European Center of Excellence for EO Disaster Management

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

www.beyond-eocenter.eu

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

The BEYOND Advisory Committee meeting
June 24, 2016

Achieved goals in BEYOND

- **Expand** the existing state-of-the-art, skills, and interdisciplinary research potential in EO, for **Building a Centre of Excellence for Earth Observation based monitoring of Natural Disasters**

- **Address GEO societal challenges and COPERNICUS EMS priorities in** South-Eastern Europe, and the wider Mediterranean region through the integrated cooperation and coordinated use of capacities and skills from more than **20 twinning partners, international organisations, and operational user authorities**

Achieved goals in BEYOND

- **Set up** innovative observational solutions, allowing to a multitude of monitoring networks (space borne and in-situ) to operate in a complementary, unified, and coordinated manner

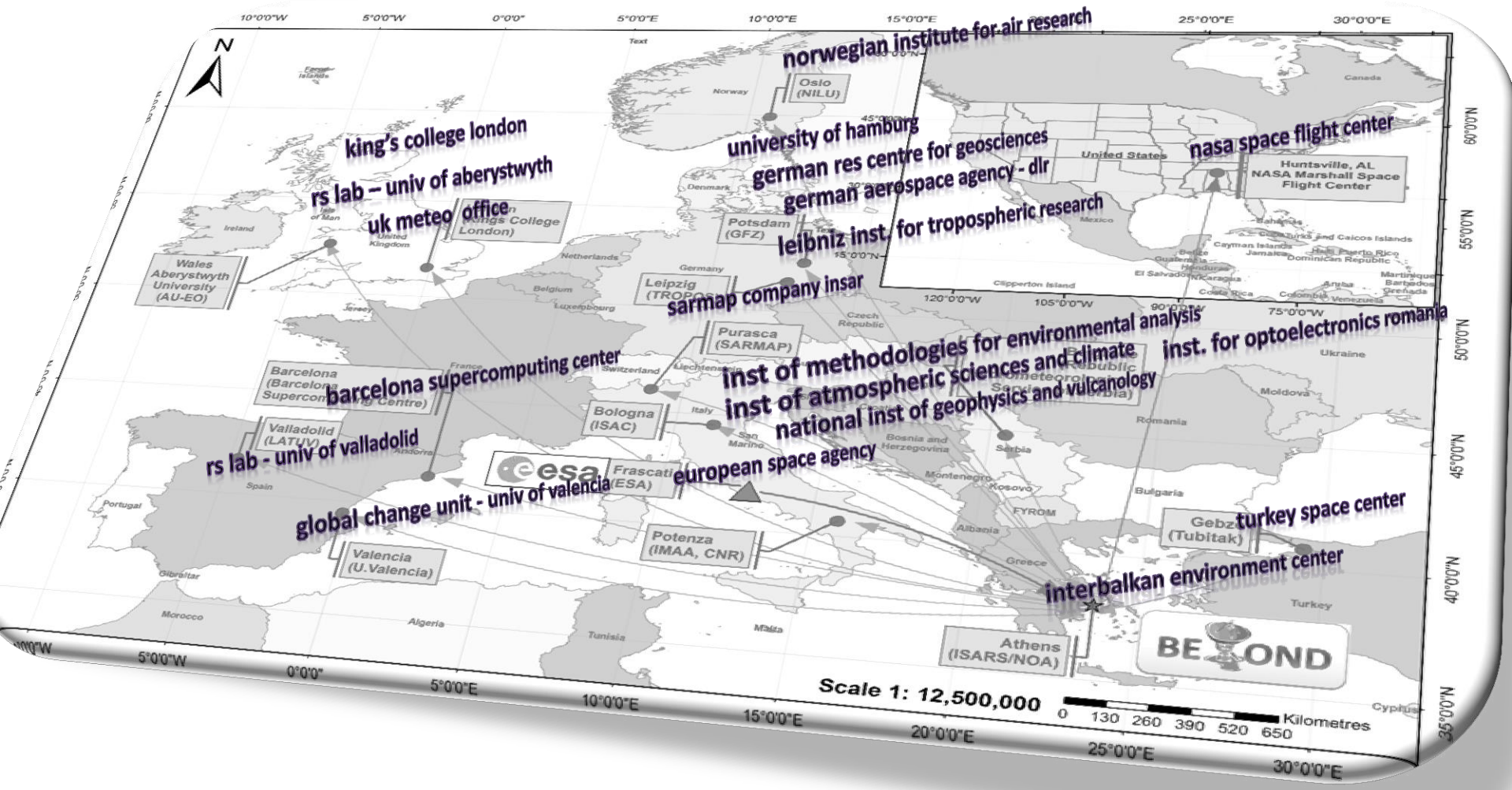
- **Transform** Earth Observations to new information, and knowledge, ready for down-streaming to specific societal needs in the domain of Disaster Risk Reduction

- **Deliver** through web observations and higher level products and services to stakeholders, international research, and end user communities

Funding
2.3 ME EC Contribution
~270KE Structural Funds

European Center of Excellence for EO Disaster Management

BEYOND DisasterHub



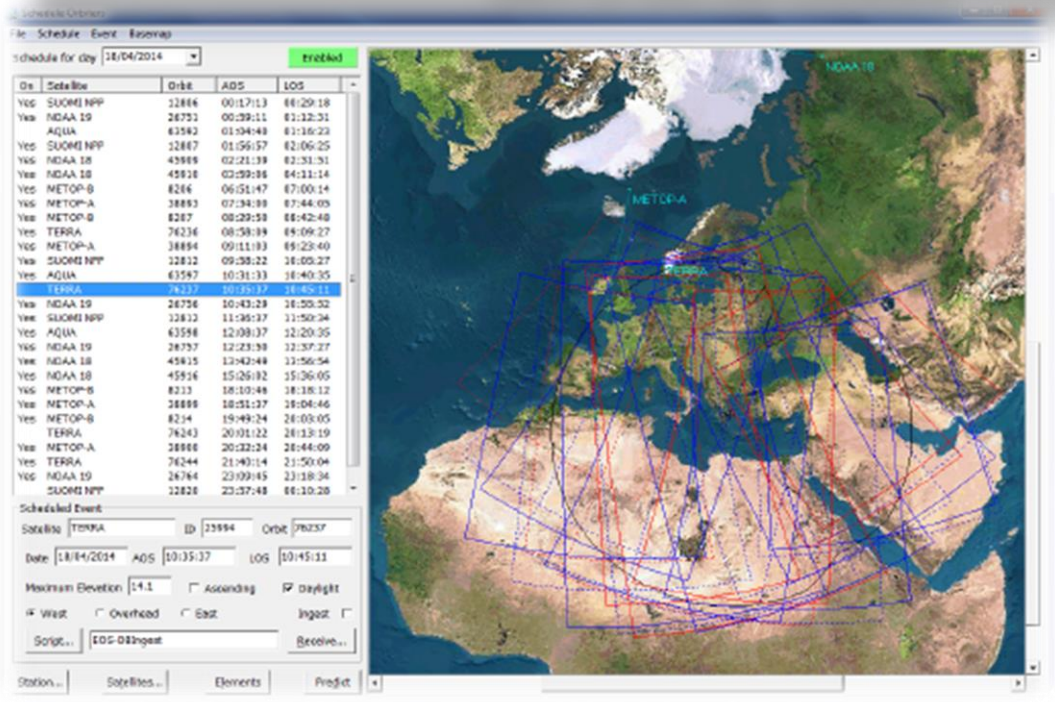
The BEYOND Advisory Committee meeting
June 24, 2016

FP7-Regpot-2012-13-1

Operate a Region-wide X-/L- band multi-mission station:

EOS Aqua and Terra, SUOMI NPP, JPSS, NOAA, Met Op, FengYun)

part of the DB network



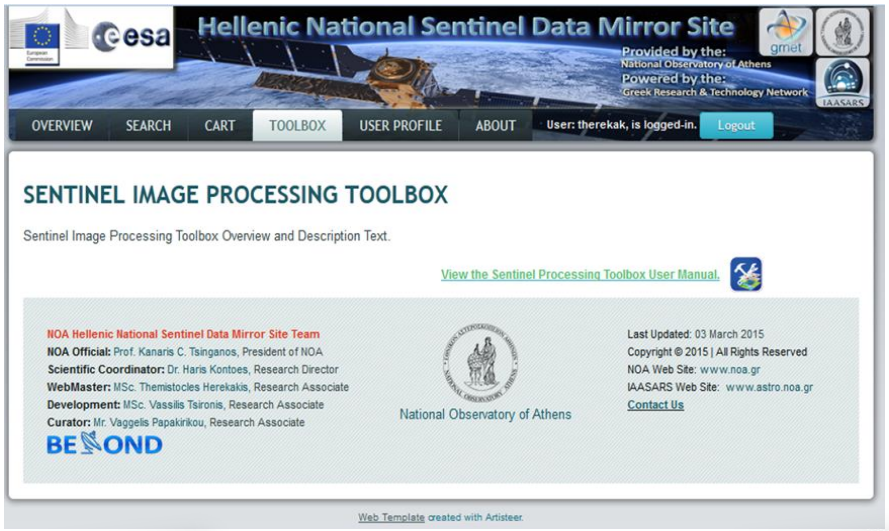
Operate two MSG acquisition stations of DVB-S & DVB-S2 systems

Exploit high throughput provided with the new EUMETCast Europe service, based on using the EUTELSAT 10A

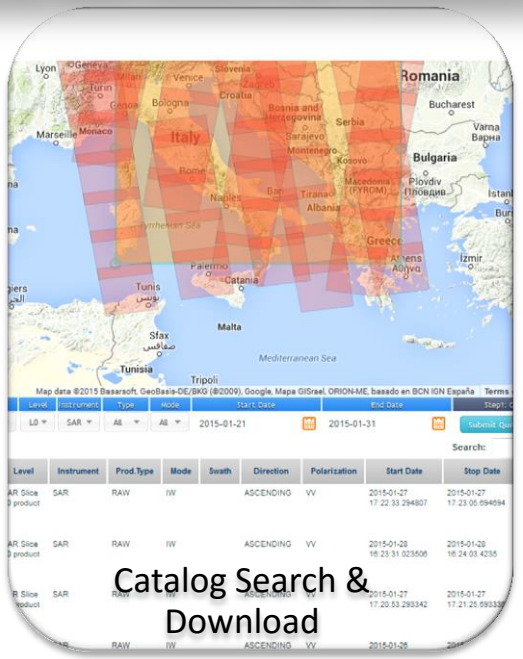
part of EUMETSAT's network

European Center of Excellence for EO Disaster Management

BEYOND DisasterHub

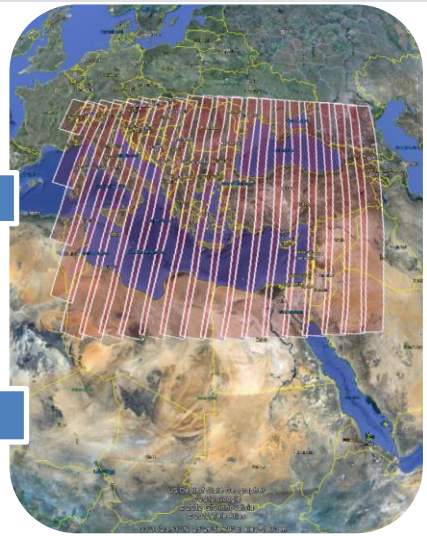


Operate the 1st Collaborative Ground Segment (Hellenic Sentinel Data Hub- Mirror Site), allowing near real time acquisition of S-1, S-2, S3, and future S5P satellite missions




Sentinel-1


Sentinel-2

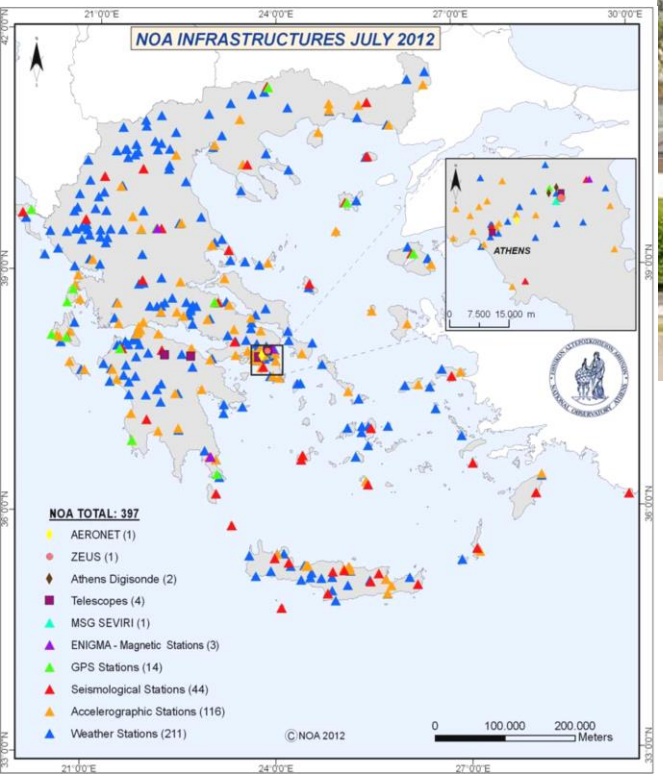



Sentinel-3


Sentinel-5p

http://Sentinels.space.noa.gr

Map of the deployed in-situ monitoring networks (meteo, GPS, geomagnetic, air, seismological)

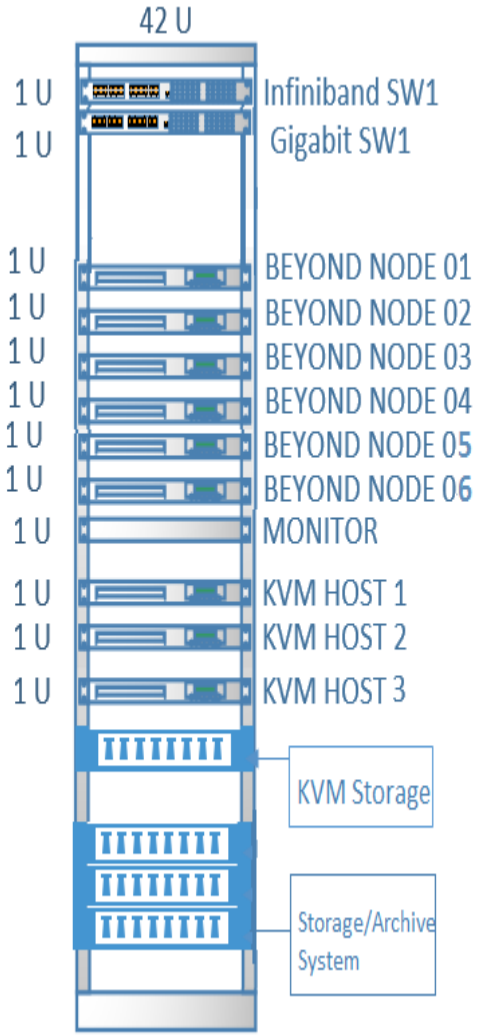


Operate Ground Lidar Stations, part of the ACTRIS Research Infrastructure

EARLINET Lidar Network

IAASARS has empowered its computational infrastructure with high-performance server hardware.

- BEYOND NODES 01-06:
  - Model: Dell PowerEdge R620 servers
  - CPU: 2x Xeon 8 Core
  - RAM: 64GB
  - OS: Centos 6.6 Minimal
- PowerVault MD3400, 12G SAS, 2U-12 drive (KVM Storage for the KVM Virtualization Servers)
- 3 KVM Virtualization Servers
  - Model: Dell PowerEdge R815
  - CPU: 2x AMD Opteron 6128
  - RAM: 512GB
  - OS: RHEL 6.0 64-bit (Dell pre-installed image)
- Storage & Archive System
  - PowerEdge R430 Server
  - PowerVault MD3460, 12G SAS, 4U-60 drive dense array with a capacity of **100 TB.**



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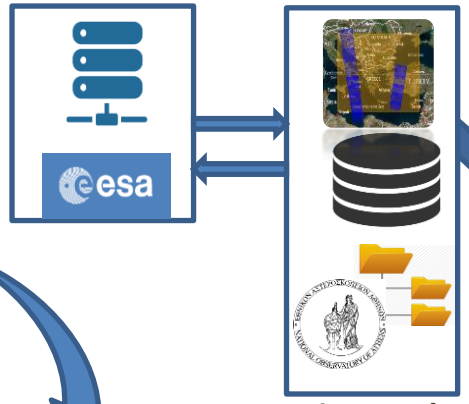
IAASARS

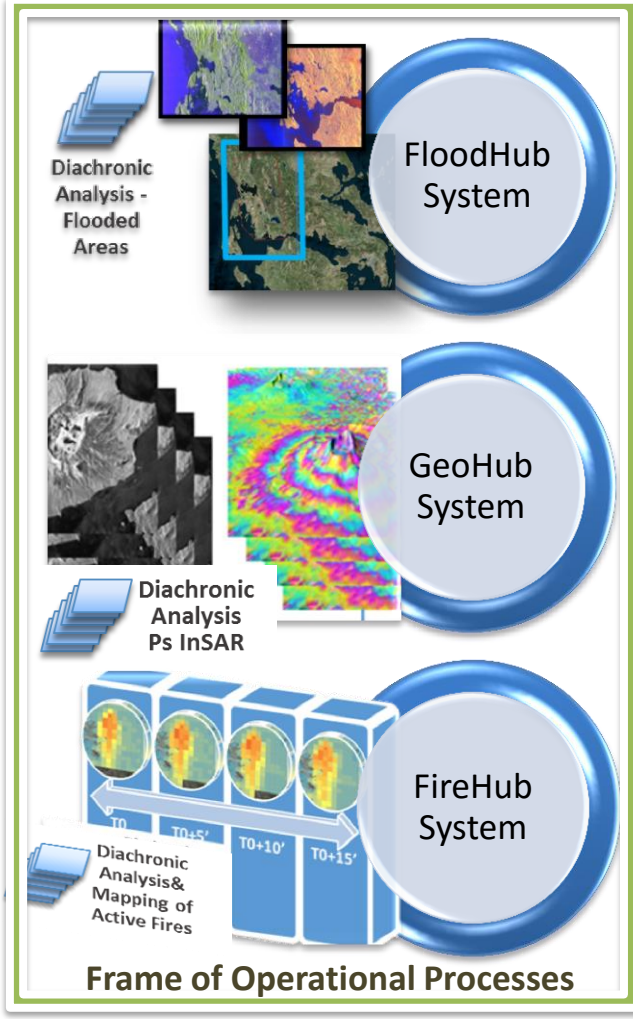
BEYOND DisasterHub

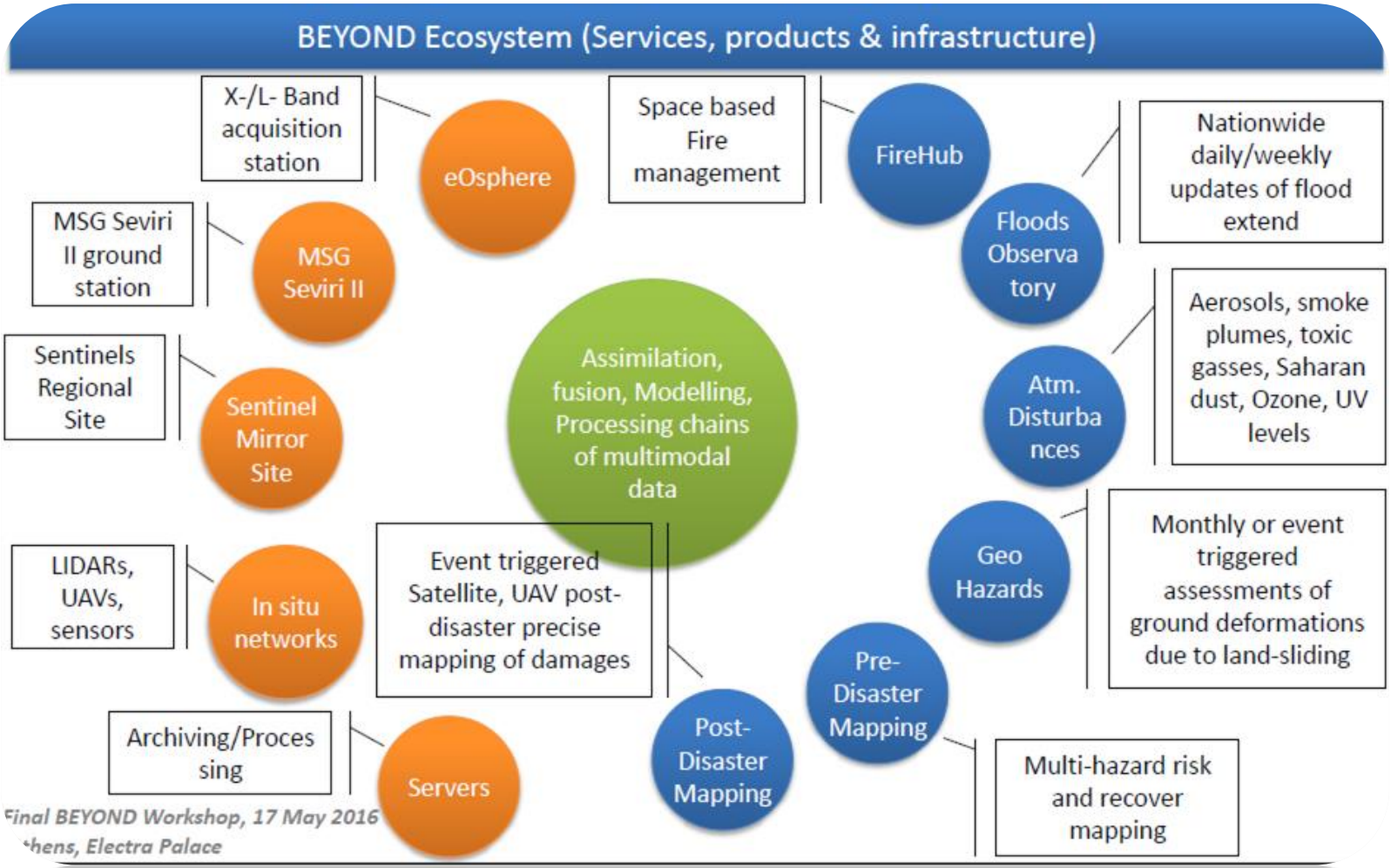
ESA's Coll Data HUB

Hellenic Mirror Site



BEYOND Processing Node




BEYOND Ecosystem (Services, products & infrastructure)
X-/L- Band acquisition station
eOsphere
MSG Seviri II ground station
MSG Seviri II
Sentinels Regional Site
Sentinel Mirror Site
LIDARs, UAVs, sensors
In situ networks
Archiving/Processing
Servers
Assimilation, fusion, Modelling, Processing chains of multimodal data
Event triggered Satellite, UAV post-disaster precise mapping of damages
Post-Disaster Mapping
Space based Fire management
FireHub
Floods Observatory
Nationwide daily/weekly updates of flood extend
Atm. Disturbances
Aerosols, smoke plumes, toxic gasses, Saharan dust, Ozone, UV levels
Geo Hazards
Monthly or event triggered assessments of ground deformations due to land-sliding
Pre-Disaster Mapping
Multi-hazard risk and recover mapping
Final BEYOND Workshop, 17 May 2016
Athens, Electra Palace

European Center of Excellence for EO Disaster Management

FireHub: A Space based Fire Management Hub

Haris KONTOES, Research Director NOA
BEYOND Coordinator

FP7-Regpot-2012-13-1

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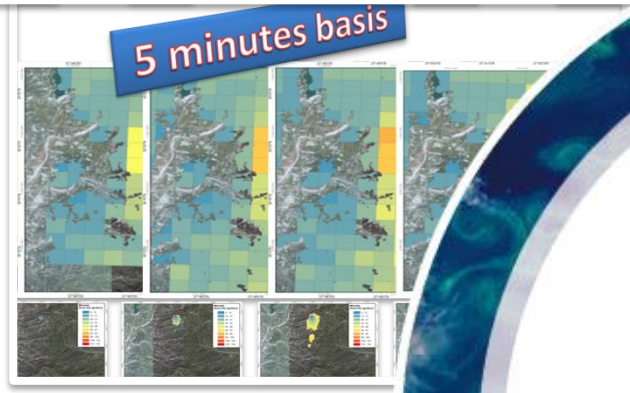
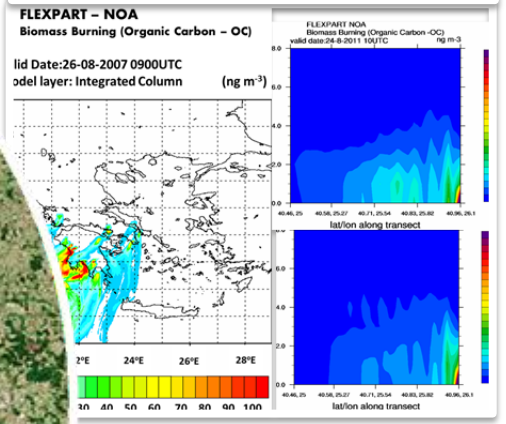
IAASARS

BEYOND DisasterHub

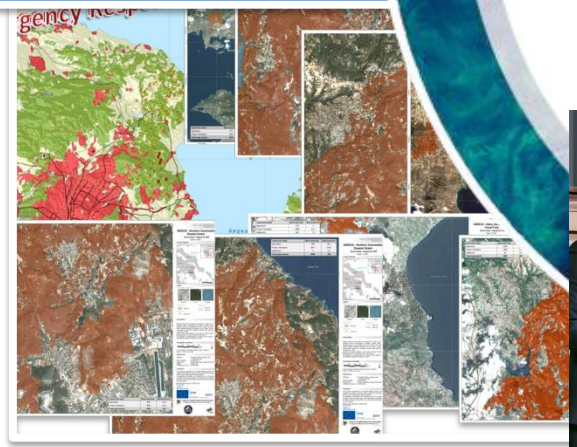
Active Fire Mapping: 5 ‘ - 500 m - 24/7



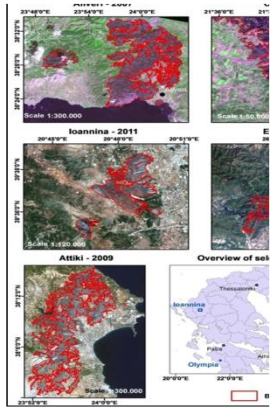
Hourly Fire Smoke dispersion



Burnt Area Mapping: daily/weekly/seas



Burnt Area Mapping



The Earth Monitoring Competition

Copernicus masters

WINNER

BEST SERVICE CHALLENGE

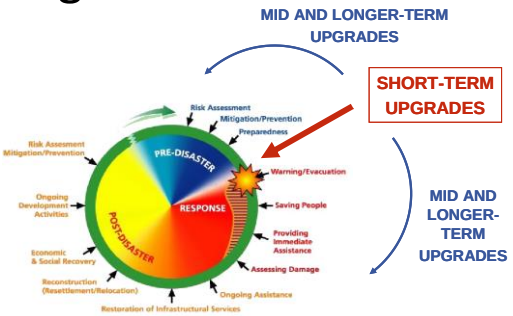
2014

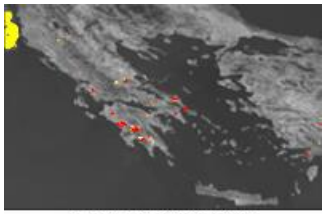
The BEYOND Advisory Committee meeting
June 24, 2016

SEVENTH FRAMEWORK PROGRAMME

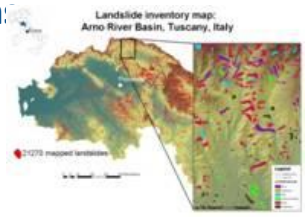
FP7-Regpot-2012-13-1

Institutional End Users and stakeholders receiving the fire disaster services:

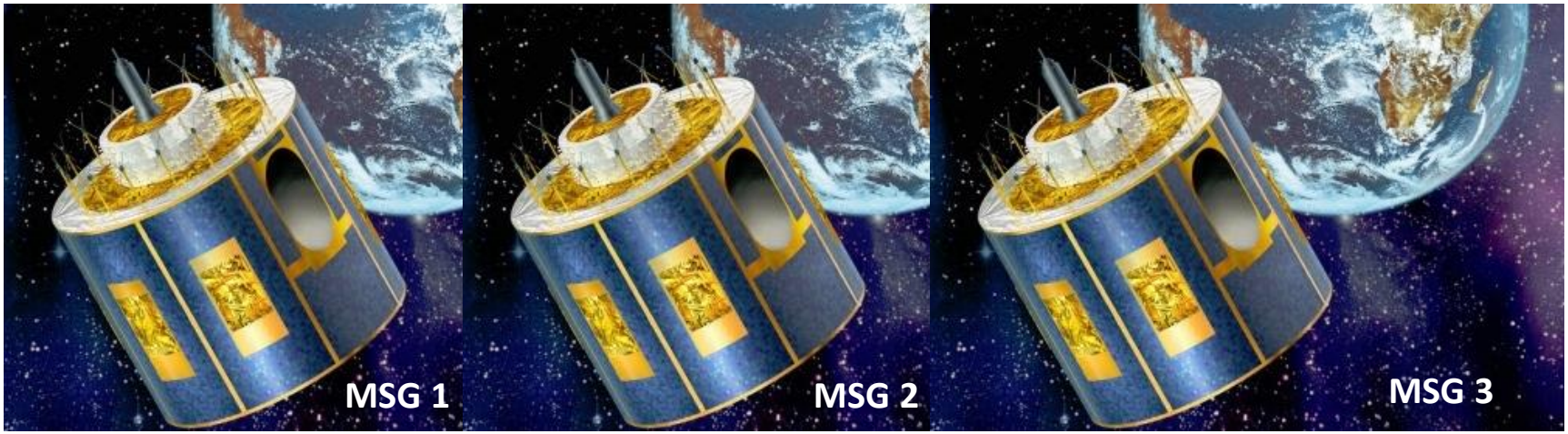




- The European Copernicus Program (EMS service)
- The Hellenic Fire Brigades Operations' Control Room (199)
- The Ministry of Env. (Directorate for Forests Protection
- The Gen. Sec. Civil Protection
- The Forestry Services over Greece and Europe
- The National Cadastral Organisation
- The Local Authorities & Environmental Organisations
- The Greek Army
- The Public
- The European Fire Monitoring Center
- The Serbian HydroMet Service
- The BBU - Research Center for Disaster Management- Romania (expressed interest)



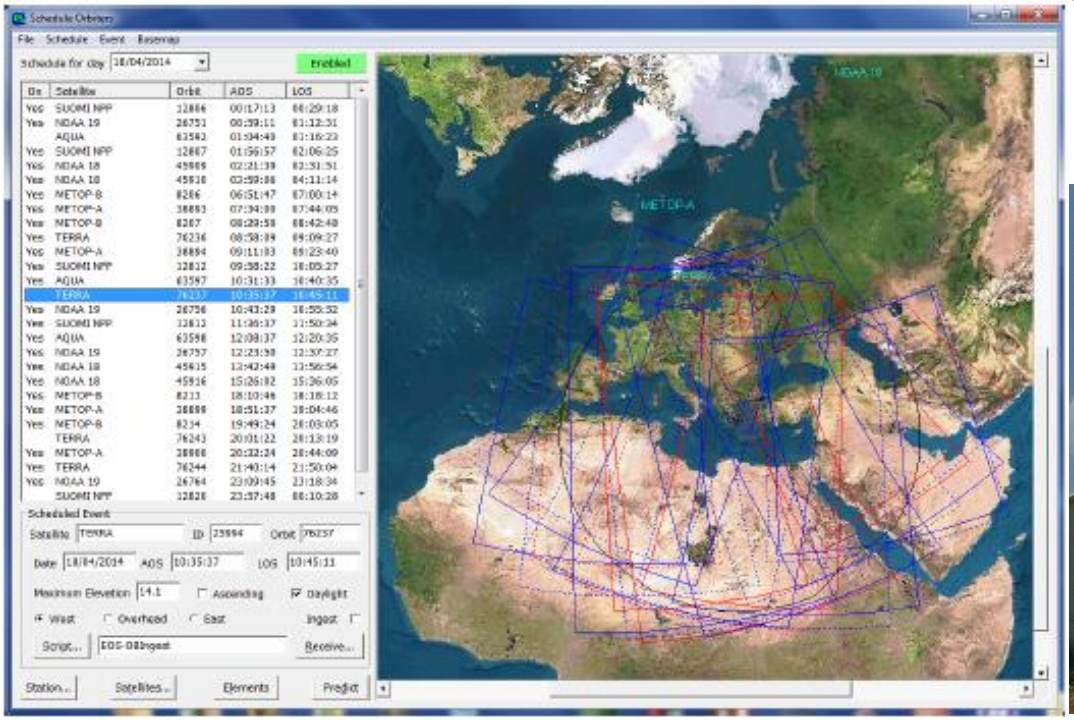
Active Fire Detection by MSG SEVIRI Instrument

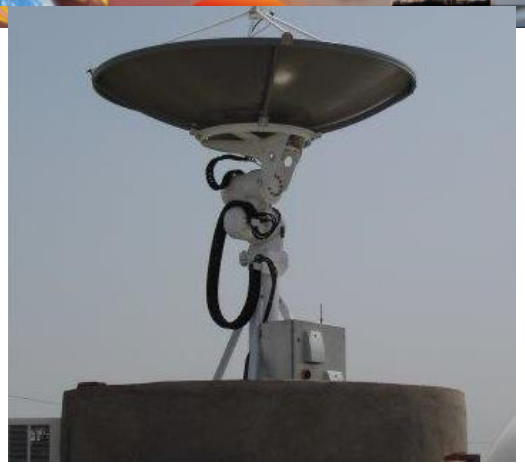


1	VIS0.6	0.635	0.56	0.71	Surface, clouds, wind fields
2	VIS0.8	0.81	0.74	0.88	Surface, clouds, wind fields
3	NIR1.6	1.64	1.50	1.78	Surface, cloud phase
4	**IR3.9**	**3.90**	**3.48**	**4.36**	**Surface, clouds, wind fields**
5	WV6.2	6.25	5.35	7.15	Water vapor, high level clouds, atmospheric instability
6	WV7.3	7.35	6.85	7.85	Water vapor, atmospheric instability
7	IR8.7	8.70	8.30	9.1	Surface, clouds, atmospheric instability
8	IR9.7	9.66	9.38	9.94	Ozone
9	**IR10.8**	**10.80**	**9.80**	**11.80**	**Surface, clouds, wind fields, atmospheric instability**
10	IR12.0	12.00	11.00	13.00	Surface, clouds, atmospheric instability
11	IR13.4	13.40	12.40	14.40	Cirrus cloud height, atmospheric instability
12	HRV	Broadband (about 0.4 - 1.1 μm)			Surface, clouds

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)**



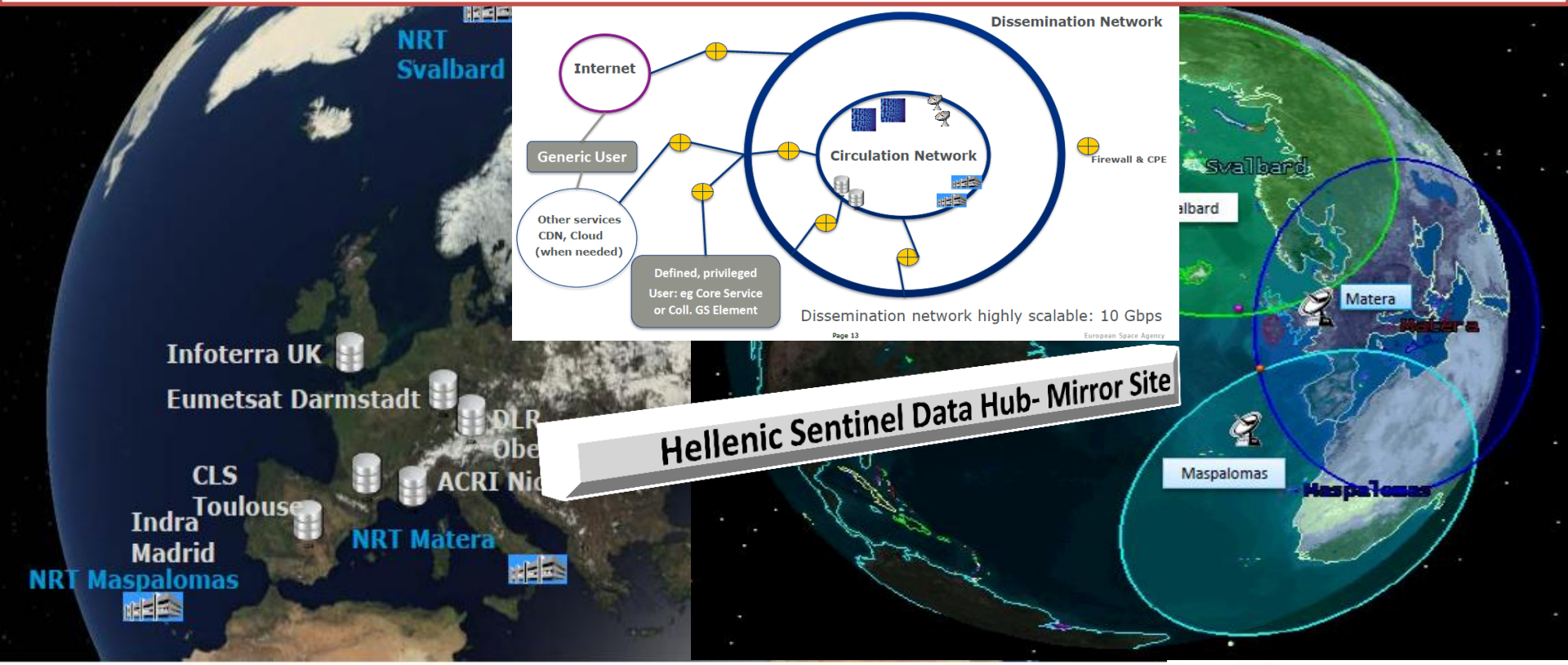


IAASARS/NOA X-/L-band Acquisition station

Infrastructure Capacity Building

On going action

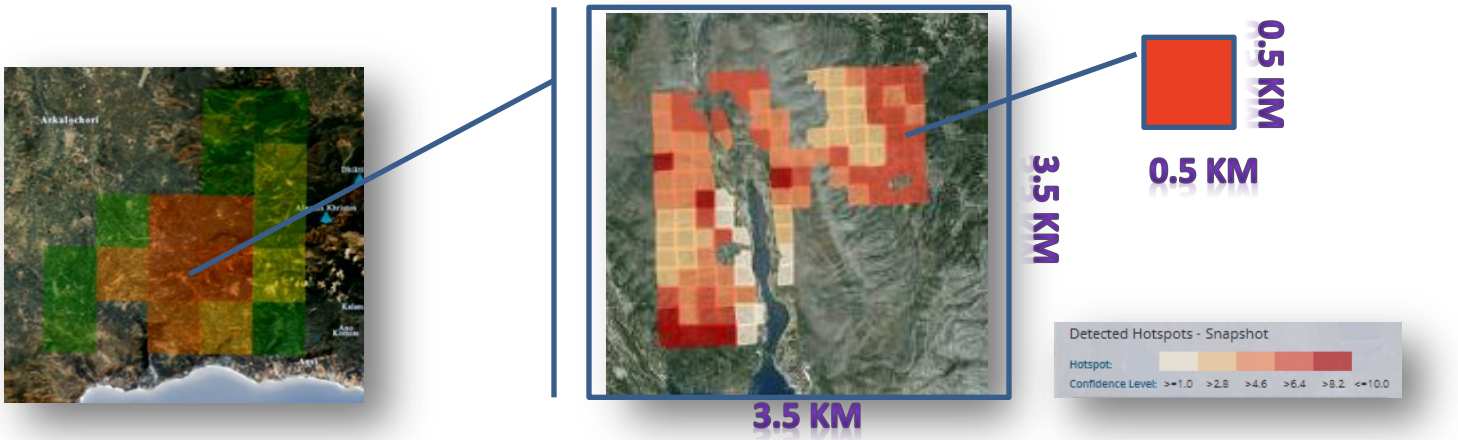
➢**Integrate NOA's Collaborative Ground Segment (Hellenic Sentinel Data Hub- Mirror Site) dedicated to ESA Sentinel missions** (Copernicus), allowing near real time acquisition of S-1, S-2, and future S3, S5P satellite missions



CLASSIFICATION PROCESS

Downscaling the first classification output and calculate the fire occurrence probability in sub-areas of 500 m x 500 m wide, inside the initial observation area of 3.5km x 3.5 km, accounting for the real meteorological, physical / ecological, and morphological conditions in the affected area such as,

a) Wind conditions (speed/direction), **b)** Fuel types and fuel type's proneness to fire, **c)** Altitudinal zone, **d)** Slope and Aspect elements of each of the 500m x500m area.



European Center of Excellence for EO based Disaster Management

BEYOND FireHub

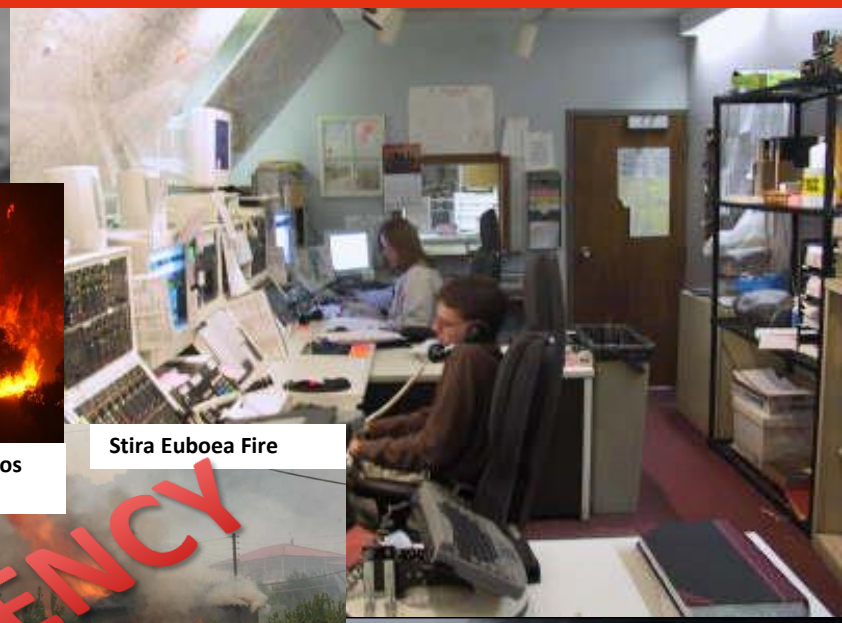
Regional Real Time Fire Monitoring - NOA's MSG SEVIRI Station – Raw Resolution mode

Zaharo Fire

Olympia site Fire

AliveriEuboea Fire

Korinthos Fire



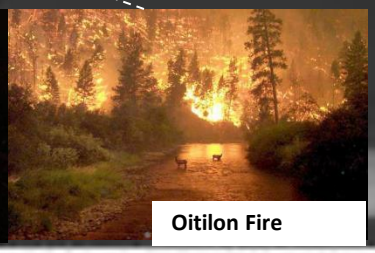
Stira Euboea Fire

Parnon Mt Fire

EMERGENCY

Taygetos Mt Fire

Megalopolis Fire



Oitilon Fire

SEVIRI MIR 070823_1030 UTC

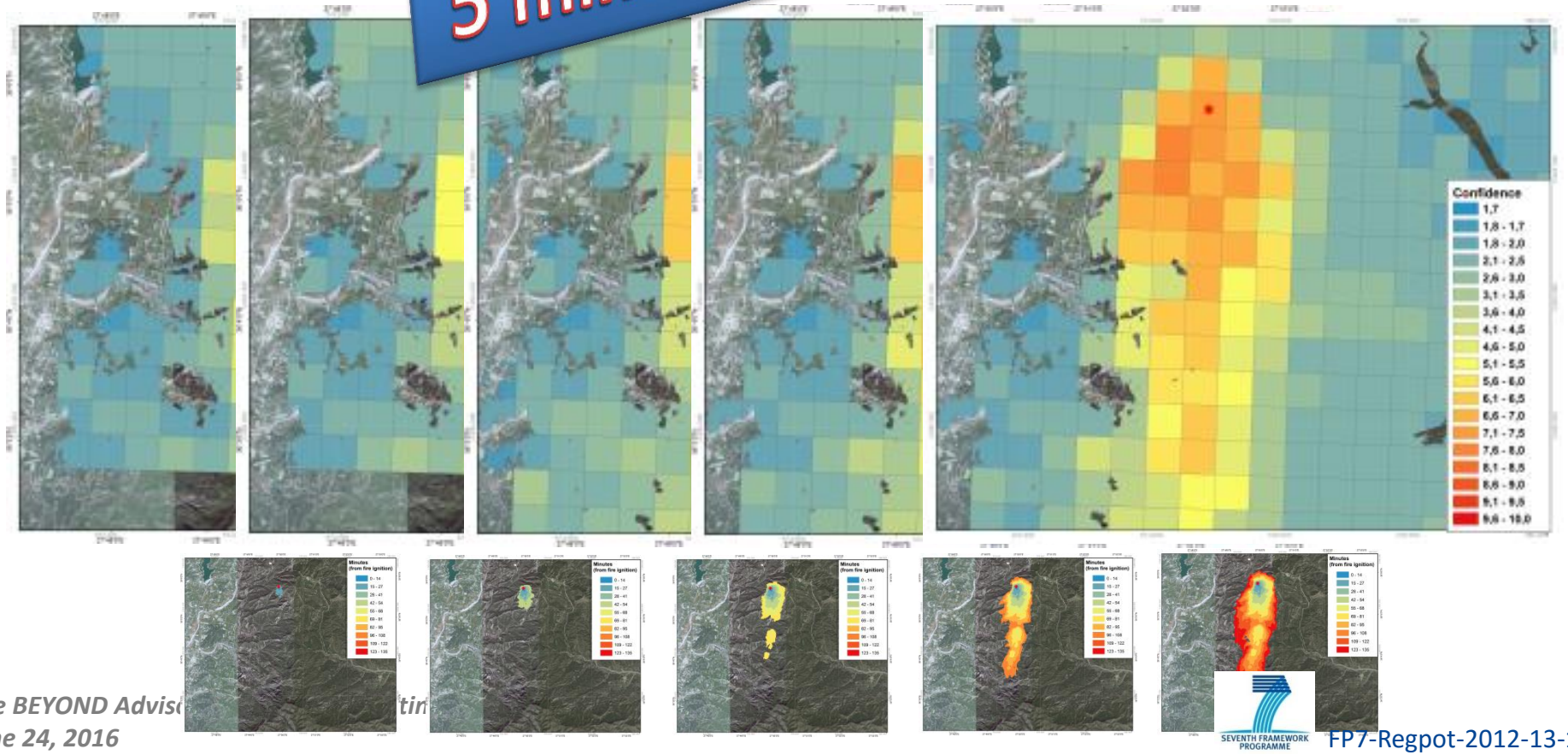
POTENTIAL FIRE

CONFIRMED FIRE

Results @ 150 minutes after fire ignition

+30’ → +35’ → +40’ → +45’ → +50’

5 minutes basis



National Observatory of Athens

Continuous offer to the Scientific Research since 1842

Greek General Secretariat for Research and Technology

Event Logo

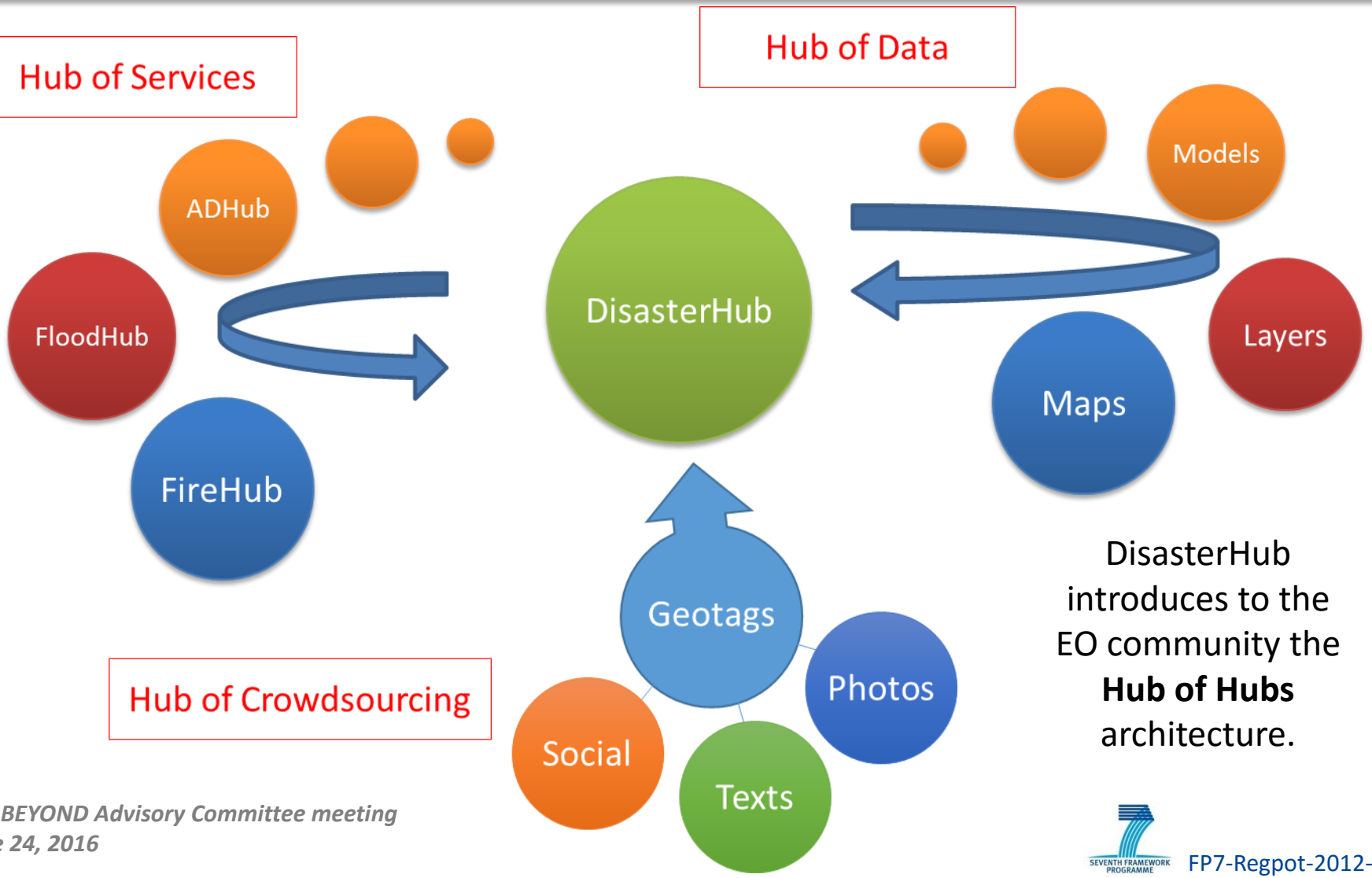
http://ocean.space.noa.gr/bsm

DIACHRONIC INVENTORY OF FOREST FIRES OVER GREECE FROM 1984 TO PRESENT, WITH USE OF LANDSAT 4,5,7 SATELLITE DATA

URL: http://www.noa.gr


DisasterHub
A mobile application for enabling crowd generated data fusion in Earth Observation disaster management services

What is innovative?

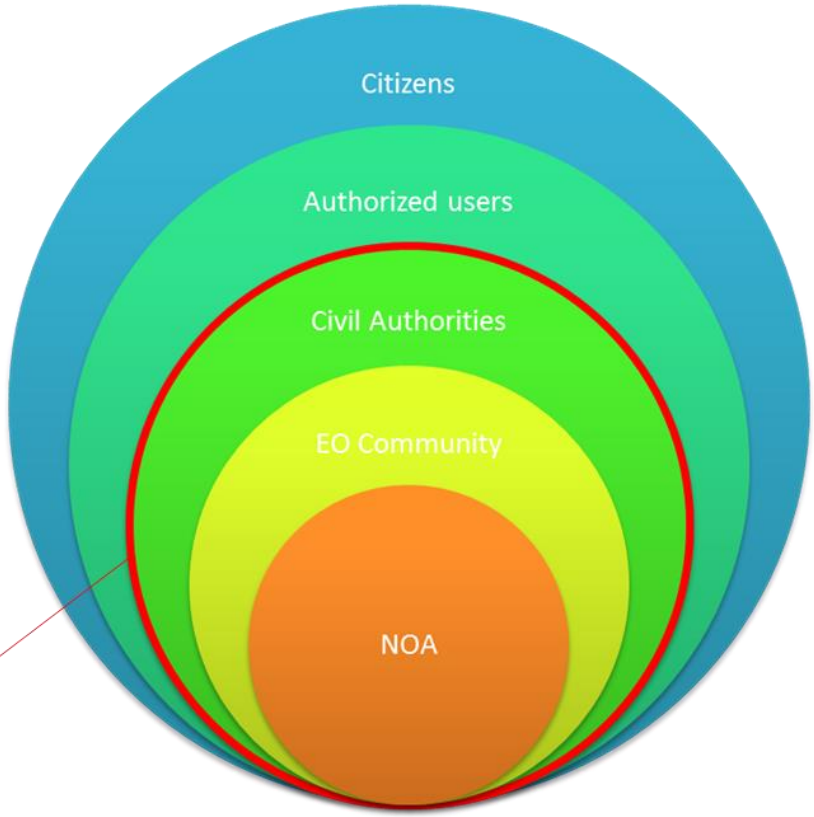


DisasterHub introduces to the EO community the **Hub of Hubs** architecture.

What DisasterHub does?

- Enables the users to send a geotag specifying a location stricken by a hazardous phenomenon.
- Provides the users with a near real-time feed of data derived from the BEYOND services.
- Offers a (currently limited) toolbox that allows the management and visualization of the data derived from the BEYOND services, combined with crowd generated and GEOSS based data.

The outreach of most services hit this wall

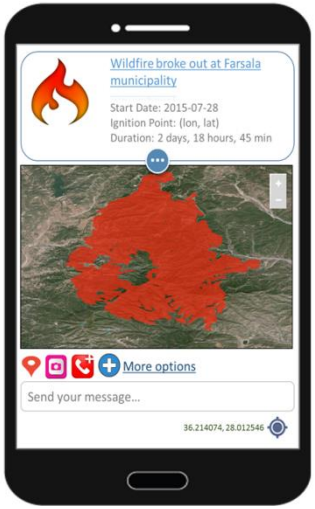


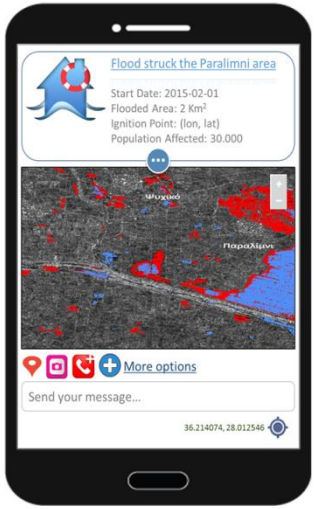
Who does it work?

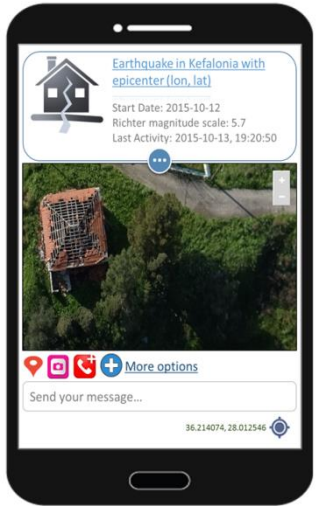
Open Source Frameworks & tools

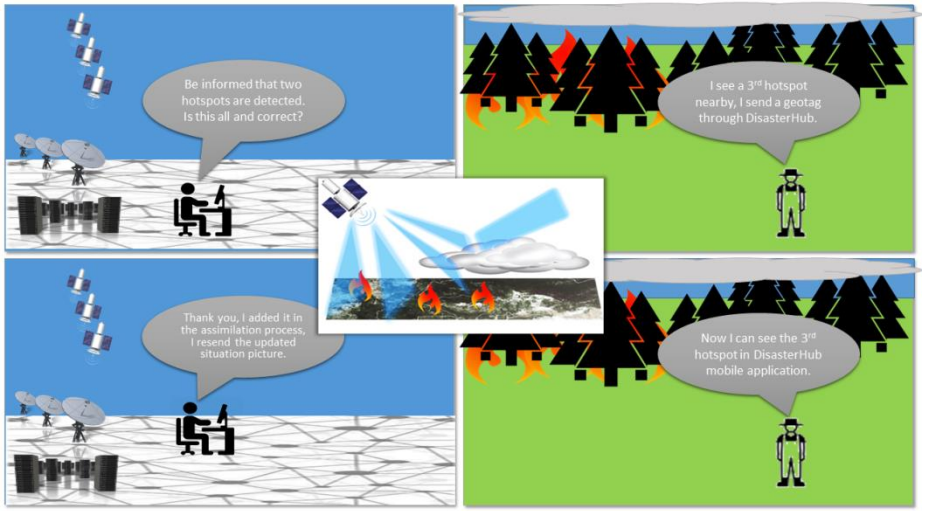
- Adobe PhoneGap
- AngularJS
- Apache Cordova
- Auth0
- Crosswalk WebView
- Ionic Framework
- ngCordova
- NodeJS
- OpenLayers 3
- PHP
- PostgreSQL
- PostGIS

DisasterHub





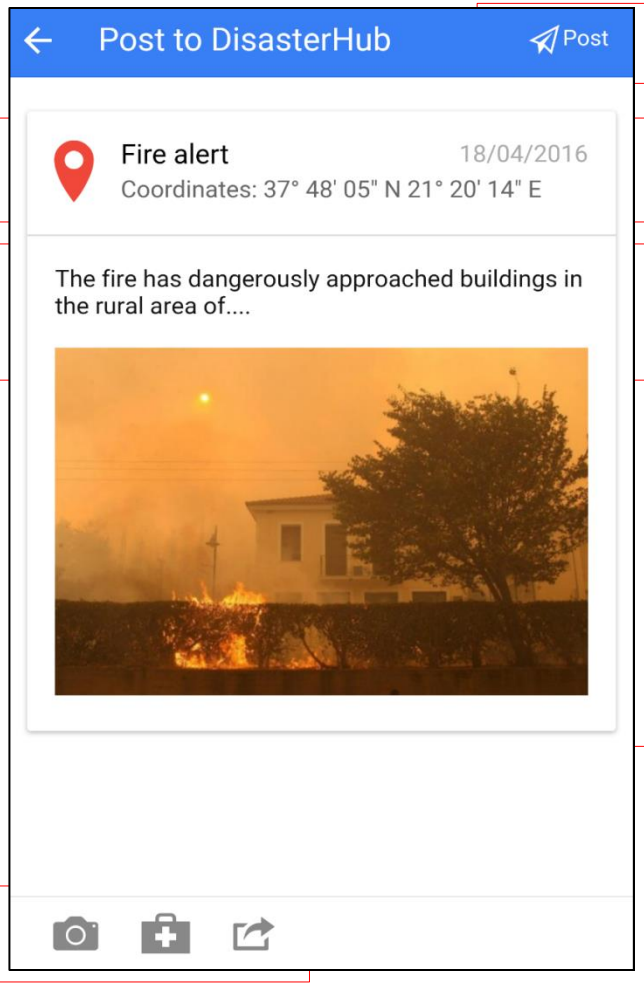




Basic info of the geotag

Add a short text info

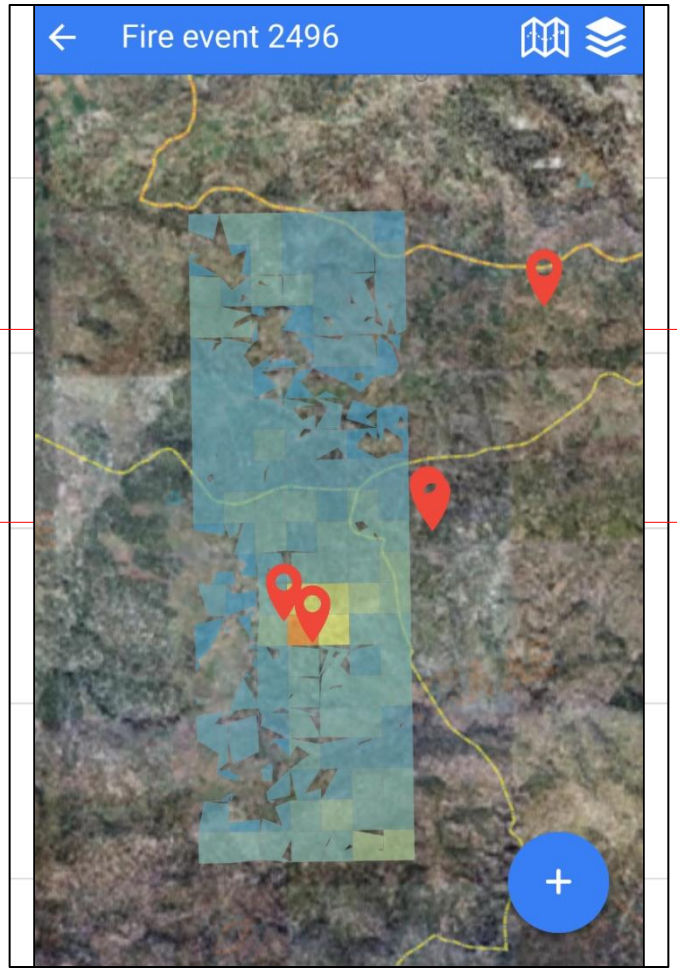
Send a photo from the burnt location



Popovers through which you can manage layers derived from open data

Click on the button to add a geotag

Click on a fire event to navigate the app's map to the specific burnt area



FireHub

A Space based Fire Management Hub

Thank you for your attention!

For more information

http://beyond-eocenter.eu