Copernicus Information & Training Session

Outline of the Presentation

- EMS Service Overview
- Copernicus EMS – Mapping
  - Rapid Mapping Domain
  - Risk & Recovery Domain
- Copernicus EMS – Early Warning
  - EFAS Actors & Services
  - EFFIS Actors & Services

Service & Overview

Emergency Management Service – EMS

- COPERNICUS service; Atmosphere, Marine, Land & Climate Change monitoring, Emergency Management & Security
- Operational since April 2012
- Continuation: full operational service [Copernicus Regulation OM(2013)0312-2013/0164(COD)]

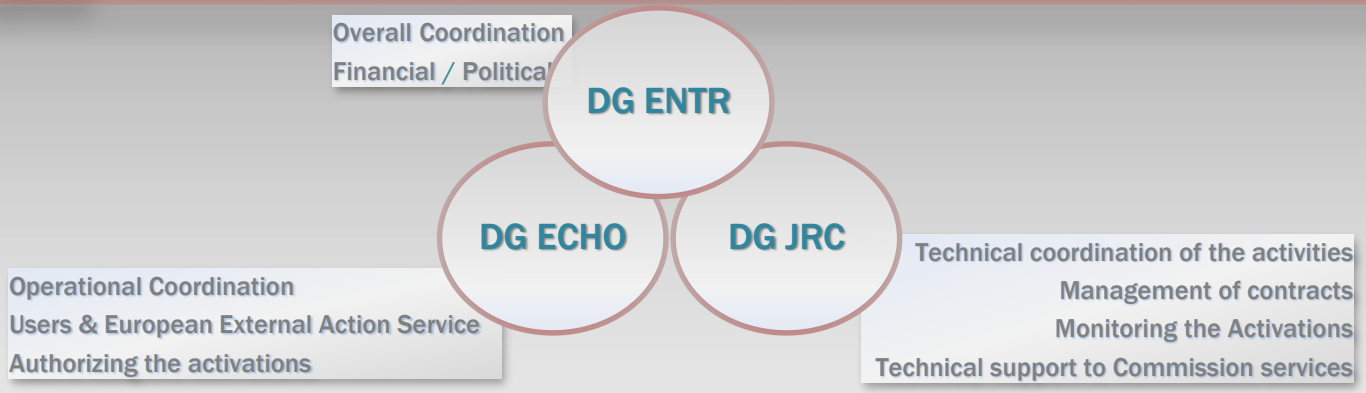
EMS implementation: separate service modules

EMS Mapping

EMS Early warning

Emergency Mapping Validation

EMS Coordination



EMS Mapping - Application Domain 1 / 2

- **COPERNICUS EMS - Mapping**
  - Worldwide coverage
  - Satellite imagery is used as the main data source
  - Wide range of **Emergency Situations** resulting from natural or man-made disasters

Meteorological Hazards	Geophysical Hazards	Deliberate & Accidental Disasters	Humanitarian Disasters
Floods Tsunamis Severe Storms	Earthquakes Volcanic Eruptions Landslides	Technological Disasters Fires	Humanitarian Crises

Support

- Emergency management - **Response** activities **immediately** following an emergency event
- **Recovery**, **Reconstruction**, disaster **Risk Reduction**, **Preparedness** & **Prevention**

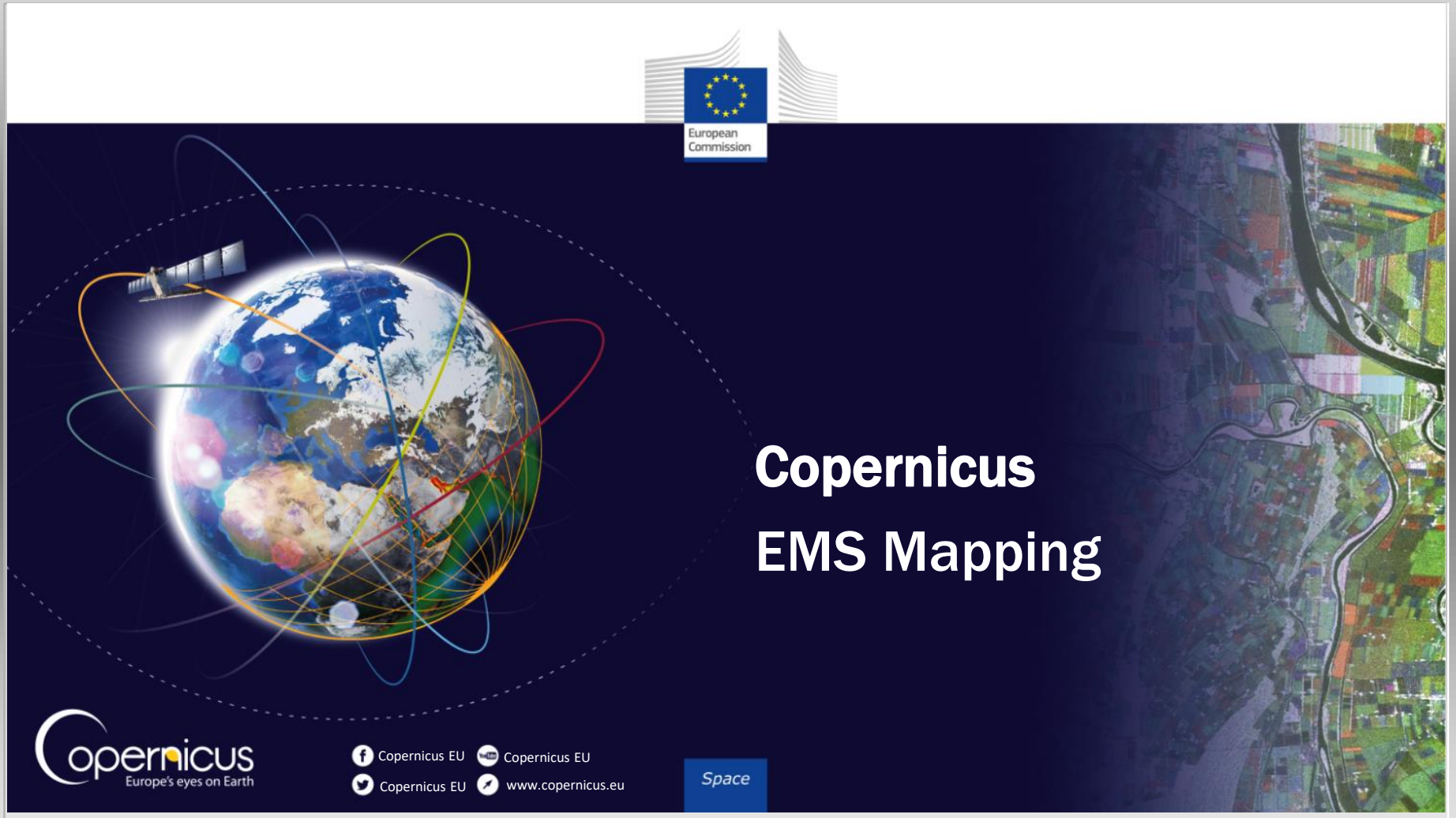
Rapid Mapping	Risk & Recovery Mapping

EMS Mapping - Application Domain 2/ 2

- COPERNICUS EMS – Early Warning
  - European coverage
  - monitoring and forecasts (10/ 6 days)

European Flood Awareness System - EFAS | **European Forest Fire Information System - EFFIS**

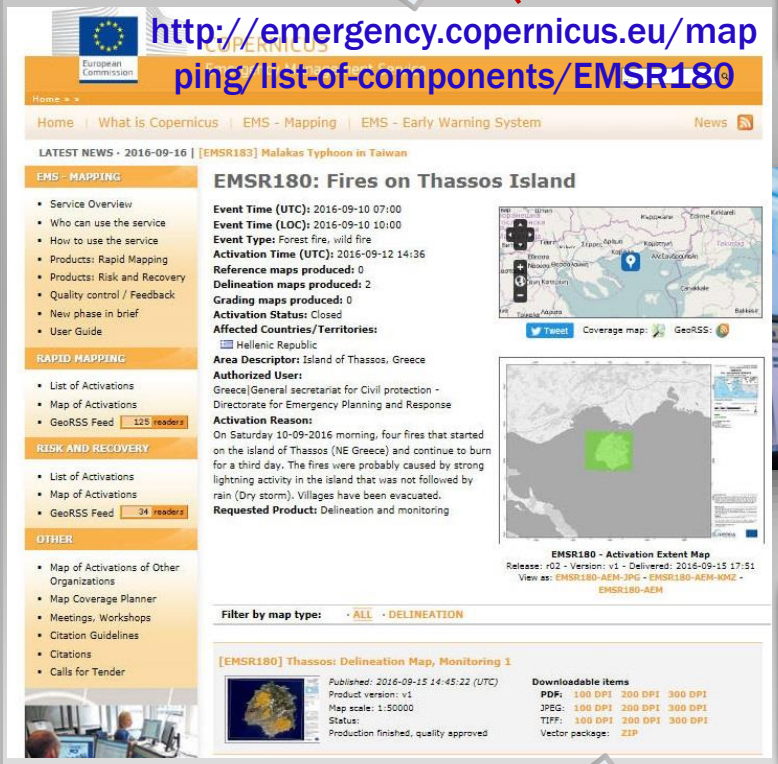
Copernicus Information & Training Session



EMS Mapping - Actors

Products
Download
Feedback

http://emergency.copernicus.eu/mapping/list-of-components/EMSR180



Authorized Users

Civil Protection Authorities
Other National Focal Points

Activation Request

echo-ercc@ec.europa.eu

Emergency Response Coordination Centre 24/7

Activation Approval

DG JRC

Technical Supervision
Quality – Specifications - Timeliness

Publication of Results

Data / Services Providers

European Space Agency

Prompt Support
EO Data Provision

EMS Mapping - Who can Use the Service

Authorized Users

Service Trigger

- Service Request Form (SRF) **directly** to the European Response Coordination Centre (ERCC)
  - National Focal Points (NFPs); EU Member States & countries participating in the European Civil Protection Mechanism
  - EC Services (DGs) and
  - Situation Room of the European External Action Service

Associated Users

Service Trigger

- **Through** the Authorized Users
  - Local, Regional and Other public entities
  - International Governmental Organisations
  - National & International Non-Governmental Organisations
  - Entities and Institutions within the EEAS sphere; EU Delegations, INTCEN, EU Satellite Centre

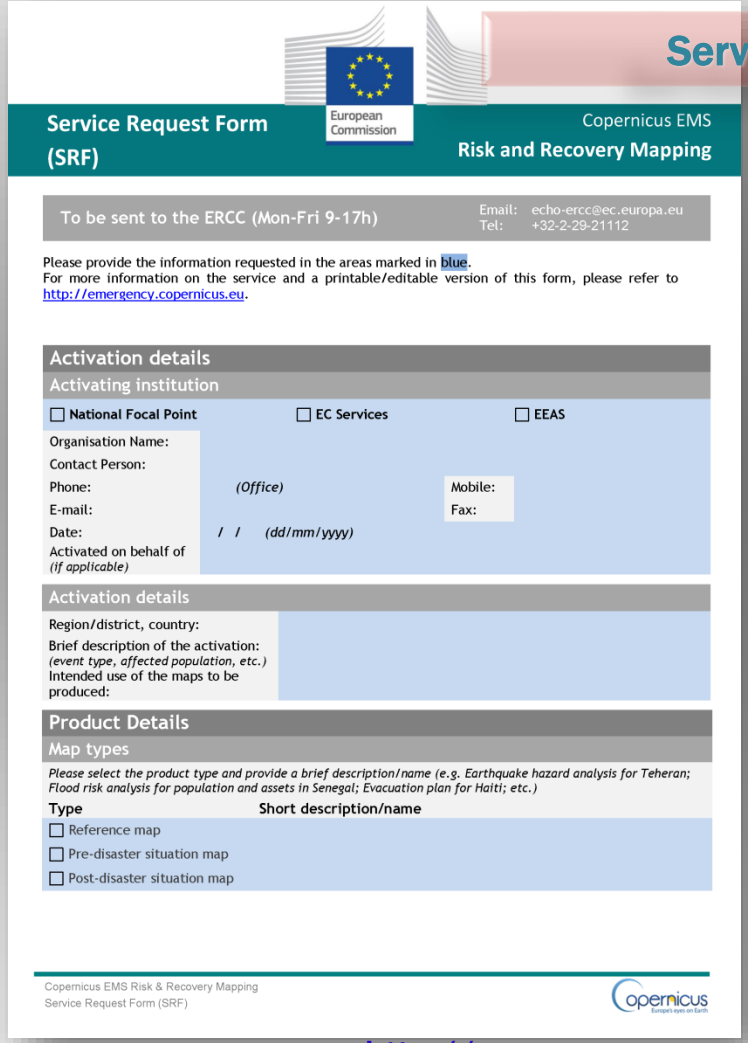
General Public Users

No Service Trigger

- Information of activation requests through the web portal

EMS Mapping - Service Request

Service Request Form/ SRF



Service Request Form (SRF) — European Commission — Copernicus EMS Risk and Recovery Mapping

To be sent to the ERCC (Mon-Fri 9-17h) — Email: echo-ercc@ec.europa.eu Tel: +32-2-29-21112

Please provide the information requested in the areas marked in blue.
For more information on the service and a printable/editable version of this form, please refer to http://emergency.copernicus.eu.

Activation details

Activating institution

☐ National Focal Point ☐ EC Services ☐ EEAS

Organisation Name:
Contact Person:
Phone: (Office) Mobile:
E-mail: Fax:
Date: / / (dd/mm/yyyy)
Activated on behalf of (if applicable)

Activation details

Region/district, country:
Brief description of the activation: (event type, affected population, etc.)
Intended use of the maps to be produced:

Product Details

Map types

Please select the product type and provide a brief description/name (e.g. Earthquake hazard analysis for Teheran; Flood risk analysis for population and assets in Senegal; Evacuation plan for Haiti; etc.)

Type	Short description/name
☐ Reference map	
☐ Pre-disaster situation map	
☐ Post-disaster situation map	

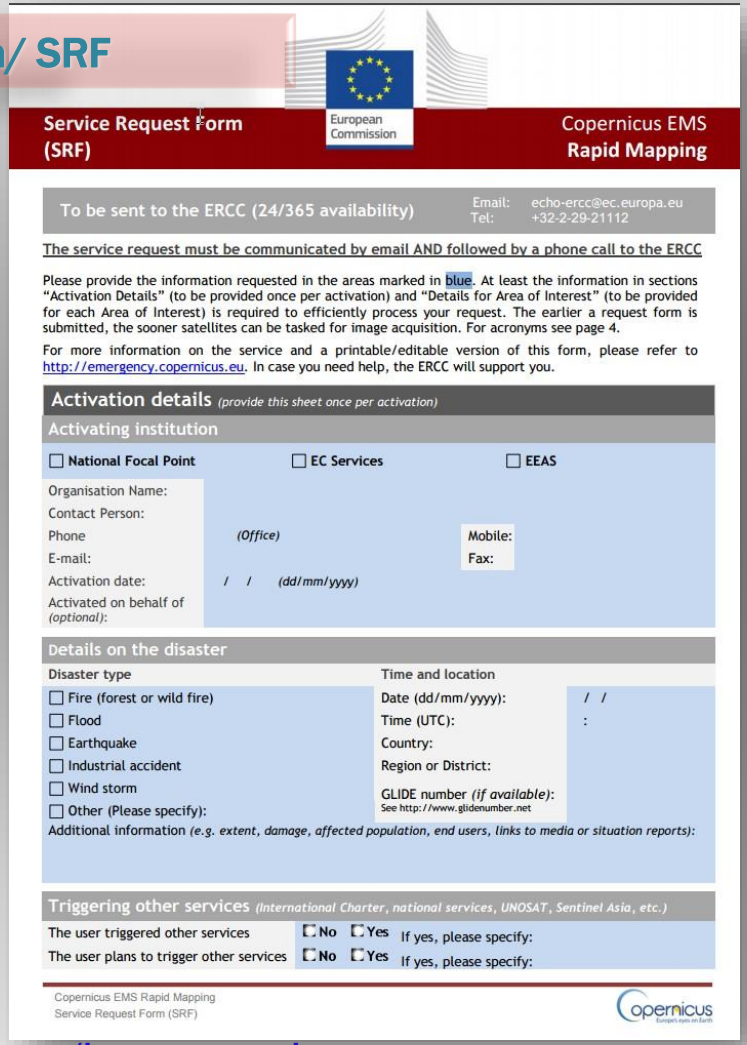
Copernicus EMS Risk & Recovery Mapping
Service Request Form (SRF)

Disaster

Date/ Area

Information Content

Scale/ Format



Service Request Form (SRF) — European Commission — Copernicus EMS Rapid Mapping

To be sent to the ERCC (24/365 availability) — Email: echo-ercc@ec.europa.eu Tel: +32-2-29-21112

The service request must be communicated by email AND followed by a phone call to the ERCC

Please provide the information requested in the areas marked in blue. At least the information in sections "Activation Details" (to be provided once per activation) and "Details for Area of Interest" (to be provided for each Area of Interest) is required to efficiently process your request. The earlier a request form is submitted, the sooner satellites can be tasked for image acquisition. For acronyms see page 4.

For more information on the service and a printable/editable version of this form, please refer to http://emergency.copernicus.eu. In case you need help, the ERCC will support you.

Activation details *(provide this sheet once per activation)*

Activating institution

☐ National Focal Point ☐ EC Services ☐ EEAS

Organisation Name:
Contact Person:
Phone (Office) Mobile:
E-mail: Fax:
Activation date: / / (dd/mm/yyyy)
Activated on behalf of (optional):

Details on the disaster

Disaster type	Time and location	
☐ Fire (forest or wild fire)	Date (dd/mm/yyyy):	/ /
☐ Flood	Time (UTC):	:
☐ Earthquake	Country:	
☐ Industrial accident	Region or District:	
☐ Wind storm	GLIDE number (if available): See http://www.glidenumber.net	
☐ Other (Please specify):		

Additional information *(e.g. extent, damage, affected population, end users, links to media or situation reports):*

Triggering other services *(International Charter, national services, UNOSAT, Sentinel Asia, etc.)*

The user triggered other services ☐ No ☐ Yes If yes, please specify:
The user plans to trigger other services ☐ No ☐ Yes If yes, please specify:

Copernicus EMS Rapid Mapping
Service Request Form (SRF)

http://emergency.copernicus.eu/mapping/ems/how-use-service

EMS Mapping - Acts & Facts

Uninterrupted Service (almost five years)

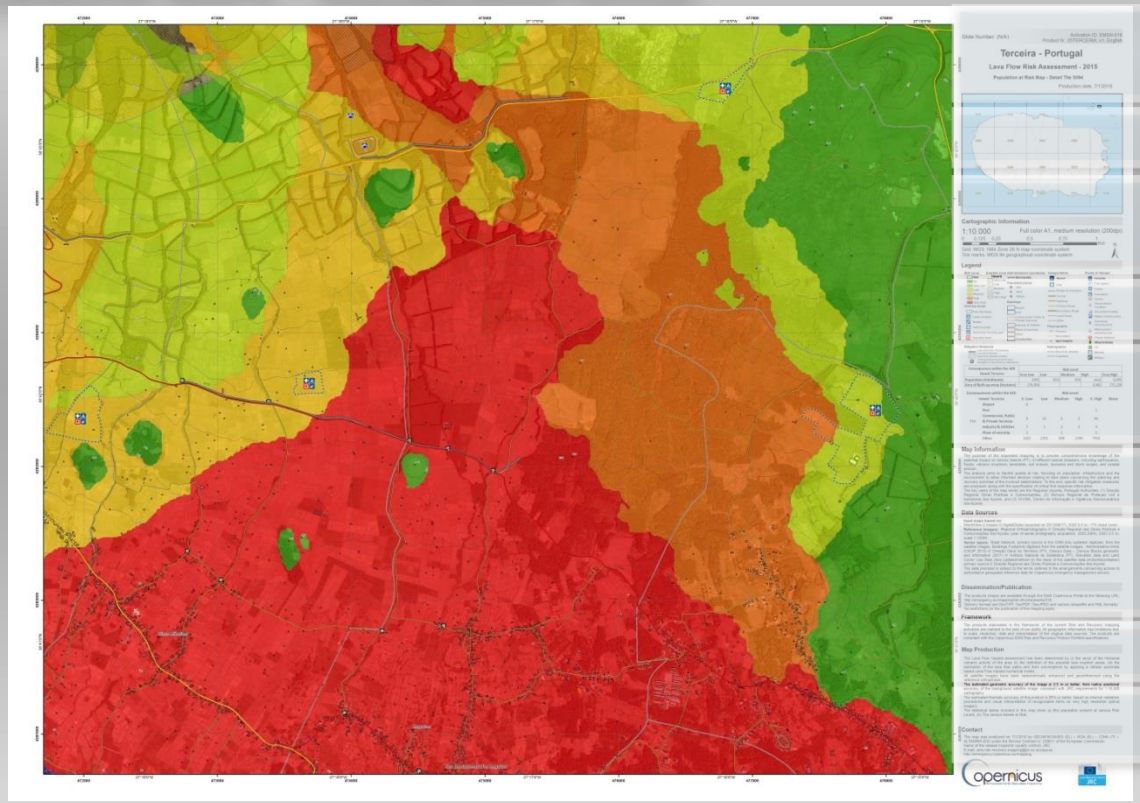
- On-demand and fast provision (within hours or days) of geospatial information
  - **RM** - within hours or (few) days
  - **RRM** - within twenty days (after delivery of EO data): Accurate Analysis & Modelling

- Worldwide Coverage
  - More than 40 worldwide Users organizations
  - More than 50 different Countries

- Intensive Production
  - Thousands (~ 20.000) of maps delivered to the Users (2.000 – RM / 18.000 –RRM)
  - More than 200 activations (185 – RM / 35 –RRM)

EMS Mapping - Thematic Products

THEMATIC MAPS - Standardized format



Map Title
Information content/ Location/ date

Map Index

Cartographic Information
Scale/ Projection System

Map Legend

Statistical Information
Areas, Assets, etc

Users/ Usage Information

Data Sources
Satellite/ Other

Publication/ Framework

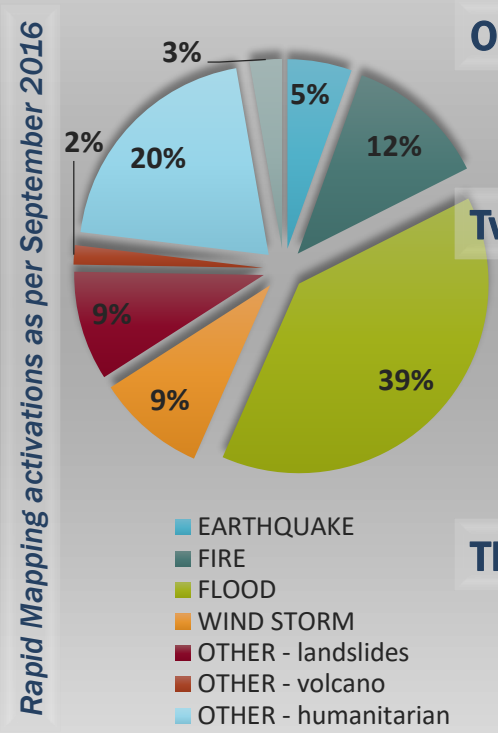
Methodological Approach

GEO INFORMATION LAYERS & DATA BASES

TECHNICAL INFORMATION – REPORT S & METADATA

EMS Mapping - Provided Services/ Products 1 / 9

RAPID MAPPING



On-demand and Fast provision (hours-days) of geospatial information

Two Service Levels

SL1 : 9 h to 12 h after the imagery delivery & quality approval

SL5 : within 5 working days

Three Types of Products

EMS Mapping - Provided Services/ Products

Reference Maps

RAPID MAPPING

- Updated knowledge on the territory and assets – affected area
- Data prior to the disaster; pre-event image captured as close as possible prior to the event
- Content: topographic features, exposed assets, other available information

http://emergency.copernicus.eu/mapping/system/files/components/EMSR185_11JEREMIE_REFERENCE_OVERVIEW_v1_300dpi.jpg

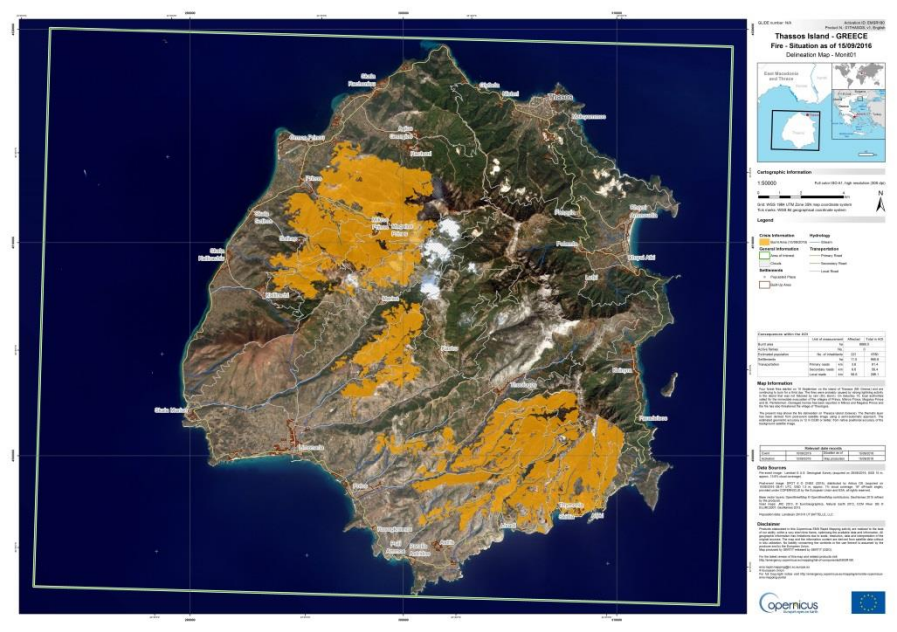
http://emergency.copernicus.eu/mapping/ems/ems-rapid-mapping-products

EMS Mapping - Provided Services/ Products

Delineation Maps

RAPID MAPPING

- Assessment of the event extent (and of its evolution if requested)
- Derived from satellite post-disaster images.
- They vary depending on the disaster type and the delineation of the areas impacted by the disaster; burnt area, flooded area, earthquake impact area



http://emergency.copernicus.eu/mapping/system/files/components/EMSR180_01THASSOS_DELINEATION_OVERVIEW-MONIT01_v1_300dpi.jpg

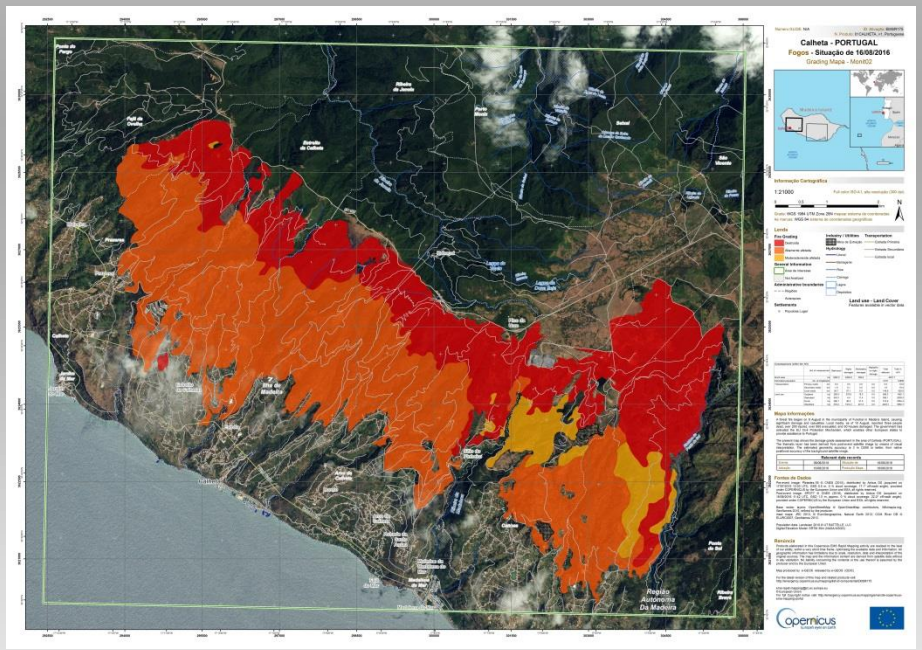
http://emergency.copernicus.eu/mapping/ems/ems-rapid-mapping-products

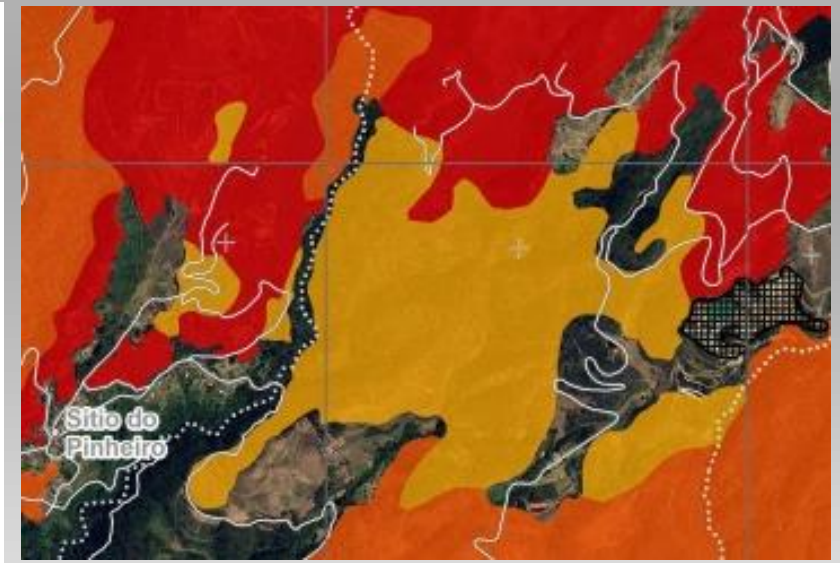
EMS Mapping - Provided Services/ Products

Grading Maps

RAPID MAPPING

- Assessment of the damage grade (and of its evolution if requested): They include **extent**, **magnitude** or **damage grades** specific to each disaster type.
- Derived from satellite post-event images
- They may also provide relevant and up-to-date information, specific to affected population & assets





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http://emergency.copernicus.eu/mapping/ems/ems-rapid-mapping-products

EMS Mapping - Provided Services/ Products 5 / 9

RISK & RECOVERY MAPPING

EoI beginning 2016

Disaster management global stakeholders

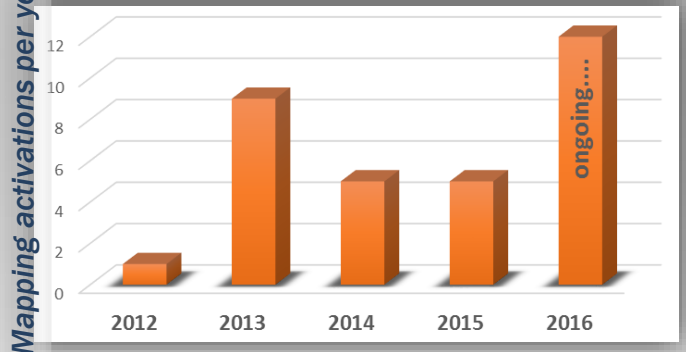
Civil Protection

Members of NGO's (humanitarian)

On-demand provision (month) of geospatial information

Emergency management not related to the immediate response phase

- Prevention
- Preparedness
- Disaster Risk Reduction
- Recovery



Greece, Portugal, Spain, Poland Austria, Germany, Bulgaria, Hungary & DG JRC, DG ECHO

Wide Variety of situations to be addressed

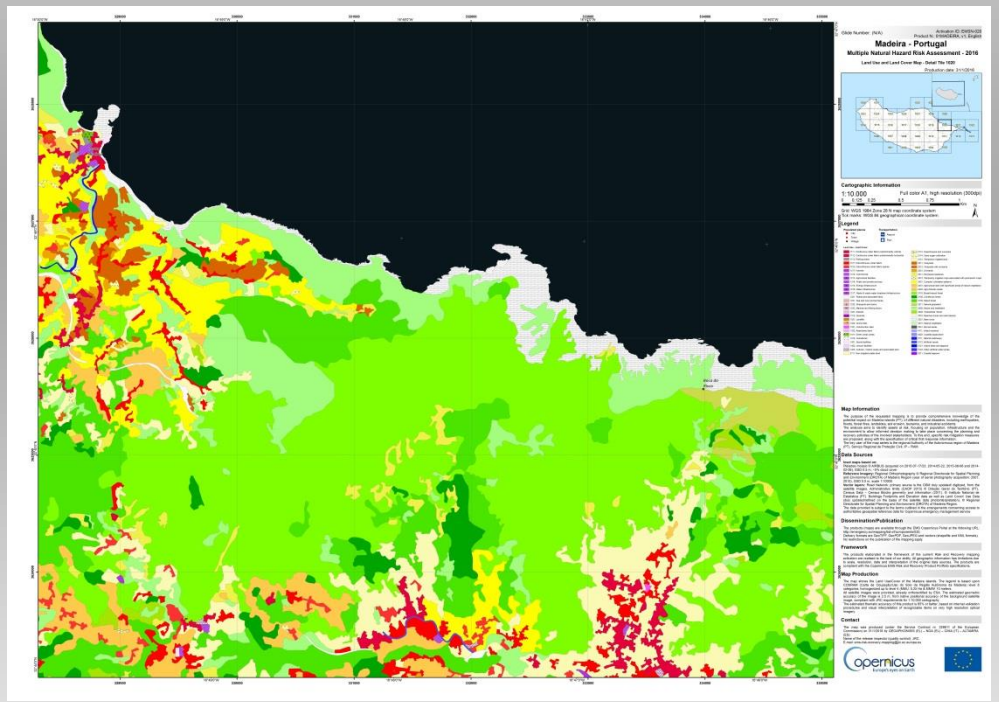
Three Types of Products

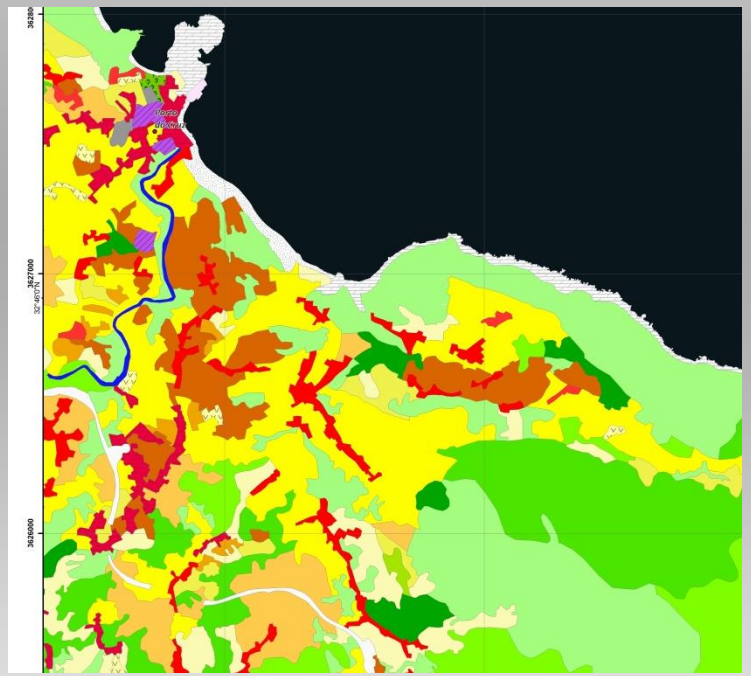
EMS Mapping - Provided Services/ Products 6 / 9

Reference Maps

RISK & RECOVERY MAPPING

- Comprehensive and Updated knowledge on the territory and relevant assets
- Disaster Risk Reduction Context - Content: topographic features, assets, LU/LC, etc





http://emergency.copernicus.eu/mapping/list-of-components/EMSN020/LULC/ALL

http://emergency.copernicus.eu/mapping/ems/ems-risk-and-recovery-mapping-products

EMS Mapping - Provided Services/ Products 7 / 9

Pre-disaster situation Maps

RISK & RECOVERY MAPPING

- Relevant and up-to-date thematic information to assist / focus planning for contingencies on areas vulnerable to hazards, aiming to minimise loss of life and damage
- Hazard, Exposure, Vulnerability, Risk status, Evacuation plans, Modelling scenarios

Hazard - *UNISDR 2009*

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. In technical settings, hazards are described quantitatively by the likely frequency of occurrence of different intensities for different areas, as determined from historical data or scientific analysis

Exposure - *UNISDR 2009*

People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses. it susceptible to the damaging effects of a hazard (distance with reference to Hazard zone & topography)

Vulnerability - *UNISDR 2009*

The characteristics and circumstances of a community, system or asset that makes it susceptible to the damaging effects of a hazard (accounts for specific parameters with respect to the assets' type)

Risk - ISO 31010

Risk is the combination of the consequences of an event (hazard) and the associated likelihood/probability of its occurrence (Convolution of Hazard and Vulnerability of the exposed assets/ population)

http://emergency.copernicus.eu/mapping/ems/ems-risk-and-recovery-mapping-products

EMS Mapping - Provided Services/ Products 8 / 9

Pre-disaster situation Maps

RISK & RECOVERY MAPPING

- Relevant and up-to-date thematic information to assist / focus planning for contingencies on areas vulnerable to hazards, aiming to minimise loss of life and damage
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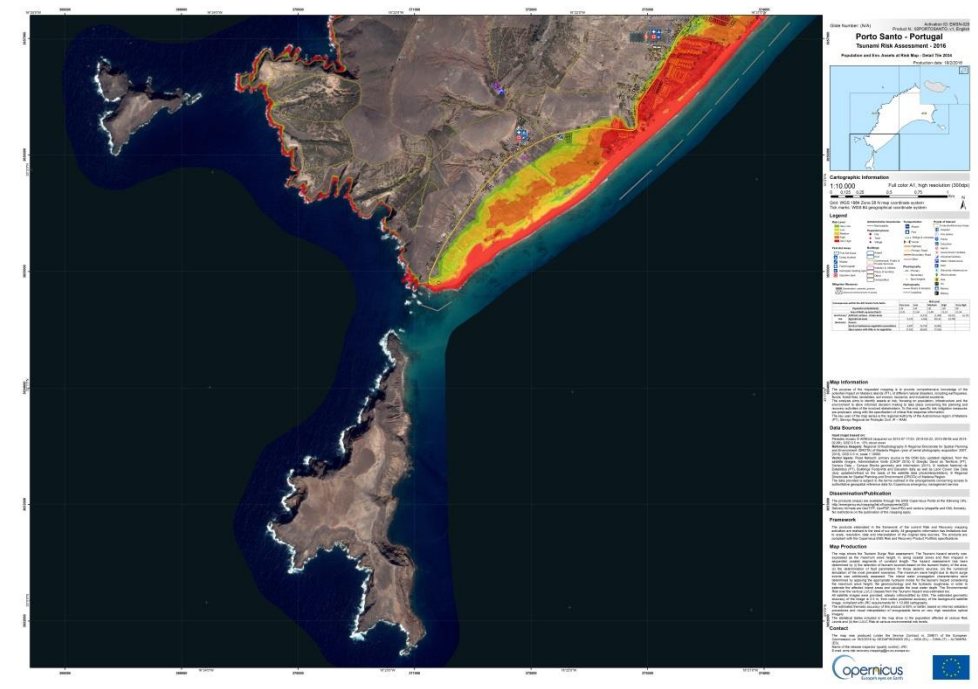

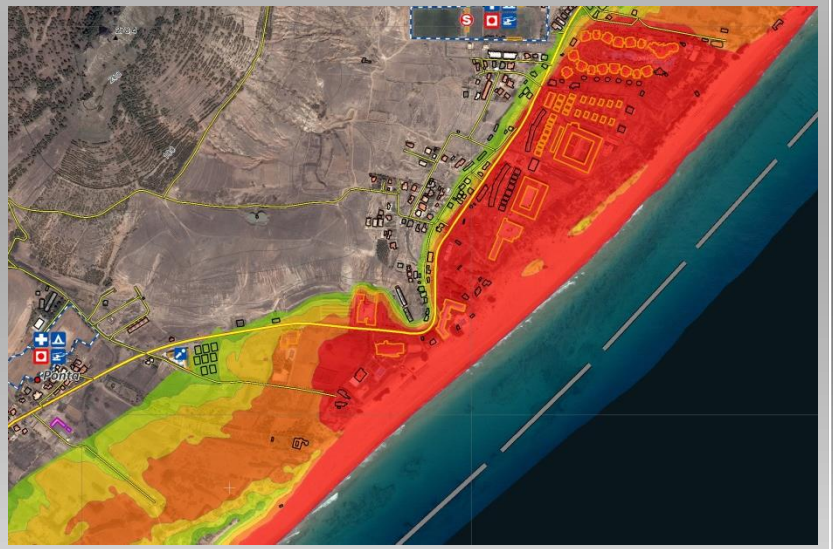

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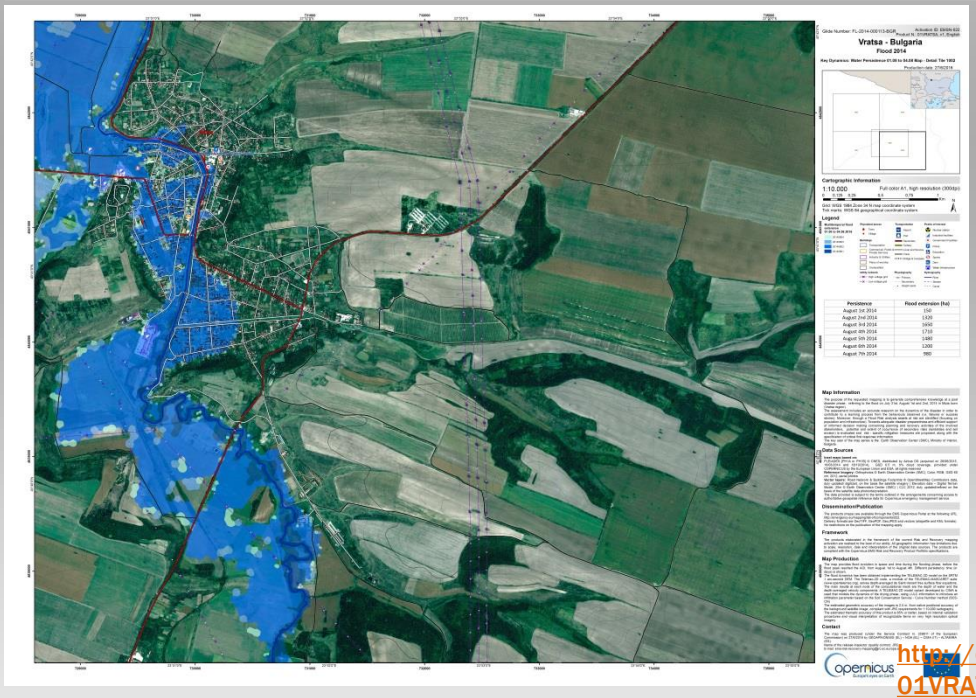
http://emergency.copernicus.eu/mapping/ems/ems-risk-and-recovery-mapping-products

EMS Mapping - Provided Services/ Products 9 / 9

Post-disaster situation Maps

RISK & RECOVERY MAPPING

- Relevant and up-to-date thematic information for the needs of reconstruction planning
- Progress monitoring, mapping long-term impact
- Post disaster needs assessment, recovery plans, reconstruction/rehabilitation monitoring, Internally Displaced Persons (IDP) monitoring, Refugee Camp monitoring



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http://emergency.copernicus.eu/mapping/ems/ems-risk-and-recovery-mapping-products

COPERNICUS EMS –RRM : Azores Archipelagos case

Activation triggered by three regional Authorities - Pre-disaster activities planning and disaster management

Serviçio Regional Proteçao Civil e Bombeiros dos Açores

Direção Regional Obras Públicas e Comunicações

Centro de Informação e Vigilância Sismovulcânica dos Açores

Establishment of the Geo-spatial Data Base

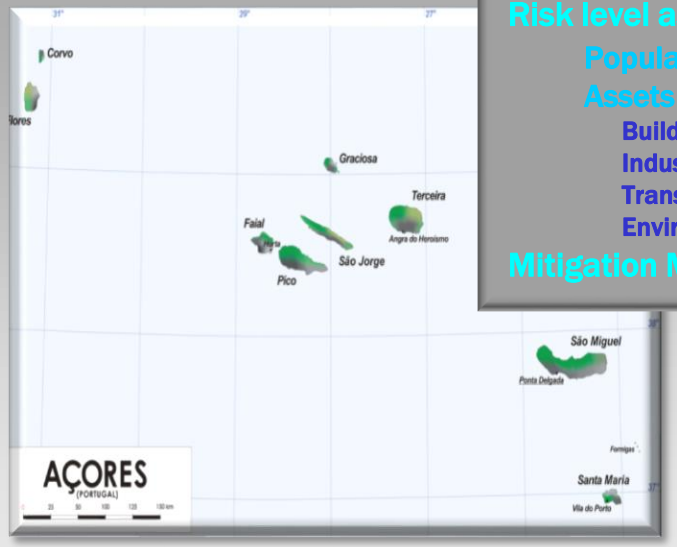
Risk Modelling

- Hazard
- Vulnerability
- Exposure
- Risk level assessment
  - Population
  - Assets
    - Buildings
    - Industries, etc
    - Transport Network
    - Environment
- Mitigation Measures

- Earthquake
- Flash Floods
- Lava Flow
- Landslides
- Soil Erosion
- Coastal Erosion
- Tsunamis & Storm Surges

Spatial Modelling

First Response Infrastructure



Risk and Recovery Maps & Tables

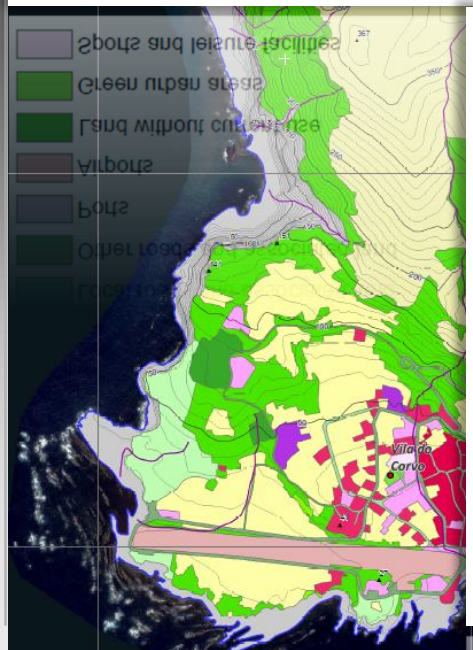
Copernicus Emergency Management Service

COPERNICUS EMS –RRM : Azores Archipelagos case

Thematic Layers / nomenclature

Land Use - Land Cover

- Continuous Urban Fabric (P.B.F. > 80%)
- Isolated Structures
- Commercial, Public & Private Services
- Industry & Utilities
- Main roads and associated land
- Local roads and associated land
- Other roads and associated land
- Ports
- Airports
- Land without current use
- Green urban areas
- Sports and leisure facilities
- Arable land
- Pastures
- Broad-leaved forest
- Coniferous forest
- Shrubs and/or herbaceous vegetation
- Natural grassland
- Bare rock
- Beaches, dunes and sand planes
- Sparsely vegetated areas
- Inland wetlands
- Lakes
- Water reservoirs



Risk Level

- Very Low
- Low
- Medium
- High
- Very High

First Aid Areas

- First Aid Areas
- Camp location
- Shelter
- Field hospital
- Helicopter landing spot
- Gasoline tank

Mitigation Measures

- Breakwaters, seawalls, groynes
- Structural reinforcement of assets

Administrative boundaries

- Municipality

Populated places

- City
- Town
- Village

Buildings

- Airport
- Port
- Commercial, Public & Private Services
- Industry & Utilities
- Place of worship
- Other
- Unclassified

Transportation

- Airport
- Port
- Bridge & overpass
- Tunnel
- Highway
- Primary Road
- Secondary Road
- Local Road
- Other

Physiography

- 300 - Primary
- Secondary
- Spot heights

Hydrography

- Rivers & streams
- Coastline

Points of Interest

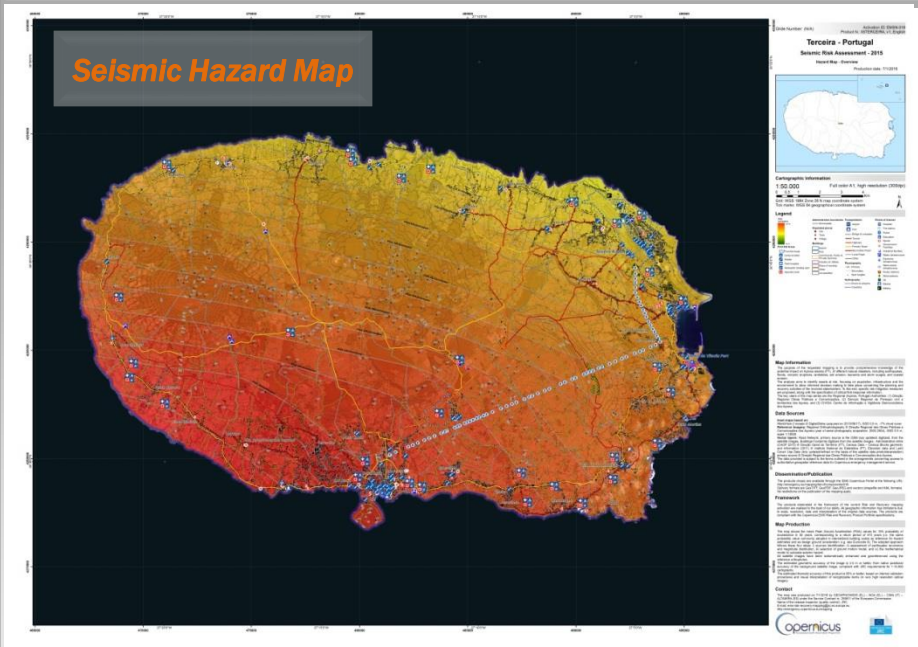
- Hospital
- Fire station
- Police
- Education
- Sports
- Government Facilities
- Industrial facilities
- Water infrastructure
- Electricity infrastructure
- Wave power infrastructure
- Power stations
- Wind turbines
- Oil
- Marina
- Military

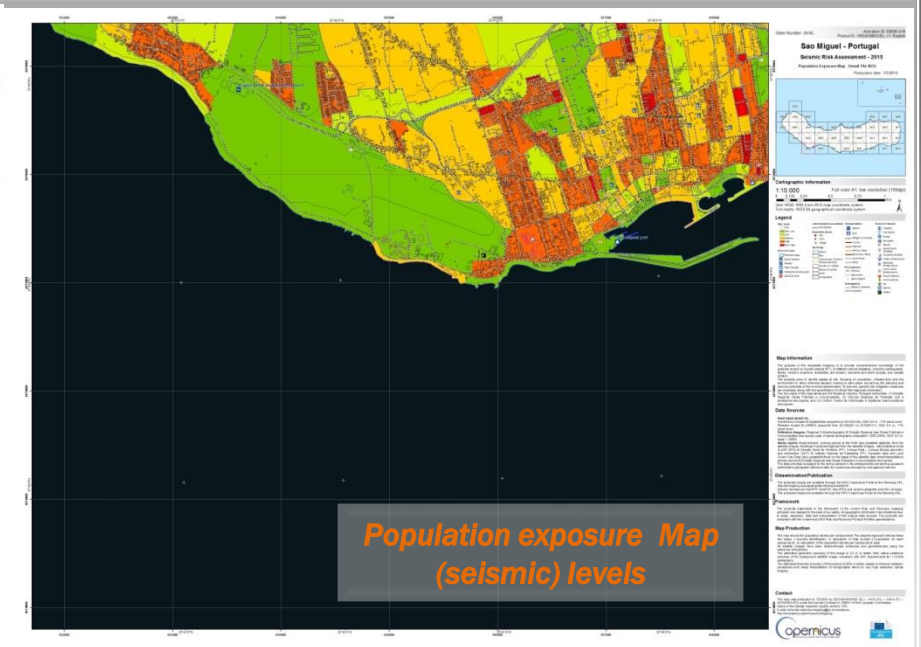
COPERNICUS EMS –RRM : Azores Archipelagos case

Pre-disaster situation Maps

- Evaluation of possible damages (vulnerability of assets, areas, etc)
- First response conditions (access roads, evacuation possibilities, locations of first aid and shelters, etc)
- Mitigation measures
- Objective and comprehensive assessment of new (secondary) risks (landslides, flash floods, etc)

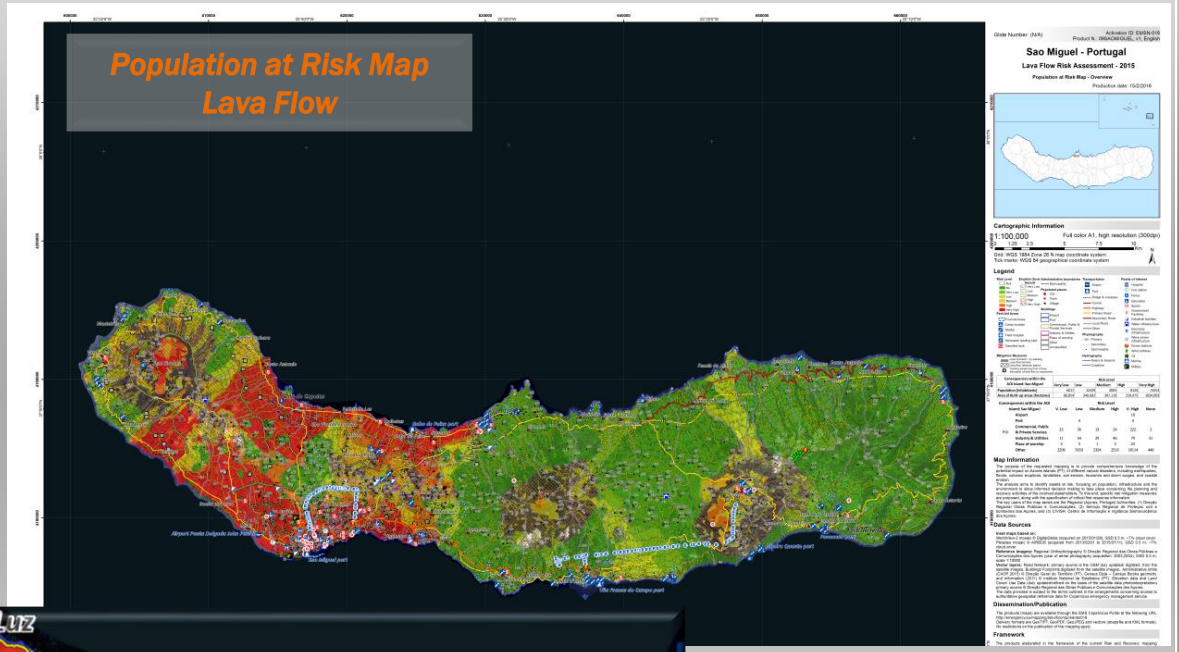
Towards in minimizing the impact of future events through undertaking the necessary preparedness measures with reference to: Human Life, EMS Infrastructure, Damage Extent





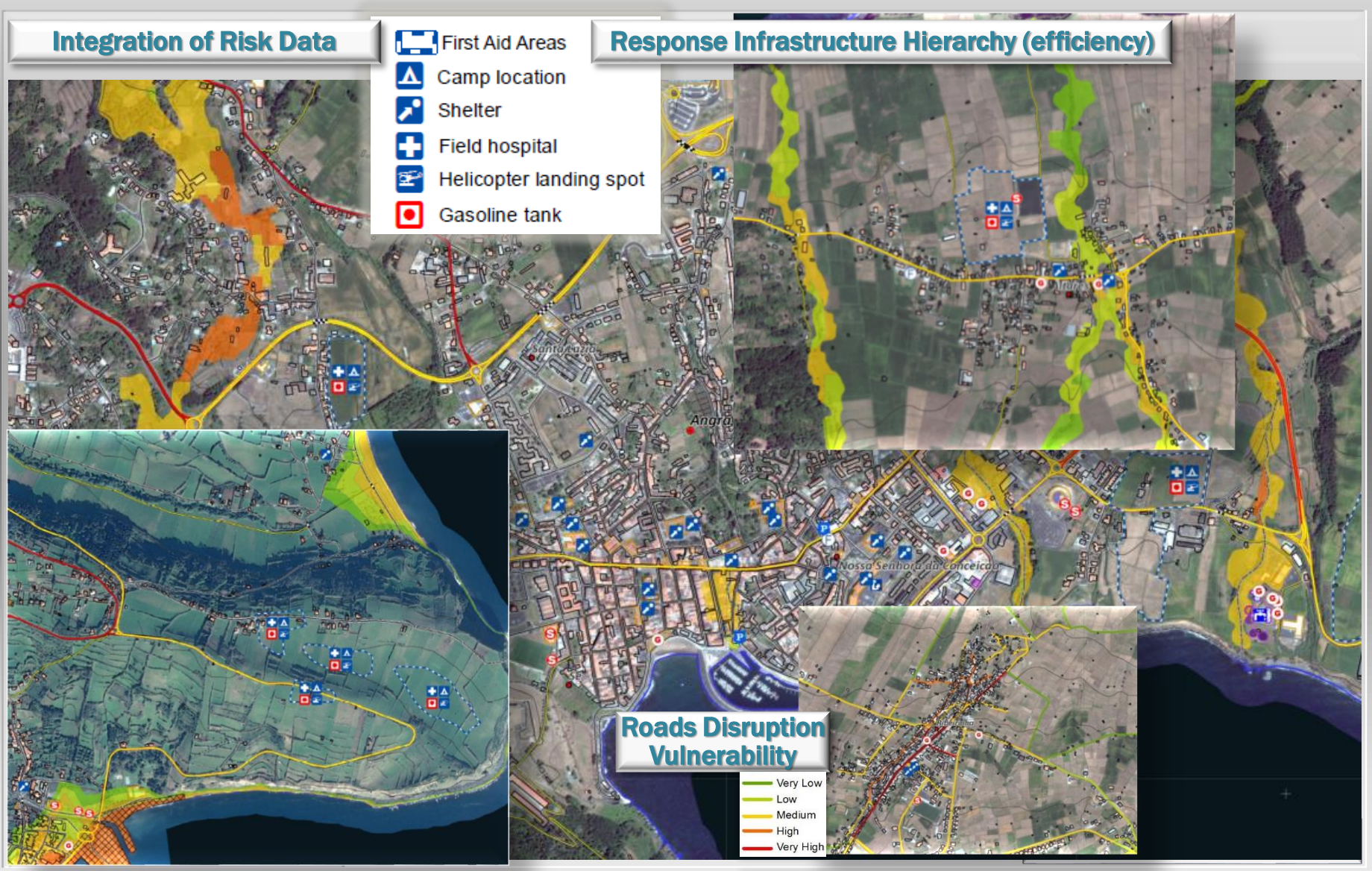
COPERNICUS EMS –RRM : Azores Archipelagos case

Pre-disaster situation Maps

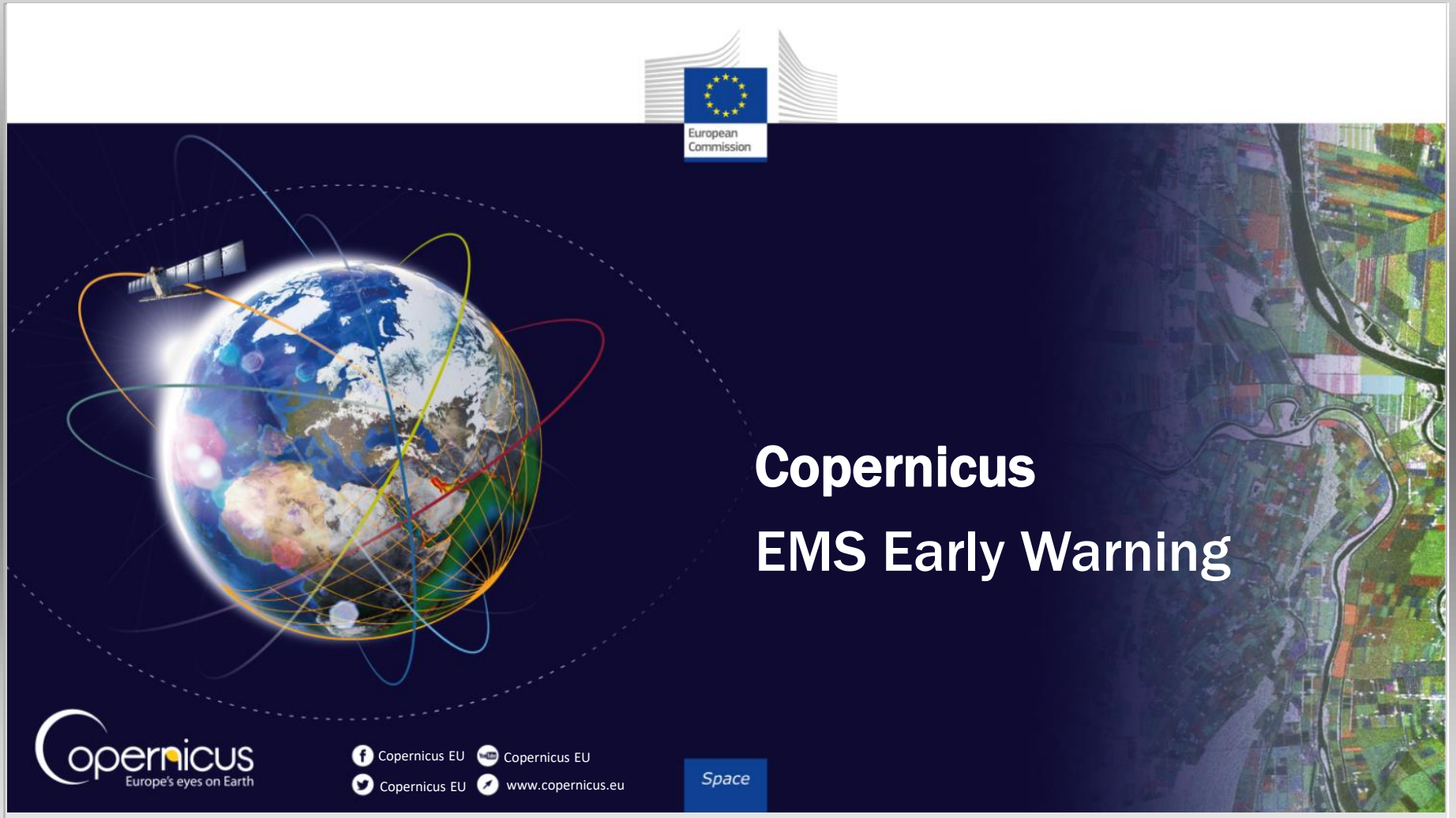


Copernicus Emergency Management Service

COPERNICUS EMS –RRM : Azores Archipelagos case



Copernicus Information & Training Session



EMS Early Warning - Application Domain

European Flood Awareness System
EFAS

EFAS provides:

- **Added value information** to the national hydrological services
- Unique Overview on the **current** and **forecast flood** situation to the European Commission's Emergency Response Coordination Centre (ERCC) of DG ECHO
- **Pan-European overview maps** of flood probabilities up to 10 days in advance
- **Detailed forecasts** at stations where the national services are providing real time data

EFAS information can contribute to timely activate of the EMS – (RAPID) Mapping for an improved flood extent monitoring

54 national/regional authorities are part of the EFAS partners network

www.efas.eu/partners-list.html

European Forest Fire Information System
EFFIS

Modular web geographic information system: near real-time and historical information on forest fires and forest fire regimes in the European, Middle Eastern and North African regions

Fire monitoring: full fire cycle, providing information on the pre-fire conditions and assessing post-fire damages (fire prevention, preparedness, fire fighting and post-fire operations)

Established by the European Commission (EC) in collaboration with the national fire administrations to :

- Support the services in charge of the protection of forests against fires in the EU & neighbouring countries
- Provide the EC services and the European Parliament with harmonized information on forest fires in Europe

Supported by an Expert Group

43 countries in Europe, Middle East and North Africa

EMS Early Warning – EFAS

EFAS Operations

Meteorological data collection Centre
Historic and real-time data across Europe

Hydrological data collection Centre
Historic and real-time discharge and water level data

Computational Centre
Forecasts & post-processing calculations web interface of the EFAS-Information System

European Commission
Joint Research Centre

Dissemination Centre
EFAS results Analysis; daily basis
Information to the EFAS partners
User meetings and training

European Flood Awareness System
EFAS

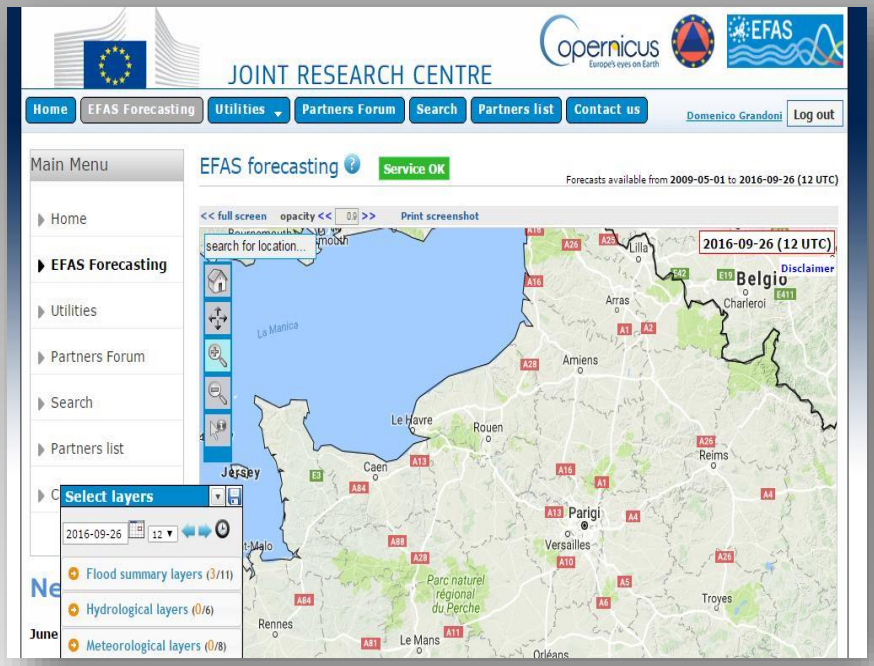
https://www.efas.eu/

EMS Early Warning – EFAS

Dissemination Centre

1- Daily analysis Full information

2 - Notification



Information Flow & Decision Making

EFAS Partner

Use 1 or wait for 2

After 2 Further Investigation

EFAS info usage Non Compulsory

EMS Early Warning – EFAS

Notifications

Formal Notification

Catchment area > 2000 km2
Event > 48 h in advance
Forecasts parameters exceeding thresholds

Informal Notification

Catchment size, forecast parameters related criteria **not met**
Officer in Duty evaluation
At least one of multiple forecasts indicates **severe** flooding risk

Flash Flood Notification

The probability of exceeding a 20 year return period magnitude of the surface runoff index forecasted **>** 35%
and the forecasted start of the event is **<** 72 hours

ERCC overview

Daily overview sent to the ERCC

- ❑ information on ongoing floods in Europe as reported by the national services and by EFAS

EMS Early Warning – EFAS

Information Layers

Flood summary layers (3/11)

Current & Past floods situation: active information on alert areas, flood forecasting, flood probability and real time hydrographs

Hydrological layers (0/6)

Maps of the individual forecasts based on different meteorological inputs such as the ensemble for ECMWF and the COSMO consortium and the deterministic forecast from the German Weather office and the ECMWF

Meteorological layers (0/8)

Accumulated rainfall & EFAS forecast

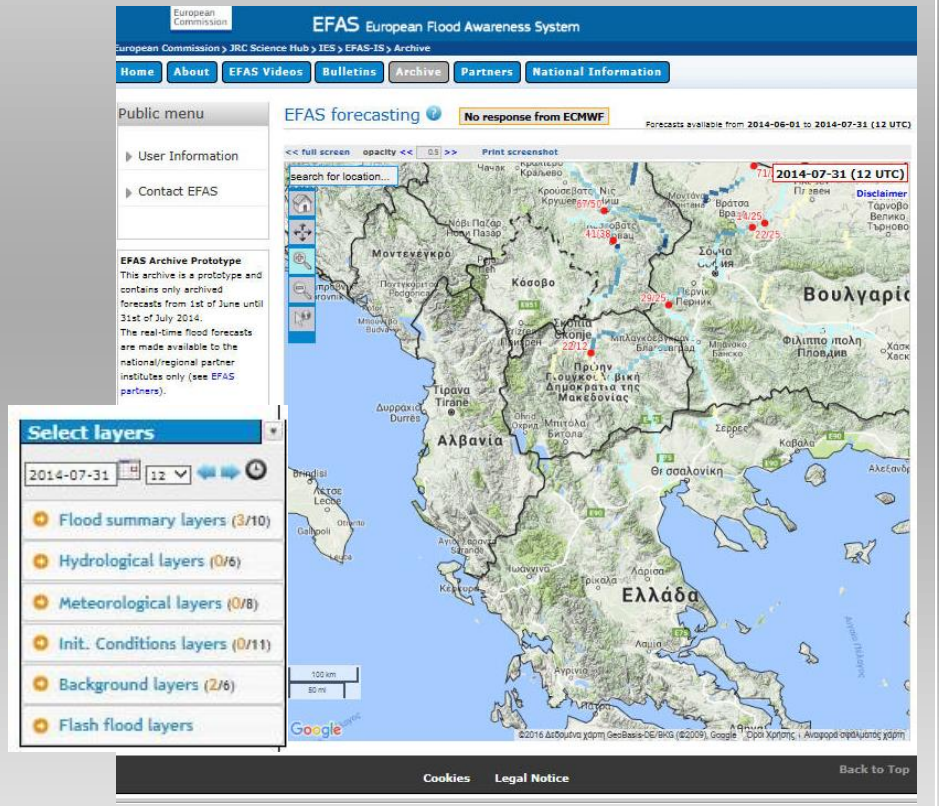
Deterministic medium-range forecasts and Ensemble forecast for flood warning beyond 48 hours

Init. Conditions layers (0/11)

Maps such as the simulated soil moisture or snow water equivalent and associated anomalies, which are important background information when analysing flood forecast

Flash flood layers (0/2)

Flash flood warnings are generated using the methodology of the Enhanced Runoff Index based on Climatology



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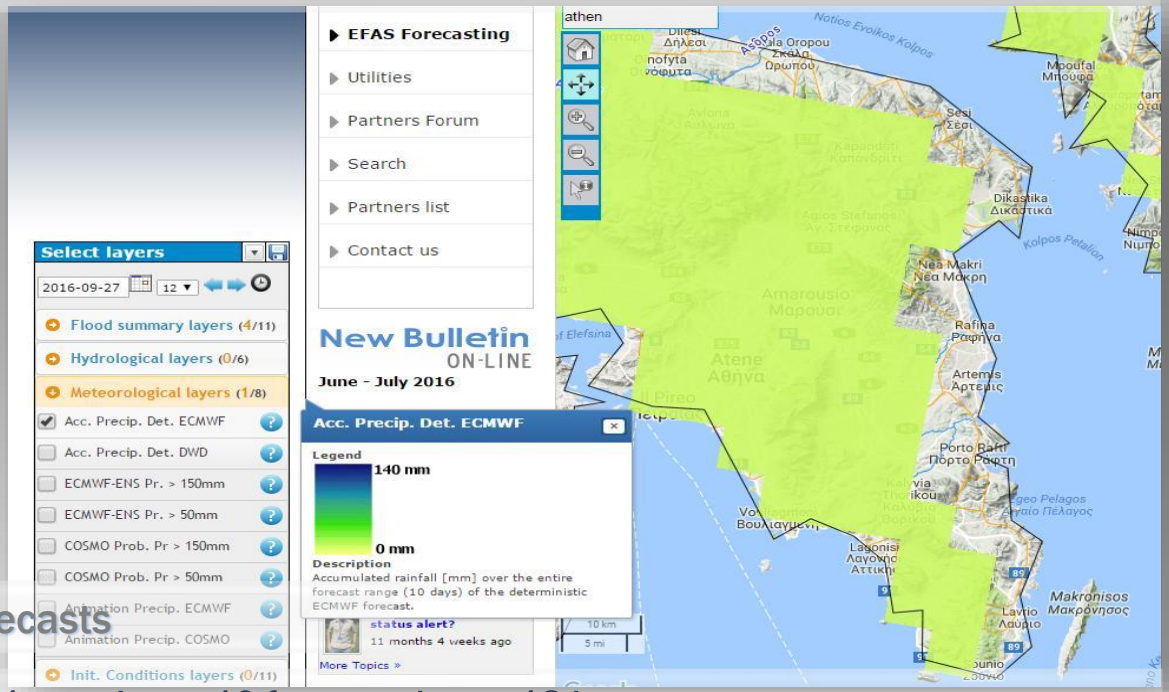
Weather Forecast

Deterministic Forecasts

- DWD/German Weather office (ICON & ICON-EU) – global model, 7 forecast days (~ 6.5 km, day 1-3 / ~ 13 km, day 4-7)
- ECMWF European Centre for Medium-Range Weather Forecasts – global model, 10 forecast days, ~ 9 km



Ensemble Prediction Systems Forecasts

- ECMWF VAREPS – global model, 51 members, 10 forecast days, ~18 km
- COSMO-LEPS – Europe, 16 members, 5 forecast days, ~ 7 km

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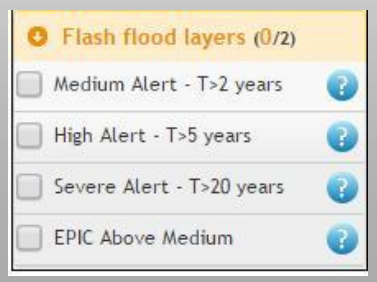
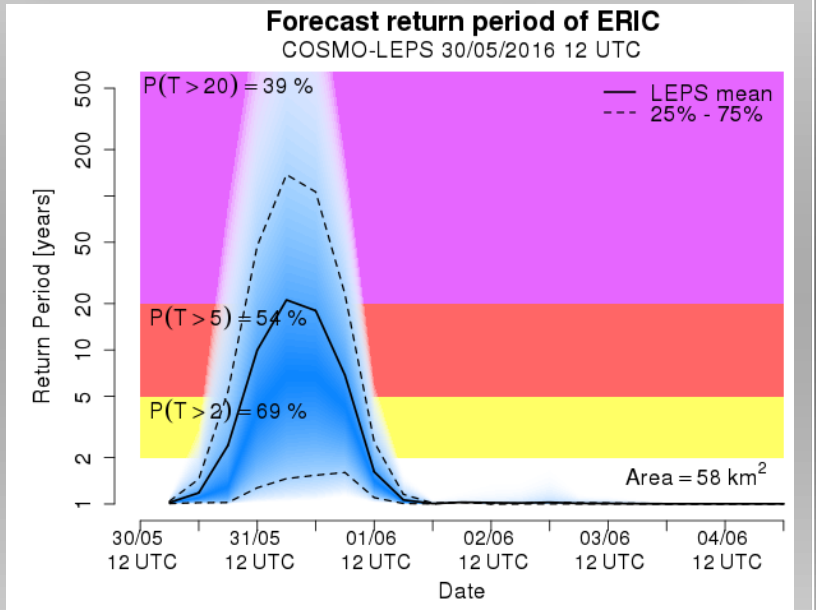
Products and services: Flash Floods Layers



Probability (forecast) for a precipitation intensity exceeding different threshold levels

- Based on accumulated upstream precipitation forecast for durations up to 24 hours (no hydrological simulation)
- Accounts for soil moisture status, geomorphology and land-use; a soil moisture - runoff coefficient relation
- COSMO-LEPS forecasts
- River network at 1 km resolution
- Catchments area between 25 km2 & 2000 km2
- Probabilistic return period shown for lead time range 12-120 hours



Point Information

Country	CoA Status	Region	River	Upstream Area [km^2]
France	YES	Loire	France - Loire, above Allier	58

Landslide susceptibility of the affected areas

Very high	High	Moderate
0%	22%	33%

EMS Early Warning – EFAS

Handling False Alarms…

EFAS is providing information to the national hydrological services only when there is a danger that critical flood levels might be exceeded.

Critical thresholds: at every grid point and therefore cannot be derived from observations.

- Long term discharge time series are calculated - based on observed meteorological data - at each grid with the same LISFLOOD (hydrological) model parameterization that is set up in the forecasting system
- From these long-term simulations return periods are estimated – currently 1, 2, 5 & 20-year return periods.
- All flood forecasts are compared against these thresholds – at every pixel – and the calculated threshold exceedance
- If critical thresholds are exceeded persistently over several forecasts, information at these locations is produced (colour - coded overview maps or time series information at control points)
- The persistence criteria were introduced to reduce the number of false alarms and focus on large fluvial floods caused mainly by widespread severe precipitation, combined rainfall with snow-melting or prolonged rainfalls of medium intensity

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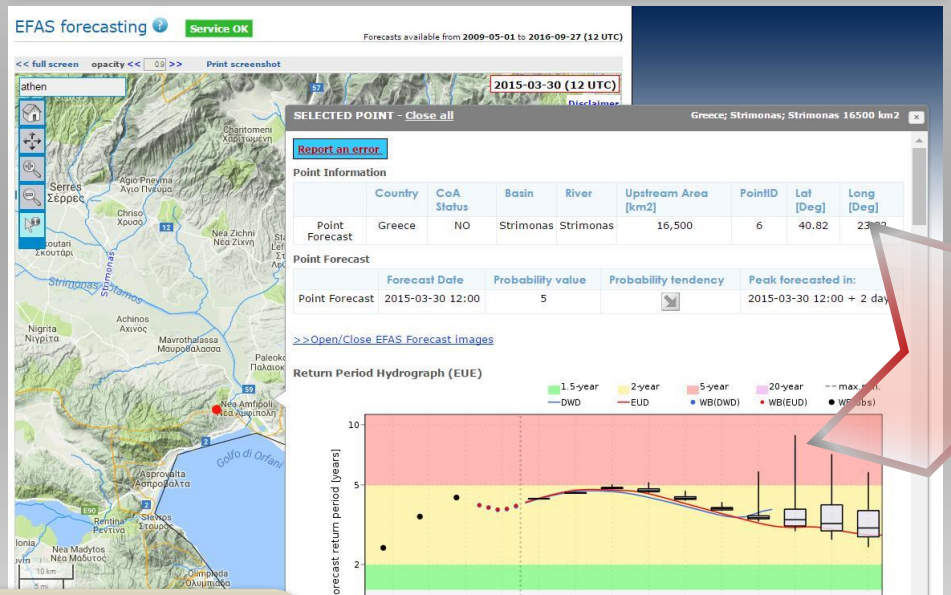
To RAPID Mapping …

EFAS flood summary layer 30.03.2015

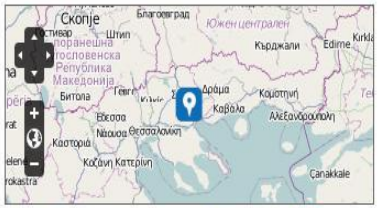


Reporting point high: probability for exceeding EFAS high threshold > 10%

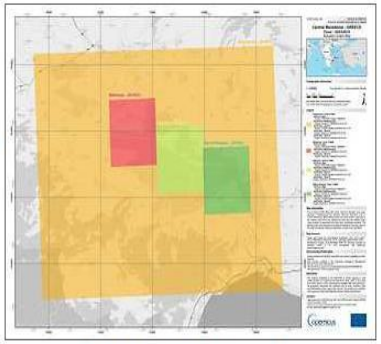
EMS Rapid Mapping activation 31.03.2015

EMSR122: Flood in Greece

Event Time (UTC): 2015-03-30 15:00
Event Time (LOC): 2015-03-30 18:00
Event Type: Flood
Activation Time (UTC): 2015-03-31 12:41
Reference maps produced: 4
Delineation maps produced: 12
Grading maps produced: 0
Activation Status: Closed
Affected Countries/Territories:
Hellenic Republic
Area Descriptor: Central Macedonia
Authorized User:
Greece|General secretariat for Civil protection - Directorate for Emergency Planning and Response
Activation Reason:
Due to heavy rainfall during last month, extensive damages have been reported in infrastructures and networks along the Strymonas river, in Central Macedonia. Many embankments have been broken, especially in the southern part of the river, flooding the road network and the rural network, while many hectares of agricultural land have been completely inundated.
Requested Product: Reference + Delineation Maps



Tweet Coverage map: GeoRSS:



EMSR122 - Activation Extent Map
Release: r06 - Version: v1 - Delivered: 2015-04-03 13:23
View as: EMSR122-AEM-JPG - EMSR122-AEM-KMZ - EMSR122-AEM

EMS Early Warning – EFAS

To access the EFAS-IS

www.efas.eu

Personal login is required to access forecasts, notifications etc.

EFAS team contact (email)

info@efas.eu

EMS Early Warning – EFFIS

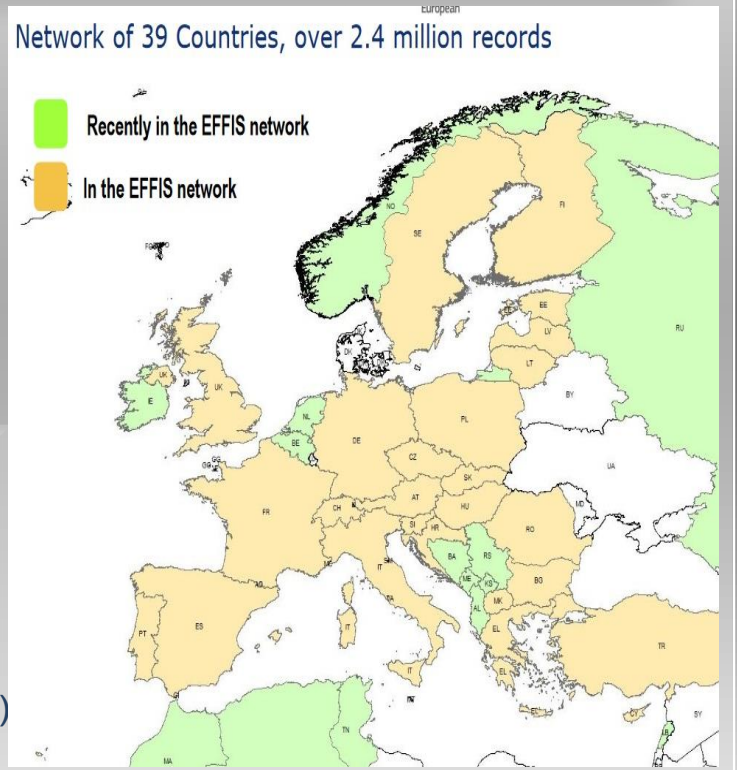
Users and Network

Services & products freely accessible via the EFFIS portal

http://forest.jrc.ec.europa.eu/effis

EFFIS Users include

- EC DGs and Services,
- European Parliament,
- Associated national/regional forest fire & civil protection services,
- FAO, Silva Mediterranea,
- UNECE (United Nations Economic Commission for Europe)



EMS Early Warning – EFFIS

Current Situation

Current fire season in Europe and in the Mediterranean area

- ❑ Meteorological fire danger maps
- ❑ Forecast up to 6 days
- ❑ Daily updated maps of hot spots and fire perimeters

Fire History

Build customized maps of historical fire incidence.

European Fire Database querying: number of fires, burned area & average fire size of selected years (nuts 1-3 level depiction/ 2013)

Fire News

A selection of news (press) on wildland fires in Europe updated daily

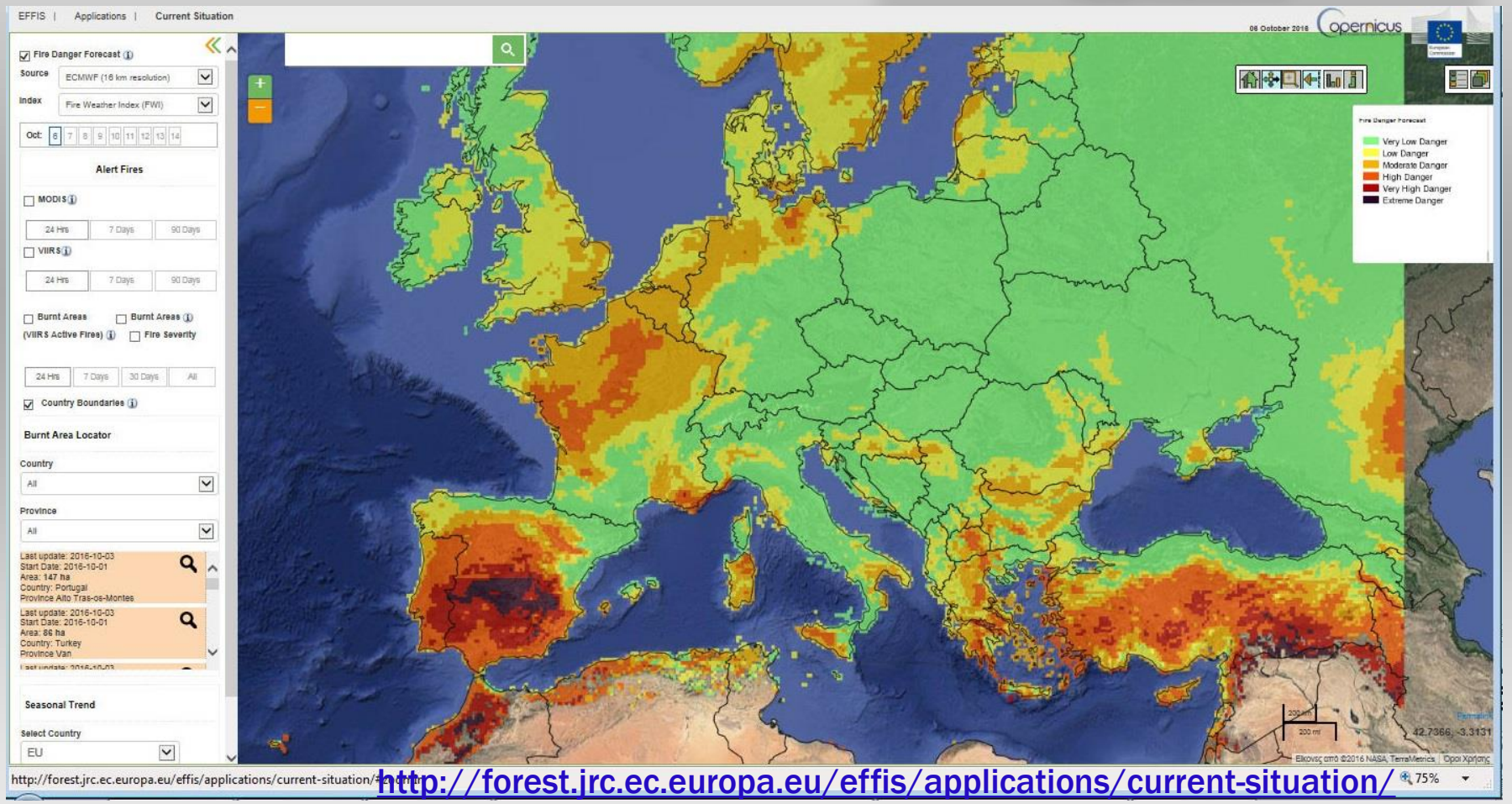
News can be browsed for specific countries selected by the user from the news map

Applications

EMS Early Warning – EFFIS

Current Situation

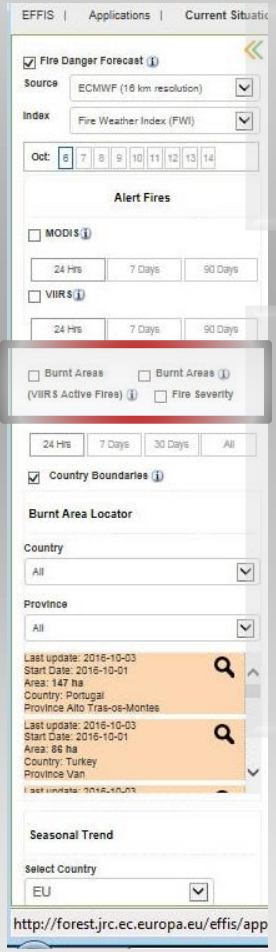
Applications



http://forest.jrc.ec.europa.eu/effis/applications/current-situation/

EMS Early Warning – EFFIS

Current Situation



Applications

Fire Danger Forecast module:

Daily maps - all year around - of 1 to 10 days forecasted fire danger level using numerical weather predictions (received daily from 3 systems, the European Centre for Medium-Range Weather Forecast (ECMWF), French (MeteoFrance) and German (DWD) meteorological services)

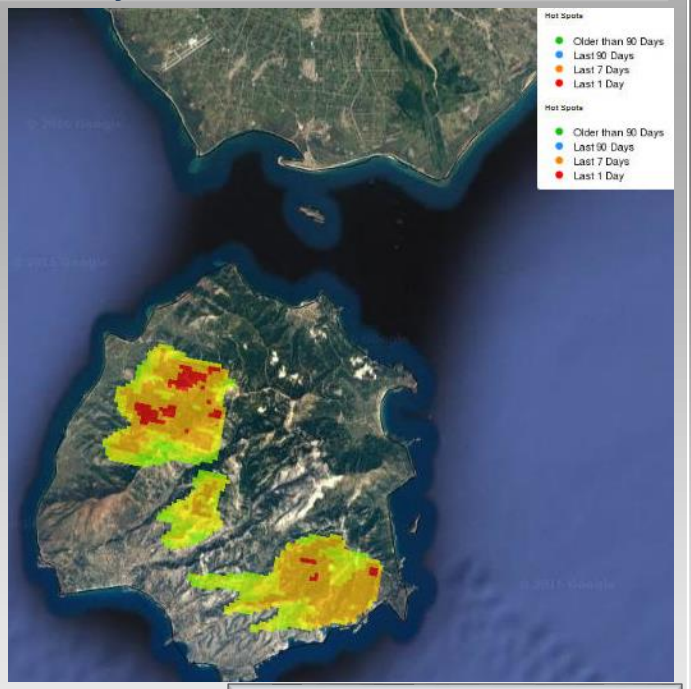
- ❑ Short & long-term fire danger forecast
- ❑ Monthly & seasonal fire weather forecast

Active fire and burnt area mapping:

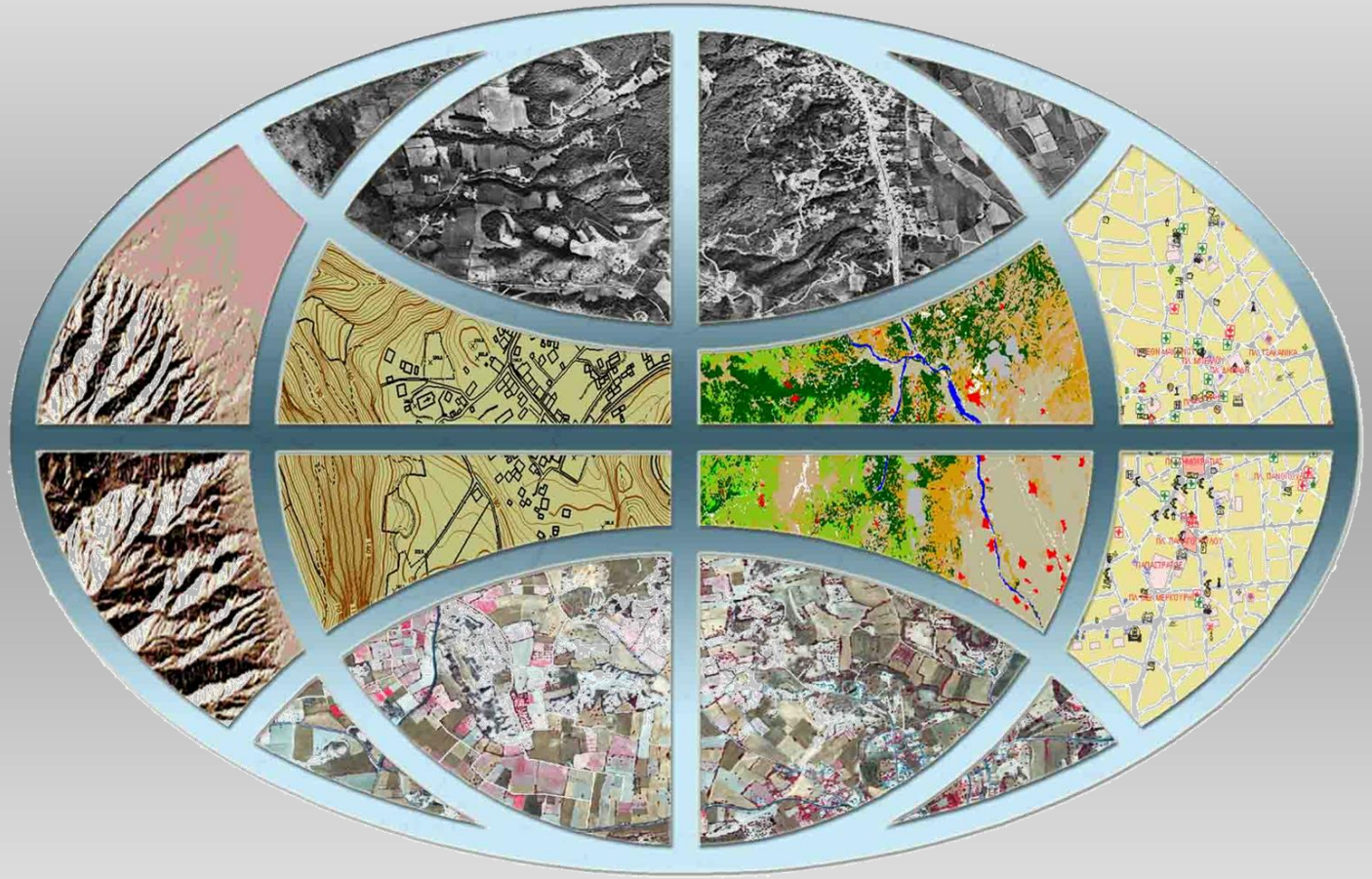
- ❑ Medium spatial resolution (~ 300 m)

  near-real time mapping of burnt areas, (twice a day/ pan-European region MODIS/VIIRS/Sentinel3)
- ❑ High spatial resolution(~10-30 m)

  weekly (or bi-weekly) mapping of burnt areas (e.g. Sentinel2, Landsat8, SPOT)
- ❑ Fire Severity based on the Relative Difference Normalized Burn Ratio



Thanking YOU…..



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