GEO EUROPEAN PROJECTS' WORKSHOP-7

Barcelona
15-16 April 2013

GROUP ON EARTH OBSERVATIONS

DIPARTIMENTO DI INGEGNERIA ASTRONAUTICA ELETTRICA ED ENERGETICA
SAPIENZA UNIVERSITÀ DI ROMA

IES Consulting s.r.l.

OHB CGS

SEVENTH FRAMEWORK PROGRAMME

PREFER

gmv INNOVATING SOLUTIONS

PREFER: Space-based Information Support for **P**revention and **RE**covery of Forest **F**ires **E**mergency in the Medite**R**ranean Area

sertit

Giovanni Laneve

satways

U C

KEMEA

GEOVIQUA

GRUMETS

UAB

CREAF

MIRAMON

- **PREFER -** Space-based Information Support for **P**revention and **RE**covery of Forest **F**ires **E**mergency in the Medite**R**ranean Area.

- Project Duration: **3** years
- Consortium: **8** partners
- Total Cost: **2.8** MEuro
- EC Contribution: **1.9** MEuro

- Starting date: 1st December 2012.

http://www.prefer-copernicus.eu/

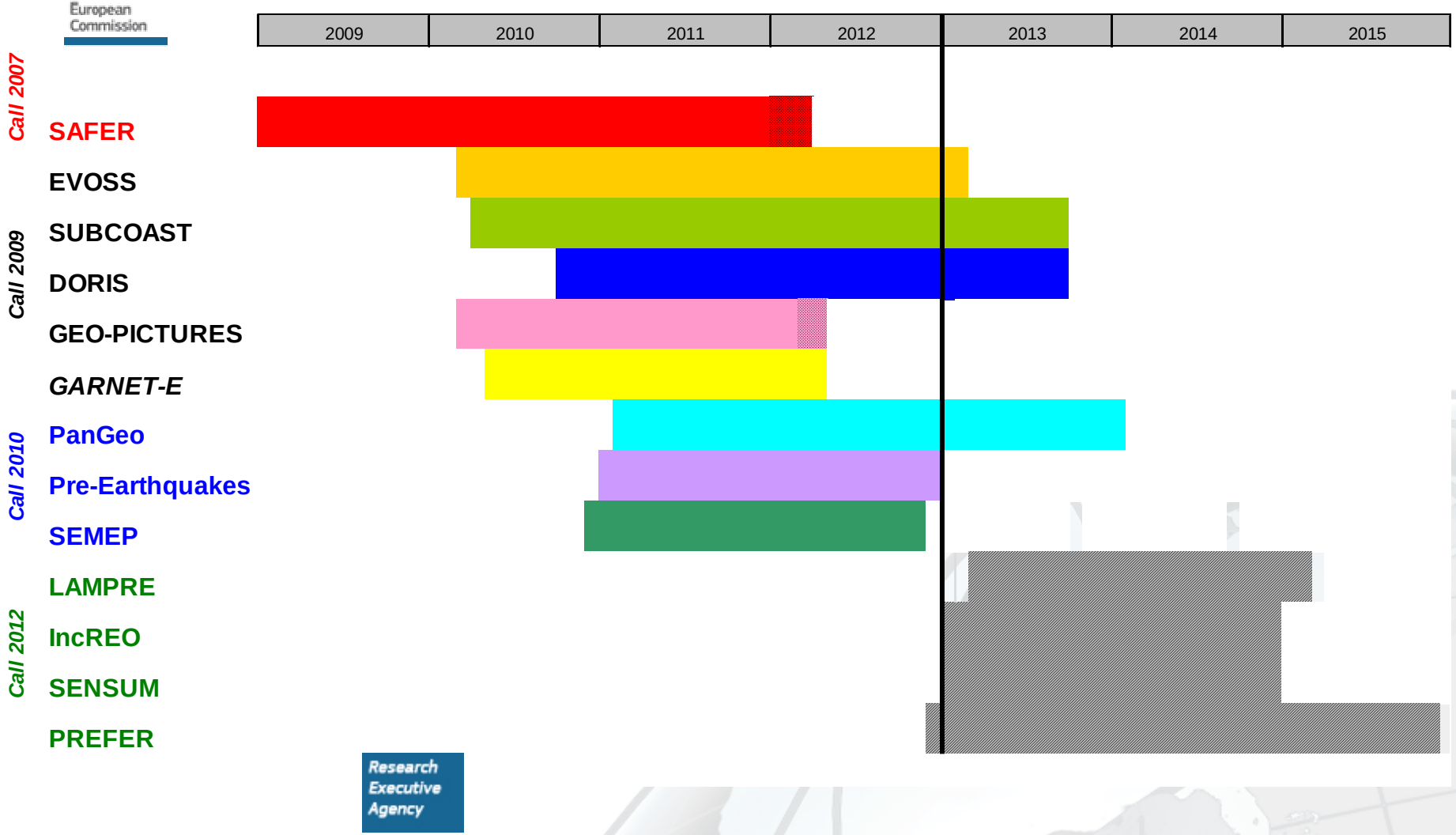
SEVENTH FRAMEWORK PROGRAMME

GEOVIQUA GRUMETS UAB CREAF MIRAMON PREFER

GEPW-7
Barcelona 15-16 April 2013

GMES FP7 Emergency Projects timeline

European Commission

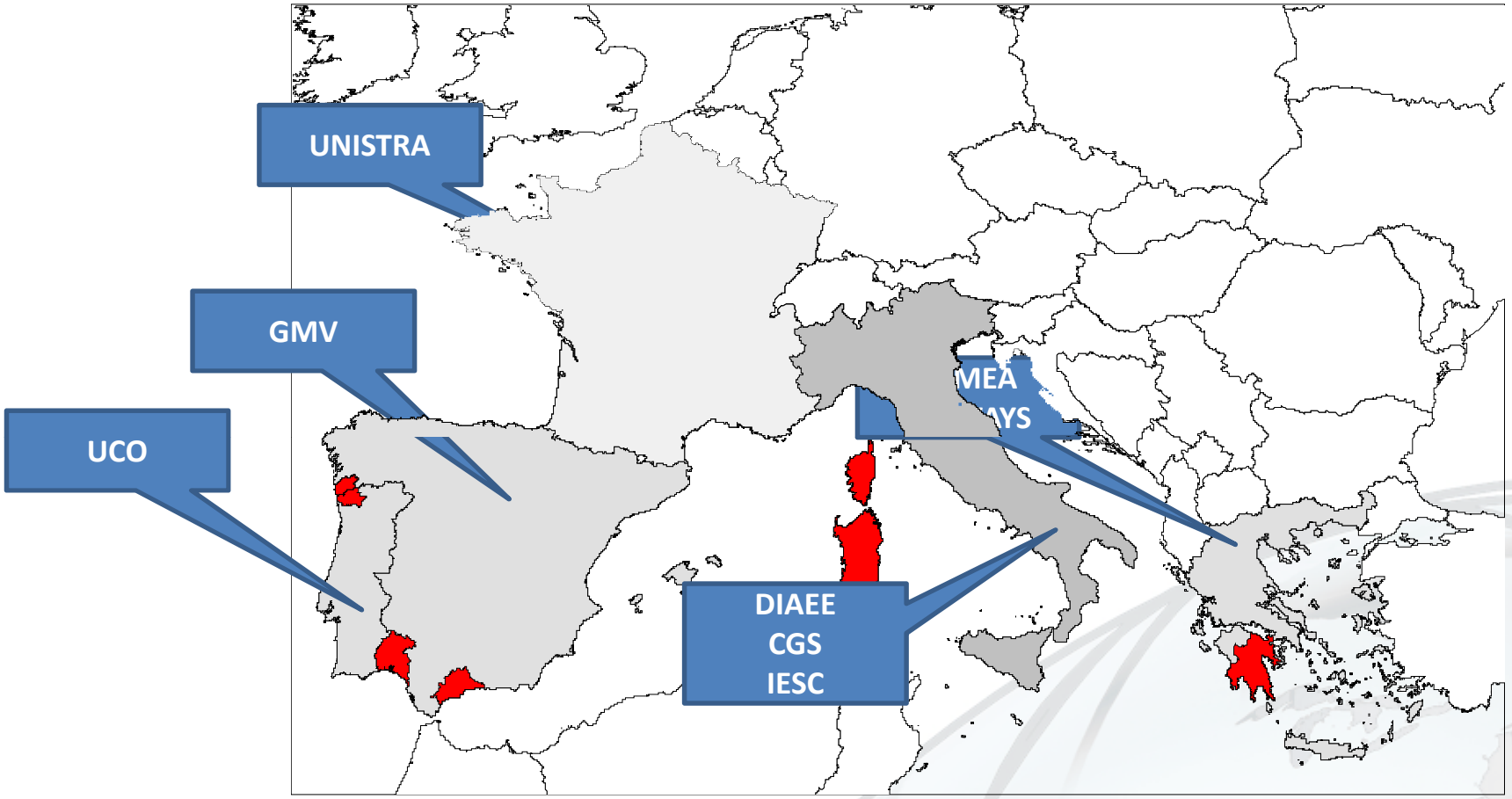


Research Executive Agency

GeoViQua GRUMETS UAB CREAF MIRAMON

LIST OF PARTICIPANTS			
Participant number	**Participant organization name**	**Participant short name**	**Country**
1	Dipartimento di Ingegneria Astronautica Elettrica e Energetica – Sapienza Università di Roma.	DIAEE	Italy
2	Compagnia Generale per lo Spazio, S.p.A.	CGS	Italy
3	Intelligence for Environment & security	IESC	Italy
4	GMV Aerospace and Defence SA	GMV	Spain
5	SATWAYS	SAT	Greece
6	Center for Security Studies	KEMEA	Greece
7	University of Strasburg	Unistra	France
8	University of Coimbra	UniCo	Portugal

Partners



Red regions represent the test areas where products will be generated and validated

USERS

Country	Committed User	Letter of Support
Portugal	Portugal National Authority for Civil Protection (ANCP)	Attached
Spain	Ministry of Environment of Andalusia	Attached
France	Office National des Forets Direction Generale Corse	Attached
Italy	Corpo Forestale e di Vigilanza Ambientale – Regione Autonoma della Sardegna	Attached
Greece	Prefecture of Peloponnesus Including associated Civil Protection Resources	Attached

1) Supporting the definition of the test areas and validation plans;

2) Contributing to the definition of requirements;

3) Describing and providing the 'in situ' data for validation activity,

4) Analyzing 'critically' the products;

5) Participating to the training sessions and workshops;

A representative of each user will take part of the **user commission**.

Objectives

PREFER aims at responding to major fire prevention needs in Southern Europe.
Fire prevention is still the most cost-effective strategy when compared to firefighting and extinguishing that are costly, local, and triggered only in response to already ongoing crises.

PREFER intends to contribute to responding to such need by:

1) providing timely multi-scale and multi-payload products based on exploitation of all available spaceborne sensors;

2) offering a portfolio of EO products focused both on Pre-crisis and Post-crisis forest fire emergency cycle in the EU Mediterranean area;

3) preparing the exploitation of new spaceborne sensors available by 2020 (e.g.: Sentinels) and

4) contributing to the definition of User requirements for the new EO missions.

Objectives

- The PREFER objective is the design, development and pre-operational demonstration of a space-based end-to-end information service to support prevention/preparedness and recovery phases of the Forest Fires emergency cycle in the EU Mediterranean Region.

- The PREFER services will be ready for operational deployment at the end of the project. Special care will be dedicated to assure the development of a sustainable service.

- The PREFER Information Service will consist of a centralized system for archiving, visualization and delivery of the product to the end-users and the set of complete EO data processing chains for 2 main service lines:

  - **ISP Services, which will provide 6 innovative information products for the Preparedness/Prevention phase**

  - **ISR Services, which will provide 7 innovative products for the emergency recovery phase.**

Cross-Cutting between GMES Core Services

- Manage interfaces between the project and the on-going parallel GMES operational land and emergency services.

- Gather relevant information and analyze EO products portfolio delivered by parallel on-going GMES operational land and emergency services (GMES Initial Operations) and compare it to PREFER Product portfolio draft specifications.

- Identify possible EO products delivered by on-going GMES services that can be used as input to the PREFER products, identify possible synergies and check/assure complementarities among services.

ZAPAS

Forest Resources Assessment and Monitoring in Russia

geoland2

HELM

BIO_SOS

Pre-operational ecological modelling system for multi-annual monitoring of NATURA 2000 sites

LAMPRE (start 2013)
Landslide modelling and tools for vulnerability assessment and recovery management

Forest damage and functional parameters assessment

IncREO (start 2013)
risk and vulnerability mapping products targeted at vulnerable zones with climate change trends including multi-hazards

MS. MONINA

Multi-scale EO-based pre-operational monitoring service of NATURA 2000 habitats

GeoViQua GRUMETS UAB CREAF MIRAMON

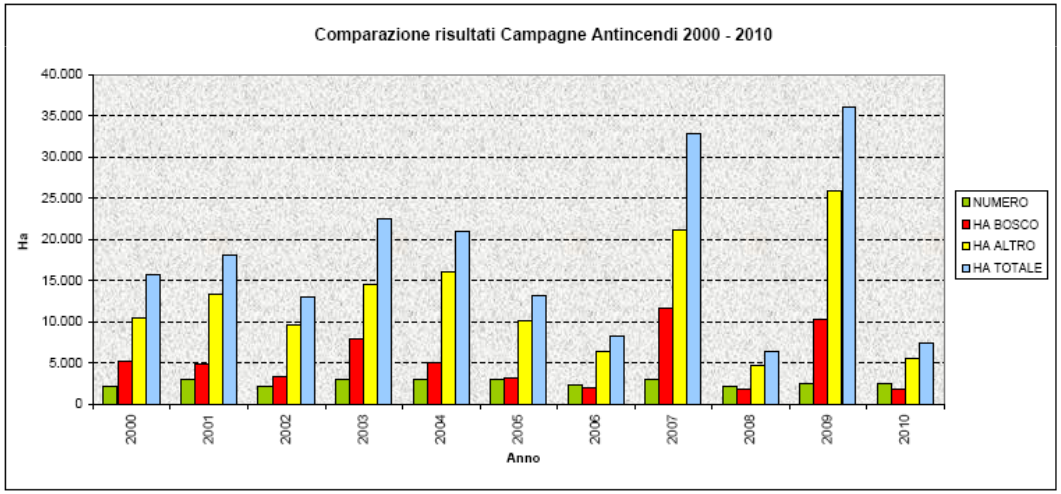
WP 3: EO Service Products Portfolio Development

WP 3.1 - Information Support to Preparedness/Prevention Phase (ISP) Service

The products developed in this WP are devoted to support the fire prevention activities at European Level.

WP 3.2 - Information Support to Recovery/Reconstruction Phase (ISR) Service

The products developed in this WP are devoted to support the fire damage assessment and vegetation recovery phases.



Statistical data on Sardinian fires, per year (2000-2010) with total number (green), total surface (light blue), hectares of wood (red) and other land uses (yellow) damaged by fires.

Products

Annex 2: PREFER Information Service Products Portfolio

Note that Product Terminology is compliant to UNISDR 2009

Service: Information Support to Preparedness/Prevention Phase				
Product	**Spatial Resolution /scale**	**Temporal resolution**	**Sensors/ satellites**	**Resp. Partner**
Seasonal Fuel Map	1:25.000.(TBC)	Twice a year (spring / autumn)	MODIS,Landsat,SPOT, RapidEYE, Pleiades, VIIRS	GMV
Seasonal Fire Hazard Map	1:25.000 (TBC)	Twice a year (spring / autumn)	MODIS,VIIRS	GMV
Seasonal Exposure (Vulnerability & Economical Value) Map	1:25.000 (TBC)	Every 3-5 years	TBD	UCO
Seasonal Risk Map	1:25.000 (TBC)	Twice a year (spring / autumn)	Based on PREFER EO products	UCO
Daily Fire Hazard Map	250 m (At European level)	Daily	MODIS, VIIRS	DIAEE
Prescribed Fires Map	TBD	Once a year (spring)	Landsat 5-TM, SPOT4 SENTINEL-2	DIAEE

Service: Information Support to Recovery/Reconstruction Phase				
Products	**Spatial Resolution (m)**	**Temporal resolution**	**Sensors/ satellites**	**Resp. Partner**
Post-fire Vegetation Recovery Map	10-30	Twice a year (spring + autumn	Landsat 5-TM, SPOT4 HRVIR-1 &2, SPOT 5 HRGT 1&2 and IRS P6 LISS3	IESC
Burn Scar Map HR Optical	10-30	Monthly during the fire season	Landsat 5-TM, SPOT4 HRVIR-1 &2, SPOT 5 HRGT 1&2 and IRS P6 LISS3	IESC
Burn Scar Map HR SAR	10-30	Monthly during the fire season	COSMO-SkyMed	IES
Burn Scar Map VHR	1-4 m	Monthly during the fire season	KOMPSAT-2, GeoEYES, QuickBird, IKONOS, RapidEYE andPleiades	IESC
Biomass Burning Aerosol Map	2 x 2 km^2 (At European level)	Monthly average during the fire season	MODIS / OMI	CGS
3D Fire Damage Assessment Map	20 -30 m (At European level)	Seasonal once a year (autumn)	PREFER EO-products, SENTINEL-1, SPOT5, RapidEye, QuickBird	UNISTRA
Severity Damage Map	TBD	Seasonal once a year (autumn)	Landsat 5-TM, SPOT4 SENTINEL-2, Future Hyperspectral	DIAEE

Objectives: products

Information Support to Preparadness/Prevention:

6 innovative information products

Products: Daily Fire hazard Map

The FPI, which is a risk index based on the Fire Potential Index (Burgan) combines different types of static **(long-term fire risk index)** and dynamic variables **(short-term fire risk index)**. This index is commonly called integrated or advanced because it has a two components, structural (**topography)** and dynamic **(weather variables and remote sensing data).**

The product is generated every day:

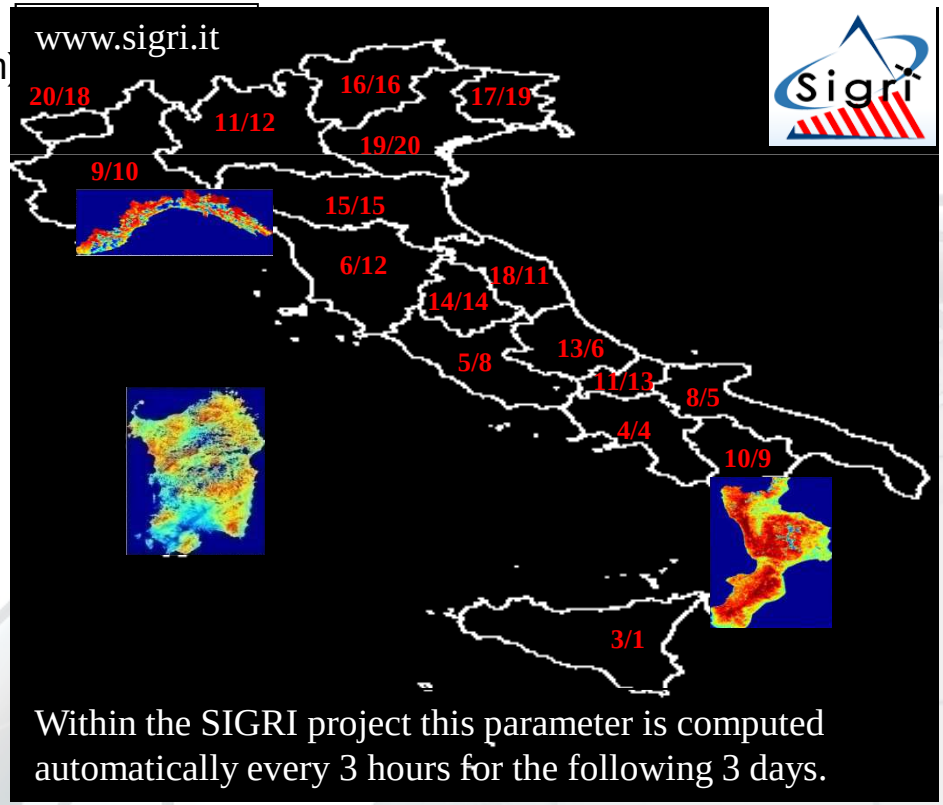
1. calculate NDVI and EWT: starting from MODIS daily images daily (Terra or Aqua);
2. Information on DEM, T, H for the ET0;
3. Using land use map, wooded areas and vegetation type;
4. Ground data of type and quantity of fuel/biomass (in order to recalibrate parameters of the algorithm)
1. Applying the definition of the FPI.

To improve the performance

Vegetation water content

To take into account the effect of solar illumination in determining the existing humidity in the died vegetation

Evapotranspiration



Products: Prescribed Fires Map

FAO defines the prescribed fire as: "***prescribed burning*** is the controlled application of fire to wildland fuels in either natural or modified state, under specific environmental conditions which allows the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to attain planned resource management objectives".

Objective

Support the User for the definition and identification of the areas where the ***prescribed burning*** (**PB**) procedure is applicable in a secure way.

The **PB** can be considered as prevention activities to removes accumulated fuels and therefore decreases the risk of intense fires.

State of art

The use of **PB** is still a disputed matter in Europe and it is generally not permitted.
Although the benefits of PB are clear, there are also notable concerns:

- fire spreading to adjacent properties
- smoke intrusions in populated areas

Practical prescribed burning application inside a *Pinus halepensis* stand, in the framework of the Fire PARADOX project. Teodoro forest, Basilicata Region, Italy.

The prescribed fire has recently been successfully reintroduced in Portugal and France following the Californian and Australian examples.
The prescribed fire has been studied primarily by the **Fire PARADOX** (FP) team, which has developed a software usable for this purpose, although there are still some restrictions.
The present project intends to exploit the experience of **FP** to improve the practice of the wildfire prevention based on the prescribed fires.

Products: Prescribed Fires Map

Research and Technological Development

The **RTD** activity aims at developing an index capable to provide indications on the possibility of practicing prescribed burning in the area of interest.

A software will be developed to compute periodic maps to know **when** and **where** the prescribed fire practice is applicable.

The main innovation proposed will be the integration of the techniques used by **FP** with advanced remote sensing techniques not yet developed for the problem under study.

The research will focus on two types of habitat:

- the Mediterranean pine forests
- the agricultural and pastoral regions

where prescribed fire techniques have produced good results with a low impact on the habitat.

Information Support to Recovery/Reconstruction:

7 innovative information products

WP 3.2 : Information support to recovery /reconstruction phase

Products	Partner
Post-fire Vegetation Recovery Map	IESC
Burn Scar Map HR Optical	IESC
Burn Scar Map HR SAR	IESC
Burn Scar Map VHR	IESC
Biomass Burning Aerosol Map	CGS
3D Fire Damage Assessment Map	UNISTRA
Severity Damage Map	CRPSM

Products: Burn Scar Map HR Optical, SAR and VHR

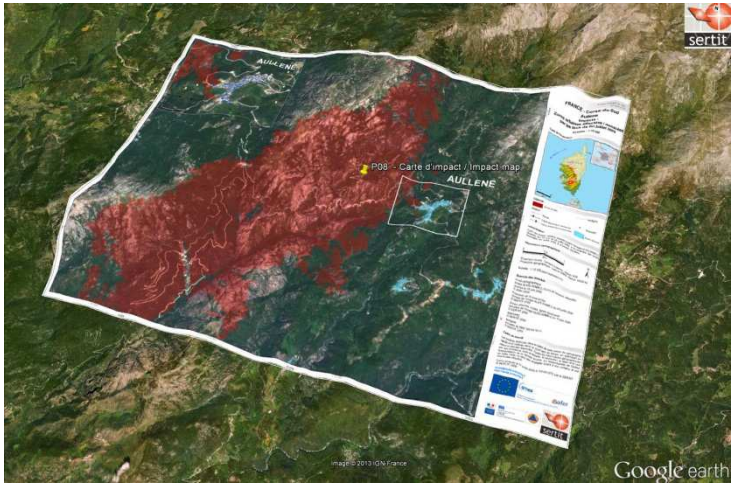
Products	Research activities
Burn Scar Maps (HR Optical, HR SAR, VHR)	• Generalize the existing procedures, calibrated and validated on the Italian territory, to Greece, France, Spain and Portugal territories • Adapt the procedures for eventual use of future EO data.

Products: 3D Fire Damage Assessment Map

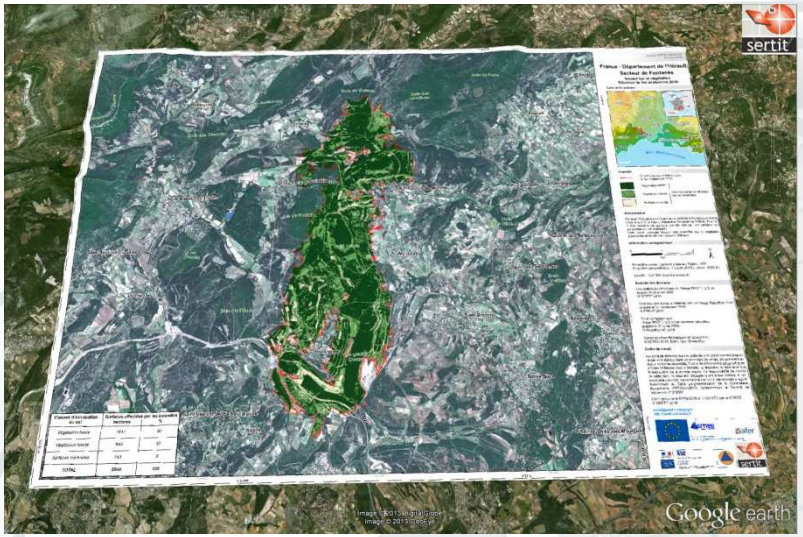
Through PREFER SERTIT aims at developing post fire recovery /reconstruction phase services such as:

- 3D impact and damage assessment
- Soil erosion vulnerability index mapping
- Explore the potential to monitor vegetation re-growth using HR and VHR satellite data from optical and possibly radar platforms.

The objective is to provide generic post-fire recovery services applicable to wherever forest fires may occur.



Example of fire extent map produced by SERTIT



Example of ire damage assessment map produced by SERTIT

Products: Damage Severity map

- The Severity Damage Map provides information on the status of the vegetation after the burning event for planning the recovery phase. The R&D activity regards the development of an index, called DSI (Damage Severity Index), allowing the estimate of the entity of the damage caused by a fire. In the case of large forest fires, post-event phases of mitigation and rehabilitation of the area can be costly and time-consuming due to the extension of the affected area.

- The index starts from the experience gained so far in the scientific community in the use of the indices **CBI** (Composite Burnt Index) and **GeoCBI** for developing it in a way to exploit the increase of the spectral information that will be available in the near future with the advent of hyperspectral satellite sensor like PRISMA or HYMAP, etc.

The effect of the degradation of the vegetation has been simulated by varying the content of pigment, dry-mass and *canopy* geometry. After a sensitivity analysis, the following relationship has been written:

$$DSI = \frac{\frac{CAI+1}{\max|CAI+1|} + \frac{MSI+1}{\max|MSI+1|} + \frac{PSRI}{\max|PSRI|}}{\frac{GI}{\max|GI|} + \frac{NDVI}{\max|NDVI|} + \frac{NDVI_{705}}{\max|NDVI_{705}|}}$$

GEO tasks

Information for Societal Benefits

DISASTERS

DI-01 Informing Risk Management and Disaster Reduction

- *Disasters: Development of multi-hazard and/or end-to-end approaches, as appropriate to meet the* needs for disaster risk reduction, preparedness and response in relevant hazard environments. More timely dissemination of information from globally-coordinated systems for monitoring, predicting, risk assessment, early warning, mitigating, and responding to hazards at local, national, regional level. Improved use of observations and related information to inform policies, decisions and actions associated with disaster preparedness and mitigation.

- **Description**
- Improve disaster risk management and reduction by providing timely information relevant to the full cycle of disaster management (mitigation, preparedness, warning, response and recovery). Adopt a multi-hazard end-to-end approach to ensure that relevant Earth observations and information effectively reach decision-makers and the public.

GEO tasks

Information for Societal Benefits

DI-01 Informing Risk Management and Disaster Reduction (Components)

- **C1 - Disaster Management Systems**

Make information related to environmental risk and vulnerability easily accessible to a wide range of decision-makers through a centralized platform.

Review global and regional disaster risk management systems, such as the Wildland Fire Early Warning system, with a view to develop an end-to-end approach.

- **C2 - Geohazards Monitoring, Alert, and Risk Assessment**

Develop large-area vulnerability modeling and mapping using novel algorithms and methodologies based on Synthetic Aperture Radar (SAR) and optical satellite data.

- **C3 - Regional End-to-End Systems**

Implement regional and cross-cutting end-to-end projects. Develop natural-risk decision-support tools and applications supporting the full cycle of disaster management.

Thank you