



→ COPERNICUS

SENTINELS SERVING SOCIETY AND THE ENVIRONMENT

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*

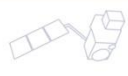
Funded under FP7-REGPOT-2012-2013-1

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

Dr Haris KONTOES

Research Director of IAASARS/NOA

Project Coordinator



BEYOND aims to maintain and expand the existing state-of-the-art and interdisciplinary research potential, by

Building a Centre of Excellence for Earth Observation based monitoring of Natural Disasters

AOI: The south-eastern Europe, with a prospect to increase its access range to the wider Mediterranean region through the integrated cooperation with more than 20 **twining organizations**

Funding: 2.3 MEuros EC Contribution

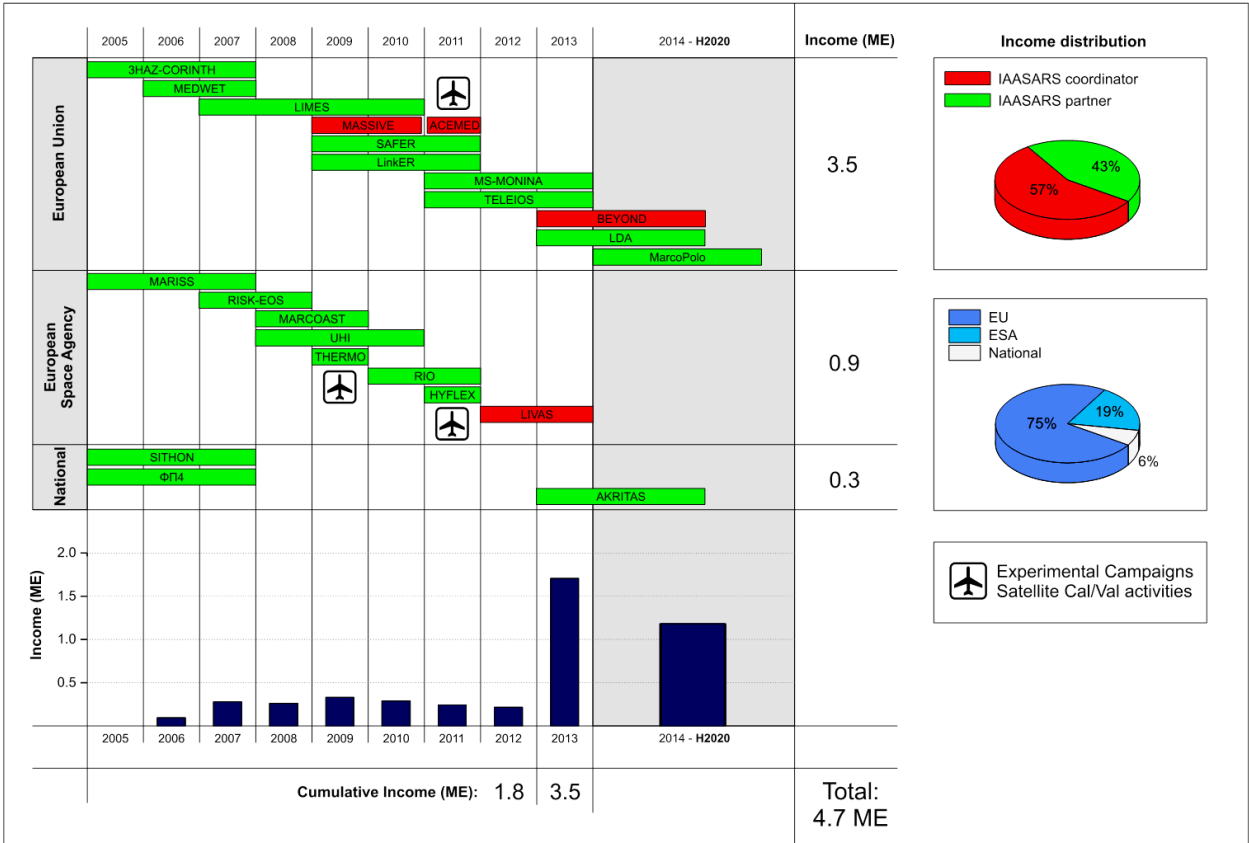
Additional funding from Structural Funds ~270KEuros

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

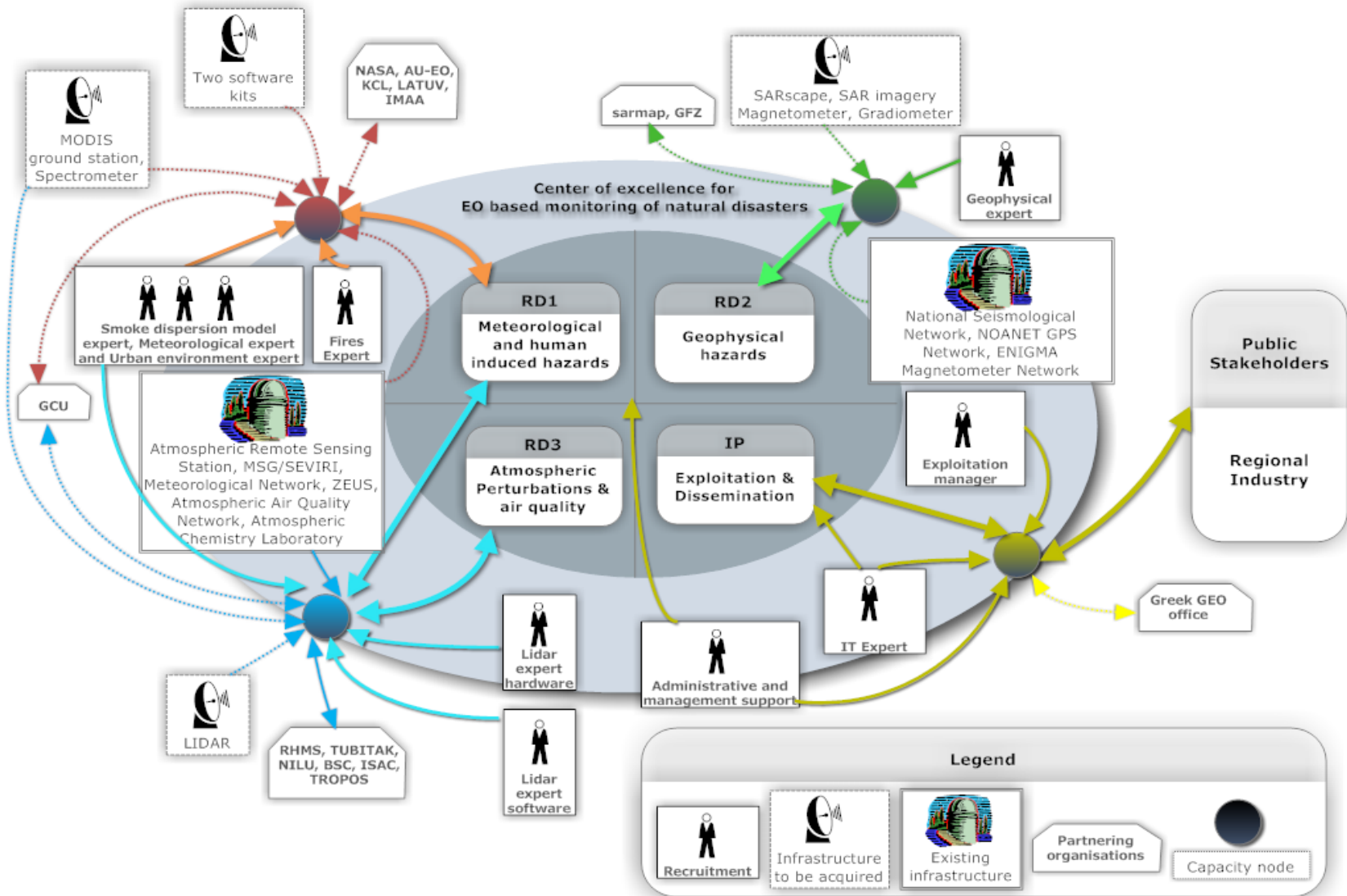


LinkER - Supporting the implementation of an operational GMES service in the field of emergency management, Invitation to Tender No: ENTR/08/028

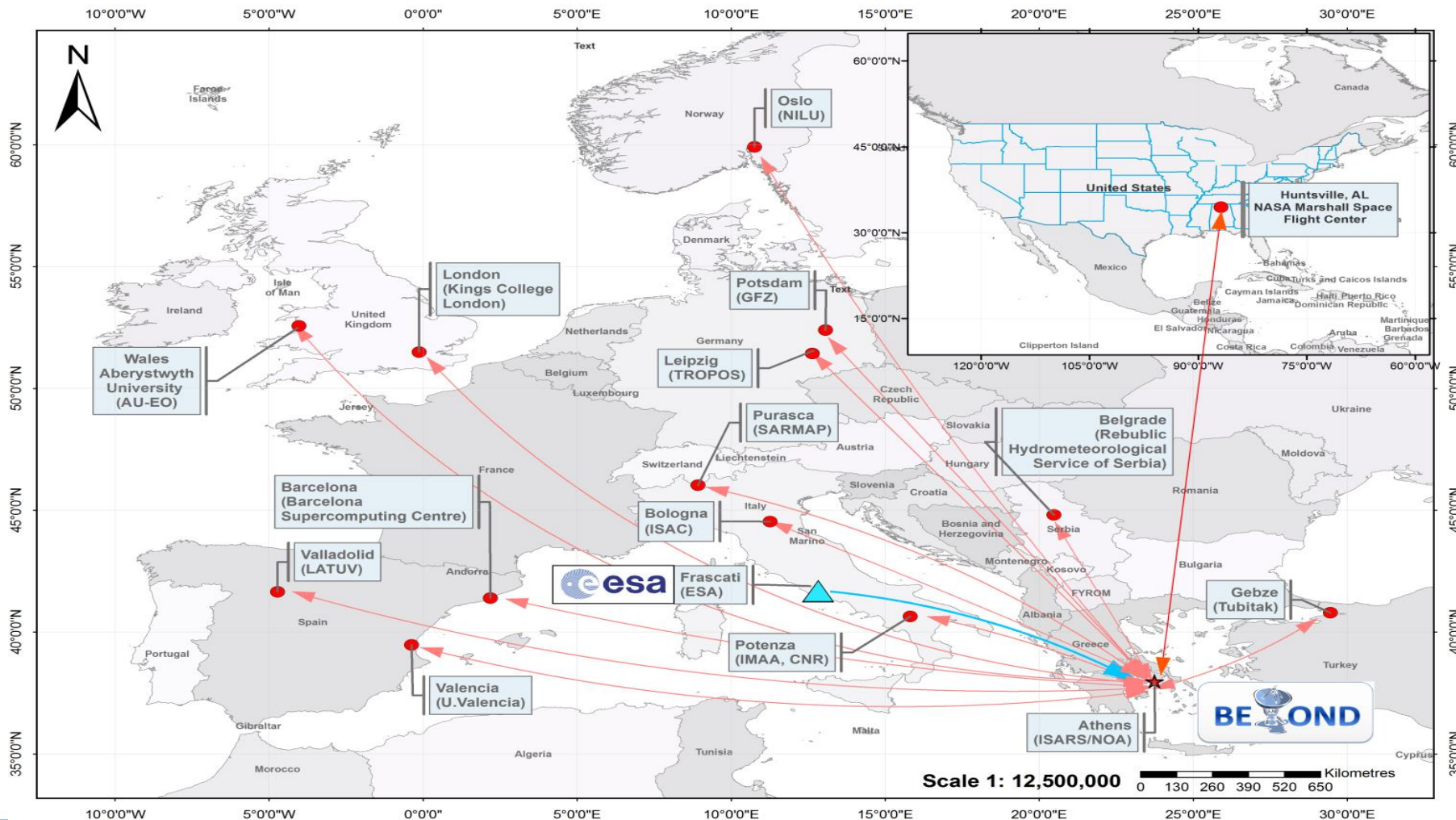
SAFER – EMERGENCY: Building Emergency Response Core Service, FP7-2007-SPACE-1/ GMES Collaborative Project

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



Partnering Organisations



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 NOAA'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

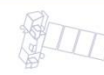
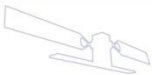
➤ **Access to NOAA's in-situ monitoring seismological, magnetometer, and GPS networks**



IAASARS/NOA MSG SEVIRI Acquisition station



IAASARS/NOA X-/L-band Acquisition station



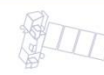
Operation of the mobile lidar of ESA by IAASARS



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

Delivered

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

To be Delivered as V1.0 in 2014

LULC CHANGE MONITORING – UAV / AIRBORNE / SATELLITE

Urban Mapping	Operational GMES Standard	World Bank, EIB, Min of Env, Cadastral Org	Local
UAV based Loss 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

To be Delivered as V1.0 in 2015-2016

Web service

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

Aliveri Euboea Fire

Olympia site Fire

Korinthos Fire

Stira Euboea Fire

Parnon Mt Fire

Taygetos Mt Fire

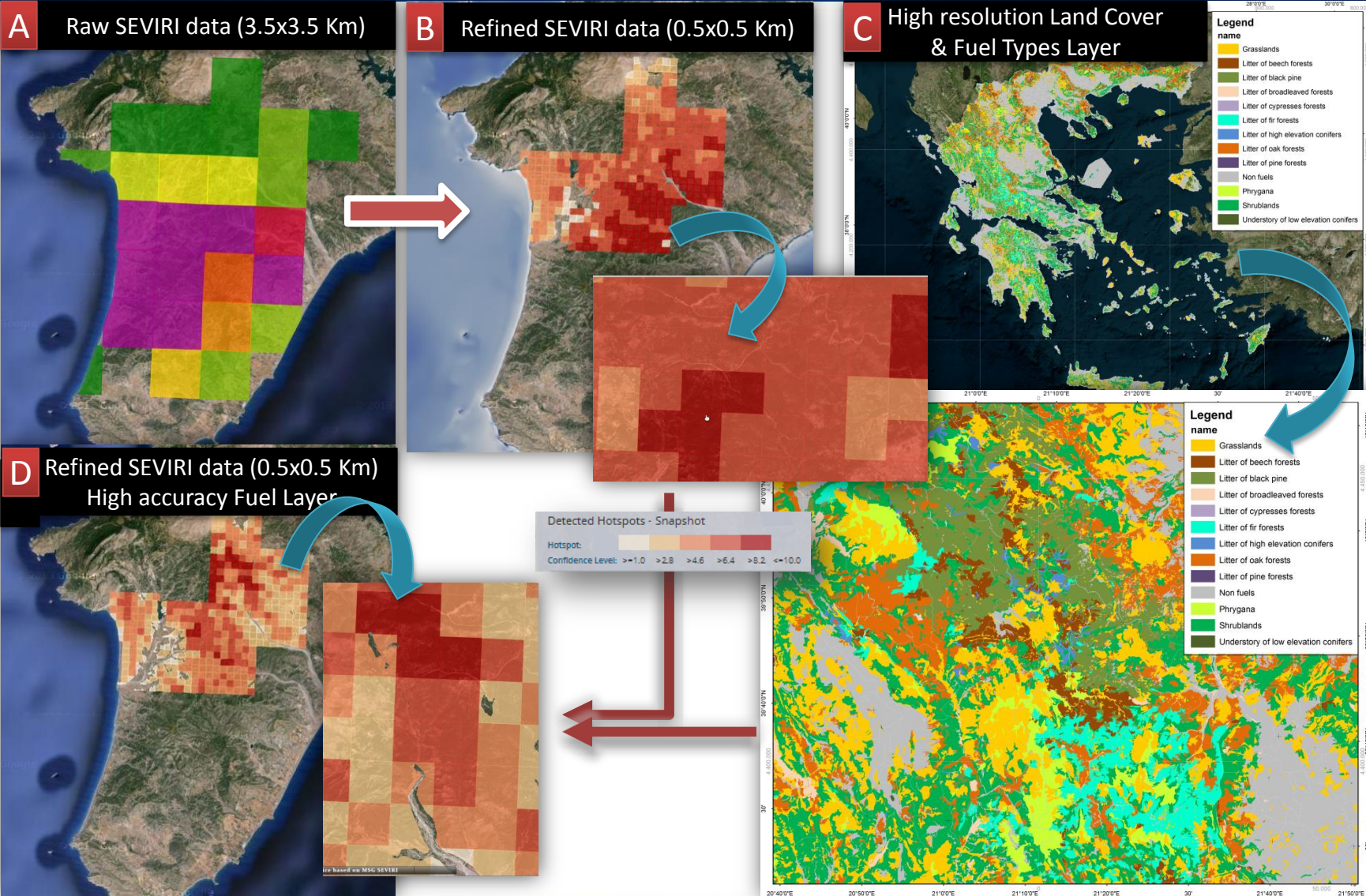
Megalopolis Fire

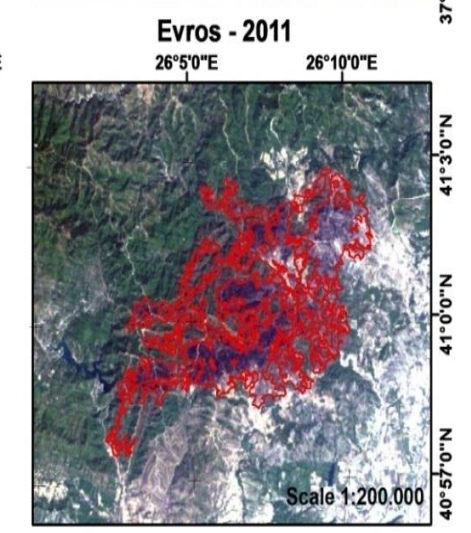
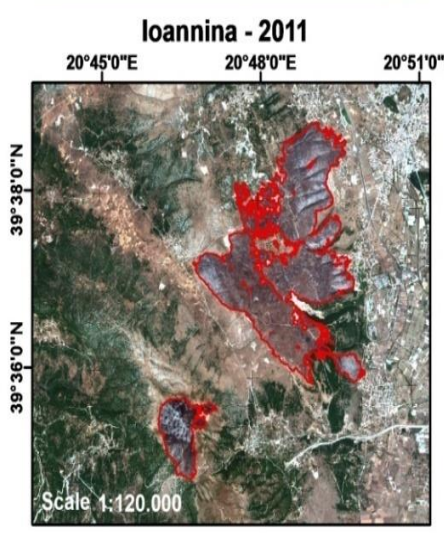
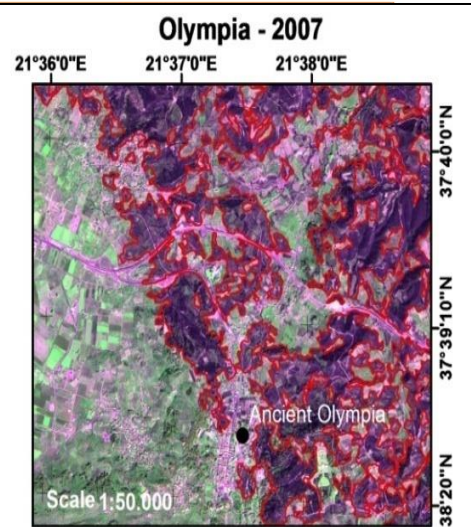
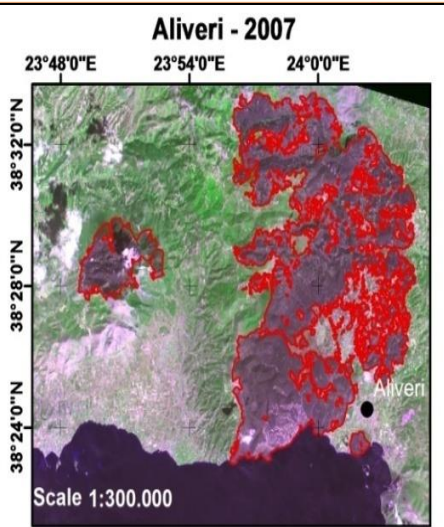
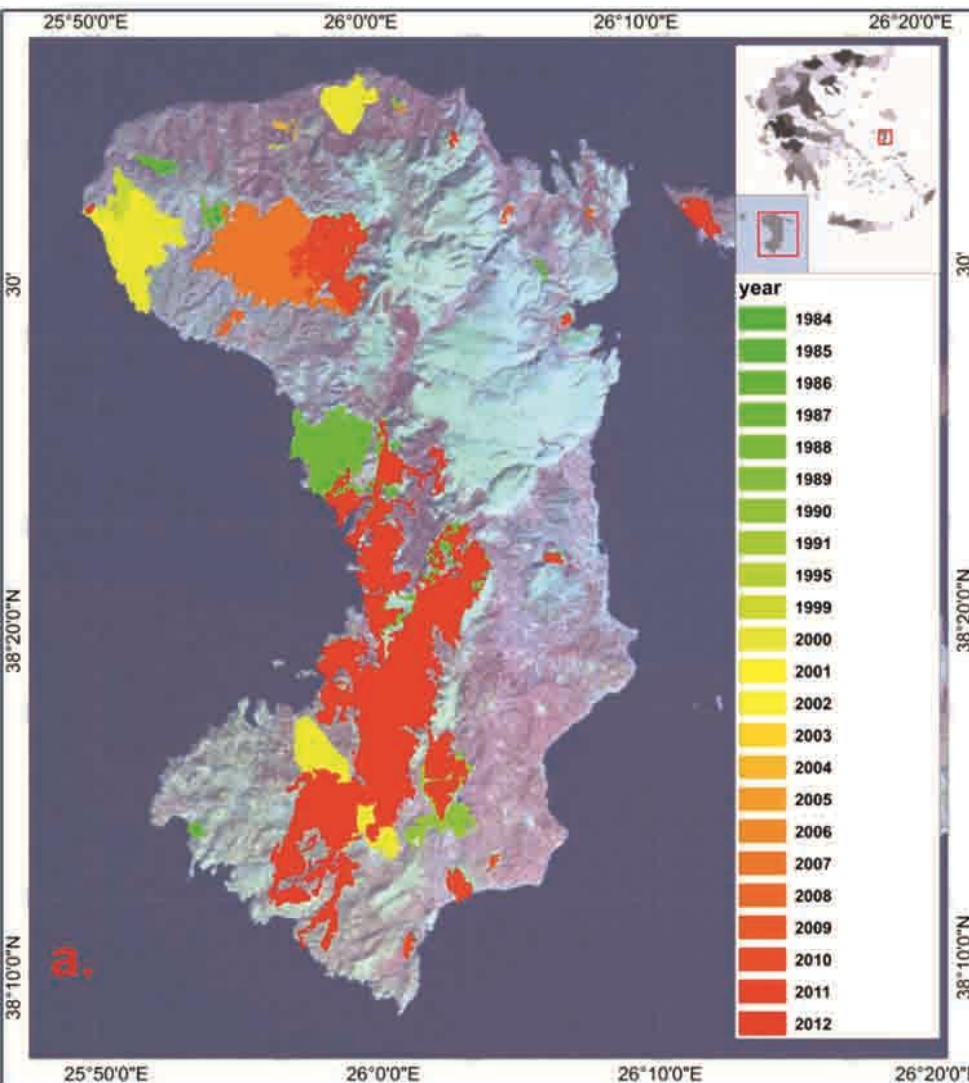
Oitilon Fire

EMERGENCY

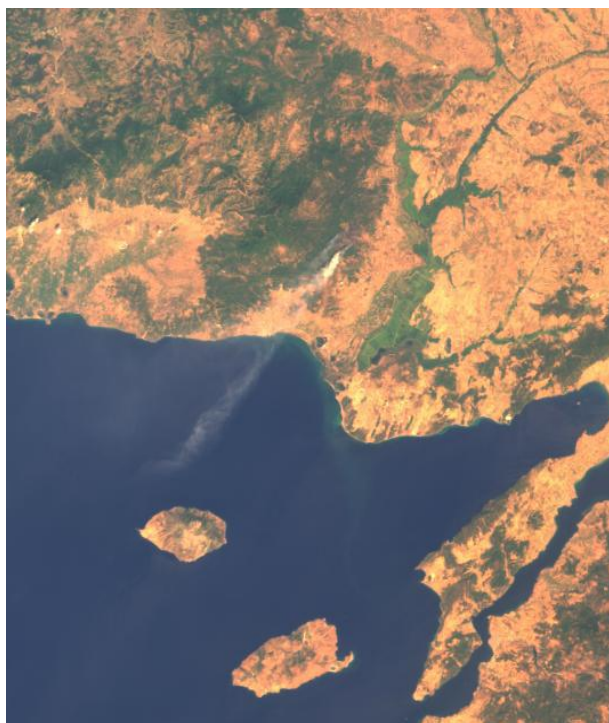
SEVIRI MIR 070823_1030 UTC

	POTENTIAL FIRE
	CONFIRMED FIRE





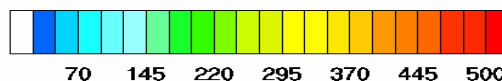
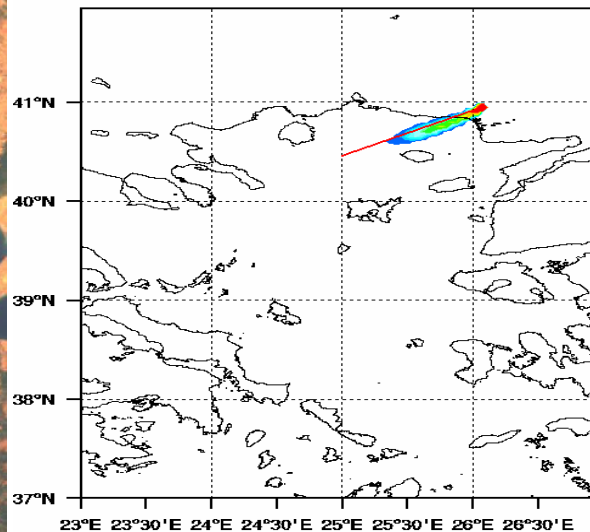
Forecasting Vertical structure of smoke plume Cross section of Organic Carbon concentration (ng m⁻³)



MISR satellite image
24 August 2011, 08:00 UTC

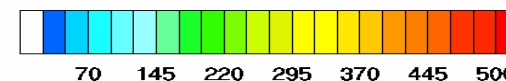
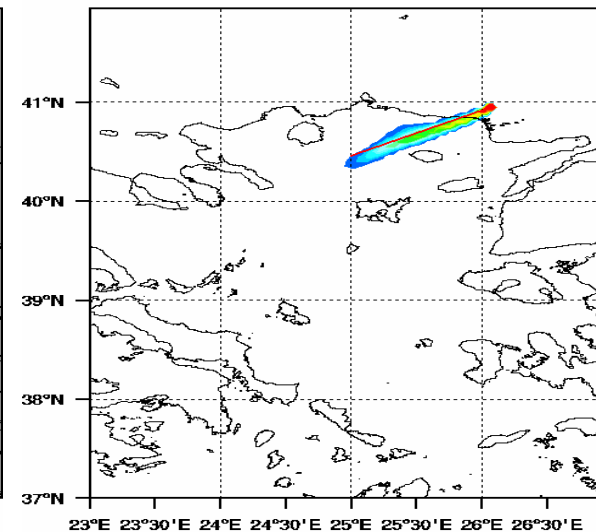
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

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



FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

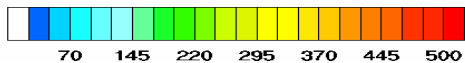
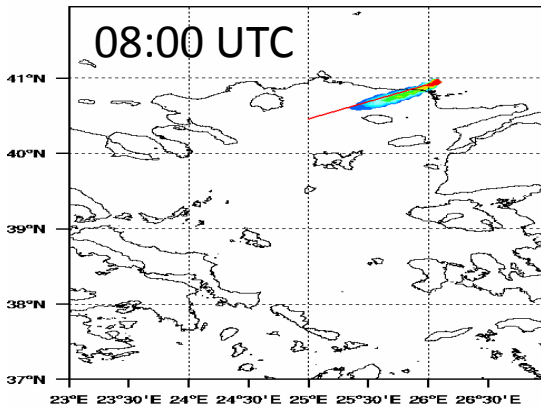
valid date:24-08-2011 09UTC
Model layer: Integrated Column (ng m⁻³)



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

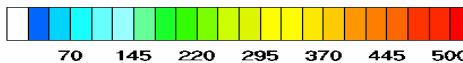
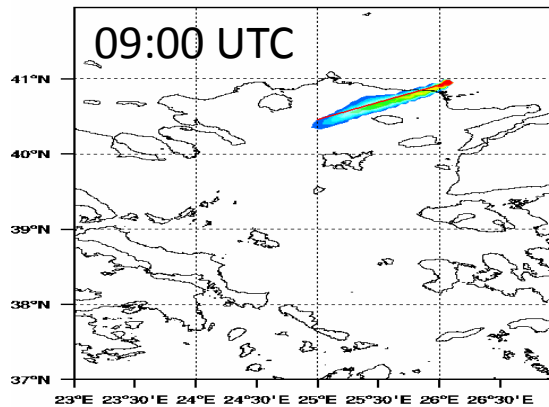
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

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



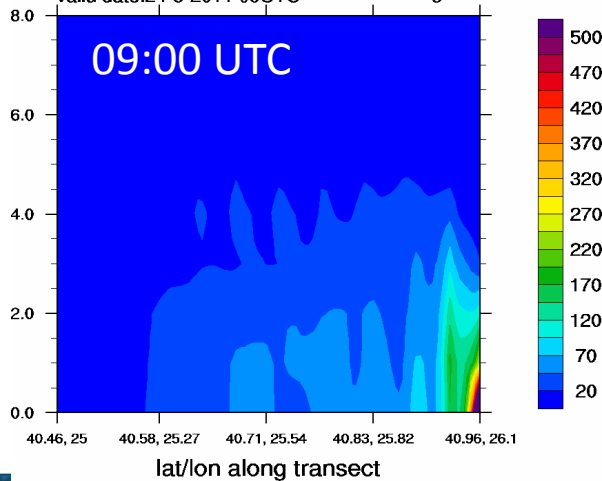
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

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



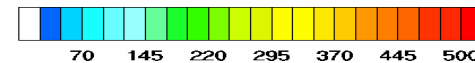
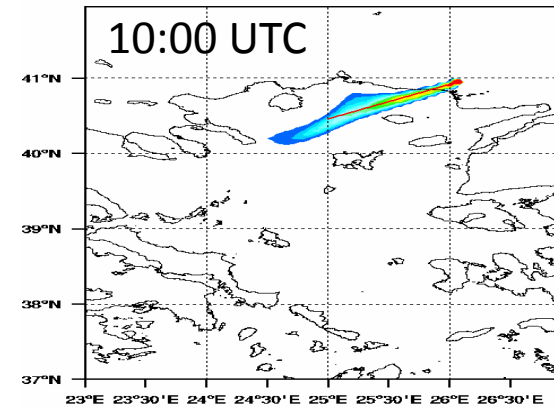
FLEXPART NOA
Biomass Burning (Organic Carbon -OC)

valid date:24-8-2011 09UTC ng m-3



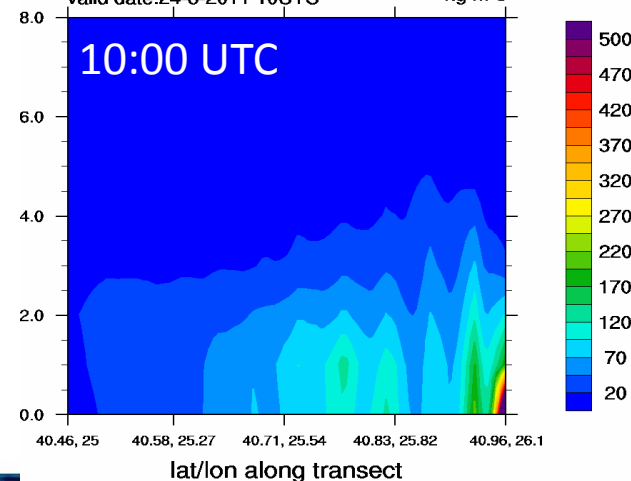
FLEXPART - NOA
Biomass Burning (Organic Carbon -OC)

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

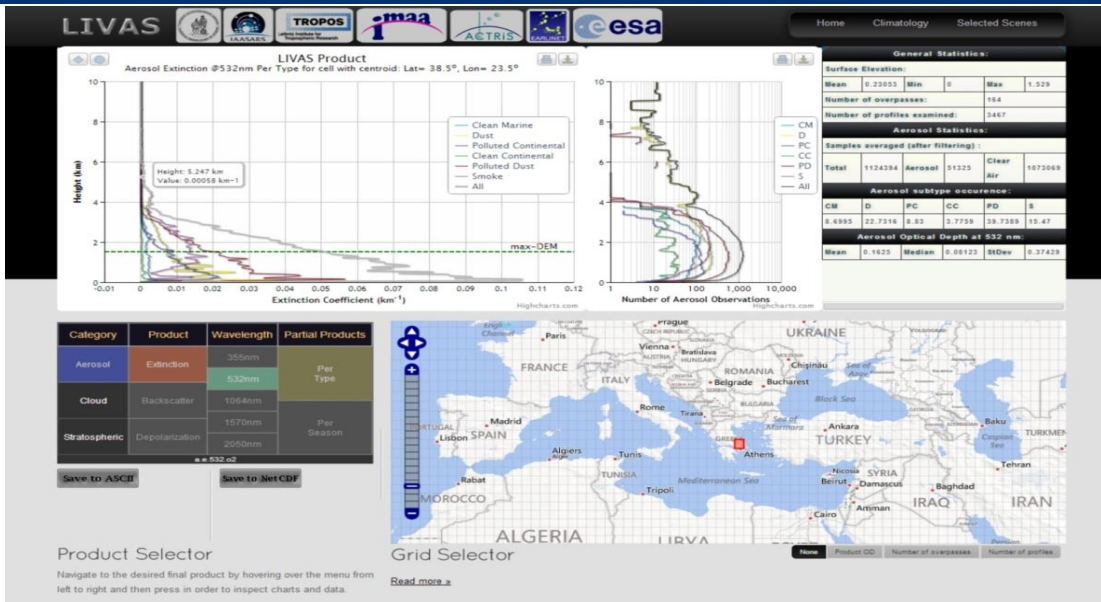


FLEXPART NOA
Biomass Burning (Organic Carbon -OC)

valid date:24-8-2011 10UTC ng m-3

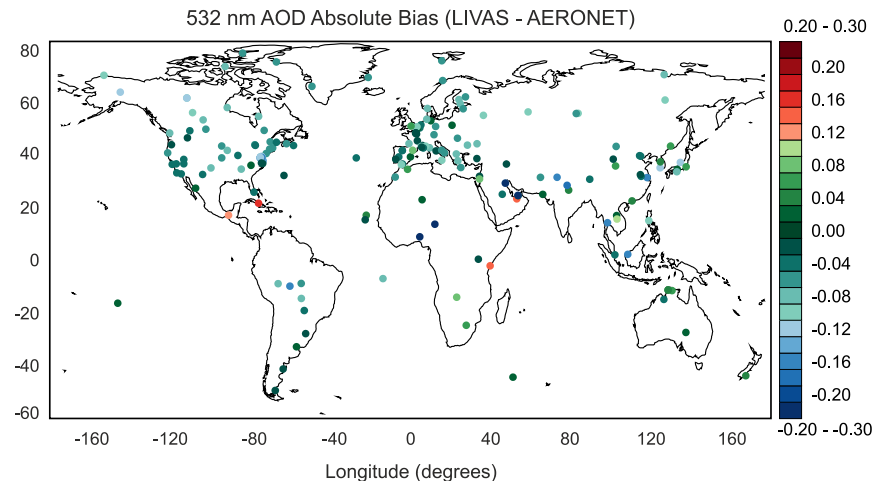
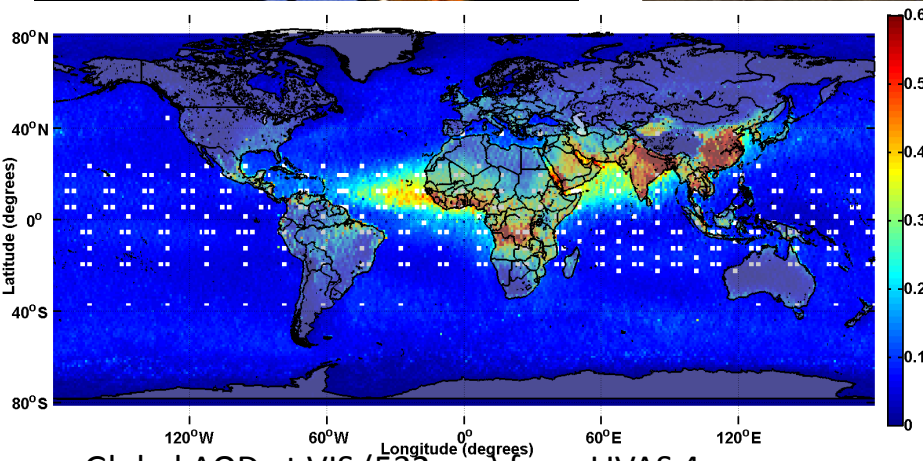
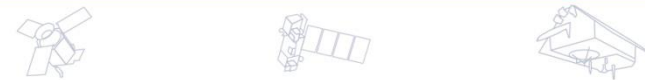


Forecasting Vertical structure of smoke plume Cross section of Organic Carbon concentration (ng m-3)



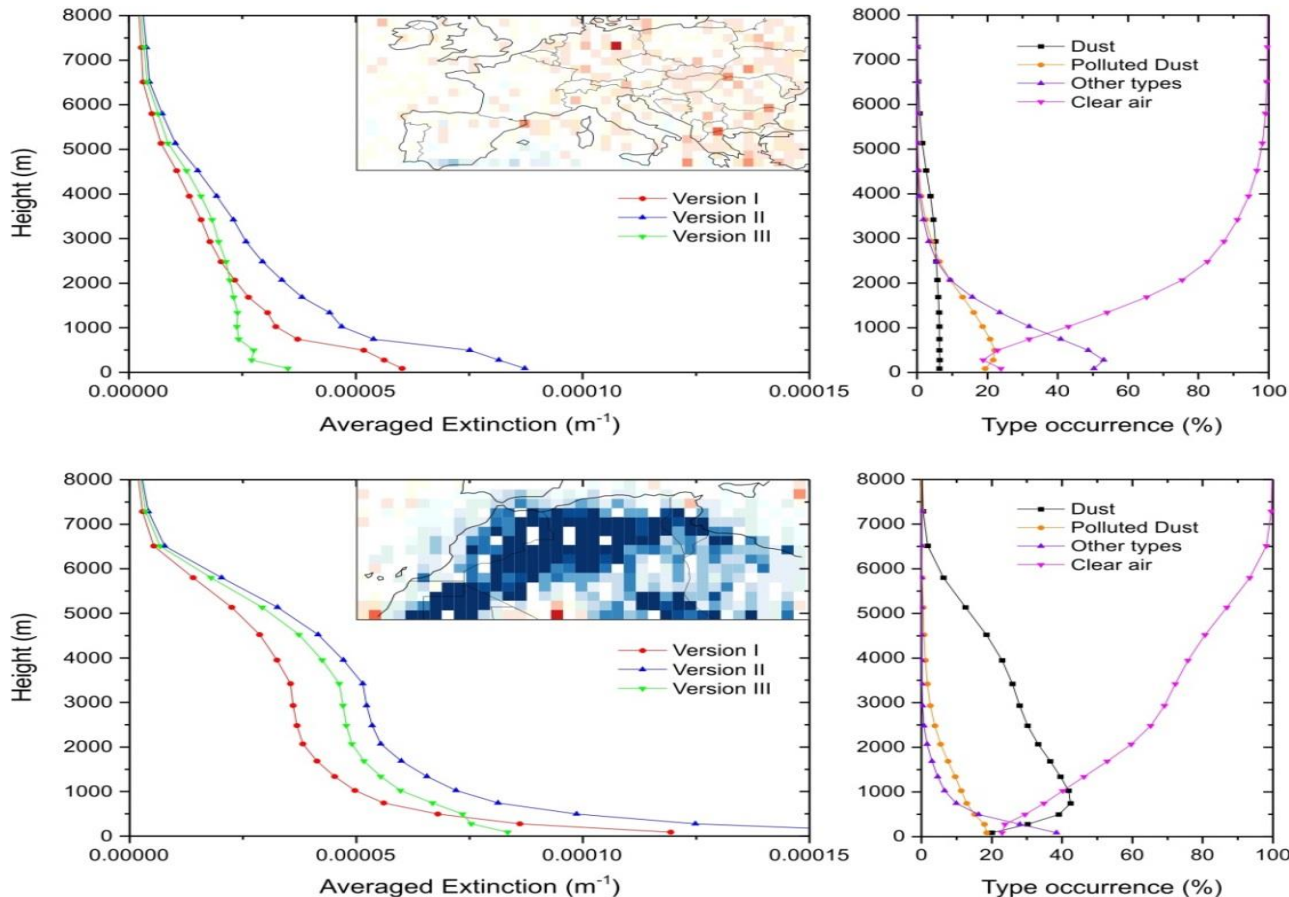
Global 3D climatology of aerosols and clouds

LIVAS portal under BEYOND (1x1 degree resolution)





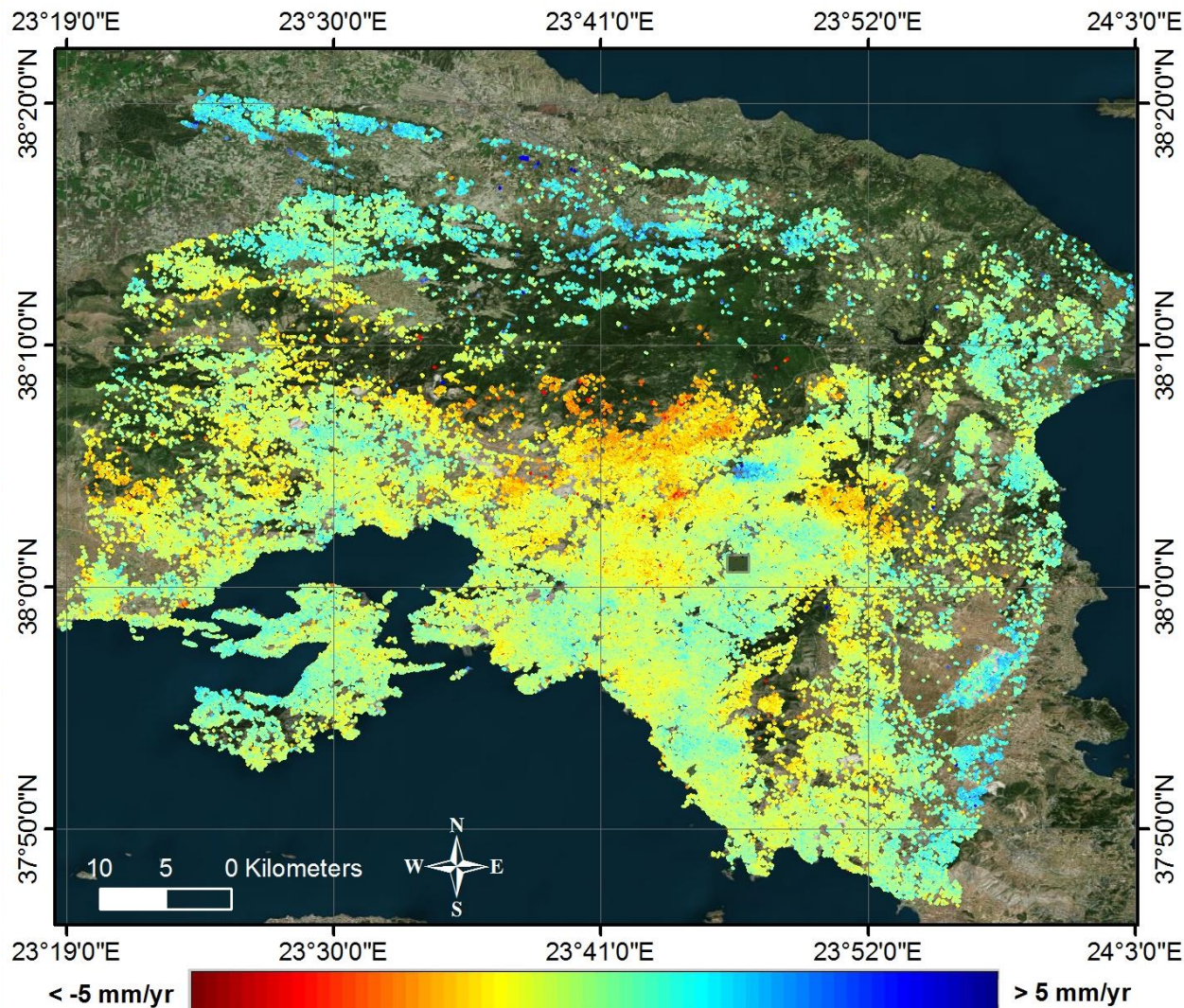
BEYOND dust product based on CALIPSO



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**

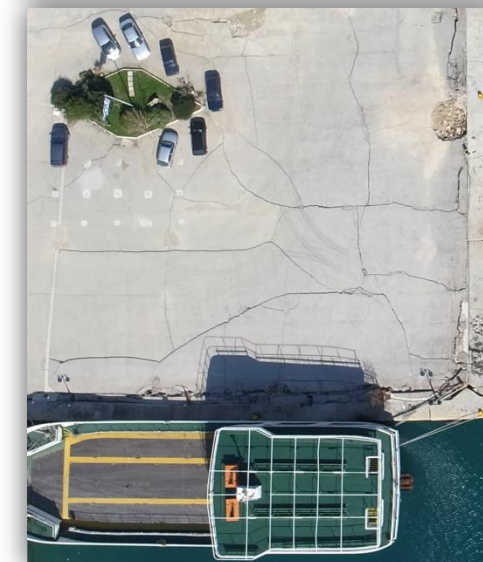
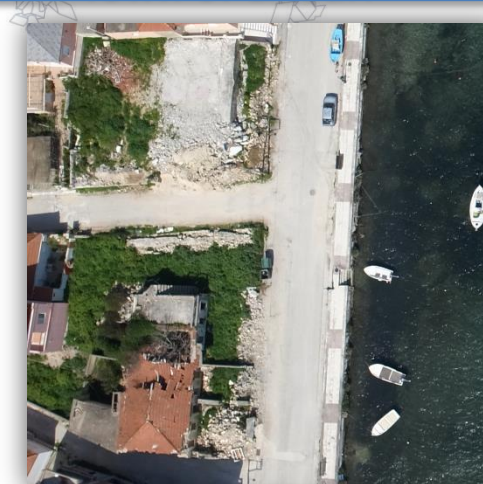
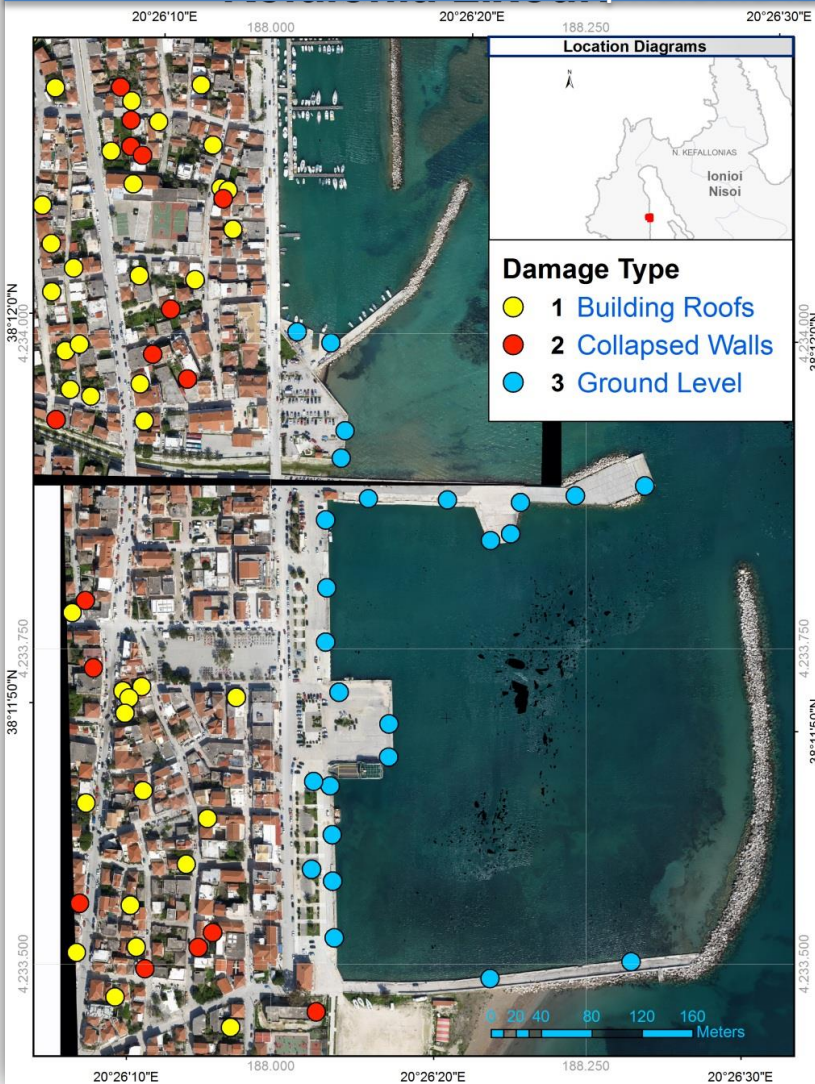


UAV Assisted Loss Recording

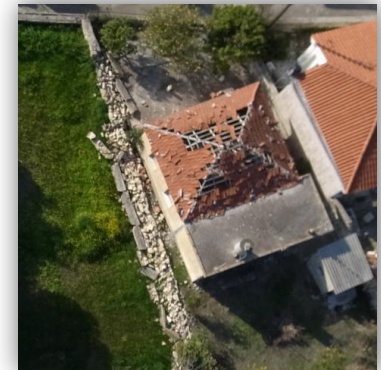
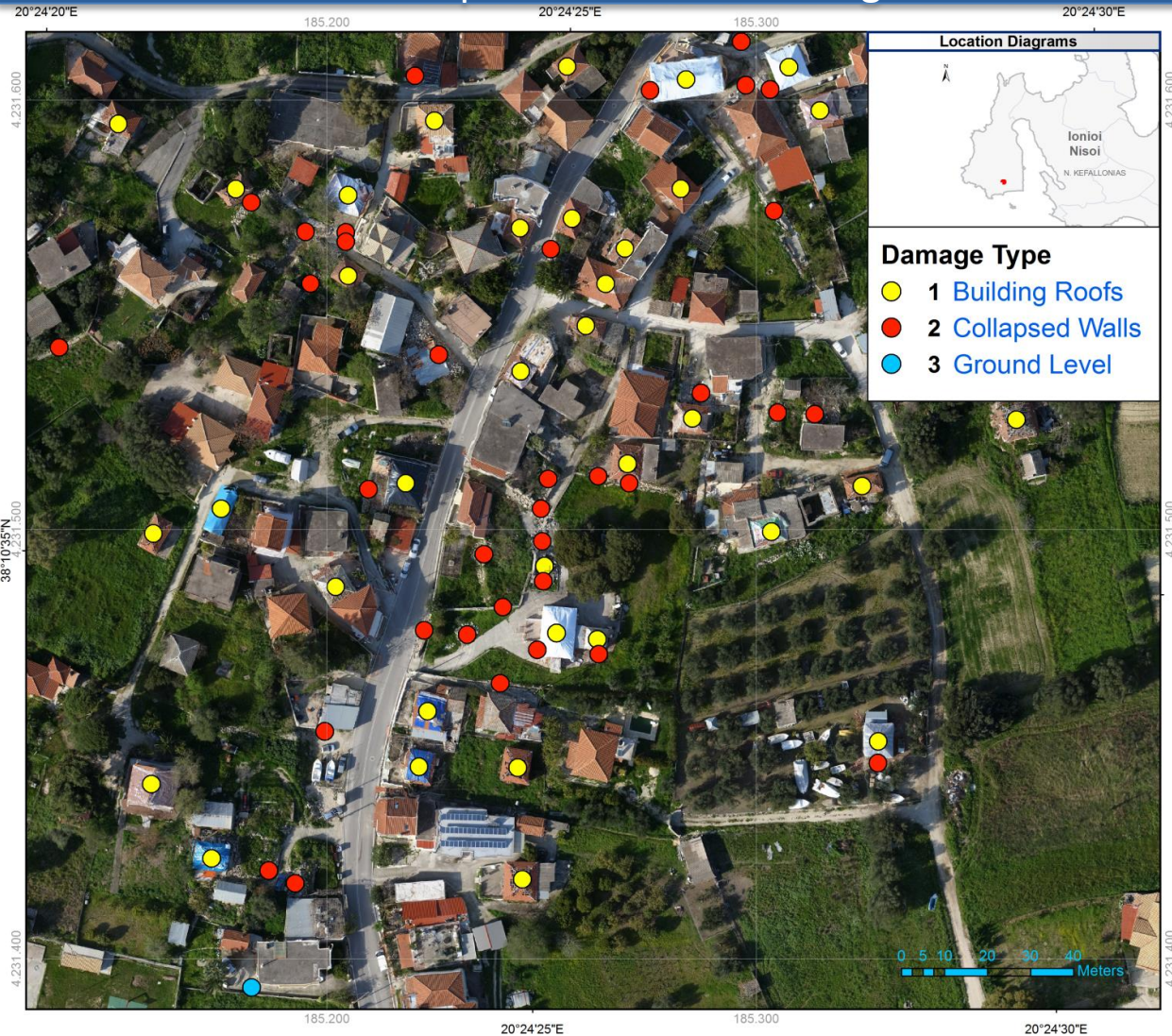
Cephalonia Earthquake Feb 2014

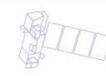


Cephalonia Island – Town of Lixouri



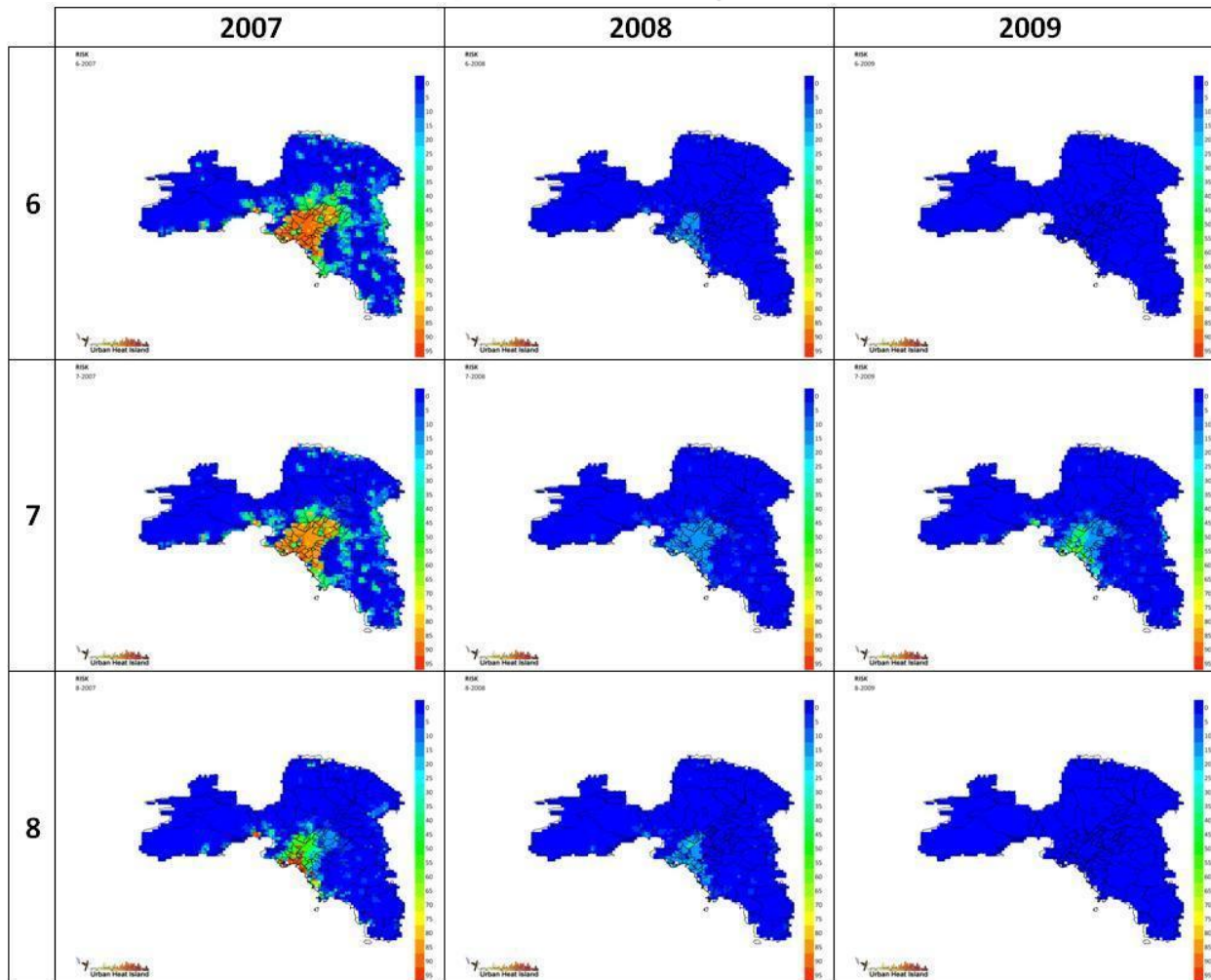
Cephalonia Island – Village of Mantzavinata





Heatwave Risk Assessment

Urban Heat Island

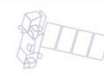
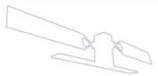


Flood Risk Modelling and Flood extend

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.

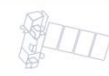
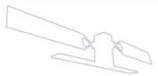


Figure 1: study area



CHALLENGES

- ❑ **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 End User community, will continue establishing contacts, and signing new MOUs and SLAs with institutional End Users and International Organisations for EO data exploitation, service enhancement and new services development in ER, DRM**
- ❑ **Set up integrated satellite based observational solutions Europe/World-wide for ERS based on existing and new facilities owned by the partnering organisations at European level and the ESA's Mirror Sites**
- ❑ **Fully benefit from the high scientific, operational and commercial potential of the Sentinel data 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>