

MASSIVE MAPPING SEISMIC VULNERABILITY AND RISK OF CITIES

GRANT AGREEMENT: 070401/2009/540429/SUB/A4



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MASSIVE

KOM, Brussels
11.01.2010



NTUA



GeoApikonis

CO Beneficiary: NOA/ISARS

The **Institute for Space Applications and Remote Sensing (ISARS, www.space.noa.gr)**,

is one of the five research Institutes of **the National Observatory of Athens (NOA, www.noa.gr)**. ISARS/NOA has high scientific capabilities and expertise in multidisciplinary space and environmental sciences, from Solar and Space Physics to Earth Observation and Geo-information. It conducts basic and application research. It runs pre-operational and operational Space- and Earth Observation-projects as PIs, Co, Co-Is or guest-investigators with particular emphasis on environmental protection, natural disaster management and emergency response

NOA and its Institutes are also hosting:

- (i) The UNESCO Chair of the Natural Disasters, established within the framework of UNESCO-BRESCE
- (ii) The Secretariat of the South Eastern European (SEE) Disasters Risk Assessment and Mitigation Network
- (iii) The Focal Point on the Global Earth Observing System of Systems (GEOSS), one of the four national GEO Offices in the World (Canada, Germany, USA, Greece)
- (iv) The Greek Focal Point for Emergency Response GMES Core Services generation and distribution in Greece (a) **SAFER - Services and Applications For Emergency Response**, b) **Linker - Supporting the implementation of an operational Global Monitoring for Environment and Security service in the field of emergency management**, c) **RISK-EOS**)
- (v) The National Seismological Network



Associated Beneficiaries



- **AB1:** The **National Technical University of Athens (NTUA)** is a Higher Education Institution. The **Computational Engineering Unit (CEU)** belongs to the Systems Analysis and Design Department of the School of Chemical Engineering. The Unit has developed collaboration with numerous Greek and Foreign Universities, Research Centres and Companies and it has been growing in staff and facilities mainly by its involvement in numerous national and EC funded research projects.



- **AB2:** **Planetek Italia** designs and develops integrated geographical information and data management systems. The Company is fully committed in the research and integration of Remote Sensing images with GIS. Its high concern is also testified by the unceasing cooperation with European Union, Universities, Space Agencies, Research Centres and internationally known Companies. The know-how and the frontier technologies mastered by Planetek Italia make the Company represent one of the main Italian sources in the field of informatics applied to land management.



- **AB3:** **Geoapikosis SA** is a company of consultant engineers providing thematic Remote Sensing and GIS services in the domains of agriculture, forestry, spatial planning, risk management, and cadastre. Geoapikosis SA is also committed in Project Management, Environmental assessment studies and generation of IT solutions including web based GIS services. The company has coordinated and successfully completed several projects in the domain supported with public funds, as well as ESA, EC and international funds.



Budget (€), 2 yrs

Coordinating Beneficiary's contribution

| Coordinating Beneficiary n° | Coordinating Beneficiary short name | Total costs of the actions in € | Coordinating Beneficiary's own contribution in € | Amount of EC contribution requested in € |
|-----------------------------|-------------------------------------|---------------------------------|--|--|
| CO | NOA | 180,000 | 45,000 | 135,000 |
| | | | | |

Associated Beneficiaries' contribution

| Associated Beneficiary n° | Associated Beneficiary short name | Total costs of the actions in € | Associated Beneficiary's own contribution in € | Amount of EC contribution requested in € |
|---------------------------|-----------------------------------|---------------------------------|--|--|
| AB1 | NTUA | 150,000 | 37,500 | 112,500 |
| AB2 | PLANETEK | 150,000 | 37,500 | 112,500 |
| AB3 | GEOAP | 152,464 | 38,116 | 114,348 |
| TOTAL | | | 113,116 | 339,348 |

Total Eligible Costs: 632,464 €
EC Contribution: 474,348 €

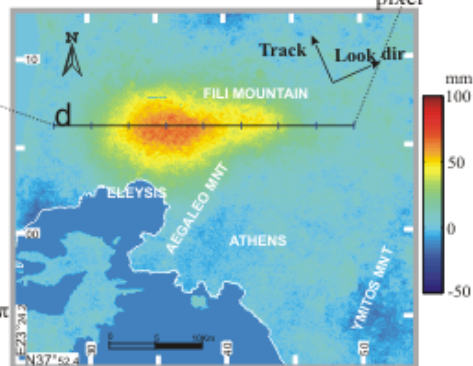
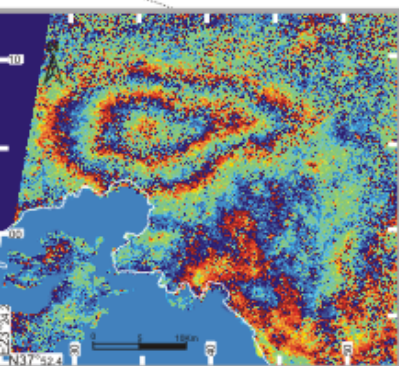
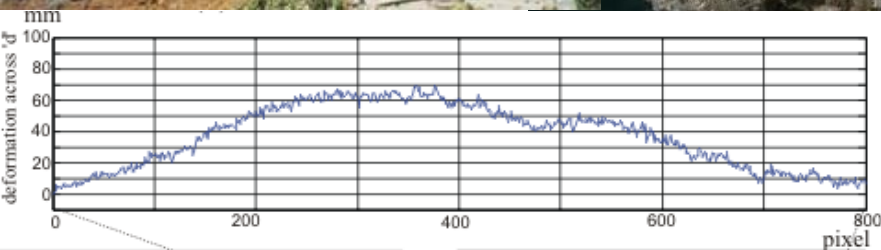
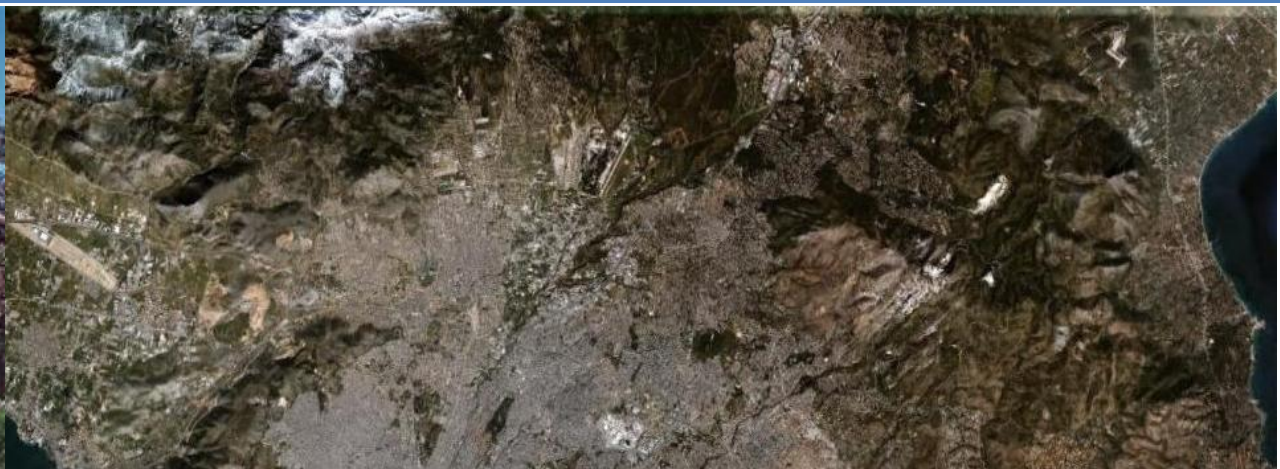


MASSIVE Concept

- Limited effort has been put into seismic risk determination at local scale
- The main focus of MASSIVE project is to provide Civil Protection with reliable and up-to-date assessments and maps of,
 - ▣ **Seismic Hazard (H)** *[local scale historical seismic records and tectonic/geological features]*
 - ▣ **Urban Vulnerability (VU, VA)** *[quality of structures]x[cost of structures]x[population]*
 - ▣ **Seismic Risk for People and Elements at Local Scale (R)**
*[convolution $H*VU*VA$ and local zoning]*
 - ▣ **State-of-the-art Population Evacuation Models**
Two European pilot sites, heavily struck by earthquakes in the past:
1) North-Western part of Athens (GR) and 2) the Abruzzo Region (IT).
- The **General Secretariat of Civil Protection of Greece** formally expressed **interest** in the context of supporting the proposed project and will be directly benefited from the project deliverables.



Site 1: North-Western Athens (GR)



(c)

(d)



Site 2: Abruzzo Region (L'Aquila) IT



Objectives

- To recognise and estimate **seismic hazard** and other earthquake related side-effects in urban areas
- To deliver **accurate** and **updated maps** of spatial planning, land use and land cover at local scale, using VHSR satellite imagery and historical aerial photography and **estimate the rate of urban fabric development**
- To analyse and deliver information on the **premises and infrastructure elements** and make reliable assumptions on **buildings construction endurance** (according to the specific anti-seismic regulation applied in the past) and generate **comprehensive inventory** of critical sites, and buildings of specific use (e.g public, hospitals, schools) and life-lines
- To formulate appropriately related **socio-economic data** (e.g. population density, building sizes and cost) based on existing census data
- To develop models for the **evacuation of population** in case of a major earthquake, and provide user-friendly tools for running **alternative evacuation scenarios in case of arterial road destruction**
- To create models for the calculation of urban **vulnerability** and seismic **risk**, easily transferable to other areas
- To integrate and combine all generated models and information layers **to GIS environment** and **develop IT tools for creating and running scenarios of earthquake** occurrence, and generate **assessments and knowledge on the expected damages** at city block together **with feasible evacuation suggestions**.



Objectives

- **To provide support to the Civil Protection** towards integrating the project outcome and developed IT tools in the daily practice for **improving preparedness and risk prevention planning**.
- **To improve co-operation with countries with similar problems**
- **To enhance the public awareness**
- **To promote the project idea and outcome** in two information days in Greece and Italy with the involvement of the interested parties (crisis managers, civil protections, regional authorities), and prepare relevant **scientific publications** for refereed journals and international conferences (e.g. **GMES Forum, SAFER/LinkER User meetings and forum**).
- To support project dissemination through the development of a **dedicated Web site**.



Deliverables & Milestones

| | |
|------------|---|
| 31/3/2010 | Technical Specifications |
| 31/7/2010 | Definition, Collection and Processing of Information layers |
| 30/9/2010 | Collection and Processing of Socio-economic data |
| 30/11/2010 | Map of Seismic Hazard for Greek pilot area |
| 30/11/2010 | Map of Seismic Hazard for Italian pilot area |
| 30/11/2010 | Map of Seismic Vulnerability for Greek pilot area |
| 30/11/2010 | Map of Seismic Vulnerability for Italian pilot area |
| 31/12/2010 | Database of Earthquake related information layers for the Greek and Italian pilot areas. |
| 31/1/2011 | 1 st Progress Report to the EC. Summary on the data stored in the database for Earthquake related information layers |
| 31/3/2011 | Map of Seismic Risk for Greek pilot area |

| | |
|------------|---|
| 31/3/2011 | Map of Seismic Risk for Italian pilot area |
| 30/4/2011 | Software module for solving the critical clustering problem in evacuation modelling |
| 30/4/2011 | XML data files for evacuation cases studied |
| 30/6/2011 | MASSIVE Web Site |
| 30/6/2011 | 2 nd Progress Report to the EC |
| 31/10/2011 | Scenarios of earthquake occurrence in the Greek pilot area |
| 31/10/2011 | Scenarios of earthquake occurrence in the Italian pilot area |
| 31/10/2011 | GIS application tools |
| 30/11/2011 | Scientific paper, Information days (confirmed), GMES forum/ media, SAFER/LinkER User workshops (potential) |
| 15/12/2011 | Layman's Report |
| 20/12/2011 | Final Report to the EC |



Tentative Dates of Major Events

Planned/ confirmed

- **Two dedicated information days in Greece and Italy** addressed to the awareness and training of involved Civil Protection Users, Crisis Managers, Regional Authorities (**3rd Q4 of 2011**)

Potential in the occasion of the GMES projects,

- a) ***SAFER - Services and Applications For Emergency Response***
- b) ***Linker - Supporting the implementation of an operational Global Monitoring for Environment and Security service in the field of emergency management***
 - **User workshops and training meetings (2011)**
 - **The European Civil Protection Forum, and Conferences (2011)** (e.g. IDRC Davos 2010)
 - **The large GMES forum and Emergency related trade shows (2011)**



Follow up

- Support the integration of the developed system to the daily practices of Civil Protection
- Maintain and update the earthquake related information layers and data bases
- Maintain the operation of the web site
- Support the transfer and application of the methodology to other seismic prone areas



MASSIVE



Thank you for
your attention!