

2nd

SOUTH-EASTERN EUROPEAN GEO WORKSHOP

The European Centre of Excellence BEYOND for Earth Observation based monitoring of Natural Disasters in South-Eastern Europe



*Building a Centre of Excellence for
EO-based monitoring of Natural Disasters*

Funded under FP7-REGPOT-2012-2013-1

*Activity: 4.1 Unlocking and developing the research potential of
research entities established in the EU's Convergence regions and
Outermost regions*

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Research Director of IAASARS/NOA

Project Coordinator



The organisation of the 2nd South Eastern Europe GEO Workshop is among the highly ranked priorities of **BEYOND** and as such it has been funded because:

➤ **BEYOND** aims to maintain and expand the existing state-of-the-art and interdisciplinary research potential in EO, by **Building a Centre of Excellence for Earth Observation based monitoring of Natural Disasters**

➤ **BEYOND** addresses societal needs of south-eastern Europe, with a prospect to increase its access range to the wider Mediterranean region through the integrated cooperation with more than **20 twinning organizations**



➤ **BEYOND** aspires to setting up innovative solutions for EO, allowing to a multitude of monitoring networks (space borne and in-situ) available over the region to operate in a complementary, unified, and coordinated manner

➤ **BEYOND** builds innovative research and skills capacity in the domain of EO through scientific exchange with European and regional partnering organisations

➤ **BEYOND** transforms the observations to added value products ready for down-streaming to specific societal needs in the domain of environmental monitoring and Natural Disasters

➤ **BEYOND** delivers online observations and higher level EO products and services to stakeholders, and international scientific and End User communities

Funding: 2.3 MEuros EC Contribution

Additional funding from Structural Funds ~270KEuros

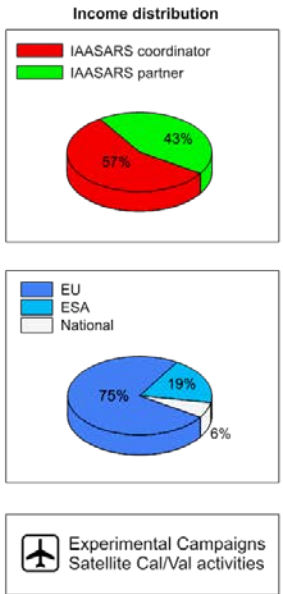
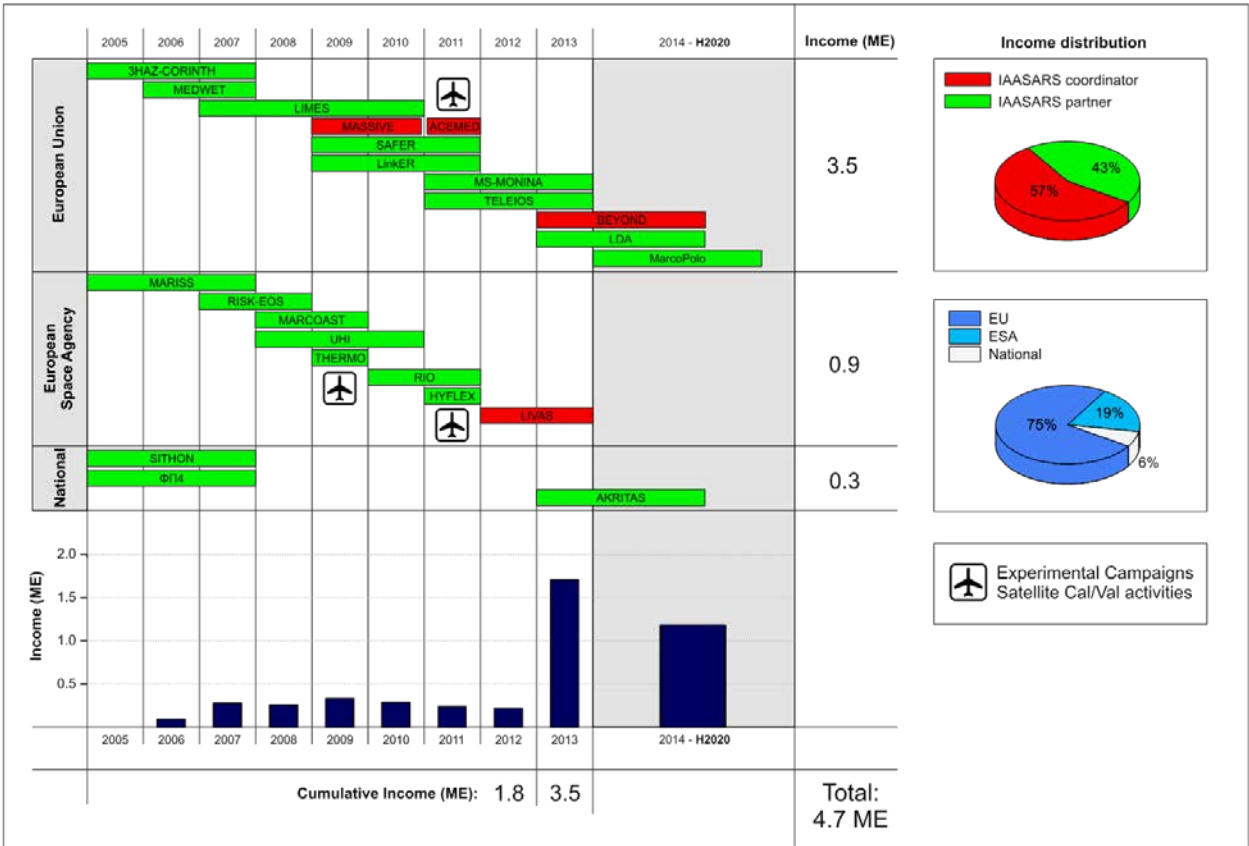


LDA Large-scale demonstrators in support of GMES and GNSS based services in Athens, Greece, GMES/DG ENTR

MASSIVE: Mapping Seismic Vulnerability and Risk of Cities, European Commission - DG ENV A.3 – Civil Protection

TELEIOS—Virtual Observatory Infrastructure for Earth Observation Data, FP7-ICT-2009-5

LIMES (Land and Sea Integrated Monitoring for European Security/GMES / EC DG Enterprise



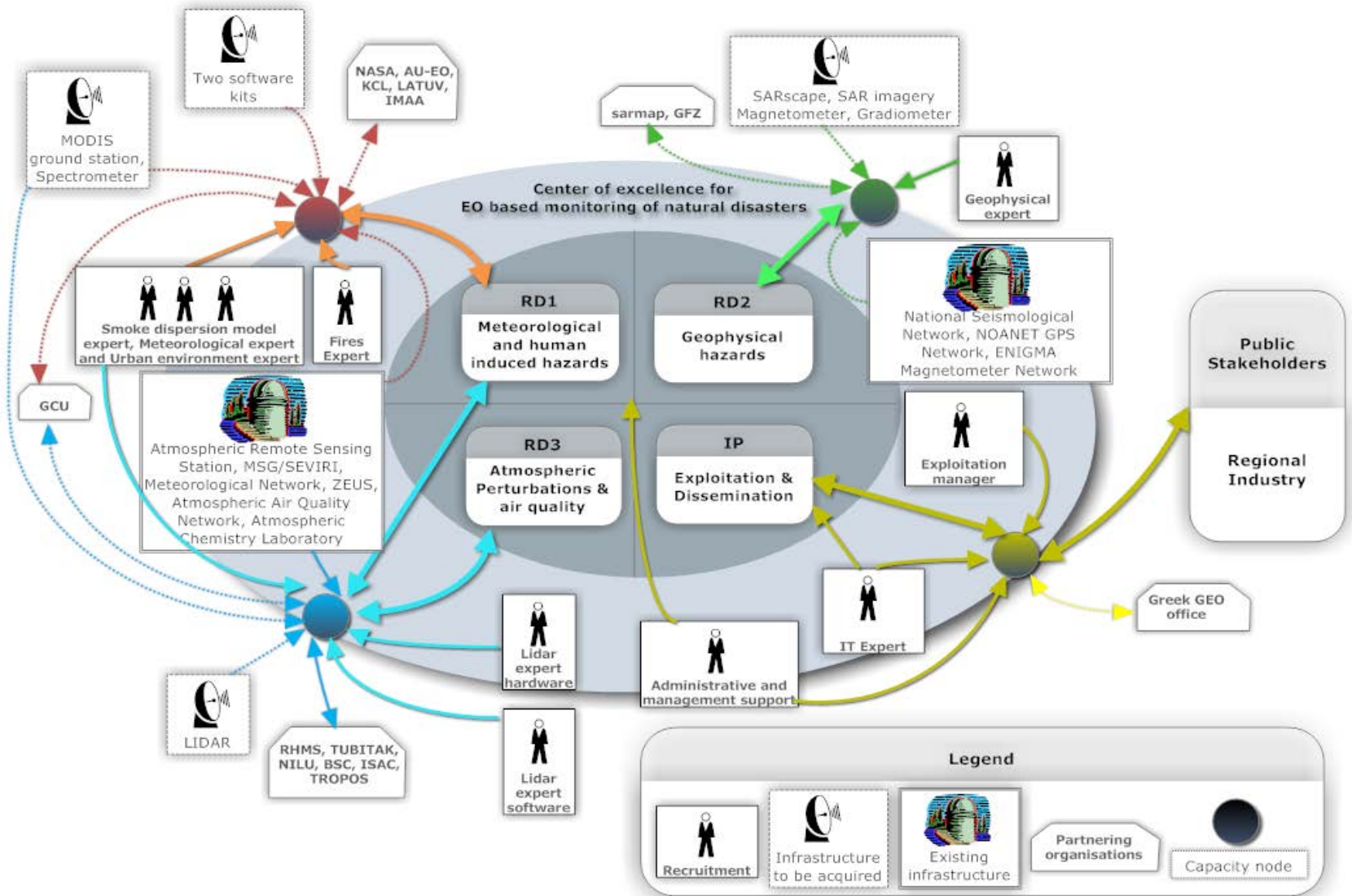
LinkER - Supporting the implementation of an operational GMES service in the field of emergency management, Invitation to Tender No: ENTR/08/028

SAFER – EMERGENCY: Building Emergency Response Core Service, FP7-2007-SPACE-1/ GMES Collaborative Project

RISK-EOS Extension to Greece - Promotion of the GSE RISK-EOS fire services portfolio in Greece, EarthWatch GMES Services Elements, ESA/GSE

MARCOAST/ISSUE-OS - Integrated system for suspect vessels emergency tracking – OIL SPILLS





EUROPEAN SPACE AGENCY- ESA

GERMAN AEROSPACE AGENCY - DLR

UK METEO OFFICE

GLOBAL CHANGE UNIT OF THE UNIVERSITY OF VALENCIA - GCU SPAIN

**REMOTE SENSING LABORATORY OF THE UNIVERSITY OF VALLADOLID -
LATUV SPAIN**

BARCELONA SUPERCOMPUTING CENTER – BSC SPAIN

NORWEGIAN INSTITUTE FOR AIR RESEARCH – NILU NORWAY

**INSTITUTE OF METHODOLOGIES FOR ENVIRONMENTAL ANALYSIS
(IMAA) - ITALY**

INSTITUTE OF ATMOSPHERIC SCIENCES AND CLIMATE (ISAC) - ITALY



KING'S COLLEGE LONDON - KCL UK

GERMAN RESEARCH CENTRE FOR GEOSCIENCES - GFZ GERMANY

LEIBNIZ INSTITUTE FOR TROPOSPHERIC RESEARCH GERMANY - TROPOS

REPUBLIC HYDROMETEREOLOGICAL SERVICE OF SERBIA - RHMS

SARMAP COMPANY FOR SAR INTERFEROMETRY - SWITZERLAND

INTERBALKAN ENVIRONMENT CENTER

REMOTE SENSING LABORATORY OF THE UN OF ABERYSTWYTH - UK

NATIONAL INSTITUTE OF GEOPHYSICS AND VULCANOLOGY INGV- ITALY



Setting up integrated satellite based observational solutions

➤ **X-/L- band** acquisition station for (EOS Aqua and Terra, NPP, JPSS, NOAA, Met Op, FengYun) **(part of the DB network)**

➤ **MSG SEVIRI** Acquisition station **(part of EUMETSAT's network)**

➤ **Access to NOA's Collaborative Ground Segment (Mirror Site) dedicated to ESA Sentinel missions (Copernicus)**, allowing near real time acquisition of S-1, S-2, and future S3, S5P satellite missions

➤ **Access to NOA's in-situ monitoring seismological, magnetometer, and GPS networks**



IAASARS/NOA MSG SEVIRI Acquisition station



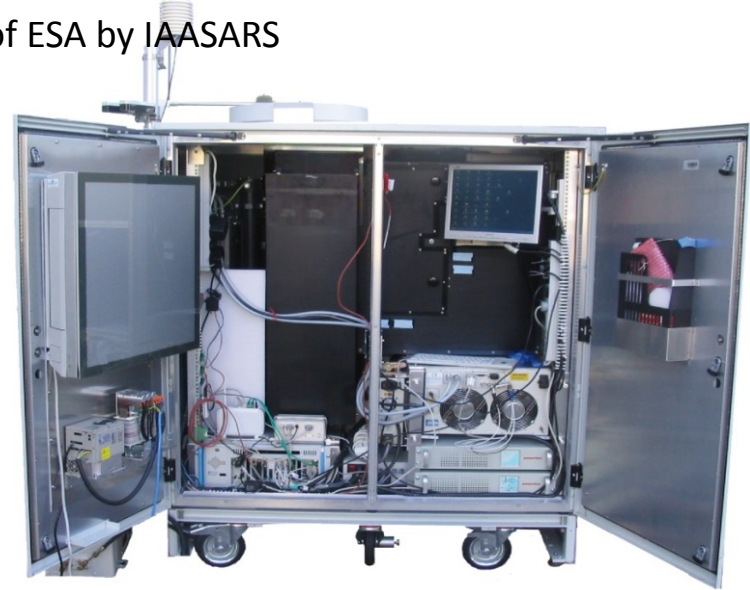
IAASARS/NOA X-/L-band Acquisition station



Operation of the mobile lidar of ESA by IAASARS



Development of a state-of-the-art multi-wavelength lidar to be installed in Crete (FKL), in the framework of the BEYOND project, part of the EARLINET network.



Infrastructure Capacity Building



ACHIEVEMENTS – EO SERVICES



Service	Status	End Users	Scale
EMERGENCY RESPONSE/EMERGENCY SUPPORT-METEO RELATED HAZARDS			
Real Time Fire Monitoring	Operational GMES Standard	Fire Brigades, Civil Protection, Public, Private Sector	National Regional
Rapid Fire Mapping	Operational GMES Standard	Fire Brigades, Civil Protection, Forestry Services, Min of Env	Regional Local
Disaster Event Mapping & Damage Ass.	Operational GMES Standard	Forestry Services, Min of Env (DG for Nat. Vegetation/Forest Protection)	Local
Seasonal/Diachronic Fire Mapping & Damage Ass.	Operational GMES Standard	Forestry Services, Min of Env (DG for Nat. Vegetation/Forest Protection, Cadastral Org, Fire Brigades)	National
Wild Fire Smoke Dispersion	Research/ Preoperational	Fire Brigades, Civil Protection, Min of Env	Regional Local
Saharian Dust Episodes	Research/ Preoperational	Civil Protection, Min of Env, Public	National
Flood Risk	Research/ Preoperational	National Electric Power Org, Min of Development, Local Authorities, Civil Protection	Regional Local
Heat Waves Risk	Research/ Preoperational	Min of Public Health, Local Authorities, Medical Science	Local

Web service

Web service

Delivered

To be Delivered as
V1.0 in 2014

To be Delivered as
V1.0 in 2015-2016

EMERGENCY RESPONSE/EMERGENCY SUPPORT- GEO- HAZARDS			
Earthquake related crustal deformation field	Operational GMES Standard	Anti-seismic Planning & Protection Org, EQ Scientists	Local
Volcano related surface velocity field	Operational GMES Standard	Anti-seismic Planning & Protection Org, Local Authorities, EQ Scientists	Local
Landslide related surface velocity field	Research	Anti-seismic Planning & Protection Org, Local Authorities, Entrepreneurs, Civ. Eng, Geologists	Local
ATMOSPHERIC DISTURBANCES - CLIMATOLOGY			
3D-Climatology	Operational GMES Standard	Cal/Val Industry, Global Atm Monitoring Networks	Global
Atmospheric Episodes	Research	Cal/Val Industry, Global Atm Monitoring Networks, Medical Science	Local
LULC CHANGE MONITORING – UAV / AIRBORNE / SATELLITE			
Urban Mapping	Operational GMES Standard	World Bank, EIB, Min of Env, Cadastral Org	Local
UAV Damage Recording	Research/ Preoperational	Anti-seismic Planning and Protection Organisation	Local
Ecosystem Monitoring and Mapping (Forests/Wetlands)	Operational	Min of Env, Hellenic Biotope & Wetlands Center, Cadastral Org	National Regional

Delivered

To be Delivered as V1.0 in 2014

To be Delivered as V1.0 in 2015-2016

Web service



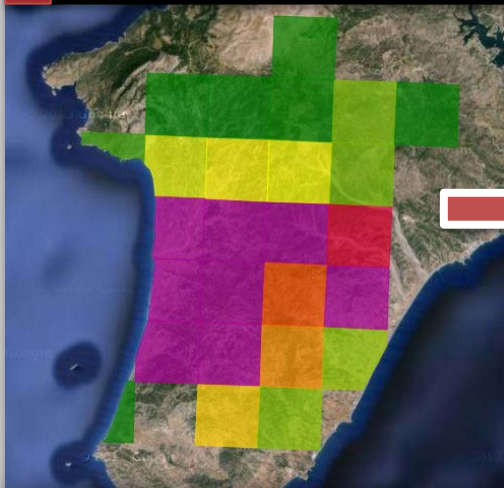
Regional Real Time Fire Monitoring - NOA's MSG SEVIRI Station



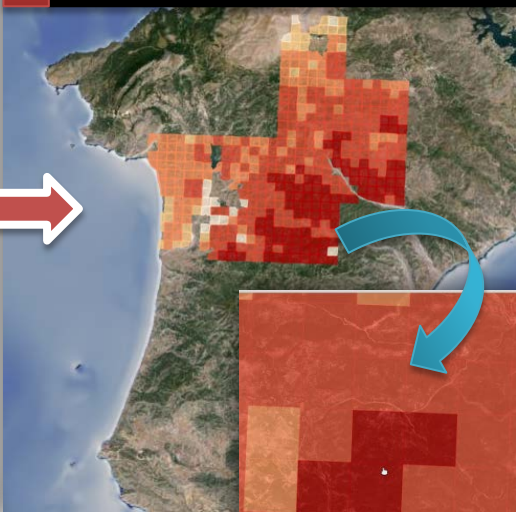
SEVIRI MIR 070823_1030 UTC



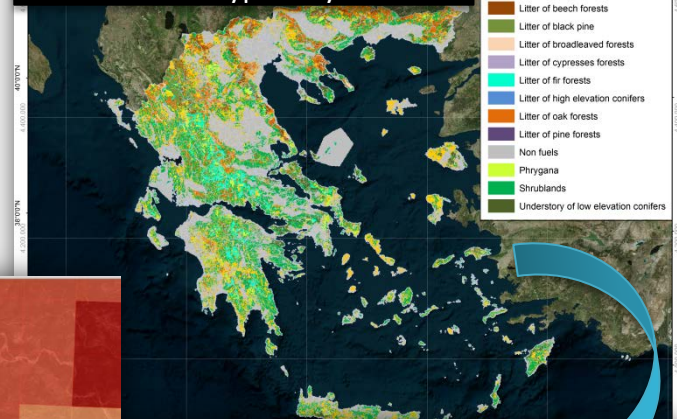
A Raw SEVIRI data (3.5x3.5 Km)



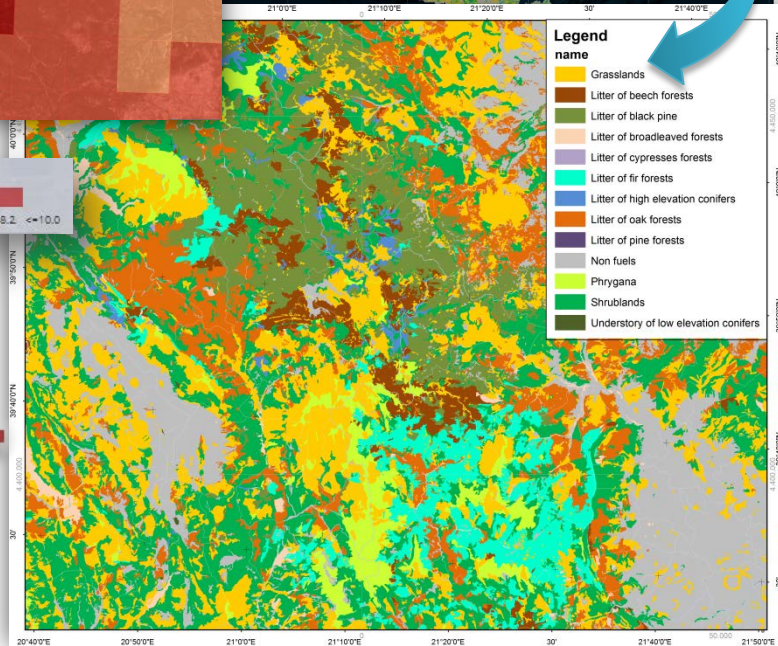
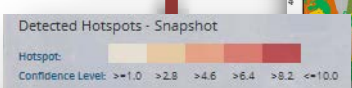
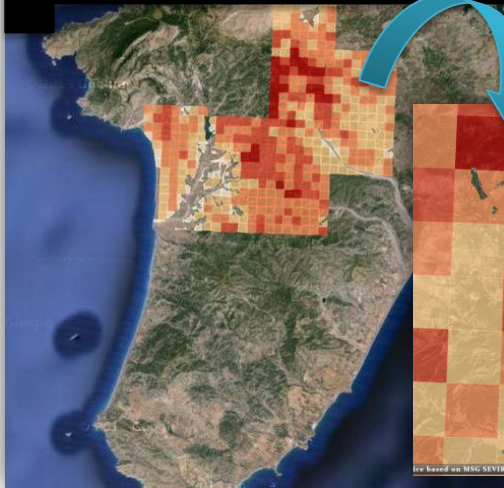
B Refined SEVIRI data (0.5x0.5 Km)

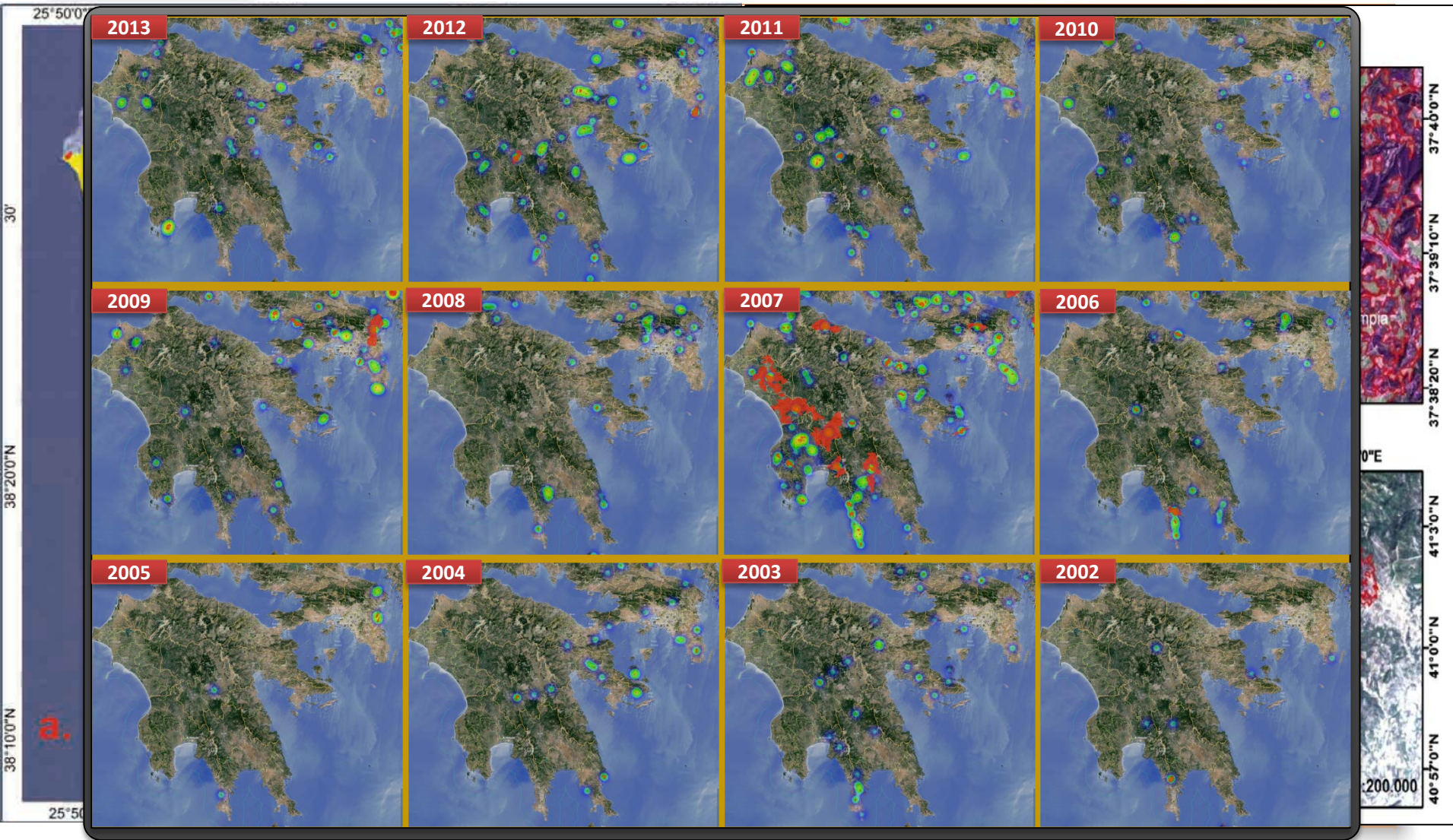


C High resolution Land Cover & Fuel Types Layer

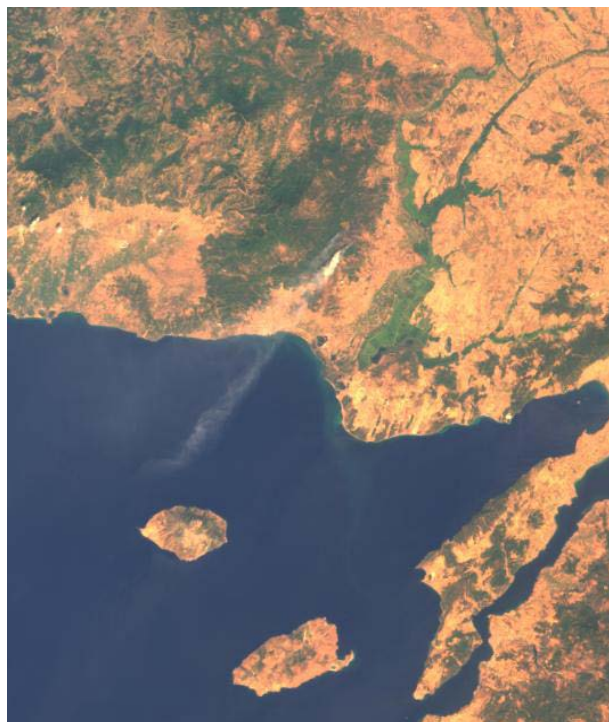


D Refined SEVIRI data (0.5x0.5 Km)
High accuracy Fuel Layer





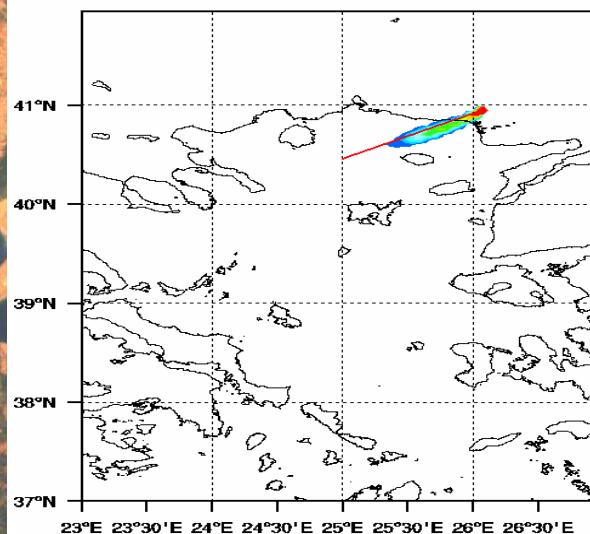
Forecasting Vertical structure of smoke plume Cross section of Organic Carbon concentration (ng m⁻³)



MISR satellite image
24 August 2011, 08:00 UTC

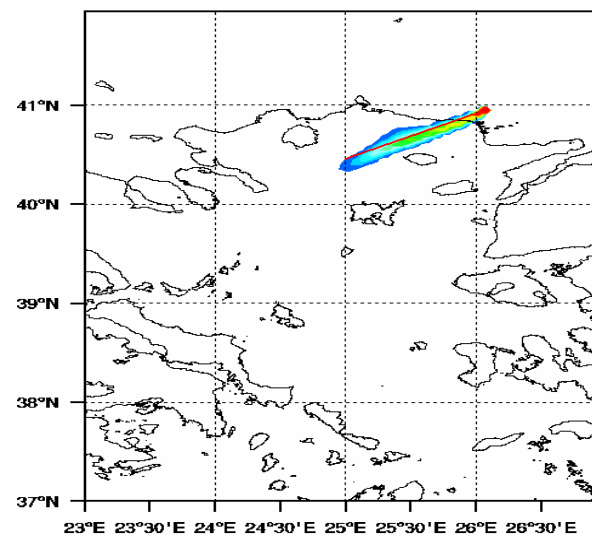
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

valid date:24-08-2011 08UTC
Model layer: Integrated Column (ng m⁻³)



FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

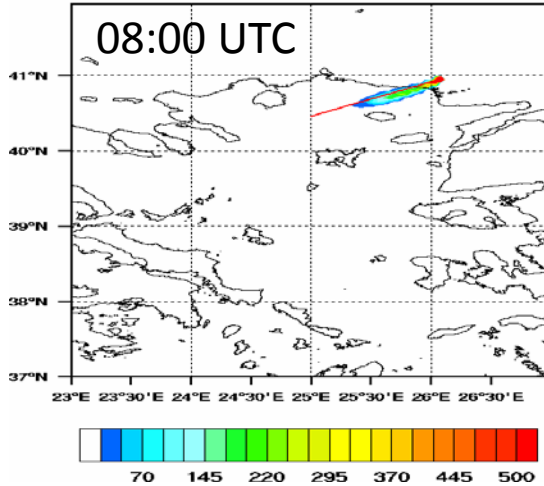
valid date:24-08-2011 09UTC
Model layer: Integrated Column (ng m⁻³)



Simulated concentration of Organic Carbon (ng m⁻³) 24 August 2011, 08:00 (left) and 09:00 (right) UTC

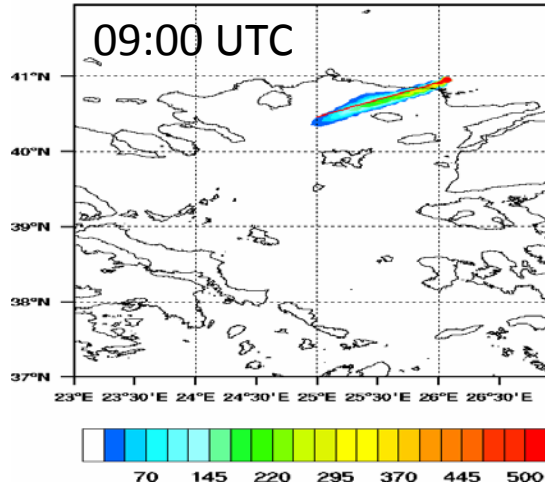
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

valid date:24-08-2011 08UTC
Model layer: Integrated Column (ng m⁻³)



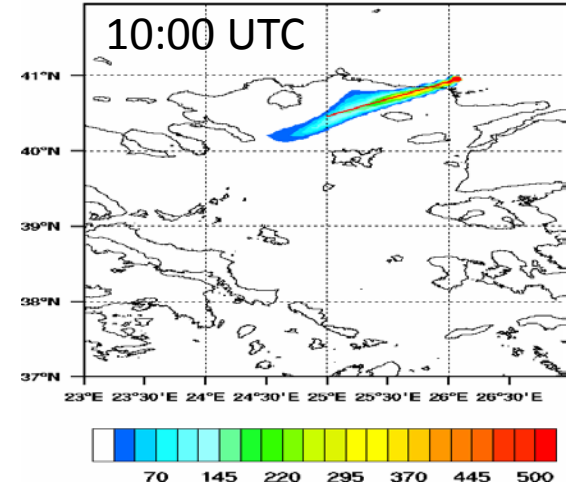
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

valid date:24-08-2011 09UTC
Model layer: Integrated Column (ng m⁻³)

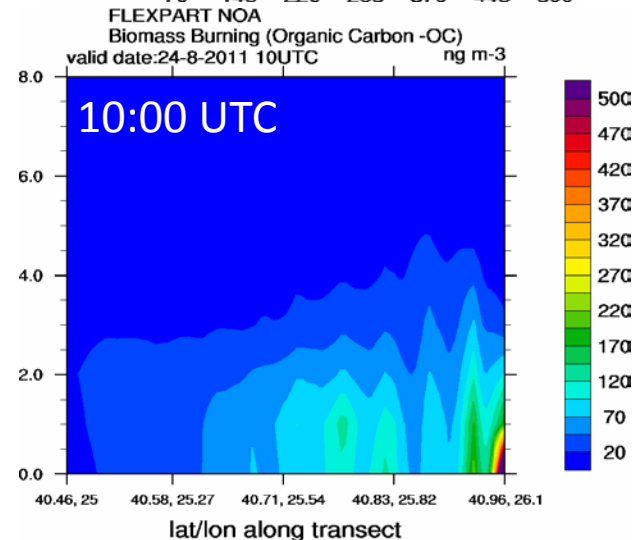
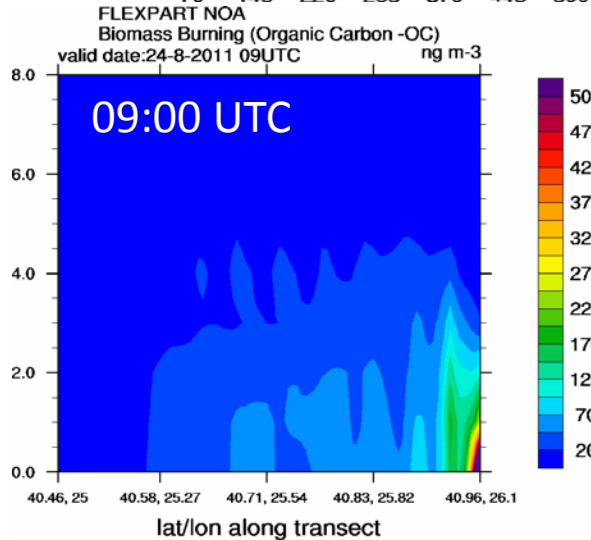


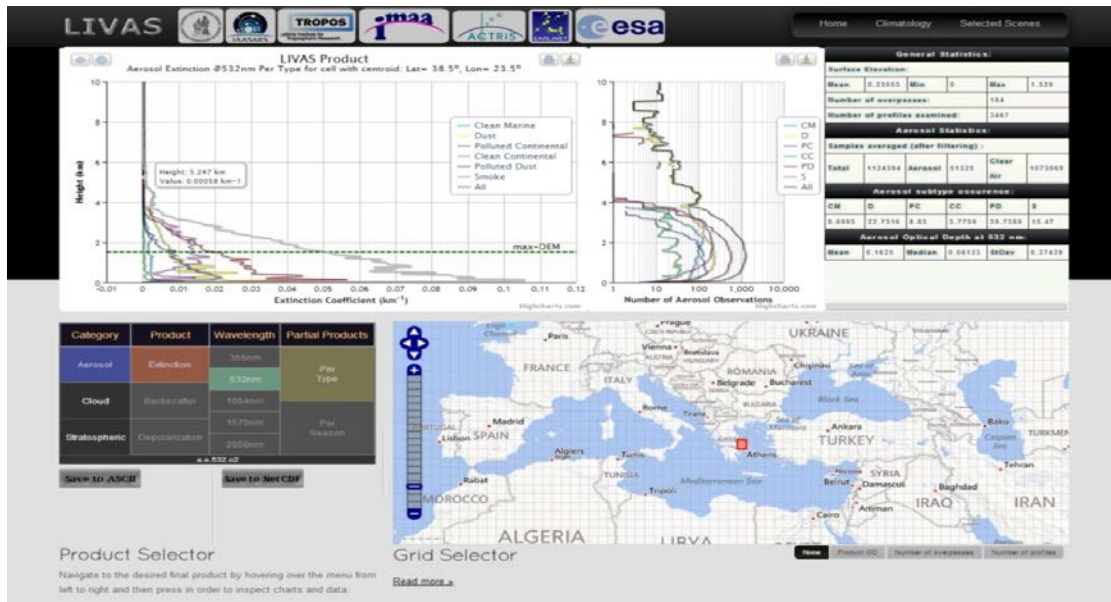
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

valid date:24-08-2011 10UTC
Model layer: Integrated Column (ng m⁻³)

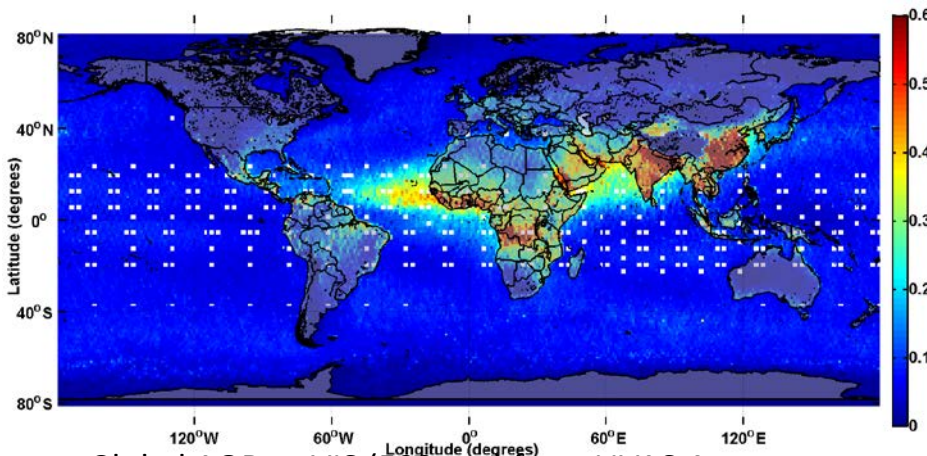


**Forecasting Vertical
structure of smoke
plume Cross section of
Organic Carbon
concentration (ng m-3)**

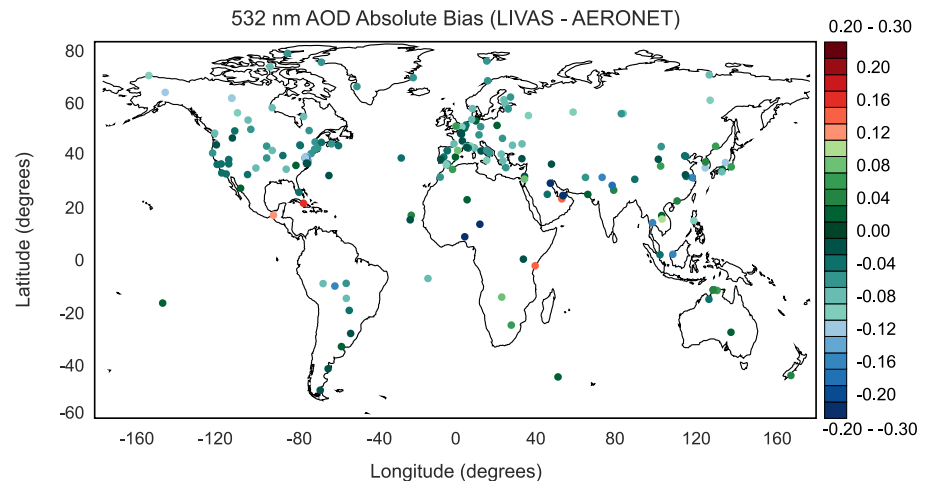




Global 3D climatology of aerosols and clouds LIVAS portal under BEYOND (1x1 degree resolution)



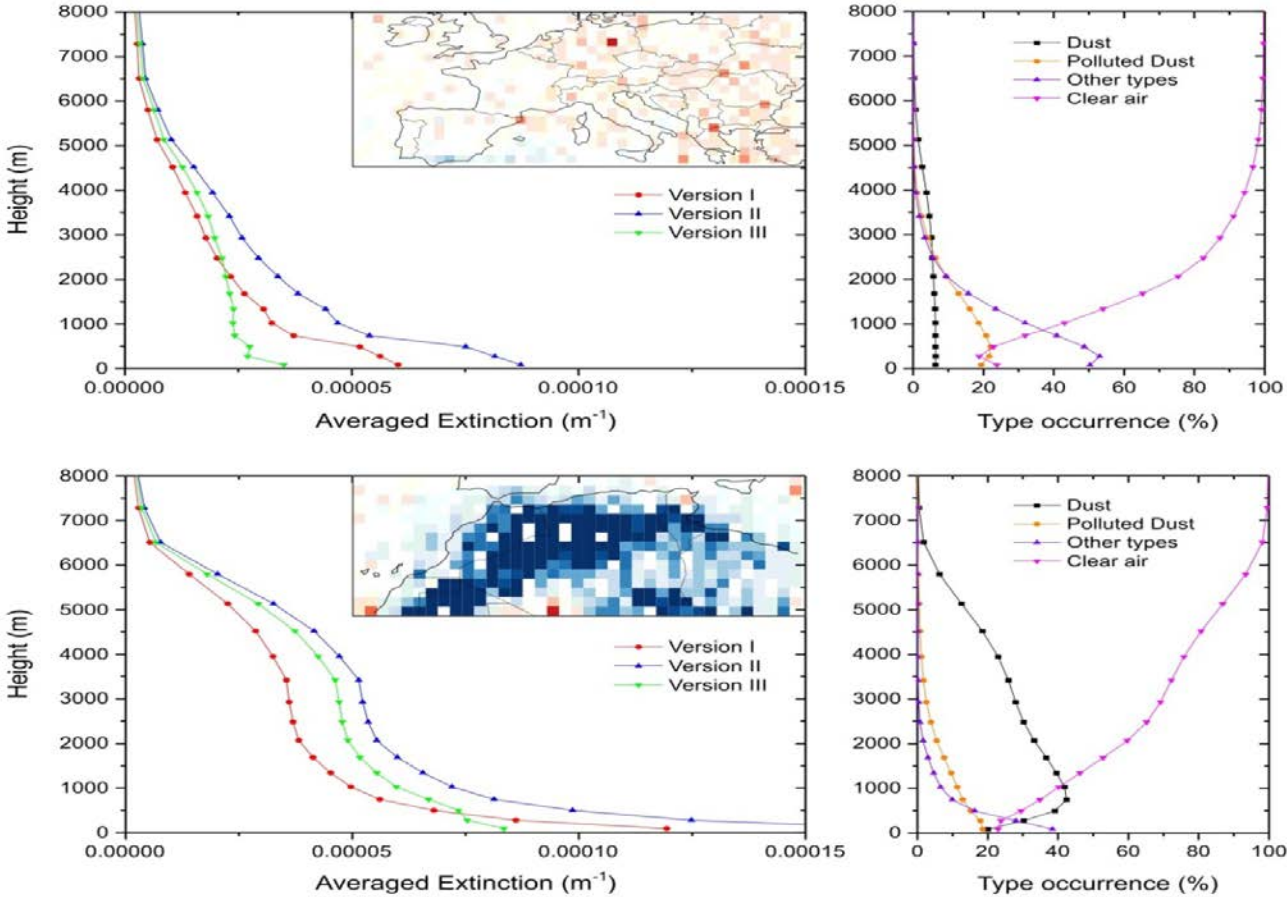
Global AOD at VIS (532 nm) from LIVAS 4-year averages of CALIPSO observations



LIVAS AOD evaluation against AERONET



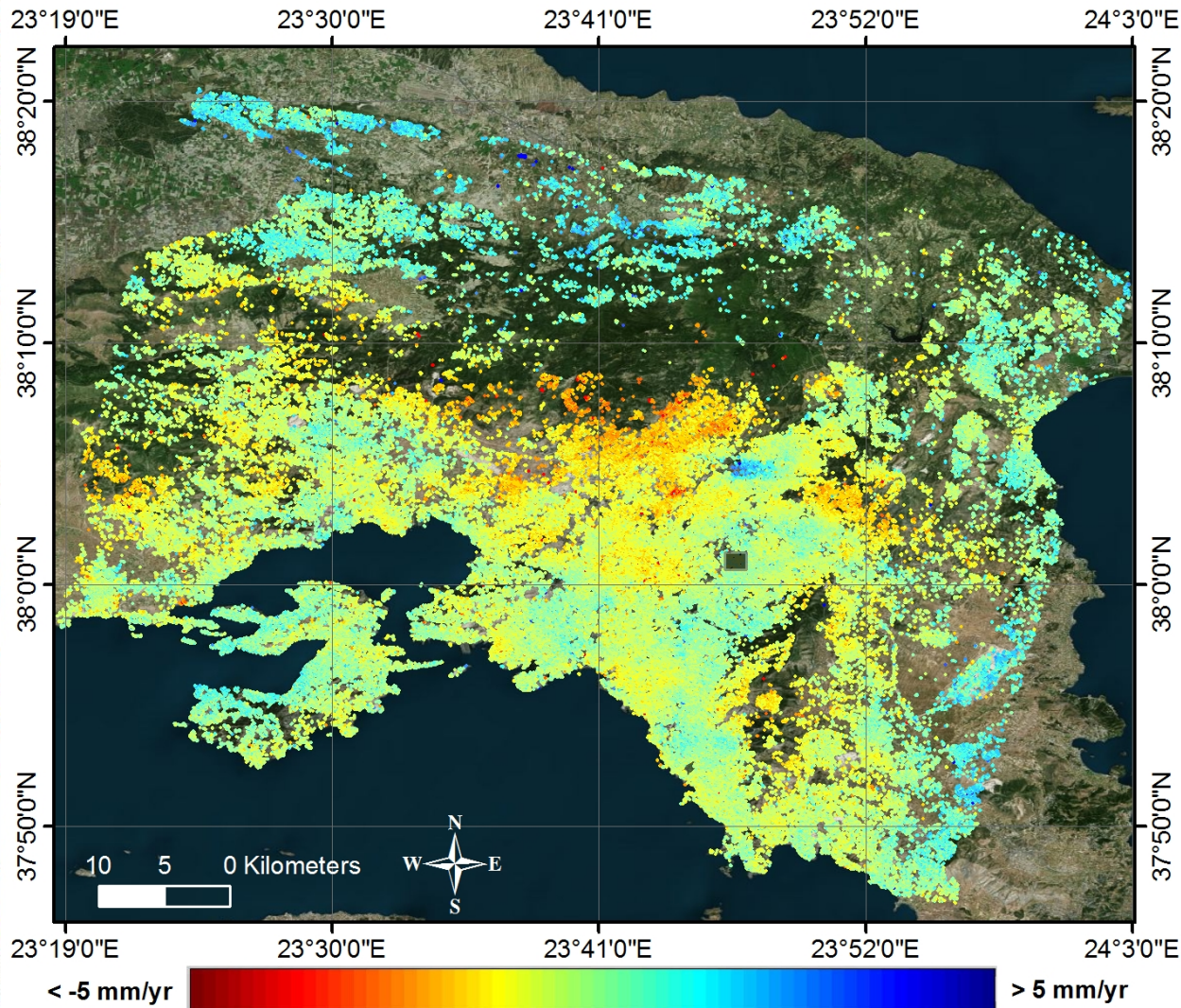
BEYOND dust product based on CALIPSO



The dust product of BEYOND is provided with a vertical resolution of 60m. The LIVAS BEYOND products are currently used as the Reference Atmospheric Model (RAM) by ESA for simulation tests in hardware and software level of future lidar missions like ADM-Aeolus and EarthCARE Earth Explorers.



Stack IV (T236 ENV 2003 - 2010): Velocity field

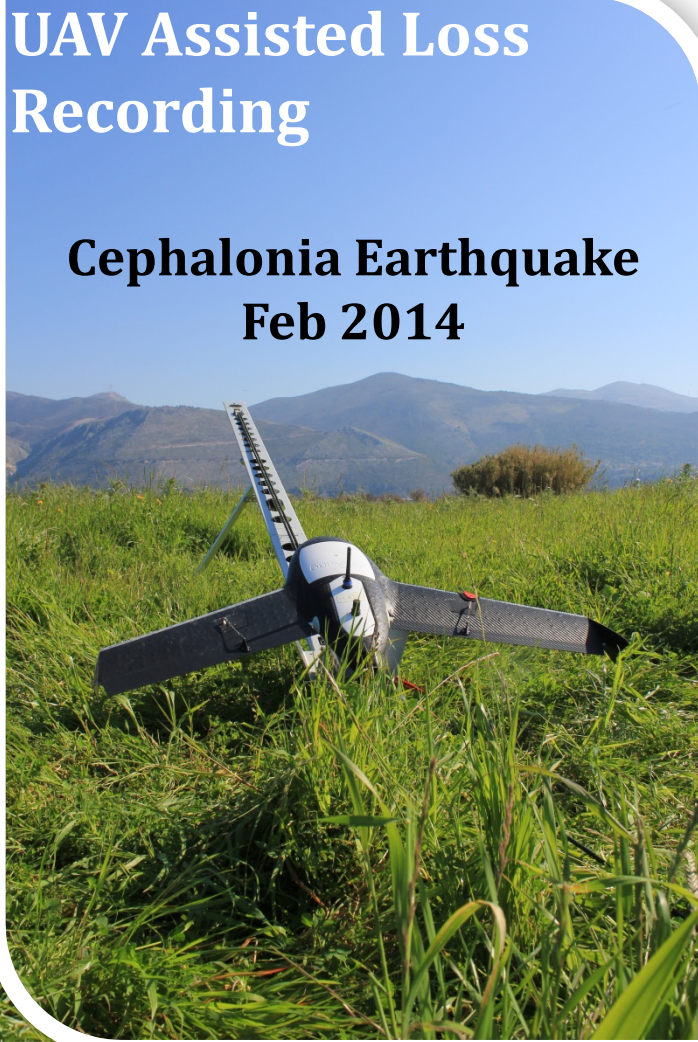


**Operational
InSAR/
CinSAR
Deformation
Rate
monitoring**

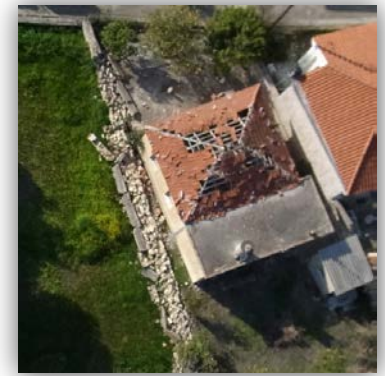
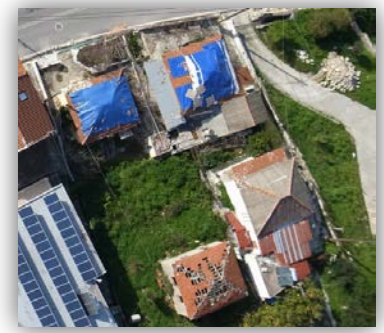
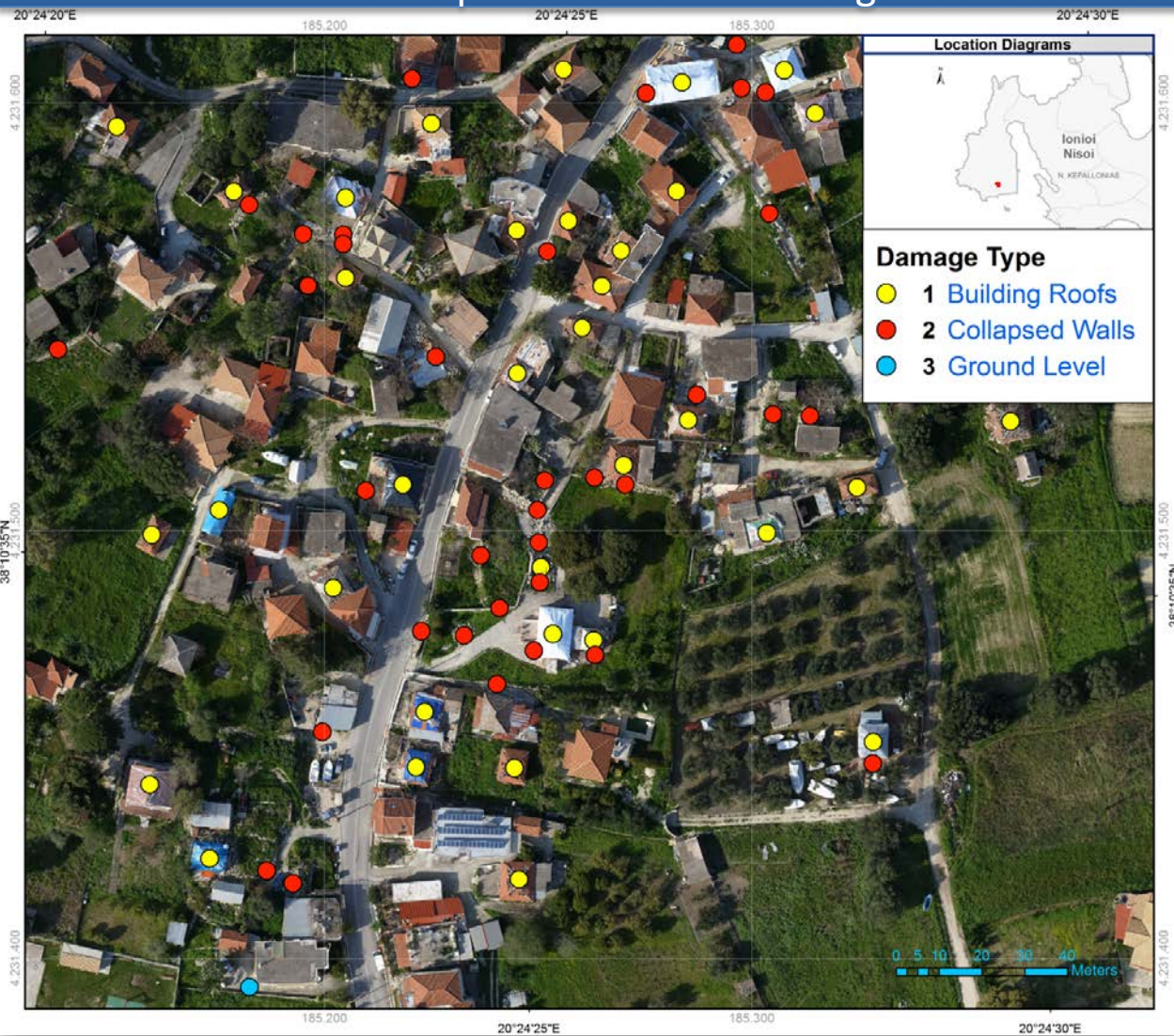


UAV Assisted Loss Recording

Cephalonia Earthquake Feb 2014

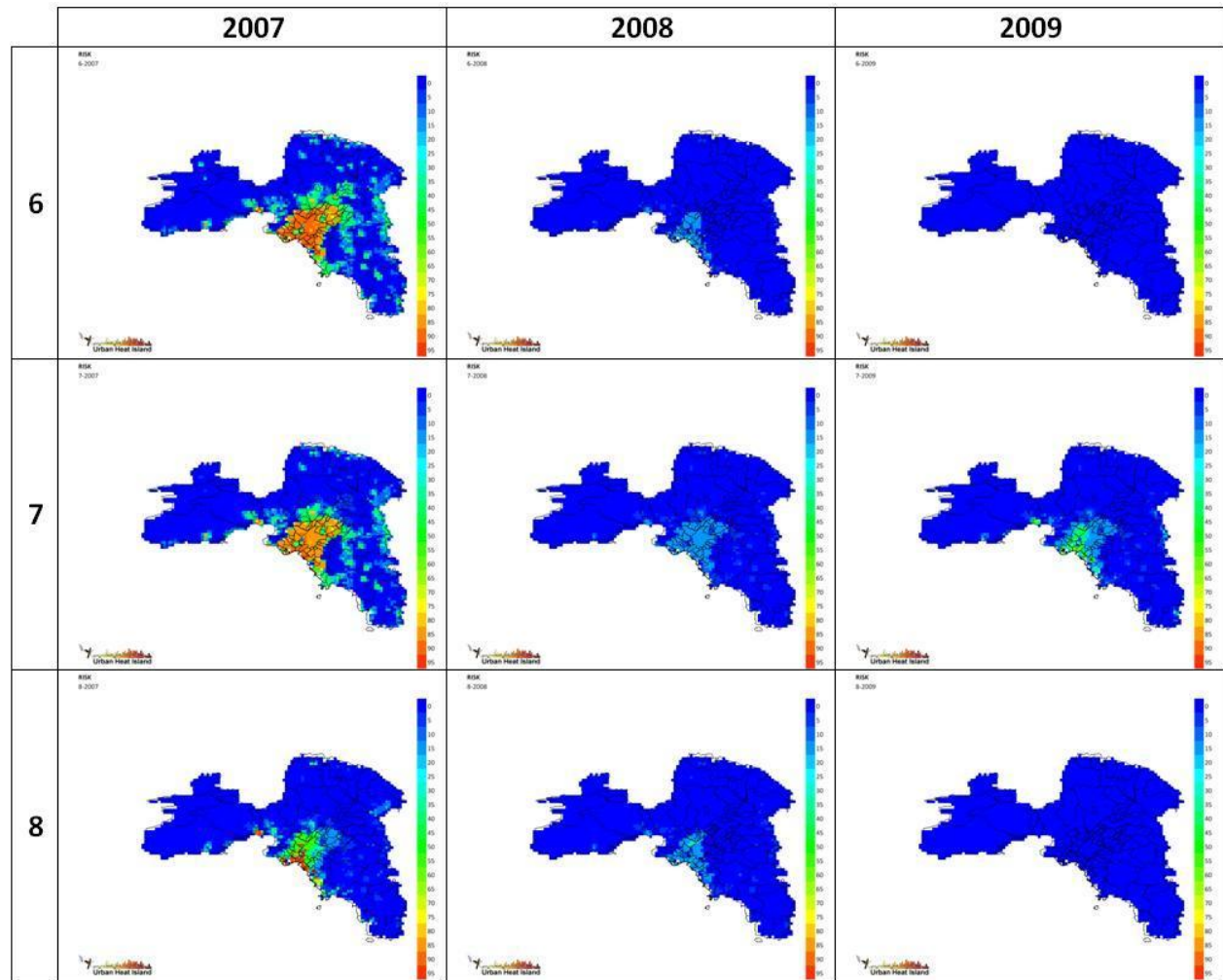


Cephalonia Island – Village of Mantzavinata



Heatwave Risk Assessment

Urban Heat Island



Flood Risk Modelling and Flood extend

The area of the basin is over 6300 km², with an average annual rainfall of 779 mm. The flood event occurred on 21-28 January 2003.

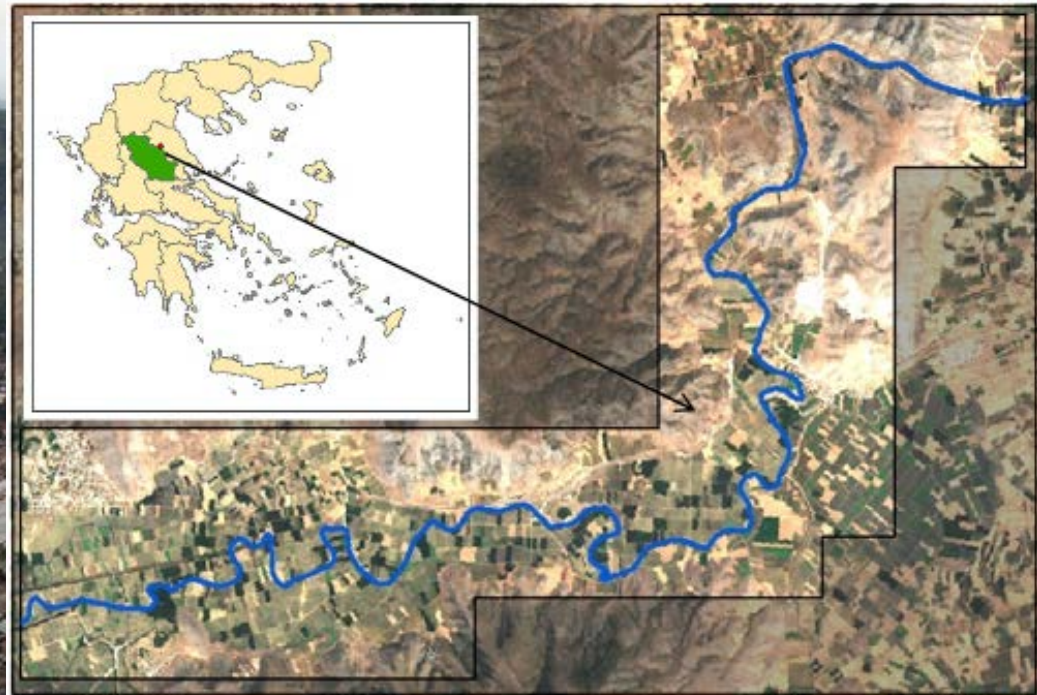


Figure 1: study area



ACTIVE CONTRIBUTION TO GEO AND GEOSS



- ❑ **BEYOND is a member of the** GEO-Natural Disaster Task, GEO-Urban Env Task, ACTRIS, EARLINET, EFMC European/Worldwide networks, and is a GMES validated provider of products/services to national/european End User community
- ❑ **BEYOND establishes contacts, and signs MOUs and SLAs with institutional End Users and International Organisations for EO data exploitation, service enhancement and new services development in the region of SE Europe**
- ❑ **BEYOND sets up integrated satellite based observational solutions Europe/World-wide based on** existing and new facilities owned by the partnering organisations at European level and the ESA's Mirror Sites
- ❑ **BEYOND fully benefits from the high scientific, operational and commercial potential of EO technology** by developing advanced methods for:
 - **Meeting the** complex needs for validation and calibration of the space data derived from the Sentinel missions as well as future ones



Thank you for your attention!

For more information

<http://www.beyond-eocenter.eu>

