institut, Denmark
- Deutsches Zentrum Für Luft - und Raumfahrt, Germany
- Satellite Oceanographic Consultants LTD, United Kingdom
- Argans Limited, United Kingdom
- Water Insight BV, The Netherlands
- Ilmatieteen Laitos, Finland

## COORDINATOR

**Thales Alenia Space France, France**

## CONTACT

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## PROJECT INFORMATION

Marine Water Quality Information Services (AquaMar)

Contract no: 241759

Starting date: 01/04/2010

Duration: 36 months

EU Contribution: € 3.499.742

Estimated total cost: € 4.875.594



# SubCoast

A collaborative project aimed at developing a GMES-service for monitoring and forecasting subsidence hazards in coastal areas around Europe

## WITH SEA LEVELS RISING, MORE ACCURATE SUBSIDENCE ESTIMATES NEEDED FOR COASTAL LOWLANDS

Whilst amongst the most economically productive areas worldwide densely populated and home to important harbours and industries, the geographic position and geological setting also makes coastal lowlands particularly vulnerable to flooding. In short, they sink and this process, known as subsidence takes place at a rate comparable to that of anticipated sea level rise. Natural compaction of soft soil deposits, settlement of infrastructure and subsidence due to fluid extraction all contribute to this development and inflict huge financial costs.

The objective of SubCoast will be to develop a GMES-service for monitoring the extent and impact of subsidence in coastal lowlands, and demonstrate its capability in a variety of settings around Europe. The service will be designed to appropriately determine the effects of subsidence on current and future floodrisk in coastal lowlands. SubCoast will monitor the integrity of coastal bar-

rier systems and infrastructure, and assess the impact of subsidence due to natural or man-made causes such as groundwater pumping and oil/gas production on land use and hydrology.

For a number of selected areas SubCoast will bring satellite-derived subsidence estimates together with ground based geodetic measurements, geological data, geotechnical data and sea level measurements into a coherent framework. A distributed data and information system will be set up facilitating the accessibility and operability of Earth Observation-data, in-situ data (including geoscientific data) and model results for the selected areas. This system will facilitate the integration of tools and services allowing end-users to query, view and access products and data.



**CHRIS BREMMER**  
IS PROJECT COORDINATOR

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

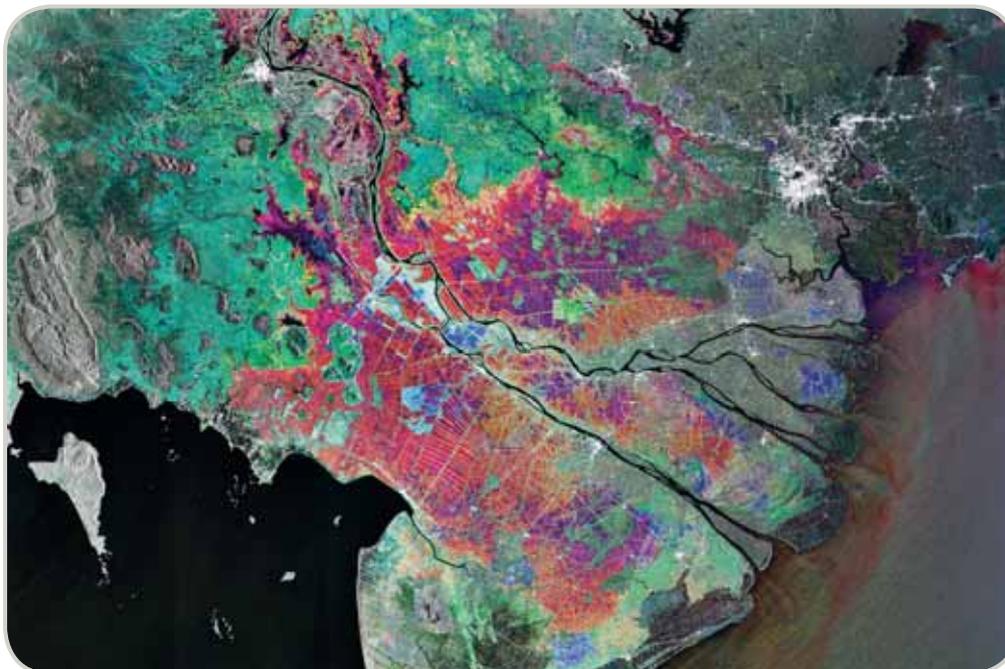
SubCoast's goal is to set up a sustainable GMES-service which brings the necessary data on subsidence hazards in coastal lowland areas to industrial stakeholders, government and citizens in order to contribute to a secure and sustainable future.

### Why is this project important for Europe?

Coastal lowlands are among the economic most viable and at the same time most affected by climate change. Subsidence seriously aggravates this. By delivering data and information on subsidence, SubCoast will support Europe to properly adapt to the consequences of climate change.

### How does your work benefit European citizens?

In light of climate change, Europe needs to adapt in a timely and effective way. SubCoast will deliver data and information which will help doing so, thus contributing to a safe and sustainable Europe for its citizens.



© SubCoast

SubCoast aims at developing a GMES-service for monitoring and forecasting subsidence hazards in coastal lowland areas around Europe.

# SubCoast

A collaborative project aimed at developing a GMES-service for monitoring and forecasting subsidence hazards in costal areas around Europe



## LIST OF PARTNERS

- Natural Environment Research Council, United Kingdom
- Fugro NPA LTD, United Kingdom
- Hansje Brinker, Netherlands
- Tele-Rilevamento Europa, Italy
- Delft University of Technology, Netherlands
- The Geological Survey of Denmark and Greenland, Denmark
- Panstwowy Instytut Geologiczny, Poland
- Lietuvos Geologijos Tarnyba, Lithuania
- Consorci Institut de Geomàtica, Spain
- Stichting Deltares, Netherlands
- Alma Mater Studiorum – Universita di Bologna, Italy

## COORDINATOR

**Netherlands Organisation for Applied Scientific Research – TNO, Netherlands**

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## PROJECT INFORMATION

A collaborative project aimed at developing a GMES-service for monitoring and forecasting subsidence hazards in costal areas around Europe (SubCoast)  
Contract no: 242332  
Duration: 36 months  
EU Contribution: € 3.108.688  
Estimated total cost: € 4.084.013,20



# DORIS

## Ground Deformations Risk Scenarios: an Advanced Assessment Service

### TOWARDS A BETTER UNDERSTANDING OF LANDSLIDES AND SUBSIDENCE

Whilst taking on the detection, mapping, monitoring and forecasting of ground deformations in Europe, DORIS integrates Earth Observation technologies with ground based information in order to improve our understanding of phenomena that result in ground deformations.

DORIS is set to explore the application of remote sensing for a better understanding of landslides and subsidence, and of the damage these processes can cause to the European public. In this respect, DORIS:

- Exploits the unique ESA ERS-1/2 and ENVISAT C-band Synthetic Aperture Radar (SAR) archives, and evaluates new SAR sensors, including COSMO-SkyMed and TerraSAR-X, to provide long time-series of ground deformations.
- Moves forwards the combined application of satellite and ground-based DInSAR, coupled with GPS measurements and geophysical probing, for the long-term monitoring of ground deformations.



Laurenzo40 © Fotolia.com

**DORIS is an advanced European downstream service for the detection, mapping, monitoring and forecasting of ground deformations caused by landslides and land subsidence.**

- Uses high and very-high resolution optical images to identify and classify elements at risk, for the assessment of damage caused by ground deformations, and in the design of risk scenarios.
- Explores the use of thermal images for landslide susceptibility and hazard zonation.

DORIS is designed to deliver products to national and local civil defence authorities. Tested in six study areas in Hungary, Italy, Poland, Spain, and Switzerland, its successful application in these areas is set to guarantee that the service will work in Europe.

DORIS is a research and technological initiative of a consortium of leading research institutes, large and small enterprises, and public administrations with consolidated experience in the exploitation of EO technology for civil defence applications.



**FAUSTO GUZZETTI**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

DORIS intends to test an operational service to detect, map, monitor and forecast ground deformations caused by landslides and subsidence. For the purpose, DORIS exploits existing and innovative European satellite technology, in conjunction with ground based information.

#### Why is this project important for Europe?

Europe is a leader in the use of satellite technology to detect, map and monitor natural hazards, including landslides and subsidence. DORIS will secure this leadership, and will advance our understanding of natural and human induced phenomena with potential harmful consequences.

#### How does your work benefit European citizens?

In Europe, landslides and subsidence are frequent and widespread phenomena, induced by natural triggers and human causes. Improving our ability to detect, map, monitor and predict ground deformations will help reduce the damage they cause, and minimise harm to the population.

# DORIS

## Ground Deformations Risk Scenarios: an Advanced Assessment Service



### LIST OF PARTNERS

- University of Florence, Italy
- Italian Space Agency, Italy
- Dipartimento della Protezione Civile, Italy
- Tele-Rilevamento Europa, Italy
- ALTAMIRA Information, Spain
- Gamma Remote Sensing, Switzerland
- Institute of Geology and Mineralogy of Spain, Spain
- Booz & Company, Germany
- Eotvos Lorand Geophysical Institute of Hungary, Hungary
- Federal Office for the Environment, Switzerland
- Polish Geological Institute, National Research Institute, Poland
- Technologies for Earth Observation and Natural Hazards, Italy

### COORDINATOR

**National Research Council, Italy**

### CONTACT

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### PROJECT INFORMATION

Ground Deformations Risk Scenarios:  
an Advanced Assessment Service(DORIS)

Contract no: 242212

Duration: 36 months

EU Contribution: € 3.395.865,98

Estimated total cost: € 4.574.904,12



# GEO-PICTURES

GMES and EARTH Observation with Position-based Image and sensor Communications  
Technology for Universal Rescue, Emergency and Surveillance management

## SEEING EMERGENCIES FROM DIFFERENT ANGLES

Throughout the world, when emergencies strike, answering the questions “where” and “what” is paramount for any rescue operation to commence. The project GEO-PICTURES provides an innovative new approach to conveying such information quickly and accurately.

Be it flooding, earthquakes, landslides or forest fires, in all emergency situations there is a need to communicate from the field as quickly and accurately as possible what has happened and where. Quick and targeted rescue operations both save lives, and mitigate effects on the environment in the danger zone.

Europe’s GMES monitoring system for environment and security includes an emergency response service, which concentrates on rapid mapping during the response phase, providing large scale reference and assessment maps.

GEO-PICTURES complements this service by setting up an innovative system facilitating the addition of small scale images and videos from the field, tagged to the

large scale GMES emergency response maps at exact locations, identified by means of GPS satellite navigation technology. In this respect, GEO-PICTURES combines state of the art in satellite communication, navigation and Earth Observation.

By combining the global view of an emergency zone generated by satellite images for GMES emergency reference maps with in field observations and images, civil protection authorities would get a more comprehensive view of the state of play in a crisis area, which is valuable for rapid and efficient rescue purposes.

GEO-PICTURES services address a global audience, which further to EU civil protection authorities also includes United Nations services, governments, NGOs and environmental protection agencies in countries worldwide.



**HARALD SKINNEMOEN**  
IS PROJECT COORDINATOR

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

Pioneering an integrated satellite solution in line with UN policy, GEO-PICTURES helps the UN, EU Civil Protection and the Government of Amazonas save lives, environment and critical infrastructures through significantly improved availability of in-situ and space based emergency observations.

### Why is this project important for Europe?

GEO-PICTURES will bring Europe to the front of both integrated satellite solutions and support for emergency management. It will contribute significantly both to new operational procedures in disaster management and related space based technology.

### How does your work benefit European citizens?

GEO-PICTURES benefits Europe by improved civil protection and disaster management directly. It raises the quality and efficiency of European contributions to global disaster management, and defines a new, leading European position in integrated satellite and space solutions.



TIC © Fotolia.com

**GEO-PICTURES combines satellite communication, navigation and Earth Observation with a view to enhancing Emergency Response capabilities to save lives and mitigate environmental effects of emergencies.**

# GEO-PICTURES

GMES and EARTH Observation with Position-based Image and sensor Communications Technology for Universal Rescue, Emergency and Surveillance management



## LIST OF PARTNERS

- AnsuR Technologies, ART, Norway
- United Nations, UNOSAT-UNITAR UN
- Universitat Autònoma de Barcelona, UAB, Spain
- Kongsberg Satellite Services, KSAT, Norway
- Johanniter-Unfall-Hilfe, JUH, Germany
- State University of Amazonas, UEA, Brazil
- Secretary of Science and Technology of the State of Amazonas, SECT, Brazil
- Disaster Management Advice & Training, DMAT Consulting e.U., Austria
- Associação Brasileira De Telecomunicações, TELECOM, Brazil

## COORDINATOR

**AnsuR Technologies, Norway**

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## PROJECT INFORMATION

GMES and EARTH Observation with Position-based Image and sensor Communications Technology for Universal Rescue, Emergency and Surveillance management (GEO-PICTURES)

Contract no: 242390

Starting date: 01/03/2010

Duration: 24 months

EU Contribution: € 2.385.871

Estimated total cost: € 3.172.081



# EVOSS

## European Volcano Observatory Space Services

### KEEPING AN EYE ON THE WORLD'S VOLCANOES

Major volcanic eruptions have a place in history. In approximately 1600 BC the eruption of Thera – present Santorini – put an end to the Minoan civilization; Mount Vesuvius destroyed Pompei in 79 AD; 30,000 people perished in the 1902 eruption of Mount Pelée, Martinique.

EVOSS is a GMES service for the monitoring of major volcanic hazards throughout the EU – including its overseas territories – and the Caribbean and Africa.

Here, more than 50 volcanoes have erupted in the last four centuries, and over one-hundred in historical time. However, the ground-based monitoring infrastructure varies from state-of-the-art volcano observatories to very limited or non-existent capacity.

The goal of EVOSS is to implement space-borne support to volcano observation, in order to enhance the speed and quality of responses to major volcanic crises and offer backup monitoring capacity.

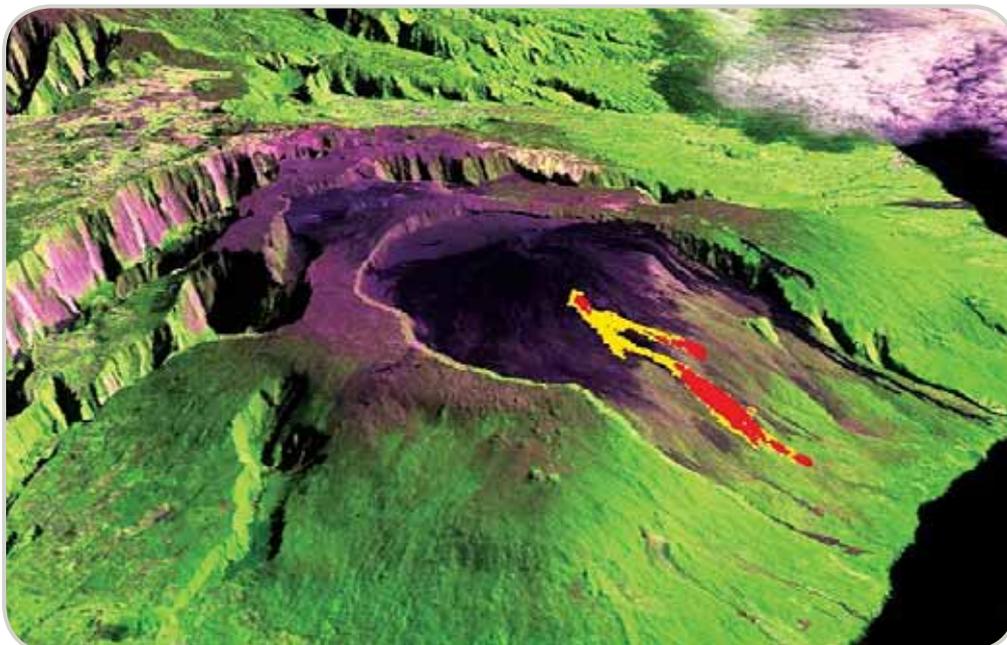
EVOSS is centered on the development of advanced data processing techniques that monitor ash, gas, ground deformation and temperature, and to provide substantial help in scenario building and emergency decision making.

The project is designed to act from situations of sustained volcanic unrest, to situations when volcanoes erupt and space-borne observation may take over from ground based observatories that may need to be evacuated.

EVOSS end-users are scientific organisations responsible for advising political authorities during volcanic crises – typically volcano observatories where they exist. Information transfer from the EVOSS team to the users will take place by ICT, whilst knowledge transfer will take place by training and dedicated workshops.



STEVEN TAIT  
IS PROJECT COORDINATOR



Instantaneous geometric and thermal properties of a lava flow at Piton de la Fournaise (Réunion Island), constrained by Infrared, space-borne observation © EVOSS

**EVOSS uses satellites to support observatories that monitor volcanoes territory in Europe, Africa and the Caribbean.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

The goal of EVOSS is to exploit space-based observations as a complement to ground-based volcano-monitoring capacity and an aid to emergency decision making. We aim at demonstrating the efficiency of this approach, especially in countries with limited scientific infrastructure.

#### Why is this project important for Europe?

Europe - including overseas territories - and neighbouring Africa host dangerous volcanoes. Costs prohibit modern observatories for all, and eruptions can destroy terrestrial networks. Space-based monitoring can reinforce capacity when needed and act at supra-national scales.

#### How does your work benefit European citizens?

EU territory stretches from continental Europe to the Atlantic, Indian, southern Pacific Oceans and the Caribbean. Major volcanic crises can evolve from local to international scale: EU citizens' safety will benefit from near-realtime support to volcano emergency management worldwide.

# EVOSS

European Volcano Observatory Space Services



## LIST OF PARTNERS

- Belgisch Instituut voor Ruimte-Aëronomie, Belgium
- Booz & Company, Italy
- Natural Environment Research Council – British Geological Survey, United Kingdom
- Carlo Gavazzi Space, Italy
- Deutsches Zentrum für Luft- und Raumfahrt, Germany
- Koninklijk Nederlands Meteorologisch Instituut, Netherlands
- IES Consulting, Italy
- Science [&] Technology, Netherlands
- Tele-Rilevamento Europa s.r.l., Italy
- Terrasphere, Netherlands
- Université Libre de Bruxelles, Belgium
- Centro Ricerche Progetto San Marco, Italy

## COORDINATOR

**Institute de Physique du Globe de Paris, France**

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## PROJECT INFORMATION

European Volcano Observatory Space Services (EVOSS)  
Contract no: 242535  
Starting date: 01/03/2010  
Duration: 36 months  
EU Contribution: € 2.864.869,05  
Estimated total cost: € 4.224.074,80



# EAMNet

## Europe Africa Marine Network

### MONITORING THE COASTS OF AFRICA

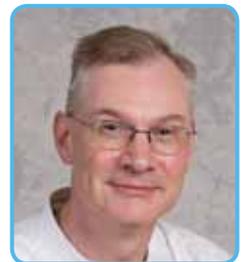
The African Union (AU) and the European Union have developed an ambitious agenda to extend benefits of Europe's GMES monitoring system for environment and security to Africa. EAMNet takes on this challenge in the area of coastal and oceanic monitoring.

Whilst Africa is the continent that has contributed least to climate change, it suffers significantly from global warming. By monitoring the environment and creating a foundation for improved evidence-based policy making, GMES helps in dealing with the effects of climate change. Therefore, its extension to Africa is of paramount importance and this is why it is a key element in the political cooperation expressed forcefully in the 2007 AU-EU declaration on GMES for Africa.

EAMNet aims at constructing a network linking providers of Earth Observation (EO) data based in Cape Town, South Africa and Plymouth, UK, research centres of ex-

cellence in Zanzibar, Tanzania and Lisbon, Portugal, and regional and national users of such information from Europe and Africa in the coastal and oceanic domain.

To achieve this EAMNet will undertake capacity building, including developing a specific EO module within the courses of three African universities and helping maintain existing infrastructure and building expertise in Africa. This will involve targeted exchanges of personnel and open fellowships for wider Europe-Africa interaction. Improvement of the dissemination and exploitation of EO data in Africa supports the development of an Africa-wide ocean observation system (GOOS-Africa). EAMNet is intended to create an interface between European GMES services, African initiatives such as AMESD, thereby strengthening the AU-EU GMES-Africa initiative.



**STEVE GROOM**  
IS PROJECT COORDINATOR



Val Byfield, NERC, UK helping students at the JRC Ocean Colour Course, (Zanzibar, Tanzania, 12-23 October 2009) process Earth Observation data for their mini-projects. © EAMNet

**EAMNet seeks to create an EU-Africa Marine Earth Observation Network, in support of an Africa-wide Earth Observation system.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

EAMNet aims to improve the interaction between EO scientists in Africa and Europe, both within the project and the wider community, to engage with national monitoring agencies and to leave a legacy of infrastructure, cooperation and training.

#### Why is this project important for Europe?

Africa and Europe share seas and oceans, so improved monitoring and understanding of the African marine environment will benefit both. EAMNet will provide a platform to highlight European GMES activities to an African audience and African EO activities to a European audience.

#### How does your work benefit European citizens?

EO data are widely used to initialise or update environmental models. Extending GMES to Africa should improve the interpretation and validation of regional EO data and this could lead to improved model based forecasts (e.g. of sea state) that are needed by European citizens.

# EAMNet

Europe Africa Marine Network



## LIST OF PARTNERS

- University of Cape Town, South Africa
- IMAR- Instituto do Mar, Portugal
- Danmarks Meteorologiske Institut, Denmark
- The European Organisation for the Exploitation of Meteorological Satellites, Germany
- Natural Environment Research Council, United Kingdom
- University Of Dar Es Salaam, Tanzania (United Republic Of)
- University of Ghana, Ghana
- Meteo-France, France
- National Institute of Oceanography and Fisheries, Egypt

## COORDINATOR

**Plymouth Marine Laboratory, United Kingdom**

## CONTACT

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## PROJECT INFORMATION

Europe Africa Marine Network (EAMNet)

Contract no: 242379

Starting date: 01/03/2010

Duration: 36 months

EU Contribution: € 997.067

Estimated total cost: € 1.360.799



# GARNET-E

## GMES and Africa: Regional Network for information Exchange and Training in Emergencies

### TOWARDS BETTER EMERGENCY RESPONSE IN AFRICA

At the highest level, the overarching objective of GARNET-E is to contribute to the partial re-alignment of the "GMES Emergency Response in Africa" agenda, from technical activities focused purely on risk and poverty reduction and response using European capacities, to those more directed to building sustainable local capacities, leading to real wealth creation in Africa.

This will be achieved through the two sub-objectives; firstly, to enable the integration of African requirements in the definition of future operation of the GMES Emergency Response Service in Africa; and secondly, to encourage the strengthening and building of regional and local capabilities, in order to allow African users and policy makers to access Earth Observation-derived information provided by the Emergency Response Service.

Moreover, the project also aims at enhancing information exchange, mainly through training exercises, on the operation of GMES Emergency Response and the International Charter Space and Major Disasters; as well as to improve the quality and efficacy of the GMES Emergency Response Service itself, through consideration of requirements gathering exercises and the ingestion of in situ data.

GARNET-E is fundamentally about engagement of people and organisations in a development process. Ultimately, the success of the project will be measured by the likelihood of any future implementation of the GMES Emergency Response Service in Africa.



**NICK VECK**  
IS PROJECT COORDINATOR



Chris Jensen © Fotolia.com

**GARNET-E seeks to develop a network of EU, African organisations and African users, in order to build economic, technical and commercial capacity within African states in support of enhanced emergency response capabilities in Africa.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

The concept of GARNET-E is to construct "needs-driven" activities. These activities must be an inherent and coherent part of a joint strategy with other GMES and Africa initiatives. They should not be just "for", but "with" Africa and with due respect for African ownership.

#### Why is this project important for Europe?

Europe has an overarching ambition to work on the world stage with Africa, addressing major issues such as climate change. This whole-Europe approach is absolutely necessary to achieve this goal. As a consequence, GARNET-E is fundamentally appropriate at the European level.

#### How does your work benefit European citizens?

The network will develop specific activities to develop awareness of the GMES and Africa emergency component. Such communication activities will target both the European public, and to some extent the African public, mainly by use of the project website.

# GARNET-E

GMES and Africa: Regional Network for information Exchange and Training in Emergencies



## LIST OF PARTNERS

- African Association of Remote Sensing of the Environment, South Africa
- Arsenale Novissimo SARL, France
- Centre Royal de Teledetection Spatiale, Morocco
- Council For Scientific and Industrial Research, South Africa
- DMC International Imaging Limited, United Kingdom
- Edisoft-Empresa de Servicios e Desenvolvimento de Software SA, Portugal
- EIS-AFRICA, A Network for the Co-Operative Management of Environmental Information, South Africa
- Geosas Consulting Service PLC, Ethiopia
- Stichting International Institute for Geo-Information Science and Earth Observation, Netherlands
- Keyobs S.A., Belgium
- The National Land Survey of Sweden, Sweden
- Paris-Lodron-Universität Salzburg, Austria
- Regional Centre for Mapping of Resources for Development, Kenya
- Regional Centre for Training in Aerial Surveys, Nigeria
- Ministerio de Administracao Interna, Cape Verde
- Vlaamse Instelling voor Technologisch Onderzoek N.V., Belgium

## COORDINATOR

**Infoterra Limited, United Kingdom**

## CONTACT

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## PROJECT INFORMATION

GMES for Africa: Regional Network for Information Exchange and Training in Emergencies (GARNET-E)

Contract no: 242385

Duration: 24 months

EU Contribution: € 999.470

Estimated total cost: € 1.333.347,40



# SAGA-EO

## Support Action to GMES-Africa on Earth Observation

### BUILDING GMES IN AFRICA

It is time to strengthen the foundation for GMES in Africa. By means of a comprehensive feasibility study, the project SAGA-EO takes on the drafting of one dimension of a possible future framework for African GMES.

Whilst each African nation has a primary interest in the security of its own citizens and the state of its environment, continent wide cooperation is needed to successfully implement the ambitious goals of the EU-AU Lisbon declaration on GMES for Africa.

However, implementing GMES capabilities in Africa, drawing the maximum benefit from European experience, there is a need to improve the capacity to use information based on Earth Observation (EO) data. The main finding driving the concept is that no project tackles the EO field as a global approach. The way to implement this EO capacity building challenge is to set-up dedicated EO networks of users belonging to the same African country and to link them with

existing initiatives in Africa and Europe. In SAGA-EO, the African national EO user network in each country will constitute the ground from where to build the thematic networks developed at continental, regional or national scales.

The main purpose and objectives of SAGA-EO is to study this organisational model and its associated technology, and to prove that the concept is viable in five African countries.

The strategic guidance of the GMES Africa Coordination Team will provide the global project orientations according to the GMES Africa action plan findings. Deploying GMES services to Africa is an immense task, yet its potential is equally enormous, and SAGA-EO is committed to contributing to bring about a solid foundation for GMES in Africa.



**JEAN-GUY PLANÈS**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

We want to prepare the African policy makers and thematic communities at national level, to receive, to share and to better use Earth Observation data and associated technology and expertise for the management of a wide range of thematic applications.

#### Why is this project important for Europe?

In the frame of the EC international cooperation programme, one of the objectives of the project consists in preparing the docking of the GMES services and the European centres of excellence to the African thematic communities in order to exchange not only data but also know how and expertise.

#### How does your work benefit European citizens?

In preparing GMES Africa, SAGA-EO will help Africa manage its environment. Particularly the African rain forest is one the largest carbon sink on the planet. So, preserving this forest is mandatory to limit the impacts of climate change.



titimed35 © Fotolia.com

**SAGA-EO facilitates the establishment of national Earth Observation networks in Africa with a view to supporting the joint EU-AU Strategic action plan.**

# SAGA-EO

Support Action to GMES-Africa on Earth Observation



## LIST OF PARTNERS

- Thales Alenia Space France, France
- Geosat Technology SARL, France
- GAF AG, Germany
- AGENCE NATIONALE DE LA METEOROLOGIE DU SENEGAL, Senegal
- Bureau National d'Etudes Techniques et de Développement / Centre de Cartographie et de Télédétection, Cote d'Ivoire
- INAM (National Institute of Meteorology), Mozambique
- Ghana Meteorological Agency, Ghana
- Agence Nationale de l'Aviation Civile, Republique du Congo
- Comafrique, Ivory Coast

## COORDINATOR

**Thales Alenia Space France , France**

## CONTACT

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## PROJECT INFORMATION

Support Action to GMES-Africa on Earth Observation  
(SAGA-EO)

Contract no: 242190

Duration: 24 months

EU Contribution: € 853.333

Estimated total cost: € 923.092,80



# Phys4Entry

## Planetary Entry Integrated Models

### PREPARE FOR LANDING ON PLANETS

One of the major technological challenges associated with the access to planetary surfaces is the entry of the space vehicle in the planetary atmospheres at superorbital speeds. The problem is the very large heat released to the vehicle surface by the surrounding gas, either as convective heating or as radiation.

Optimization of the thermal shield design can have a profound impact on the mass and volume of a vehicle, and consequently on its energy and cost budgets. Today, a poor knowledge of the physics of hypersonic entry is the limiting factor. Uncertainties increase with the entry speed, in particular as radiation becomes a considerable contribution to the overall heat load.

Phys4Entry's main goal is a thorough analysis of the physics behind space vehicle entry into planetary atmospheres and an improvement of crucial elements of the modelling that allows reliable predictions of flight conditions.

Therefore this study is concerned with the development of advanced chemico-physical and plasma models of hypersonic entry flows. Advanced models mean the description of the non-equilibrium chemical kinetics of the high temperature medium on the basis of a state-to-state approach.

This approach, in turn, calls for a microscopic description of the elementary processes that play a role in the high temperature reactive gas mixtures surrounding space vehicles during the entry phase.

The predictive capabilities of theoretical models will be assessed against well-defined experimental measurements, and their impact on the overall heat flux to the surface will be estimated by Computational Fluid Dynamics simulations of realistic ground and flight tests.



**MARIO CAPITELLI**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

To draw the attention of the scientific community on the issues of aerospace modelling, build up advanced chemical and plasma models addressing those issues, and create a European network of expertise in hypersonics. In summary, to bring Europe on the frontier of aerospace research.

#### Why is this project important for Europe?

It will establish the leadership of European research in aerospace that is the key to both actual and perceived success in future aerospace missions and industrial development.

#### How does your work benefit European citizens?

History shows that promoting aerospace research and industry inevitably drives medium- and long-term technological advances also in fields far from aerospace applications.



Sarah J Duckfield © Fotolia.com

**Phys4Entry provides physically sound models of atmospheric hypersonic entries.**

# Phys4Entry

## Planetary Entry Integrated Models



### LIST OF PARTNERS

- University College London, United Kingdom
- Centro Italiano Ricerche Aerospaziali Scpa, Italy
- Ingénierie et Systèmes Avancés, France
- Università degli studi di Perugia, Italy
- Centre National de la Recherche Scientifique, France
- Universitat de Barcelona, Spain
- A. Ishlinsky Institute for Problems in Mechanics - Russian Academy of Sciences, Russian Federation
- Von Karman Institute for Fluid Dynamics, Belgium
- Consiglio Nazionale delle Ricerche, Italy
- Politecnico di Torino, Italy
- Software Engineering Research & Practices Srl, Italy
- Poznan University of Technology, Poland

### COORDINATOR

Università degli studi di Bari, Italy

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### PROJECT INFORMATION

Planetary Entry Integrated Models (Phys4Entry)

Contract no: 242311

Duration: 48 months

EU Contribution: € 1.961.533

Estimated total cost: € 2.791.134,27



# PRoViScout

## Planetary Robotics Vision Scout

### GIVING ROBOTIC ROVERS A SIGHT OF THEIR OWN

For more than two millenia, Mars has made Europeans dream. Ancient Greek astronomers looked at it, H.G. Wells wrote about it, and today some of Europe's best scientists prepare to explore the Red Planet further with robotic vehicles. The project PRoViScout develops new building blocks for future robotic exploration of the planets.

Is life unique on Earth? The search for traces of life – past or present – is at the centre of Europe's ongoing planetary exploration programme. In the near future, robots with life science sensors will explore the surface of Mars and drill below its surface to look for signs of life, supported by recent data from Europe's Mars Express mission.

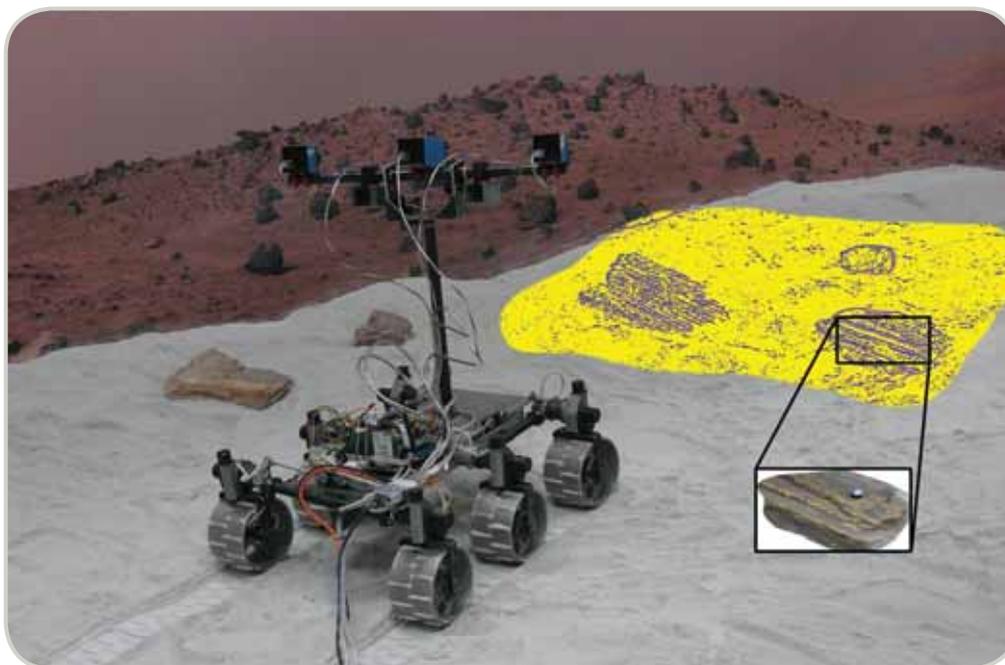
Yet mobility at the surface of another planet is no small challenge. Mars is a harsh and cold environment, and transmission time between Mars and Earth currently

stands at some 15 minutes. So real-time remote control is impractical, making overall scientific progress slow.

PRoViScout addresses this challenge. The project will demonstrate a novel, autonomous exploration system. In order to make robotic rovers more independent and efficient, instead of waiting for instructions from Earth, PRoViScout will implement a vision-based identification and planning system on board of rovers. Thereby the rovers will be able to independently identify objects of interest and interpret their relevance against various mission goals. Rovers will "see" important scientific or navigation features in the terrain and task themselves to gather more detailed data about previously unseen targets, whilst carefully prioritising and allocating their limited resources, and keeping track of possible hazards.



**GERHARD PAAR**  
IS PROJECT COORDINATOR



Using advanced 3D and image understanding algorithms, PRoViScout will enable rovers to interpret the surrounding terrain and, if appropriate, gather additional data such as a high resolution image data without intervention from the ground. © SciSys Ltd. & Aberystwyth University

**PRoViScout supports the development of more autonomous space vehicles. Vision based sample identification enables such rovers to act more independently, which is needed for more efficient mission outcomes.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

Our objective is to increase the amount of quality science data that remote planetary rovers can deliver on behalf of Earth based science teams. We will do this by prototyping intelligent technologies, which increase their autonomy and therefore exploration efficiency.

#### Why is this project important for Europe?

Mars exploration promotes the European competencies in the exploration of difficult and hazardous terrain on Earth, using autonomous robotic platforms. For space science itself, the project helps save resources of future European missions by maximizing their science return.

#### How does your work benefit European citizens?

It will effectively increase the amount of data returned per euro spent on European space missions thereby ensuring good value for European taxpayers. The development of the core robotic technologies will help secure European jobs in this emerging market.

# PRoViScout

Planetary Robotics Vision Scout



## LIST OF PARTNERS

- SCISYS UK LTD, United Kingdom
- Deutsches Zentrum Fuer Luft - Und Raumfahrt EV, Germany
- Aberystwyth University, United Kingdom
- Ceske Vysoke Uceni Technicke v Praze, Czech Republic
- Gmv Aerospace and Defence SA, Spain
- University of Leicester, United Kingdom
- Csem Centre Suisse D'electronique et de Microtechnique SA - Recherche et Developpement, Switzerland
- TRASYS S.A., Belgium
- University College London, United Kingdom
- University of Strathclyde, United Kingdom

## COORDINATOR

**Joanneum Research Forschungsgesellschaft MBH,  
Austria**

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## PROJECT INFORMATION

Planetary Robotics Vision Scout (ProViScout)  
Contract no: 241523  
Starting date: 01/04/2010  
Duration: 30 months  
EU Contribution: € 1.914.224  
Estimated total cost: € 2.698.479



# RASTAS SPEAR

## Radiation-Shapes Thermal protection investigations for high-Speed Earth Re-entry

### PREPARING FOR SAFE EARTH RETURN

A safe return is the ultimate goal of any space exploration mission. Therefore mastering Earth re-entry technologies is essential. The project RASTAS SPEAR undertakes an analysis of the impact of capsule design for successfully returning to Earth through the atmosphere.

Future European space exploration missions to other planets such as Mars are foreseen to return samples of rocks and dust to Earth. Studying objects on Earth that are collected on other planets has a huge potential to push science further, since this would allow for state-of-the-art laboratories in Europe to examine Martian soil at first hand. However, for such science to be carried out, technologies enabling the safe return of such objects, travelling at high speed through Earth's atmosphere need to be developed.

RASTAS SPEAR undertakes a comprehensive analysis of the crucial "bricks" that are essential to master when designing a capsule that is able to travel through Earth's atmosphere at speeds reaching 10 km per second, or 36.000 km/h.



Atmospheric Re-entry Demonstrator - artist's impression. D. Ducros © ESA

**RASTAS SPEAR undertakes an analysis of the key technological elements that are essential for successful Earth re-entry of a capsule loaded with research samples from other planets.**

In this respect, the project seeks to investigate how to best improve ground facilities supporting a capsule during re-Entry, developing technologies to improve its Thermal Protection System (TPS), and developing energy-absorbing systems that better protect the capsule's payload, or cargo with samples from other worlds.

RASTAS SPEAR is set to analyse the impact on flight mechanics of changes in the shape of a capsule as it travels through the atmosphere, and investigate the impact of surface roughness of the heat transfer between the flow field and the capsule heat shield.

The project therefore addresses several of the critical technologies required for successful re-entry, enabling a significant step forward beyond the state-of-the-art in this field.



**HÉLÈNE REQUISTON-COSTANTINI**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

Mars sample return is the mandatory step before sending humans to the Moon or to Mars. This project will represent a significant step beyond the state-of-the-art of the Earth re-entry capsule.

#### Why is this project important for Europe?

An important step for exploration is to develop advanced transportation systems enabling the return of cargo and humans back to earth. Improving this technology allows Europe to be a valuable partner within the international cooperation.

#### How does your work benefit European citizens?

Robotic and human expansion in the solar system is part of our dreams, especially when samples from space can be brought back to earth for further analysis and exchanged between scientists and engineers across the world.

# RASTAS SPEAR

Radiation-Shapes Thermal protection investigations for high-Speed Earth Re-entry



## LIST OF PARTNERS

- Centro Italiano Ricerche Aerospaziali, Italy
- CFS Engineering, Switzerland
- NCSR DEMOKRITOS, Greece
- Laboratory of Ecole Centrale, France
- Institute of Aviation, Poland
- Kybertec, Czech Republic
- Lomonosov Moscow State University, Russian Federation
- ONERA, France
- Von Karman Institute, Belgium

## COORDINATOR

**Astrium SAS, France**

## CONTACT

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## PROJECT INFORMATION

Radiation-Shapes Thermal protection investigations for high-Speed Earth Re-entry (RASTAS SPEAR)

Contract no: 241992

Duration: 26 months

EU Contribution: € 1.626.587

Estimated total cost: € 2.362.804



# THESEUS

## Towards Human Exploration of Space: a European Strategy

### SETTING THE STAGE FOR HUMAN SPACE EXPLORATION

Space is full of endless possibilities; 40 years of human space flight has shown that humans can survive and work in space.

However, despite existing ESA or NASA studies or roadmaps, today Europe has no scientific and industrial roadmap for human space exploration. The THESEUS objective is to develop an integrated life sciences research roadmap enabling European human space exploration in synergy with ESA, taking advantage of the European expertise and identifying the potential of non space applications, dual research and development.

The project will both identify disciplinary research priorities and focus on fields with high terrestrial application potential, whilst also building a European network as the core of such a strategy.

The objective will be achieved by setting-up and coordinating 15 groups of European and international experts, ensuring that complementary expertises are gathered and that experts coming from non European countries, and from the industrial sectors are included. They will be asked to develop their activities and recommendations based on the scenario proposed by the ESA Space Exploration Architecture – i.e. human presence in Low Earth Orbit, a return to the Moon and human exploration of Mars.

THESEUS' work plan is structured to develop a survey of the state of the art, an improved focus on the relevance of the research for current and upcoming health challenges on Earth and potential bio-medical applications, a detailed set of disciplinary priorities and an integrated roadmap providing strategic orientations for research.



**JEAN-CLAUDE WORMS**  
IS PROJECT COORDINATOR



Kim Warden © Fotolia.com

**THESEUS aims at establishing a life sciences research roadmap for European human space exploration, and to identify how this can benefit people on Earth.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

To make Europe a mandatory partner of an international human space exploration programme by identifying related life sciences research priorities and build a European network as the core of this strategy, relying on ESA programmes and supported through the EC Framework Programme.

#### Why is this project important for Europe?

Exploration of space (Mars, Moon, etc) remains one of the most stimulating and exciting areas of scientific research and technological development. Yet, Europe has no roadmap approved by the European scientific and industrial communities to support its ambitions in this context.

#### How does your work benefit European citizens?

By answering challenges in human health prevention, diagnosis and care, THESEUS will also outline the relevance for terrestrial health challenges and biomedical applications, and ensure dissemination of knowledge in both space research and Earth-based applications to the public.

# THESEUS

Towards Human Exploration of Space: a European Strategy



## LIST OF PARTNERS

- Centre National de la Recherche Scientifique, France
- Deutsches Zentrum für Luft- und Raumfahrt, Germany
- Institut de Médecine et de Physiologie Spatiales, France
- Studiecentrum voor Kernenergie, Belgium
- University of Sheffield, United Kingdom

## COORDINATOR

**European Science Foundation, France**

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## PROJECT INFORMATION

Towards Human Exploration of Space: a European Strategy (THESEUS)

Contract no: 242482

Starting date: 01/01/2009

Duration: 24 months

EU Contribution: € 806.069

Estimated total cost: € 944.109,67



# COMETS

CONVERTERS broadband low power high performance for Telecommunications in Space

## MAKING EUROPE A WORLD LEADER IN DIGITAL SATELLITE TECHNOLOGY

Satellites are essential in today's world, and enhancing their performance is paramount for technological development. The project COMETS leads the way, supporting the development in Europe of a technology for the future.

Telecommunications payloads, which will use more and more digital processing to make best use of scarce spectrum and to offer the top operational flexibility to operators will benefit from High Speed, Broadband Analogue to Digital Converters (ADC), in various ways:

- Allowing removal of Radio Frequency (RF) down-conversion stages, resulting in significant mass reduction and cost savings.
- Allowing frequency plan optimization thanks to the flexibility of digital processing.
- Opening opportunities in existing markets such as cellular communications, broadband multimedia, and in new markets demanding higher dynamic range (e.g. High Definition TV in moving vehicles).

- Ensuring future-proof compatibility in digital output interconnectivity when digital processing component speeds and capacities increase.

Today such converters are not available for production in Europe, hampering further developments of the European space industry, which currently holds worldwide leadership in the area of commercial satellites.

Therefore the COMETS project responds to the demand for a high performance ADC conversion capacity, as it undertakes the development of such converters in Europe.

In doing so, the project aims at enhancing the performance of ADCs, pushing technological barriers further by turning current state-of-the-art 10-bit converters into 12-bit converters. Such an improvement will enhance the data rate ability of satellite signals, moving Europe from technological dependency into world leadership in this field of critical space technologies.



**VÉRONIQUE ROZAN**  
IS PROJECT COORDINATOR

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

We want to offer the space industry the Broadband ADCs needed for digital telecom satellites. Our goal is to make available space qualified 10b/1.5GSps ADCs, and move the State-of-the-art to 12bit, offering higher dynamic performance at low power in addition to radiation tolerance.

### Why is this project important for Europe?

The COMETS project is important for the European space industry to remain competitive in broadband satellite telecommunications. Also, the results of the activity will allow Europe to keep control on the supply chain of strategic ADCs, to ensure the production independence of Europe.

### How does your work benefit European citizens?

COMETS will benefit European citizens as it will allow for new services in the communications and TV domains. Moreover, project outcomes benefit the competitiveness of the European Space Industry, whereby the project helps keeping jobs in Europe.



V. Yakobchuk © Fotolia.com

**COMETS aims for European strategic non-dependence in future space based telecommunications by supporting the development of Analogue to Digital (ADC) converters that are required by the European space industry to stay competitive.**

# COMETS

COntverters broadband low power high performancE for  
Telecommunications in Space



## LIST OF PARTNERS

- E2V Semiconductors SAS, France
- Infineon Technologies AG, Germany
- Thales Alenia Space France, France
- Astrium Limited, United Kingdom
- Centre National d'Études Spatiales - Cnes, France
- Centre National de la Recherche Scientifique, France

## COORDINATOR

**E2V Semiconductors SAS, France**

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## PROJECT INFORMATION

COntverters broadband low power high performancE  
for Telecommunications in Space (COMETS)

Contract no: 242521

Duration: 36 months

EU Contribution: € 1.994.943,70

Estimated total cost: € 3.533.118,40



# MIDAS

## Millimetre-wave Integrated Diode and Amplifier Sources

### HARVESTING THE FULL POTENTIAL OF RADIO WAVES

Invisible to the human eye, yet essential to all modern day communication, radio waves are all around us. However, Europe's ability to exploit very high radio frequencies is limited by technological constraints above 100 GHz. The project MIDAS addresses this shortfall.

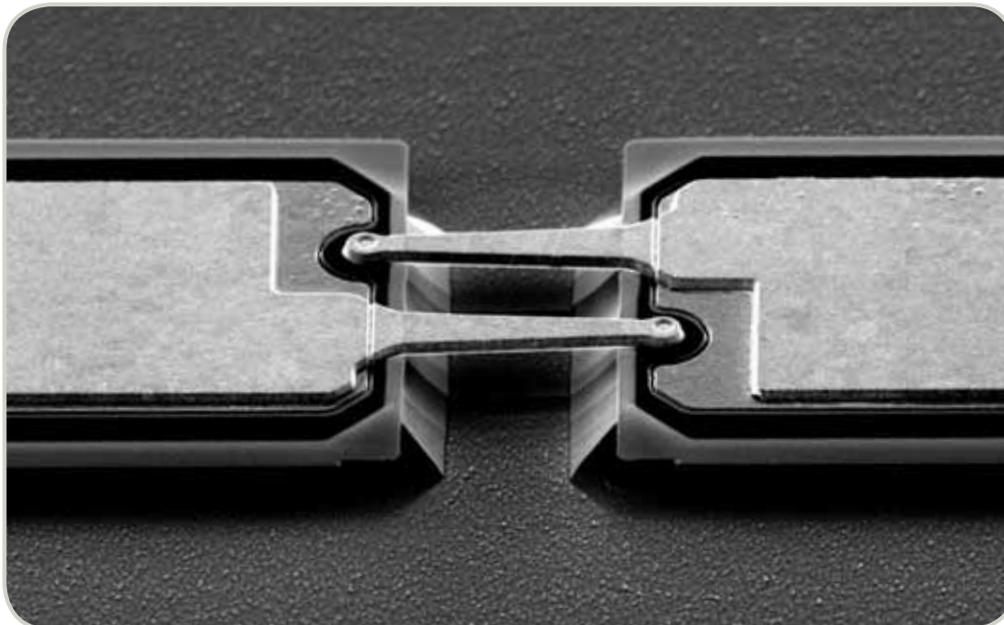
Recognised to be of key scientific and commercial importance, exploitation of the upper Extremely High Frequency (EHF) spectrum (between 100 GHz and 1000 GHz) is paramount for further development of state-of-the-art satellites. In the field of commercial telecommunications or Earth observation, the upper EHF spectrum heralds increased satellite precision as regards measurements and data transmission capability. Therefore, Europe needs to develop its own technical capabilities to use this part of

the spectrum, since its scientific and commercial exploitation constitute the seeds for subsequent harvesting of key scientific and technological potential generated within this frequency band.

The MIDAS project undertakes the development of a demonstrator source delivering enough power at 300 GHz for having direct commercial applications. In doing so, the project intends to build upon European amplifier technology when developing critical Schottky varactor diodes that may enable planned sub-millimetre wave space science and Earth observation instrumentation. These diodes are critical components in generating power above 100 GHz where the available power from other amplified sources significantly reduces.



**BYRON ALDERMAN**  
IS PROJECT COORDINATOR



Air-bridged Schottky diode fabricated at STFC - Rutherford Appleton Laboratory.  
The bridge length is 16 microns. © STFC - Rutherford Appleton Laboratory

**MIDAS enhances Europe's ability to exploit the sub-millimetre region of the electro-magnetic spectrum for the fabrication of a terahertz source, thereby addressing one of the most significant technological imbalances existing between the EU and third countries.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

This project will significantly enhance our ability design and fabricate high frequency circuits, enabling new applications to be realised. Europe will also become non-dependent on the US in this critical area of THz power generation.

#### Why is this project important for Europe?

This project will help Europe become more competitive in a range of emerging applications that require increasing levels of power in the THz region. The results of this project will be applied to applications in Earth observation and climate monitoring.

#### How does your work benefit European citizens?

The technology being developed in MIDAS will not only impact future Space applications but will also play a role in Security Imaging and high-speed communications.

# MIDAS

Millimetre-wave Integrated Diode and Amplifier Sources



## LIST OF PARTNERS

- Science and Technology Facilities Council, United Kingdom
- Observatoire de Paris, France
- RPG Radiometer Physics GMBH, Germany
- Universidad Politecnica de Madrid, Spain

## COORDINATOR

**Science and Technology Facilities Council,  
United Kingdom**

## CONTACT

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## PROJECT INFORMATION

Millimetre-wave Integrated Diode and Amplifier  
Sources (MIDAS)  
Contract no: 242334  
Duration: 36 months  
EU Contribution: € 940.000  
Estimated total cost: € 1.299.712,61



# EuSiC

## High Quality European GaN-Wafer on Sic Substrates for Space Applications

### TOWARDS HOME GROWN HIGH POWER SPACE ELECTRONICS IN EUROPE

The European Commission, the European Space Agency (ESA) and the European Defence Agency (EDA) join forces to develop critical space technologies in Europe. The project EuSiC enhances European non-dependence on Gallium Nitride (GaN) based space technologies.

Europe holds world leadership in the area of commercial communication satellites. However, sustaining this position largely depends on access to GaN space technology, which has emerged as the technology of choice for the next generation of high power electronics. Given its superior performance in harsh space environments subject to radiation, GaN technology is essential for electronic chips to function in satellites.

Yet today European access to GaN technology is limited by the absence of an industrial capacity of sufficient quality to undertake production of semi-insulating SiC-substrates. Because of its outstanding material properties, SiC-based electronics and devices can work in very hostile environments, where operation of conventional electronics is not possible. Silicon carbide's ability to

work under high temperature, high power and high radiation conditions enables large enhancements of device-performance in a wide variety of applications. These substrates currently constitute a missing link in the GaN supply chain.

Therefore EuSiC undertakes their development. The intention of this project is to establish a purely European supply chain for GaN technology by development of a high-quality 3 inch semi-insulating SiC substrate. Upon completion of this task, EuSiC also undertakes a profound analysis and evaluation of these substrates by a group of specialists.

This project complements GaN support activities carried out by the European Commission in earlier space research projects such as AGAPAC, and initiatives supported by ESA through the GaN Reliability Enhancement and Technology Transfer Initiative (GREAT2).



**SABINE STORM**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

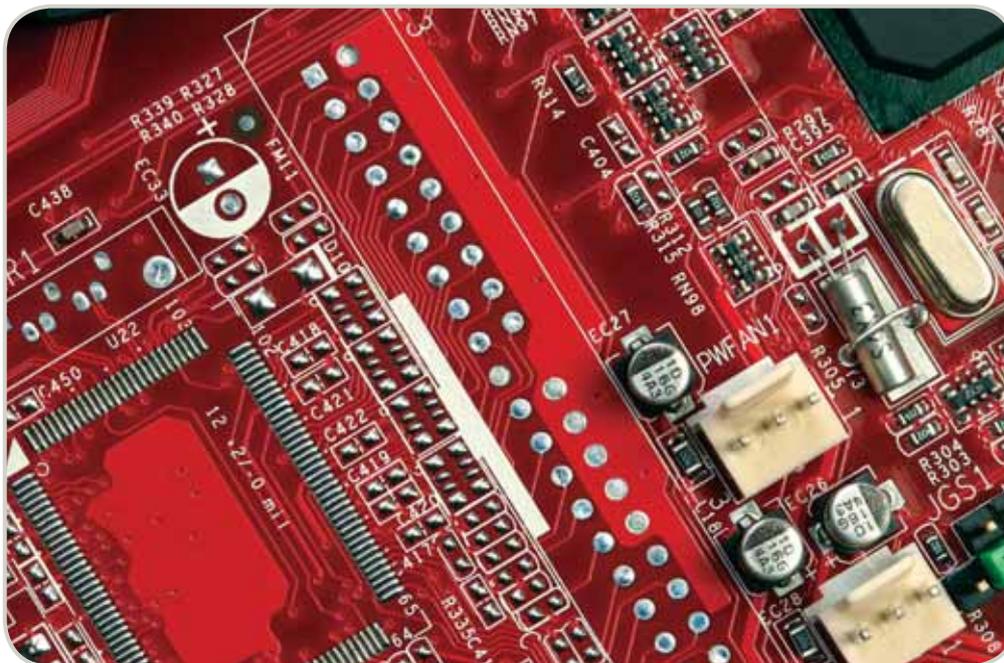
Within EuSiC we endeavour to develop a high-quality semi-insulating 3" SiC-substrate. The project brings together all parts of the supply chain, namely substrate manufacturer, epitaxial houses and a MMIC foundry.

#### Why is this project important for Europe?

EuSiC will significantly reduce the dependence on critical technologies and capabilities from outside Europe for future space applications. The collaborative character of EuSiC will accelerate the development, which will enable the manufacturing of excellent GaN-based devices.

#### How does your work benefit European citizens?

The chain for manufacturing IC's with the use of GaN on SiC material will trigger innovation in European industry in the area of communication and sensor systems. EuSiC will boost competitiveness European level.



Gutierrez Barrow © Fotolia.com

**EuSiC aims at establishing an independent European supply chain for Gallium Nitride (GaN) space technologies, thereby significantly reducing EU dependency on imports from third countries.**

# EuSiC

High Quality European GaN-Wafer on SiC Substrates for Space Applications



## LIST OF PARTNERS

- SiCrystal AG, Germany
- ALCATEL THALES III V LAB, France
- Fraunhofergesellschaft Zur Foerderung der Angewandten Forschung E.V, Germany
- QINETIQ LIMITED, United Kingdom
- United Monolithics Semiconductors GmbH, Germany

## COORDINATOR

SiCrystal AG, Germany

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## PROJECT INFORMATION

High Quality European GaN-Wafer on SiC Substrates for Space Applications (EuSiC)

Contract no: 242360

Duration: 36 months



# TeraComp

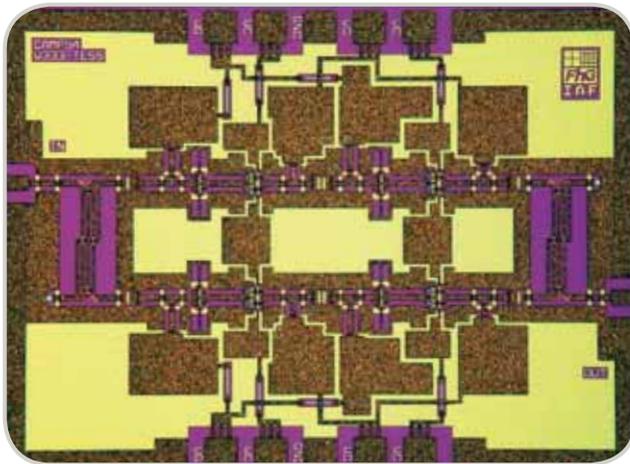
Terahertz heterodyne receiver components for future European space missions

## HARVESTING SCIENCE FROM RADIO WAVES

Looking for life on other planets, the high end of the electromagnetic spectrum holds huge scientific potential. Yet current performance of terahertz receivers is insufficient, and European supply inexistent. The project TeraComp takes on this challenge.

High frequency radio waves are paramount for scientific exploration and Earth observation from satellites. This part of the electromagnetic spectrum provides for enhanced precision of transmitted and received signals. Therefore, the development in Europe of an industrial capability to receive terahertz signals is supported by the TeraComp project. TeraComp is complementary to the MIDAS project, which supports the development of amplification capabilities in this area of critical technologies for European strategic non-dependence.

Like MIDAS, TeraComp focuses on high frequency Schottky diodes, as the project aims at developing a European industrial level capability to design and manufacture terahertz front-end electronics. Moreover, TeraComp involves novel Heterostructure Barrier Varactor and mHEMT MMIC



A 94 GHz MMIC chip © TeraComp

technology, which offer a unique compact solution for efficient terahertz signal generation. Such electronics may both support life science, improving our capability to detect molecules that might bear traces of life on other planets or moons, and refine Europe's Earth observation capability, especially in the GMES atmospheric domain. Indeed, terahertz signals herald enhanced monitoring of clouds, a key climate change variable.

TeraComp undertakes the development of a low noise 557 GHz subharmonic Schottky diode mixer, a 275 GHz Heterostructure Barrier Varactor frequency tripler, a 92 GHz mHEMP power amplifier, and a 15 to 92 GHz 6x multiplier. Whilst contributing to European non-dependence, the development of these critical technologies is also set to increase the current state-of-the-art in this domain, making the technologies smaller and more energy efficient, and therefore more suited for satellite use.



Monolithic InP-HBV chip mounted in a waveguide block



Terahertz single side band mixer block



**JAN STAKE**  
IS PROJECT COORDINATOR

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

We aim to demonstrate a compact and integrated terahertz receiver, based on European components, suitable for a number of future earth observation and space science missions.

### Why is this project important for Europe?

The project addresses strategic technology for space terahertz instrumentation and will develop a European industrial capability to design and manufacture terahertz components and electronics.

### How does your work benefit European citizens?

In the long-term, the outcome of TeraComp will play a role in gaining knowledge of the earth atmosphere, the climate system and understanding of the universe. Terahertz electronics will also find dual use applications in ground-based systems and open up for new markets.

**TeraComp reduces European dependency on imports from third countries when monitoring Earth's atmosphere or looking for traces of life in the universe by developing industrial level capability to design and manufacture terahertz front-end electronics.**

# TeraComp

Terahertz heterodyne receiver components for future European space missions



## LIST OF PARTNERS

- Chalmers University of Technology, Sweden
- Fraunhofer Institute for Applied Solid State Physics, Germany
- Deutsches Zentrum für Luft- und Raumfahrt e.V., Germany
- Technical University of Denmark, Denmark
- Omnisys Instruments AB, Sweden
- Wasa Millimeter Wave AB, Sweden
- Goethe-University Frankfurt, Germany

## COORDINATOR

**Chalmers University of Technology, Sweden**

## CONTACT

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## PROJECT INFORMATION

Terahertz heterodyne receiver components for future European space missions (TeraComp)

Contract no: 242424

Starting date: 01/04/2010

Duration: 36 months

EU Contribution: € 1.511.371

Estimated total cost: € 1.999.370



# SATURNE

## Microsystems Based on Wide Band Gap Materials for Future Space Transmitting Ultra Wideband Receiving Systems

### DEVELOPING MORE FLEXIBLE SATELLITES

The next generation of satellites is set to be lighter, cheaper, and more flexible. Such a technological leap forward is dependent on the development of novel Radio Frequency (RF) front ends, empowering operators to tune the characteristics of the payloads, even when the satellites are in orbit. The project SATURNE addresses this challenge.

When predicting the future, a basic known is the unknown. However, today when companies commission satellites, they are asked to anticipate and define requirements for the whole of the lifetime of the satellite, which might be 15 years.

Indeed, today each satellite is tailor made for its specific purpose. This increases its cost, and limits flexibility as to its use, since once launched, changing the wavelength of the signal the satellite sends back to Earth is impossible. The next generation of satellites is set to be radically different.

Developing flexible RF front ends that enable changing the wavelength of satellite signals in orbit amounts to a technological breakthrough: Mass production of satellite components would be possible - supporting future

satellite payloads at lower cost, with smaller mass and with more flexibility, since operators would no longer be required to think decades ahead, but instead simply progressively adapt satellites to new use.

The main concept of the SATURNE project is to realise such novel types of microwave functions. By means of Wide Band Gap (WBG) semiconductors and RF-MEMS switches, the project seeks to enable the development of re-configurable and highly power efficient communication satellite payloads with narrow-, multi- or wide-band channel allocation, at the benefit of operators, including environmental monitoring and cartography in X-band.

For the European space industry, a world market leader in the domain of commercial satellites, the prospect of such mass production of light and flexible satellites represents a significant industrial potential.



**AFSHIN ZIAEI**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

SATURNE's objective is to prove the feasibility and inherent advantages of using wideband gap and RF-MEMS based technologies in Intelligent Micro Systems for future space ultra wideband systems.

#### Why is this project important for Europe?

SATURNE technology will be used in future satellites. This technology will meet the demands from providers and operators for more flexibility and mass reduction, and consequently offer new services. SATURN will also preserve EU independence in the satellite domain.

#### How does your work benefit European citizens?

Multiband satellites will allow more users and services per satellite. This will reduce the number of satellites needed and then reduces the cost for the final user. Mastering this technology in Europe will help keeping high-tech employment in Europe.



Neo Edmund © Fotolia.com

**SATURNE promotes the establishment of European technological leadership in microwave components technology used in satellite communication and navigation payloads.**

# SATURNE

Microsystems Based on Wide Band Gap Materials for  
Future Space Transmitting Ultra Wideband Receiving Systems



## LIST OF PARTNERS

- THALES SA (THALES Research & Technology), France
- Thales Alenia Space Italia Spa, Italy
- EADS Deutschland GmbH, Germany
- Uppsala Universitet, Sweden
- TOP-GAN SP ZOO., Poland
- Centre National de la Recherche Scientifique, France

## COORDINATOR

**THALES SA (THALES Research & Technology),  
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## CONTACT

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## PROJECT INFORMATION

Converters broadband low power high performance  
for Telecommunications in Space (SATURNE)  
Contract no: 242458  
Starting date: 01/04/2010  
Duration: 36 months  
EU Contribution: € 1.876.237  
Estimated total cost: € 3.161.259,60



# NEWA

## New European WAtcher

### OBSERVING OUR BORDERS FROM SPACE

The security of Europeans is increasingly dependent on space assets for enhanced border monitoring and effective law enforcement throughout the EU. The project NEWA draws up a sustainable road-map outlining use of radar satellites for European space-based Reconnaissance & Surveillance (R&S).

With borders stretching more than 10.000 kilometres across land and some 50.000 kilometres at sea, new space based technologies for border surveillance are of strategic importance to the EU. Across these vast areas, radar satellites hold the potential to feed intelligence to border control and law enforcement authorities throughout Europe. Moving Target Indication by Space Based Radar (MTI SBR) promises to enhance efforts to mitigate trafficking of human beings and drugs. However, the effectiveness of radar satellites at the service of European space based R&S is dependent on the accessibility of critical technological components, some of which are currently not produced in Europe. Therefore NEWA undertakes a comprehensive mapping of existing technological gaps that prevent the establishment of

such capabilities. Hence the NEWA project seeks to support the European Commission, the European Defence Agency (EDA) and the European Space Agency (ESA) in their work aimed at identifying critical technologies for European strategic non-dependence in the area of moving object detection and identification.

NEWA will support further European capabilities by identifying the most critical innovation concept techniques that need to be developed in Europe in order to secure effective space-based R&S. Also NEWA will help EU research centres invest into this field of interest. In doing so, the project will draw up a sustainable European roadmap for such technological development, taking into account the different requirements of the authorities within the EU that are responsible for border control and law enforcement in this area of space security and defence policies.



**CLAUDIO CATALLO**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

The main purpose of NEWA is to review the state of the art in EU competences for the MTI technique and the useful technologies. The aim of the final Roadmap is to support the development of next generation Radar satellite capabilities for citizen security and environmental monitoring.

#### Why is this project important for Europe?

The importance of NEWA is to develop an EU Roadmap for the implementation of independent T&T, and increase EU competences not only for the benefit of the large integrator companies but also for PMIs and SMEs.

#### How does your work benefit European citizens?

The European citizens will benefit from NEWA by the wide range of applications, such as environmental monitoring, and maritime surveillance that can focalize efforts on the implementation of T&T indicated by the study



Alexey Popov © Fotolia.com

**NEWA addresses State of the Art in EU Technology and Techniques (T&T) useful for identifying and following moving objects by means of radar satellites, which could be used for smart border surveillance.**

# NEWA

New European WAtcher



## LIST OF PARTNERS

- Thales Alenia Space Italia SpA, Italy
- E-GEOS, Italy
- Istituto Affari Internazionali, Italy
- Universitat Politecnica de Catalunya, Spain
- Foundation puor la recherché stratègique, France
- INDRA Espacio, Spain
- Selex System Integration Ltd, United Kingdom
- Thales Systemes Aeroportes S.A, France

## COORDINATOR

**Thales Alenia Space Italia SpA, Italy**

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## PROJECT INFORMATION

New European WAtcher (NEWA)

Contract no: 241630

Duration: 18 months

EU Contribution: € 587.804

Estimated total cost: € 772.535



# C-Space

## Conditions for Space Policy and related Action Plan Consolidation in Europe

### TOWARDS A STRONGER EUROPEAN SPACE IDENTITY

Space policy represents a unique political value in Europe. Space is full of endless possibilities, both as a strategic asset, a driver for progress in research and development (R&D), and as a means to mitigate the effects of climate change and improve the economy and the security of Europe. The project C-Space undertakes a comprehensive study in support of the further development of the European Space Policy (ESP).

Europeans share a common passion for space. Past European explorers went beyond the horizon, not because it was easy, but because it was difficult. Adopting their curiosity, the European Union looks to space to further strategic public policies, from Galileo satellite navigation to GMES Earth observation, and space science and exploration.

As a major space power, the EU is devoted to international cooperation to harvest the full potential of the

contribution of space to the climate challenge, and future inter-planetary exploration.

C-Space supports the vision of a comprehensive European Space Policy (ESP). By means of a multi level policy study, the project is set to further the development and implementation of the ESP. Indeed, its objectives are to define a comprehensive approach towards new milestones for space in Europe. In doing so, the study will adopt a double framework, including both an analysis of the drivers for change within key space sectors in Europe, and a comprehensive space policy vision. Based on a profound analysis of ongoing space trends in Europe, the study will propose a set of "high level" concepts to be further developed within the ongoing European integration, aiming for the progressive fostering of a growing identity for space in Europe.



**XAVIER PASCO**  
IS PROJECT COORDINATOR



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**C-Space provides a study in support of the future development of the European Space Policy.**

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

C-Space is intended to provide European Union decision-makers, institutions and the public with a comprehensive vision of the European Space Policy in order to support its elaboration and implementation and to facilitate its acceptance by the European citizens.

#### Why is this project important for Europe?

C-Space will allow gathering different perspectives on space often expressed by specific user or professional communities focused on their domains. As a consequence, a comprehensive view is now required to unify these viewpoints and analysis in an organised and readable manner.

#### How does your work benefit European citizens?

C-Space will put many aspects related to the uses of space by the European citizen at the centre of the European space policy debate. By helping this debate, C-Space will help the European citizen reap direct benefits from the excellence developed in Europe for decades in space.

# C-Space

## Conditions for Space Policy and related Action Plan Consolidation in Europe



### LIST OF PARTNERS

- Centre National de la Recherche Scientifique, France
- Totalforsvarets Forskningsinstitut, Sweden
- Istituto Affari Internazionali, Italy
- Royal Aeronautical Society, United Kingdom
- Romanian Space Agency, Romania

### COORDINATOR

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### PROJECT INFORMATION

Conditions for Space Policy and related Action Plan  
Consolidation in Europe (C-SPACE)  
Contract no: 242507  
Starting date: 01/03/2010  
Duration: 18 months  
EU Contribution: € 674.995  
Estimated total cost: € 794.949



# SP4ESP

## Implementing the European Space Policy: A Coherent European Procurement Law and Policy for the Space Sector – Towards a Third Way

### A THIRD WAY IN SPACE PROCUREMENT

The European Space Policy (ESP) was established in 2007 in a joint ministerial between the Council of the European Union and the Council of the European Space Agency (ESA), meeting as the "Space Council". The project SP4ESP supports its further implementation in the domain of procurement for joint EU/ESA space programmes.

Space is rocket science and in Europe procurement in the space sector is no less complex. At the origin of this challenge, one sees the collision in this field between EU internal market rules based on fair competition, and ESA rules governed by the principle of geographic return.

SP4ESP undertakes a comprehensive study of the state-of-affairs in the field of space procurement in Europe, seeking for creative solutions to these challenges with a view to better implementation of the ESP. In doing so, the study will propose a set of mandatory and facultative criteria for a new European procurement regulation.

Aiming for a "third way" between fair competition and geographic return, the study is set to explore new possibilities for enhanced cooperation between all members of the Space Council, taking the ESP further.

Starting with a profound analysis of current procurement rules, SP4ESP will subsequently carry out an analysis of the space market and industry, gathering opinions from stakeholders on how to best refine the procurement rules. On the basis of such analysis and stakeholder consultation, the study is set to outline a possible third way forward, taking into account also insights obtained from comprehensive comparisons of procurement regimes in sectors that are similar to the space sector.

Solving the procurement challenge is paramount for taking the ESP and Europe further in space.



**STEPHAN HOBE**  
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

#### What do you want to achieve with this project?

By drawing up viable proposals for how to reconcile the respective procurement philosophies of ESA and EU, the SP4ESP project intends to further European cooperation in space. Our project is in support of the overall European Space Policy.

#### Why is this project important for Europe?

Europe has come a long way. With ESA and the EU, two distinct organisations came to fruition in Europe. Their origins differ, but Europe has to move forward in a strong, competitive and industrially sound way. A Third Way to procurement is key to such a development.

#### How does your work benefit European citizens?

As a cross-cutting activity in programme facilitation, the SP4ESP project is to harvest efficiency gains throughout the European space sector. Europe benefits from an improved delivery of space services to its citizens and increased global competitiveness of the space industry.



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**SP4ESP provides a study into a third way between EU fair competition rules, and ESA geo-return rules in future space programme procurement.**

# SP4ESP

Implementing the European Space Policy: A Coherent European Procurement Law and Policy for the Space Sector – Towards a Third Way



## LIST OF PARTNERS

- Katholieke Universiteit Leuven, Belgium
- Univerzita Karlova v Praze, Czech Republic

## COORDINATOR

Universität zu Köln, Germany

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## PROJECT INFORMATION

Implementing the European Space Policy: A Coherent European Procurement Law and Policy for the Space Sector – Towards a Third Way (SP4ESP)  
Contract no: 242286  
Starting date: 01/08/2009  
Duration: 12 months  
EU Contribution: € 309.711  
Estimated total cost: € 345.760



# NordicBaltSat

Utilizing the existing and emerging potential of Nordic-Baltic dimension in critical satellite technologies and applications

## BRINGING EUROPE TOGETHER ON THE SPACE JOURNEY

Europeans share a common passion for space. The general objective of the NordicBaltSat project is to create the necessary capabilities for utilizing the existing and emerging potential of the consortium's partners. In this way, NordicBaltSat supports the integration of Poland and the Baltic states into the European space architecture.

Since 1975, the European Space Agency (ESA) has led Europe on space missions ranging from low Earth orbit human space flight at the International Space Station (ISS) to pioneering journeys to Mars, and further to the moons of Saturn. Following the accession of Poland and the Baltic states to the European Union in 2004, ESA accession is an important next step for the integration of these countries into the European space architecture.

As emerging space countries Estonia, Latvia and Lithuania want to get closer to ESA, primarily as a way to advance their integration into Europe and to create new opportunities for their economies. A joint technology program is seen as the heart of the NordicBaltSat project to match the most urgent needs of ESA while creating

desired preconditions for emerging space countries to play along in the space market, and to speed-up their accession process to ESA. The creation of joint technology programs together with relevant capacity building activities will help to create substantial impact for participating countries on their road to ESA.

Other important objectives of the project consist of contributing to the shaping of systems of governance in the space field in these countries, as well as public outreach activities fostering dialogue and debate on space science and research with the public at large.

It is paramount to engage with a new generation of scientists and engineers who hold the potential to take Europe further together in space towards the fascinating journey, which is the route ahead beyond old space frontiers in the 21st century.



**MADIS VÕÕRAS**  
IS PROJECT COORDINATOR

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

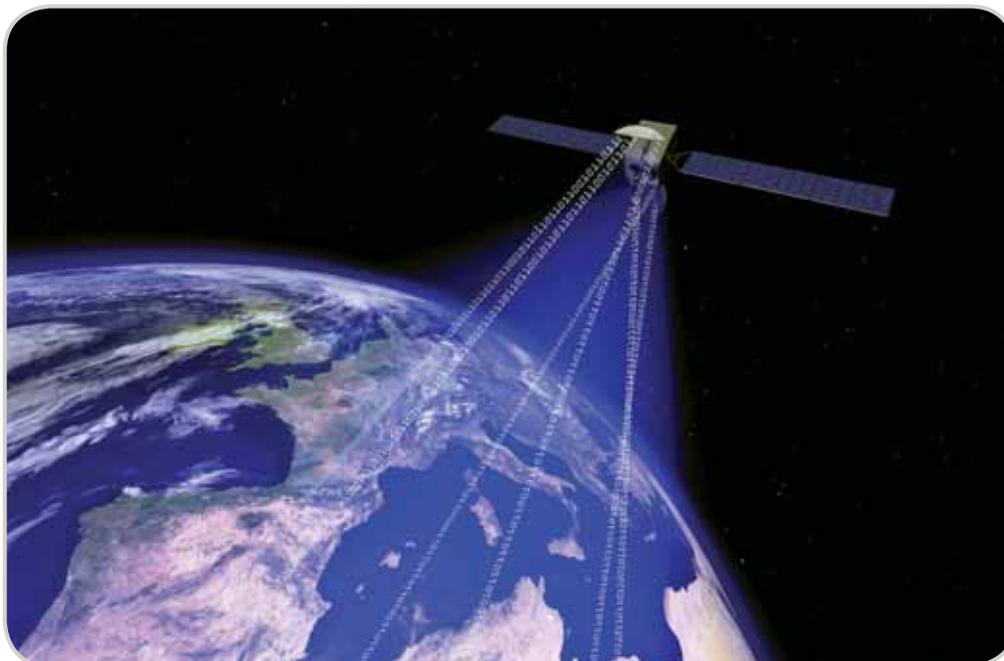
We are aiming to create the necessary conditions for utilizing the existing and emerging potential of companies and scientific institutions in Nordic-Baltic dimension for a continuous and sustainable contribution in major ongoing and planned European space programmes.

### Why is this project important for Europe?

The NordicBaltSat project aims to build a bridge for successful integration into the space industry in Europe. Emerging space countries are expected to raise their space capacities in order to access to ESA and to contribute to European space programmes in the future.

### How does your work benefit European citizens?

By raising awareness among policy-makers, especially in emerging space countries, we promote a social demand for the frequent usage of space applications. Larger exploitation of space technologies enable better public services to European citizens.



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**NordicBaltSat supports emerging space countries in the Baltic region establish the space governance structures that are needed for successful ESA accession, as well as public awareness raising in the space field.**

# NordicBaltSat

Utilizing the existing and emerging potential of Nordic-Baltic dimension in critical satellite technologies and applications



## LIST OF PARTNERS

- Invent Baltics OU, Estonia
- Nodibinajums Ventspils Augsto Tehnologiju Parks, Latvia
- Kauno Technologijos Universitetas, Lithuania
- Wasat sp. z o.o. , Poland
- Swedish Space Corporation, Sweden
- International Space University, France

## COORDINATOR

**Ettevotluse Arendamise Sihtasutus, Estonia**

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## PROJECT INFORMATION

Utilizing the existing and emerging potential of Nordic-Baltic dimension in critical satellite technologies and applications (NordicBaltSat)

Contract no: 242427

Starting date: 01/03/2010

Duration: 24 months

EU Contribution: € 692.962,47

Estimated total cost: € 741.074,82



**FURTHER INFORMATION IS AVAILABLE AT**

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



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