Copernicus EMS in support of crisis preparedness and response operations

Copernicus Emergency Management Service

Copernicus
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Space

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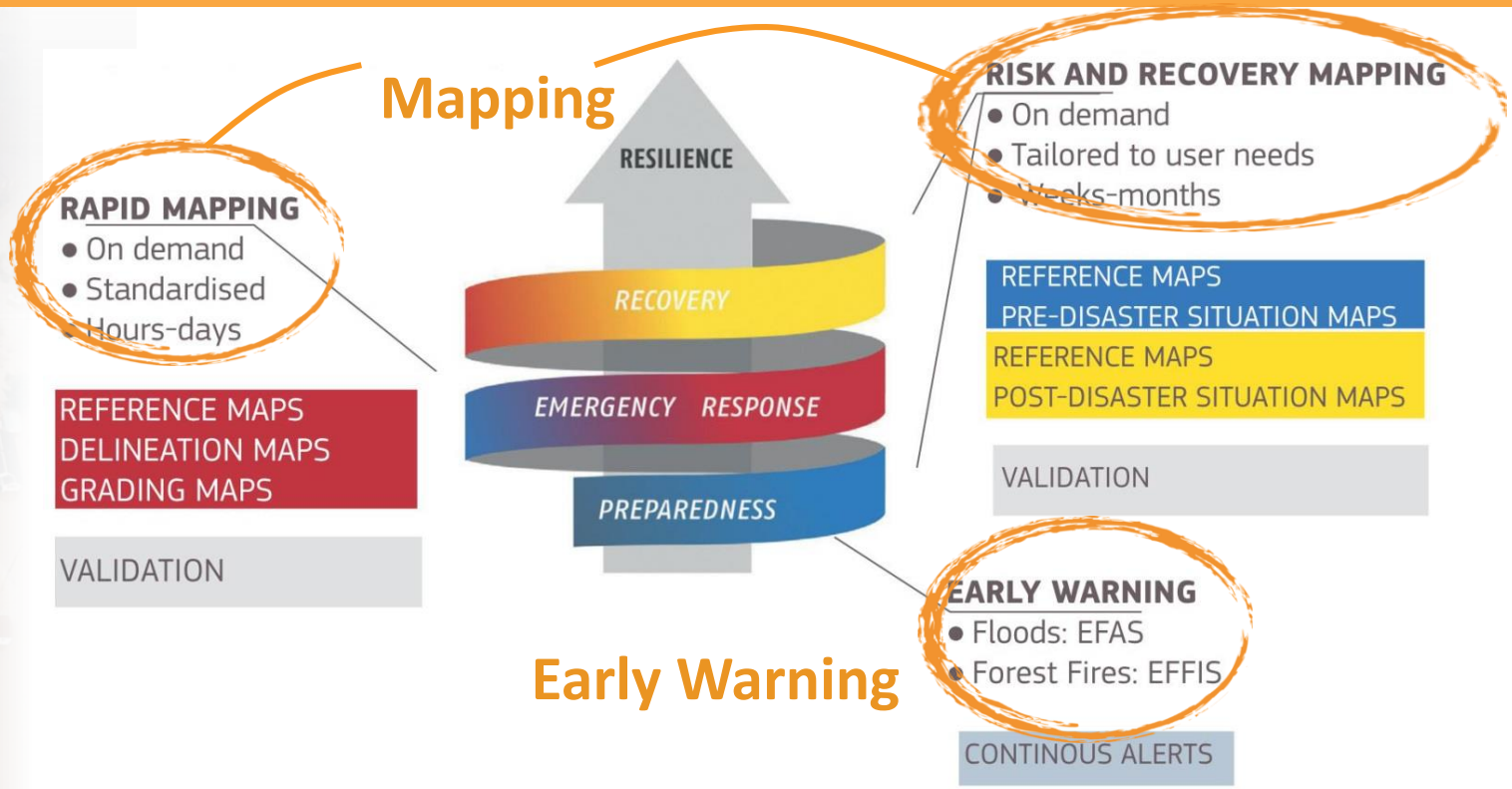
Emergency Management

Copernicus EMS - components



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What are the Emergency Management Services?

COPERNICUS

Emergency Management Service

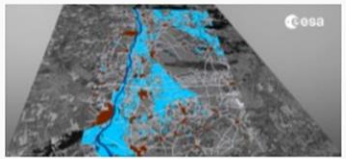
Copernicus Emergency Management Service

Copernicus Emergency Management Service (Copernicus EMS) provides information for emergency response in relation to different types of disasters, including meteorological hazards, geophysical hazards, deliberate and accidental man-made disasters and other humanitarian disasters as well as prevention, preparedness, response and recovery activities. Three modules constitute the Copernicus EMS:

Copernicus EMS - Mapping

The Copernicus EMS - Mapping addresses, with worldwide coverage, a wide range of emergency situ from natural or man-made disasters. Sate used as the main datasource. The se particular:

- Floods
- Severe Storms
- Tsunamis
- Volcanic eruptions
- Earthquakes
- Technological disasters
- Landslides
- Humanitarian crises
- Fires



Copernicus EMS - Mapping

European Flood Awareness System

assessments up to 10 days in advance.

European Flood Awareness System

European Forest Fire Information System

Specific applications are available in EFFIS:

Current Situation

Latest data on the current fire season in Europe and in Mediterranean area. Today's meteorological fire danger maps + forecast up to 6 days, daily maps of hot spots and perimeters.

Fire News

News on wildland fires in Europe updated daily by the EFFIS team.

European Forest Fire Information System

emergency.copernicus.eu

What is Copernicus EMS Mapping Services?

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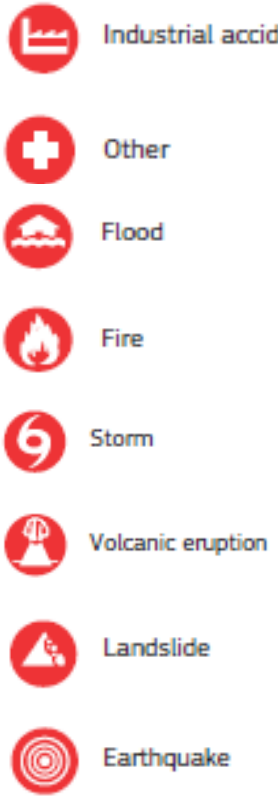

Rapid Mapping

On-demand and fast provision of geospatial information immediately following an emergency event

Risk and Recovery Mapping

Analyses delivered within weeks or months, in support of recovery, disaster risk reduction, preparedness and prevention

- 5 years of un-discontinued H24/365 operations
- 253 RM activations and 43 RRM
- More than 40 worldwide Users organizations triggering
- Providing support in more than 50 different Countries worldwide
- More than 3000 maps delivered

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Which type of maps and when?

Rapid Mapping -RM

- **Reference maps:** baseline for generating post-emergency products
- **Delineation maps (with monitoring option)** outline the extent of the area affected by the event.
- **Grading maps** assessment of the impact caused by the disaster.
- **Activation Extent Map** atlas of the maps produced

Risk and Recovery Mapping - RRM

- **Reference maps** comprehensive knowledge of the territory and exposed assets and population
- **Pre-disaster situation maps** up-to-date thematic information for contingencies on areas vulnerable to hazards
- **Post-disaster situation maps** for use beyond the immediate response phase, to assess recovery needs, long-term impact of the disaster event, progress in reconstruction efforts

Service Level 1 (SL1)

- Reference maps: 9 h
- Delineation and Grading maps: 12 h Service

Service Level 5 (SL5)

All map types typically in 5 working days

Multilingual support

Translation of relevant cartographic elements of the maps in official EU languages

Reference Map

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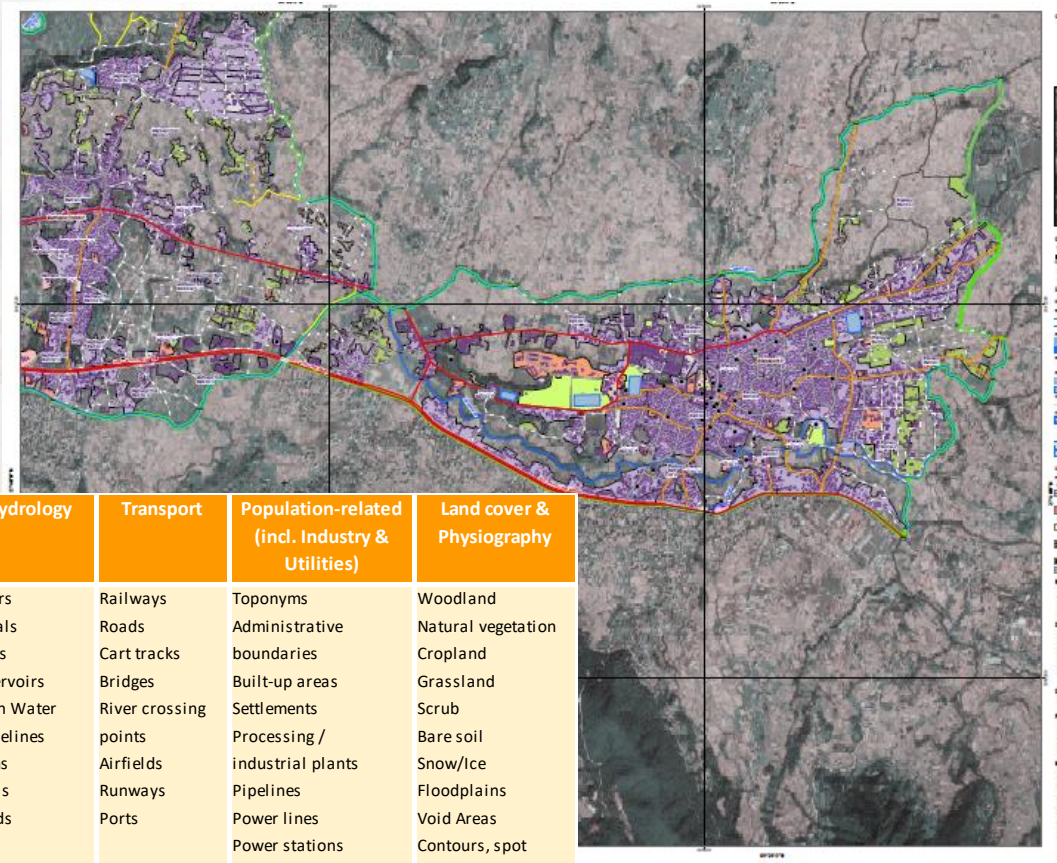

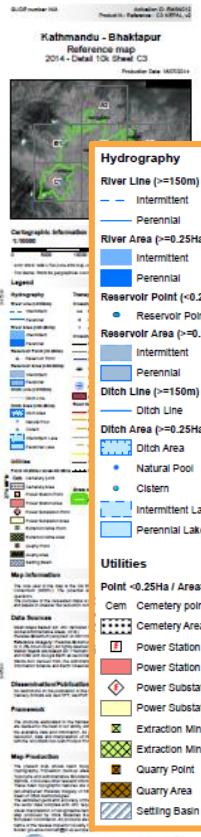

Legend

Hydrography
- River Line (>=150m)
  - Intermittent
  - Perennial
- River Area (>=0.25Ha)
  - Intermittent
  - Perennial
- Reservoir Point (<0.25Ha)
  - Reservoir Point
- Reservoir Area (>=0.25Ha)
  - Intermittent
  - Perennial
- Ditch Line (>=150m)
  - Ditch Line
- Ditch Area (>=0.25Ha)
  - Ditch Area
  - Natural Pool
  - Cistern
  - Intermittent Lake
  - Perennial Lake

Transportation
- Crossing Point (<50m)
  - Bridge Point
  - Culvert
  - Ford
- Crossing Line (>=50)
  - Bridge
  - Culvert
  - Ford
  - Tunnel Point (<50m)
  - TunnelLine (>=50m)
  - Airfield Point (<0.25Ha)
  - Airfield Area (>=0.25Ha)
- Road Network
  - Primary paved
  - Secondary paved
  - Secondary unpaved
  - Local paved
  - Local unpaved
  - Cart Track
  - Trail
  - Railway

Urban Areas
- Buildings
- Built Up Area
  - Agricultural
  - Commercial
  - Educational
  - Industrial
  - Institutional
  - Medical
  - Military
  - Other
  - Recreational/Sports
  - Religious
  - Residential Formal
  - Residential Informal

Utilities
- Point <0.25Ha / Area>=0.25Ha
  - Cem Cemetery point
  - Cemetery Area
  - Power Station Point
  - Power Station Area
  - Power Substation Point
  - Power Substation Area
  - Extraction Mine Point
  - Extraction Mine Area
  - Quarry Point
  - Quarry Area
  - Settling Basin

Area of Interest
- AOI

Points of Interest
- Commercial
- Educational
- Fire brigade
- Governmental
- Hospital
- Hotel
- Industry
- Military
- Other
- Police station
- Recreational/Sports
- Religious

Typical key features

Hydrology	Transport	Population-related (incl. Industry & Utilities)	Land cover & Physiography
Rivers	Railways	Toponyms	Woodland
Canals	Roads	Administrative boundaries	Natural vegetation
Lakes	Cart tracks	Built-up areas	Cropland
Reservoirs	Bridges	Settlements	Grassland
Open Water	River crossing points	Processing / industrial plants	Scrub
Shorelines	Airfields	Pipelines	Bare soil
Dams	Runways	Power lines	Snow/Ice
Wells	Ports	Power stations	Floodplains
Ponds			Void Areas
			Contours, spot heights
			Cliffs

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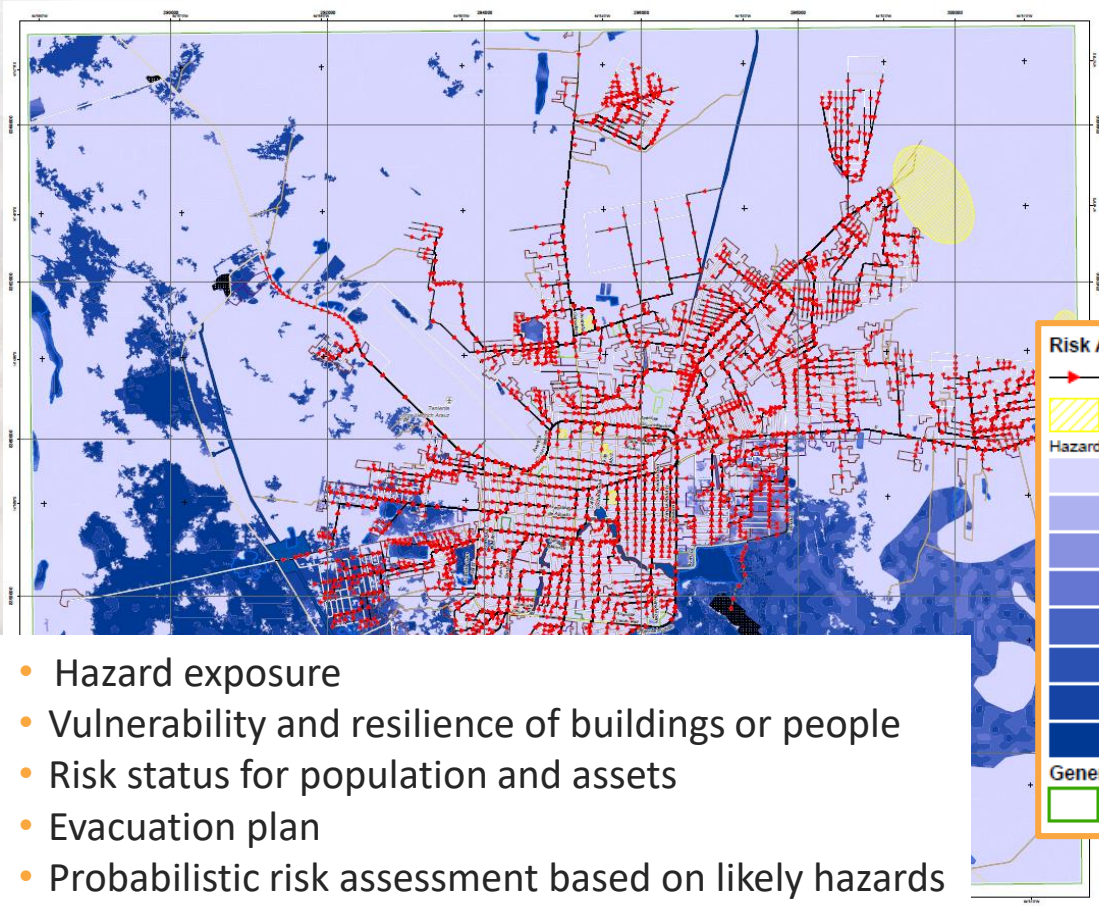
RRM Pre-Disaster Situation Map



Application examples

- Hazard exposure
- Vulnerability and resilience of buildings or people
- Risk status for population and assets
- Evacuation plan
- Probabilistic risk assessment based on likely hazards

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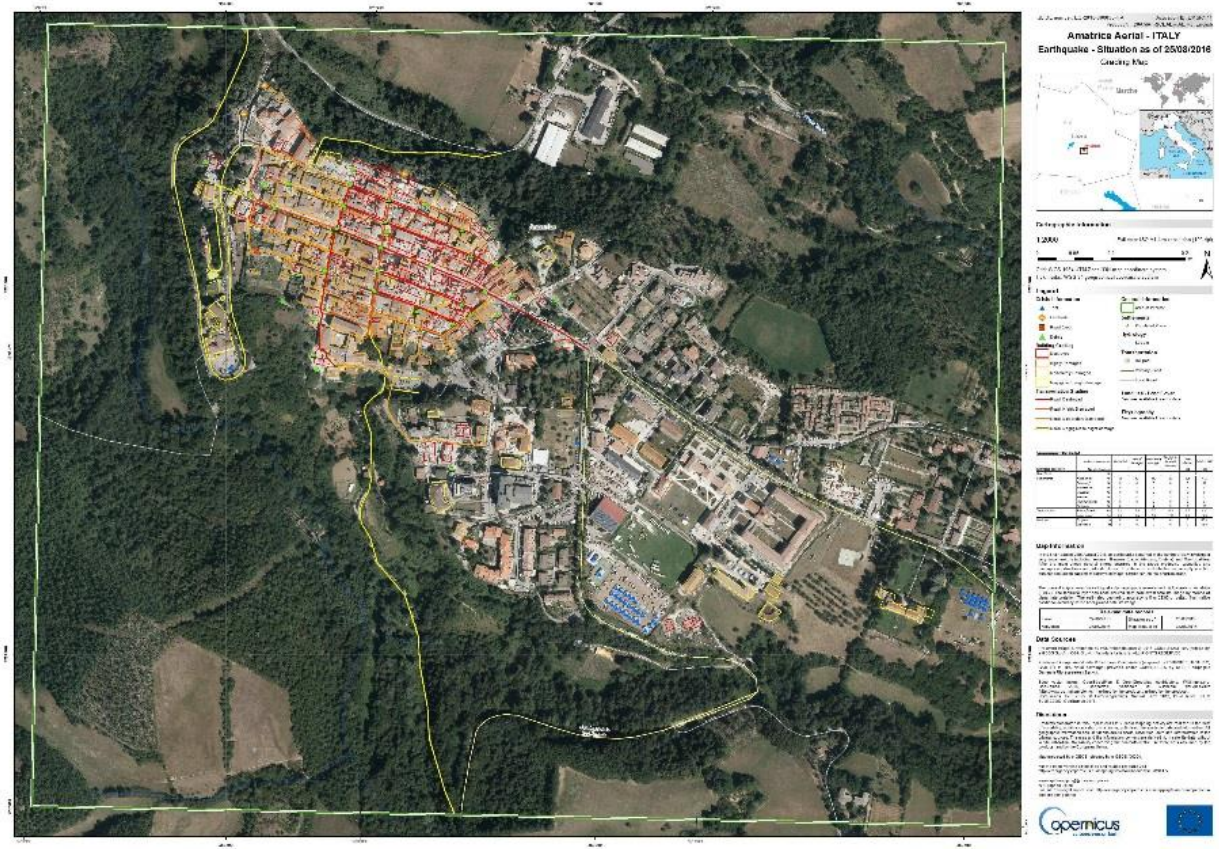
RM Grading Map



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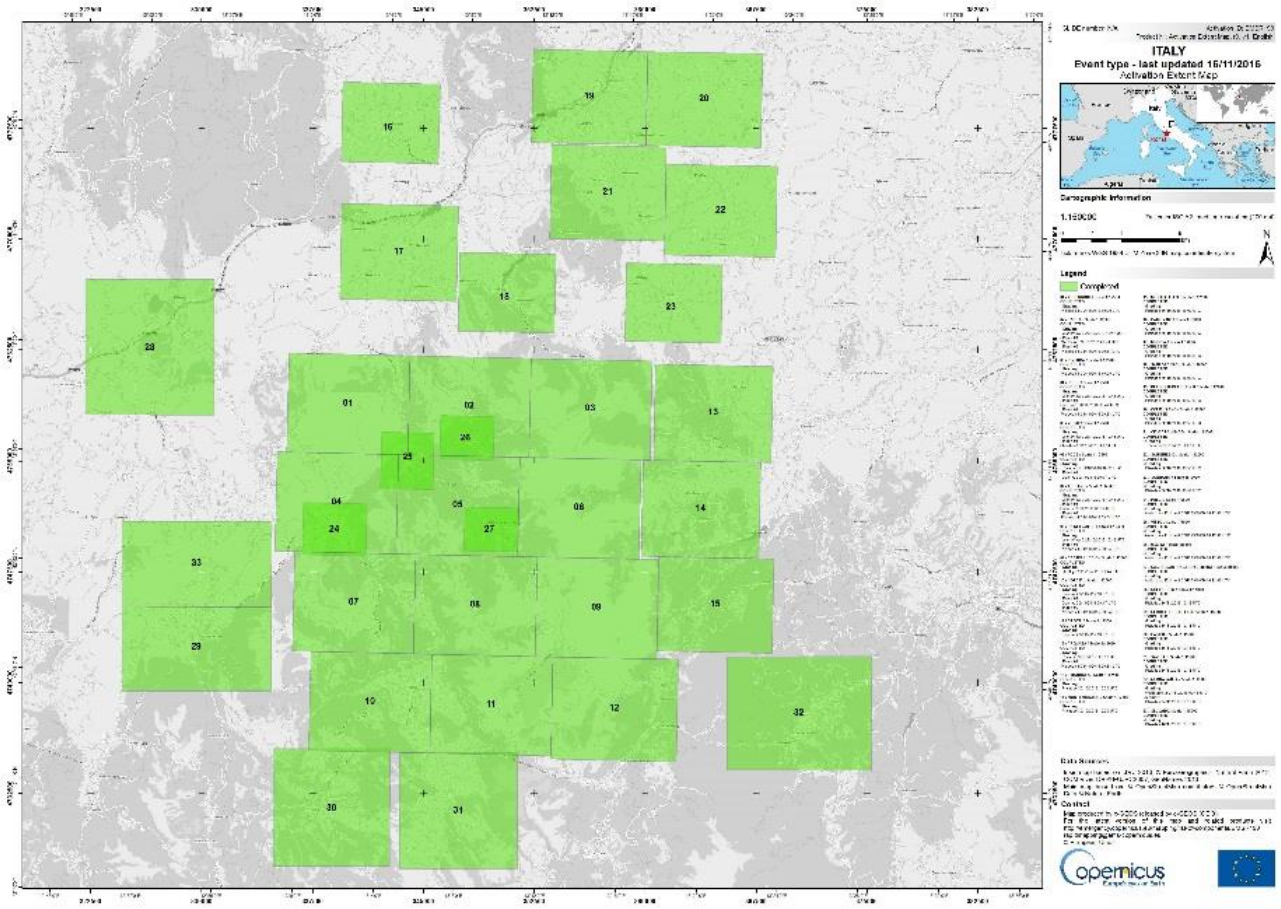
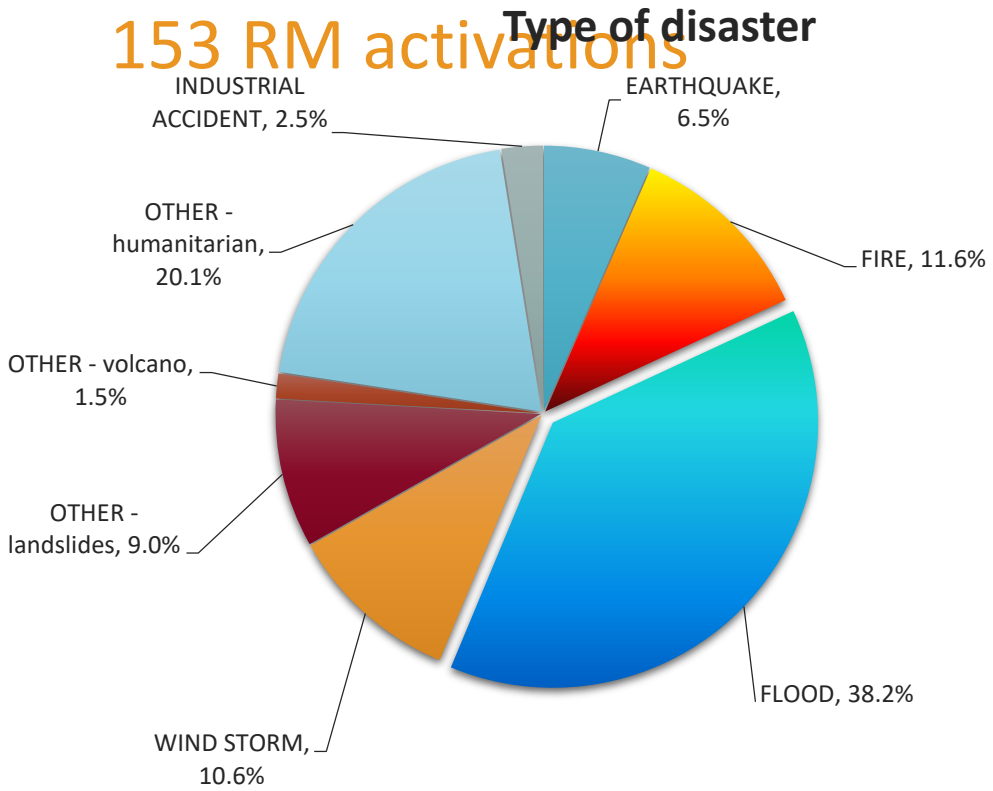
RM Activation Extent Map



EMS RM figures

153 RM activations



MS involvement

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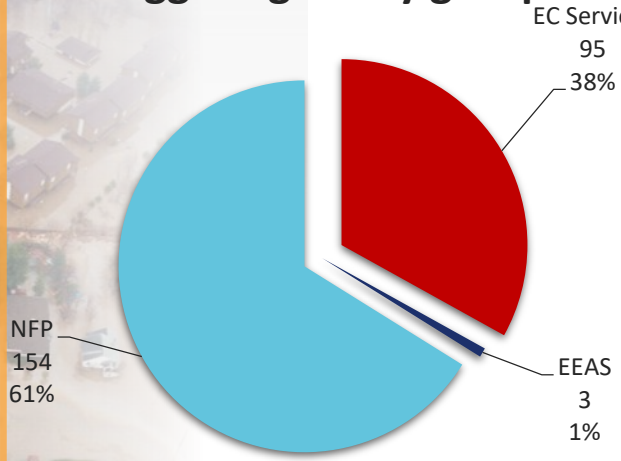
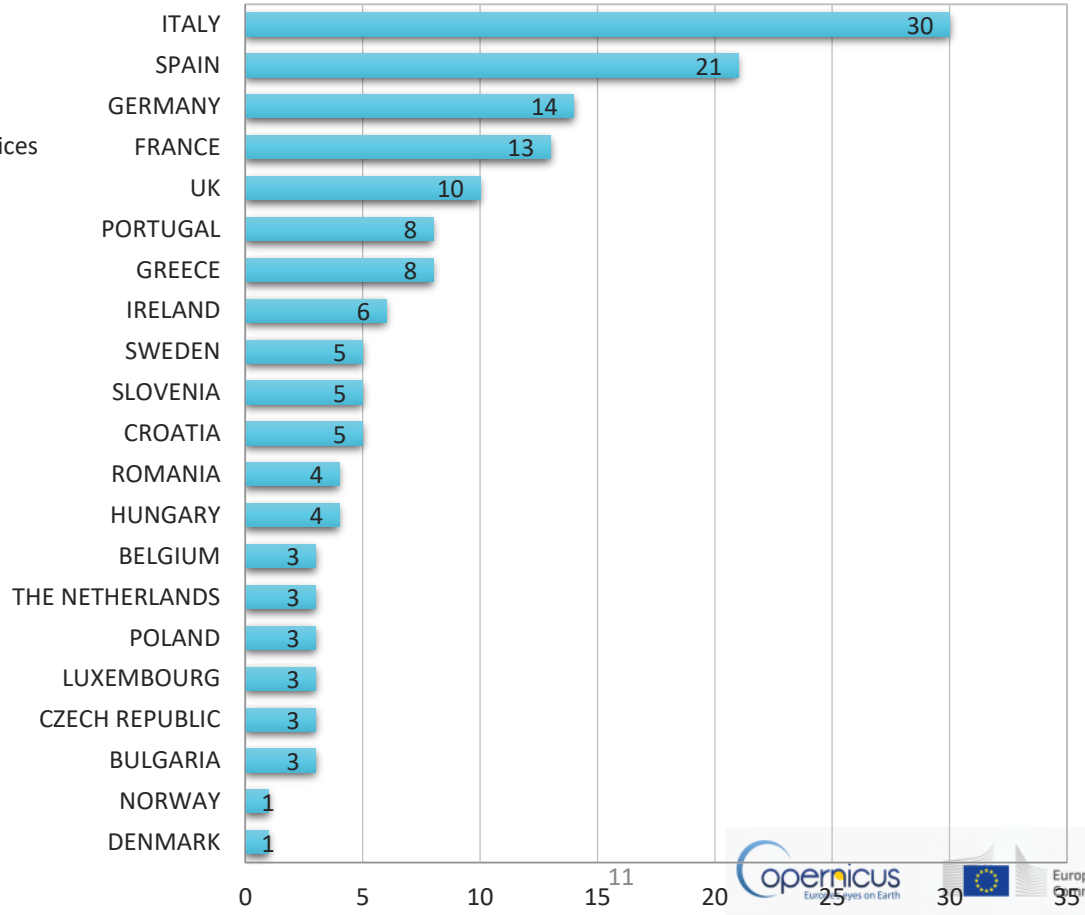
Triggering entity group





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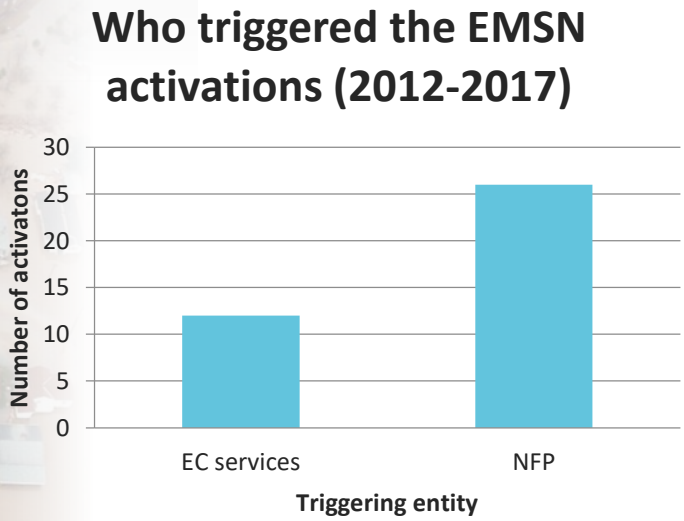
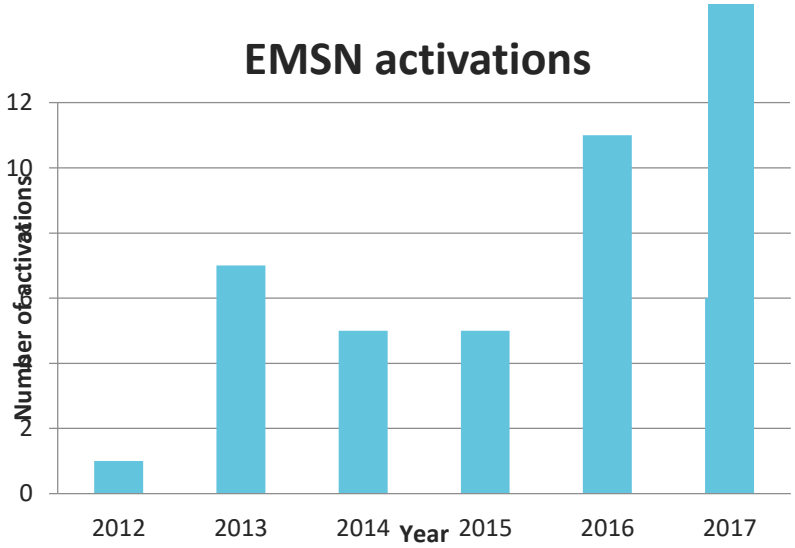
43 RRM activations





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Who can use the Service?

There are three distinct user categories:

- **Authorized Users** may trigger the service directly to the European Response Coordination Centre (ERCC)
  - National Focal Points (NFPs) in EU Member States and in countries participating in the European Civil Protection Mechanism as well as EC Services (DGs) and the Situation Room of the EEAS.
- **Associated Users** must go through the Authorized Users to trigger the service
  - local, regional and other public entities
  - International Governmental Organisations (e.g. UN agencies, World Bank), and National & International Non-Governmental Organisations
  - entities and institutions within the EEAS sphere such as EU Delegations, the INTCEN, the EU Satellite Centre
- **General Public Users** are not authorised to trigger the service, but can be informed of an activation request through the web portal

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To whom shall I send my request?

European Commission

Emergency Management

Will my request be accepted?

Send the SRF via mail to: **ECHO-ERCC@ec.europa.eu**

Followed by a phone call to: **+32-2-29-21112**

Authorization process

- **Check of the relevance: e**mergency situations and humanitarian crises related to natural disasters or man-made emergencies
- **Technical Feasibility check:** to verify that satellitae based geoinfo shall meet your requirements
- **Sensitivity check:** to decide wether specifc confidentality measures shall be applied
- **Capacity check:** in case of multiple simultaneous activations to verify that the service can actually cover the requests

If the request is rejected, the ERCC notifies the Authorised user

ERCC sends the SRF to the Copernicus EMS Service Provider

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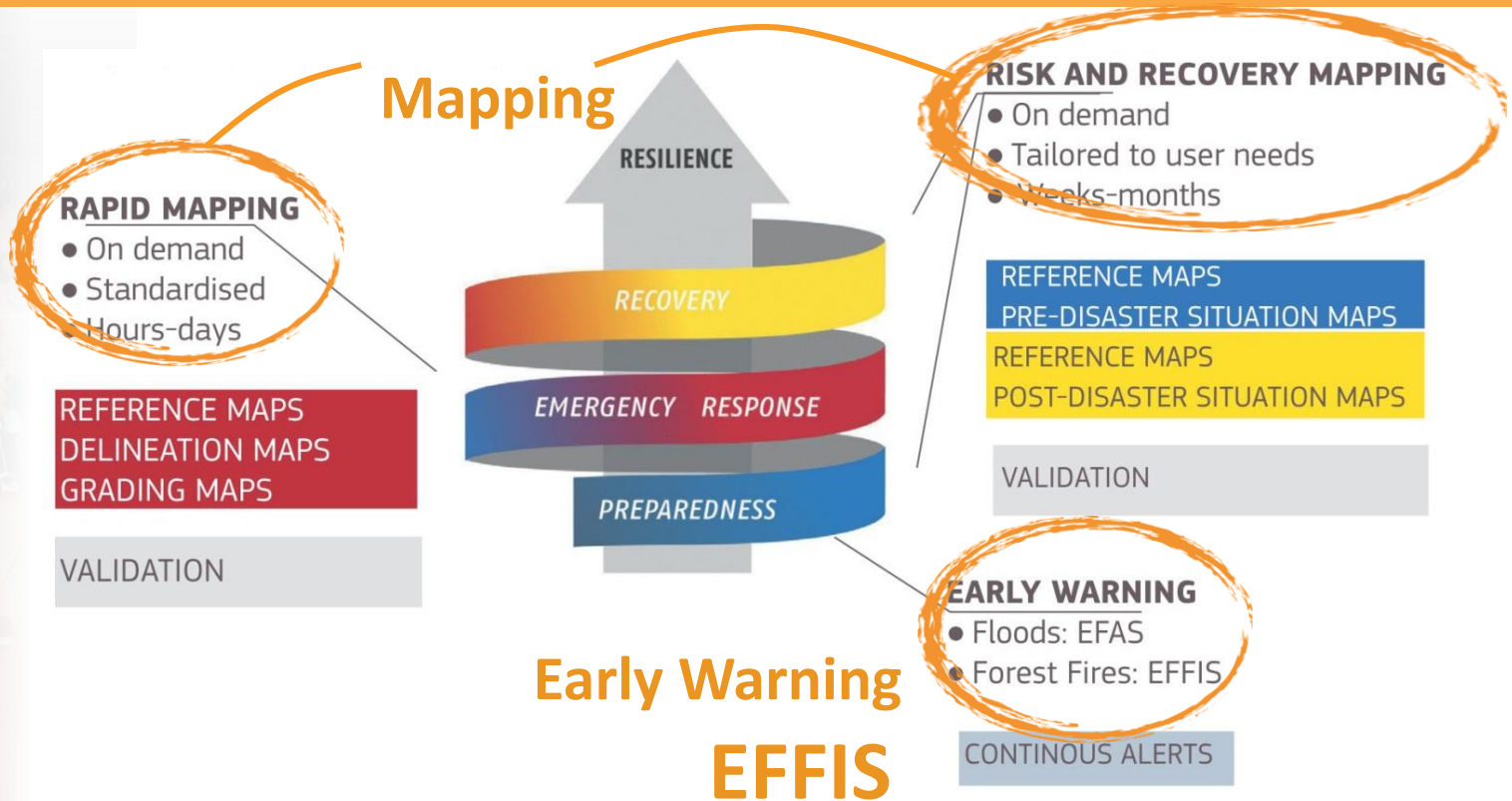
Copernicus EMS - components



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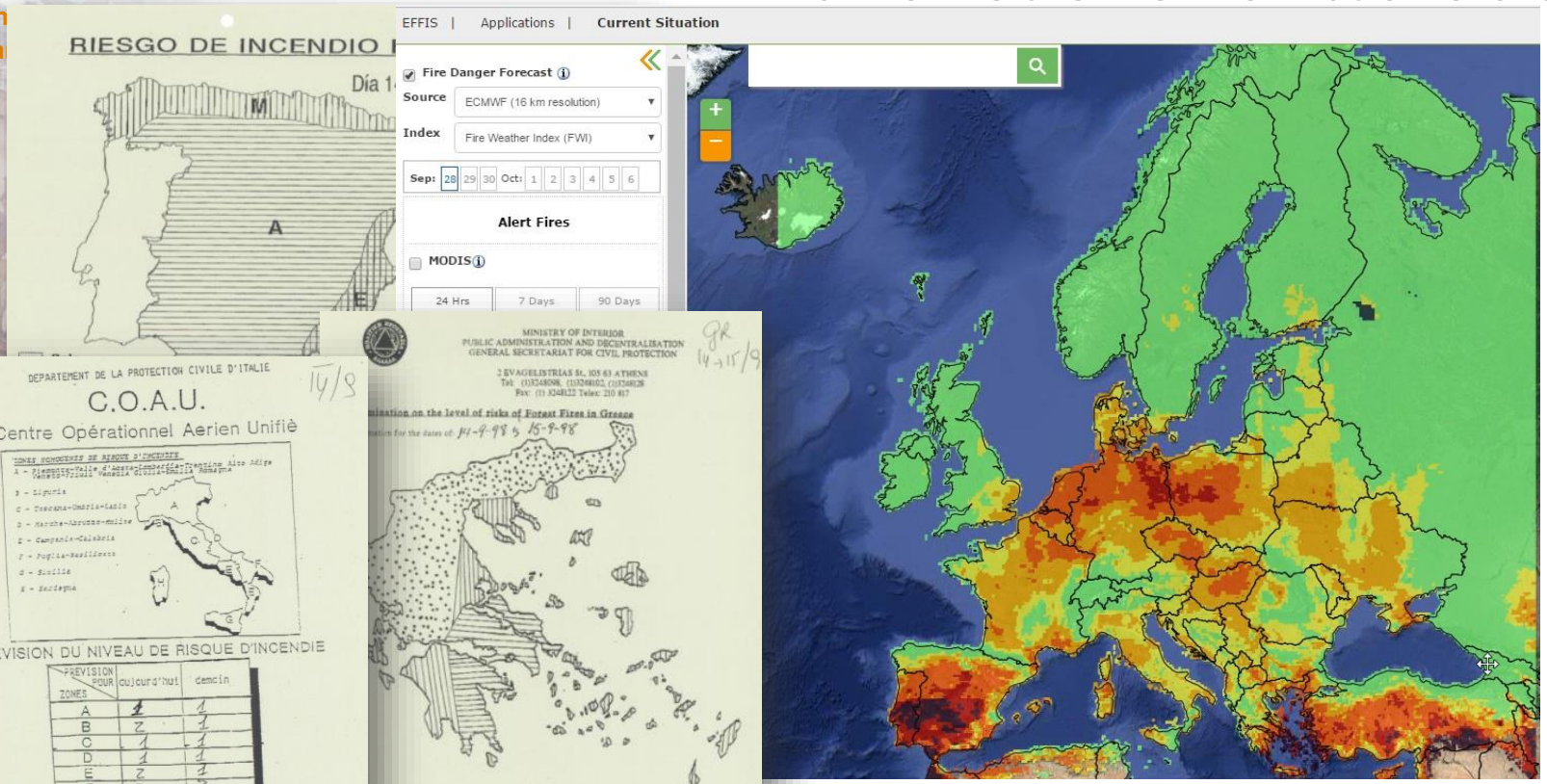
Scope of EFFIS

Harmonize the fire information exchange



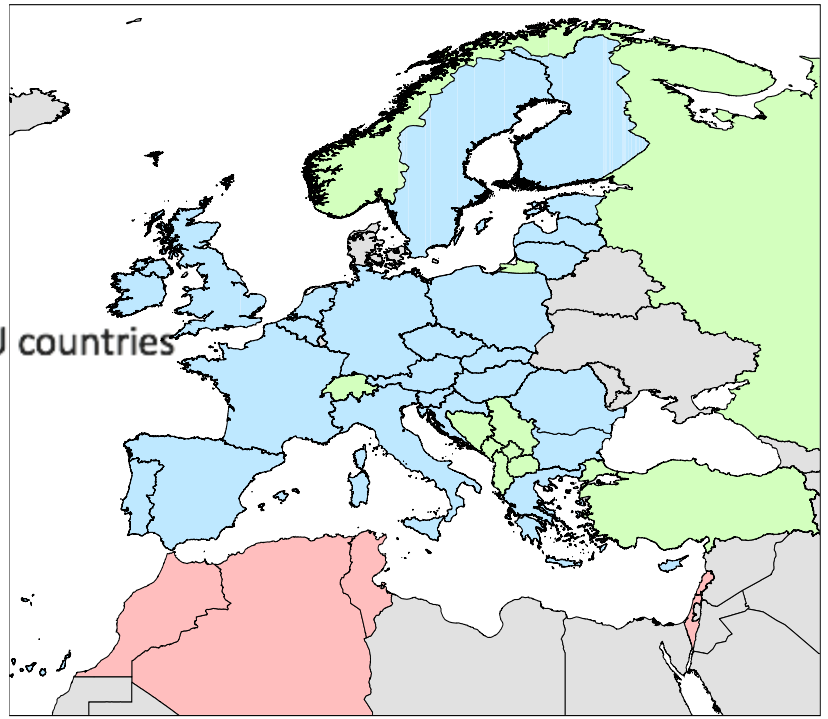
The EFFIS network

Emergency Management

- EFFIS services and products are freely accessible via the EFFIS portal at http://forest.jrc.ec.europa.eu/effis/

- EFFIS users include:
  - EC DGs and Services,
  - European Parliament,
  - associated national/regional forest fire and civil protection services,
  - FAO, Silva Mediterranea,
  - UNECE

2016 EFFIS Network – 40 countries



PT-ES-FR-UK-IT-CH-DE-SE-NO-BE-CZ-AT-SI-HR-FI-PL-SK-HU-MK-GR-EE-LV-LT-RO-BG-TR-CY-IE-MA-LB-ME-BS-KO-AL-RU-ALG-LEB-MOR-TUN

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Operational EFFIS components

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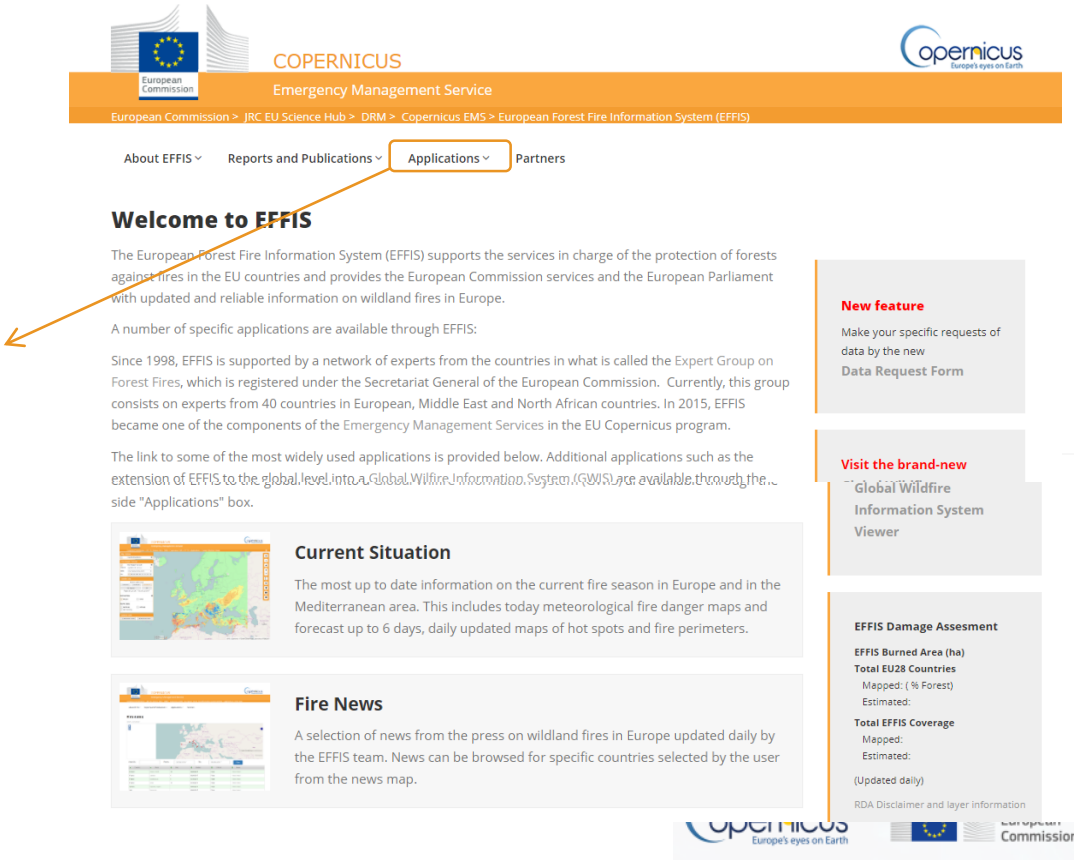
1. Fire danger forecast

2. Active fire and burnt area mapping

Applications

Current Situation Viewer
Long-term seasonal fire weather forecast
Long-term monthly fire weather forecast
Fire History
Fire News
Data request Form
Data and services



1. Fire danger forecast

Short and long-term fire danger forecast

daily maps of 1 to 10 days of forecasted fire danger level using numerical weather predictions

Monthly and seasonal fire weather forecast

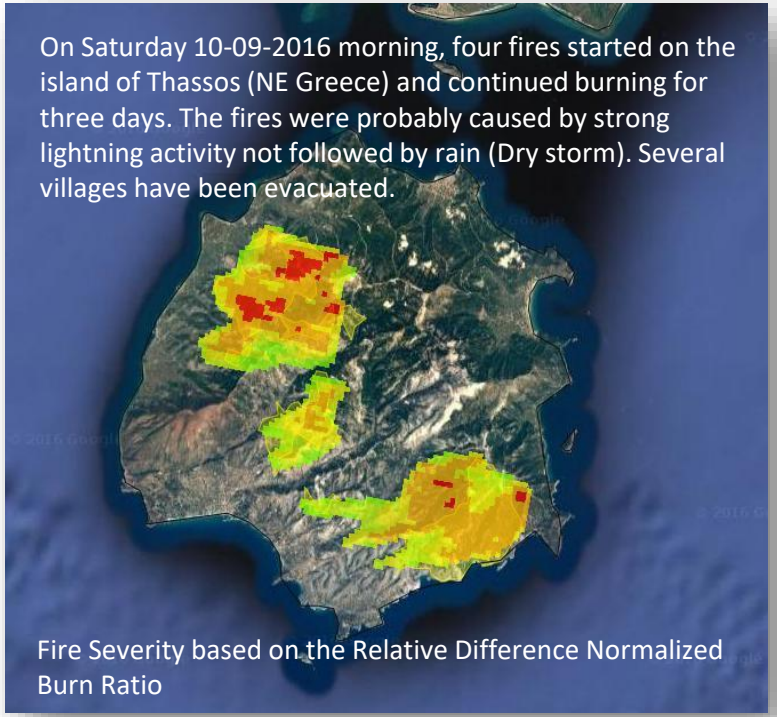
temperature and rainfall anomalies expected over European and Mediterranean areas. Based on the ECMWF (European Centre for Medium-Range Weather Forecasts) monthly and Seasonal Forecasting

Fire Danger Classes	FWI ranges (upper bound excluded)
Very low	< 5.2
Low	5.2 - 11.2
Moderate	11.2 - 21.3
High	21.3 - 38.0
Very high	38.0 - 50.0
Extreme	>= 50.0

- 6 classes (very low, low, medium, high, very high and extreme)
- spatial resolution of about 16 km (ECMWF data), 10 km (MF data) and 36 km (DWD data)
- harmonized picture of the spatial distribution of fire danger level throughout EU

2. Active fire and burnt area mapping

- Firenews, items selected from a large set of RSS feeds published by various forest fires related sites
- Active fire mapping (MODIS/VIIRS/Sentinel2&3)
- Medium spatial resolution (~ 300 m) Near-real time mapping of burnt areas (twice a day in 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)



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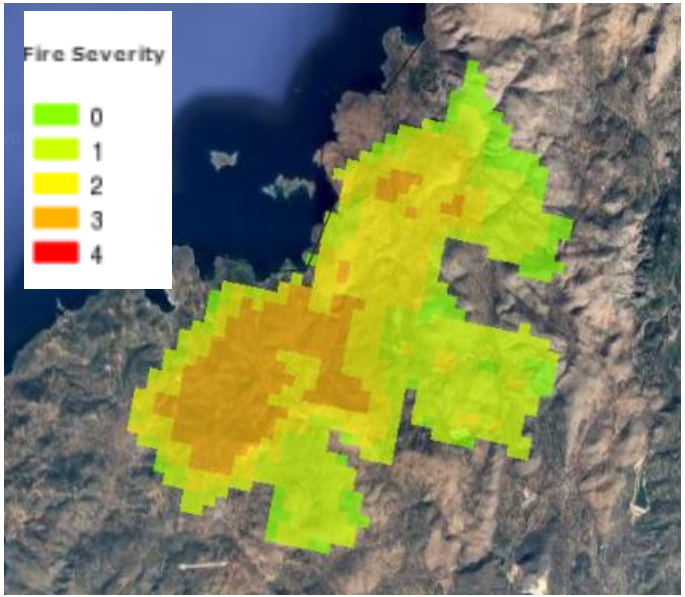
Post damage assessment - fire severity

- Fire severity: based on the Relative Difference Normalized Burn Ratio (Miller et al. 2009)
- Under development:
  - Post-fire vegetation regeneration to assess the vegetation recovery in a time series of images
  - Post-fire soil erosion risk to assess the potential soil loss



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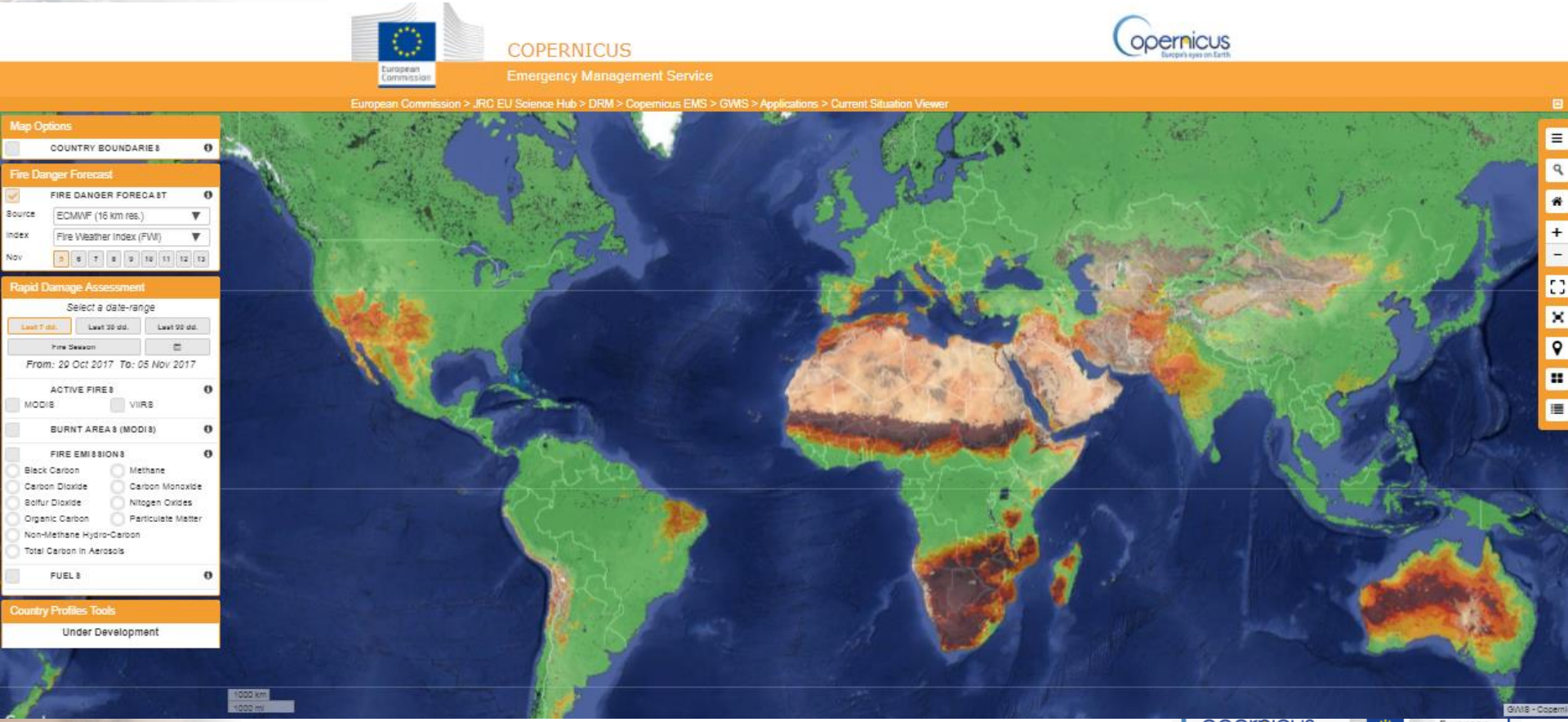
Global Wildfire Information System



How can I access EFFIS?

- The EFFIS landing page provides fire danger forecast and active fire and burnt area mapping in a freely accessible Web-GIS at: http://forest.jrc.ec.europa.eu/effis/
- WMS are available at http://forest.jrc.ec.europa.eu/effis/applications/data-and-services/ , serving Hot Spot, Burnt Area Points, Burnt Area Perimeters (24 hours, 7 days, 30 days, entire season)
- Get additional support by filling in the data request form for any request of data which is not available through the EFFIS web services (e.g. historic data, extracts of the fire database, or raw burned area perimeters) can be asked.

Emergency Management

Copernicus EMS - components

Mapping

RAPID MAPPING
- On demand
- Standardised
- Hours-days

REFERENCE MAPS
DELINEATION MAPS
GRADING MAPS

VALIDATION

RISK AND RECOVERY MAPPING
- On demand
- Tailored to user needs
- Weeks-months

REFERENCE MAPS
PRE-DISASTER SITUATION MAPS

REFERENCE MAPS
POST-DISASTER SITUATION MAPS

VALIDATION

Early Warning

EFAS

EARLY WARNING
- Floods: EFAS
- Forest Fires: EFFIS

CONTINOUS ALERTS

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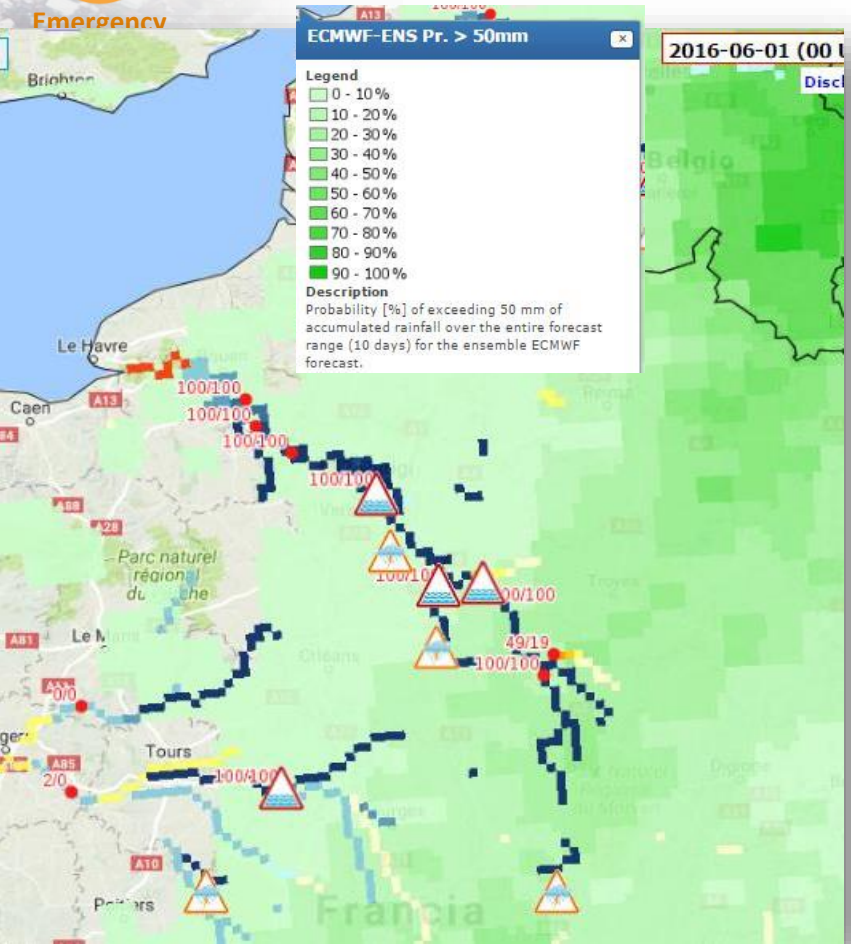
EFAS: support to decision making

- Early flood warning aims to draw attention to an upcoming event so a country can make proper preparations:
  - Equipment
  - Put team and responsible officers on standby
  - Consult local information regularly (MetService, observations, …)
- At the EU level EFAS provides a congregated picture on a larger scale

EFAS portal services



Flood summary layers (3/11)

Information on current and 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

Flash flood layers (0/2)

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

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

Meteorological layers (0/8)

Accumulated rainfall and EFAS forecast consisting in:
deterministic medium-range forecasts:

- global model from DWD (German Weather office) and ECMWF
- ensemble forecast for flood warning times beyond 48 hours, from ECMWF and Consortium for Small-scale Modeling (COSMO)

Access to EFAS

How can I access EFAS?

EFAS real time forecasts are not publicly available in order to safeguard the one voice principle. To access those you have to be an EFAS partner. Archived EFAS forecasts (older than 1 month) however are freely available under www.efas.eu

How ca

Estonian Environmental Agency (keskkonnaagentuur)

Address: Keskkonnaagentuur, Mustamäe tee 33, Tallinn
Web: http://www.keskkonnaagentuur.ee/

You shou … flood risk manage… …s (e.g. national hydro-m… …AS team via info@efas.eu)

I am a partner of EFAS and I want to access real time forecast…

Once you have signed a condition of access (CoA), you automatically get free of charge, password protected, web access to real time services and products through the EFAS Information System (EFAS-IS): www.efas.eu

Currently 62 national/regional authorities are EFAS partners

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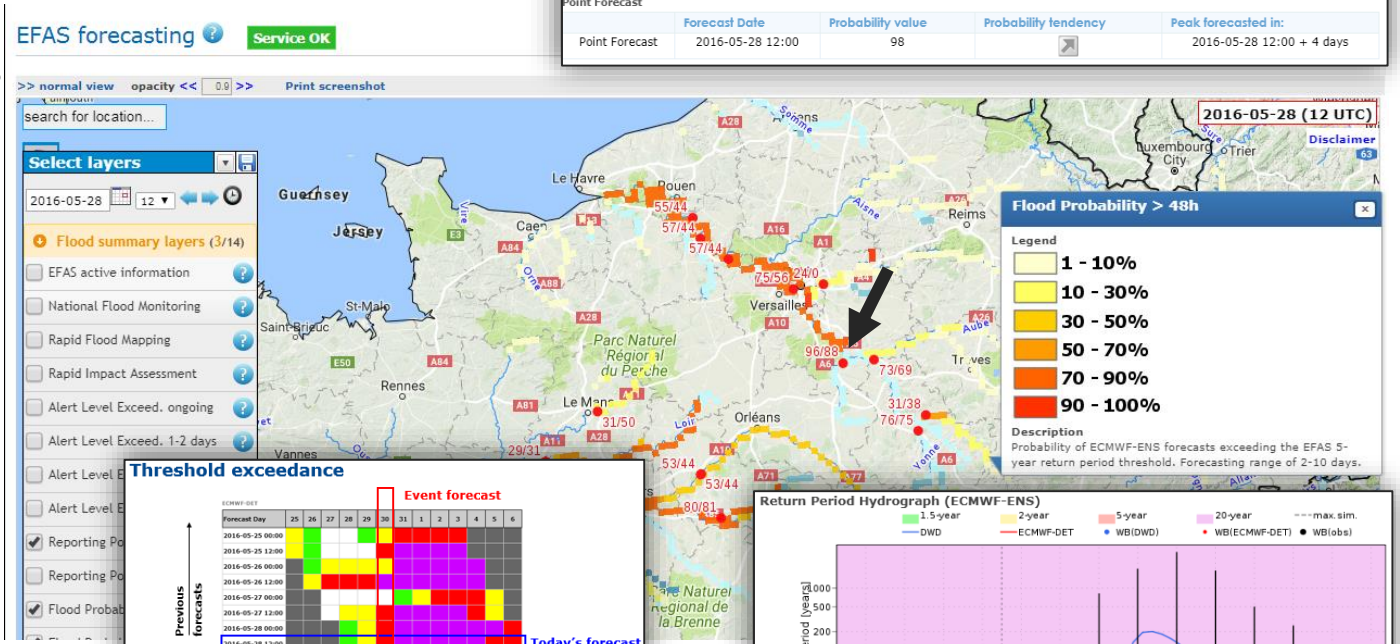
1. Probabilistic flood forecasts

Main characteristics

- for whole of Europe
- 10 day lead time
- 5*5km resolution
- twice a day updated



Point Information

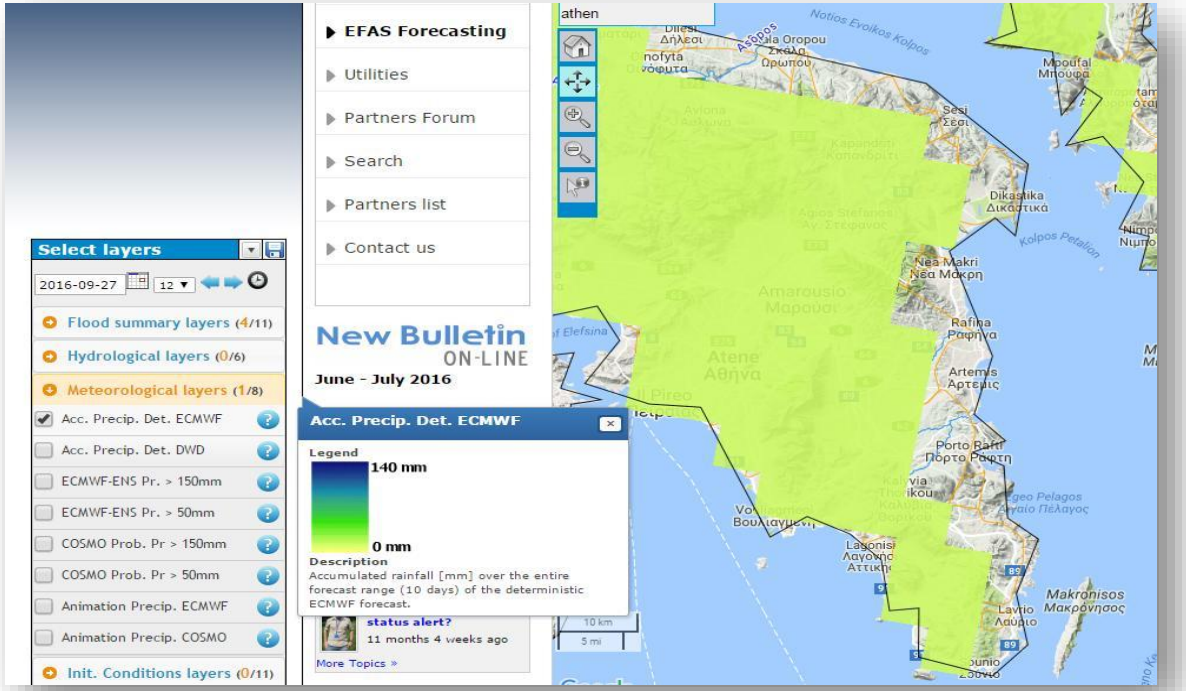
	Country	CoA Status	Basin	River	Upstream Area [km2]	PointID	Lat [Deg]	Long [Deg]
Point Forecast	France	YES	Risle,Seine	Loing	4,000	21	48.33	2.77

Point Forecast

	Forecast Date	Probability value	Probability tendency	Peak forecasted in:
Point Forecast	2016-05-28 12:00	98		2016-05-28 12:00 + 4 days

2. Meteorological forecasts

- Deterministic forecasts
  - DWD (ICON & ICON-EU) – global model, 7 forecast days (~ 6.5 km, day 1-3 – ~ 13 km, day 4-7)
  - ECMWF – global model, 10 forecast days, ~ 9 km
- Ensemble 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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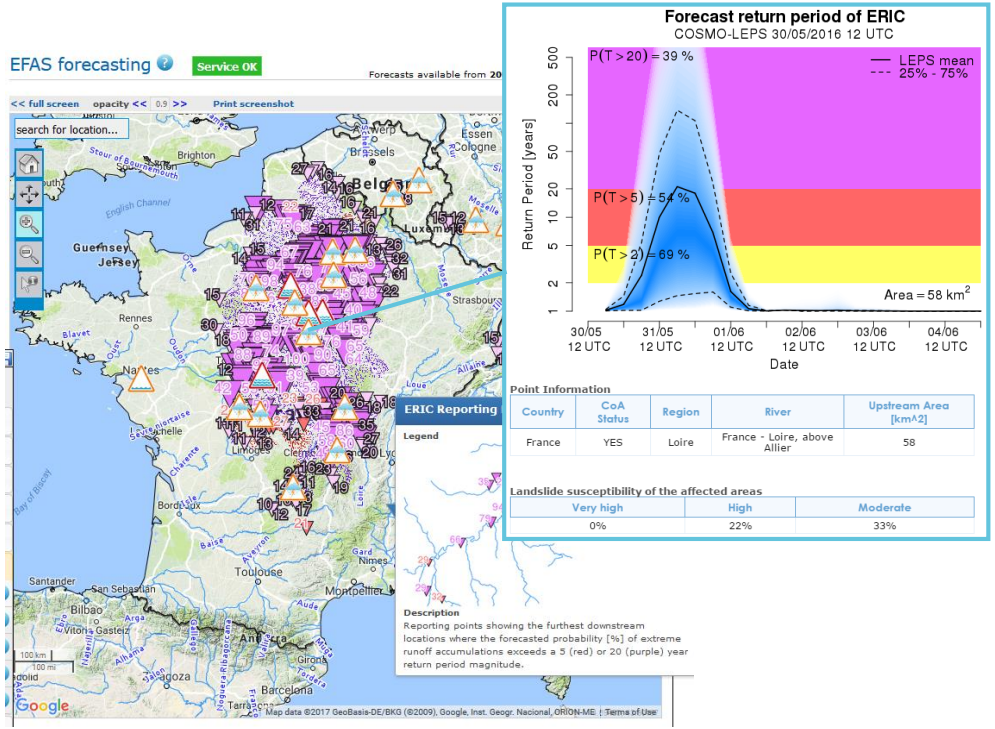
3. Flash flood forecasting, ERIC indicator

Main characteristics:

- Based on forecast accumulated upstream precipitation for durations up to 24 hours (no hydrological simulation)
- Accounts for soil moisture status, geomorphology and land-use through a soil moisture - runoff coefficient relation
- COSMO-LEPS forecasts
- River network at 1 km resolution
- for catchments between 25-2000km^2
- Probabilistic return period shown for lead time range 12-120 hours



Raynaud, D., Thielen, J., Salamon, P., Burek, P., Anquetin, S., Alfieri, L., 2014. A dynamic runoff co-efficient to improve flash flood early warning in Europe: evaluation on the 2013 central European floods in Germany. Meteorological Applications, doi:10.1002/met.1469

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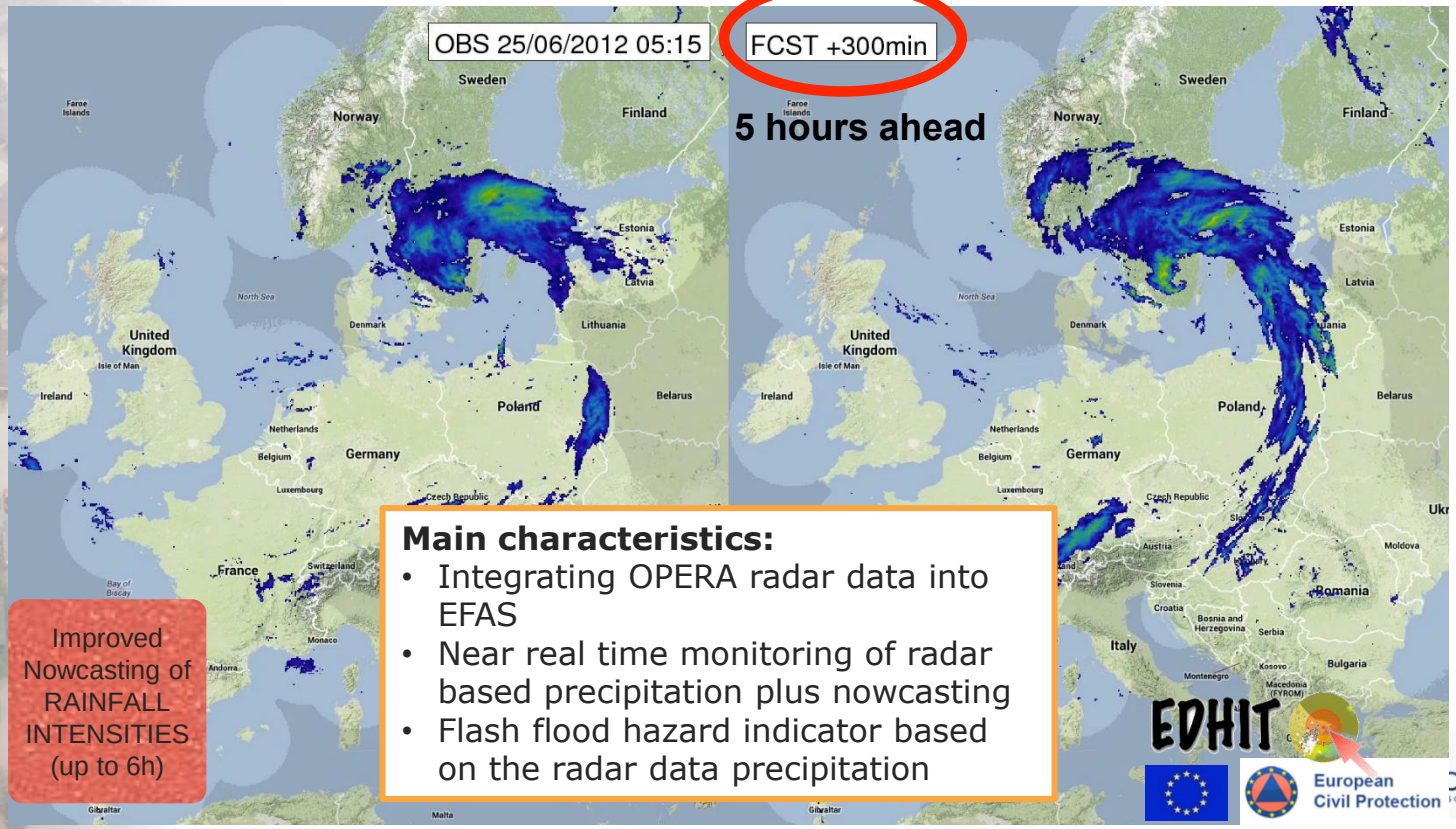
3. Flash flood nowcasting, ERICHA (European Radar Nowcasting)



Improved Nowcasting of RAINFALL INTENSITIES (up to 6h)

Main characteristics:

- Integrating OPERA radar data into EFAS
- Near real time monitoring of radar based precipitation plus nowcasting
- Flash flood hazard indicator based on the radar data precipitation

Berenguer et al.; CRAHI Algorithm of nowcasting by lagrangian persistence. J. Hydrometeorology, 2005; J. of Hydrology, 2011

European Civil Protection

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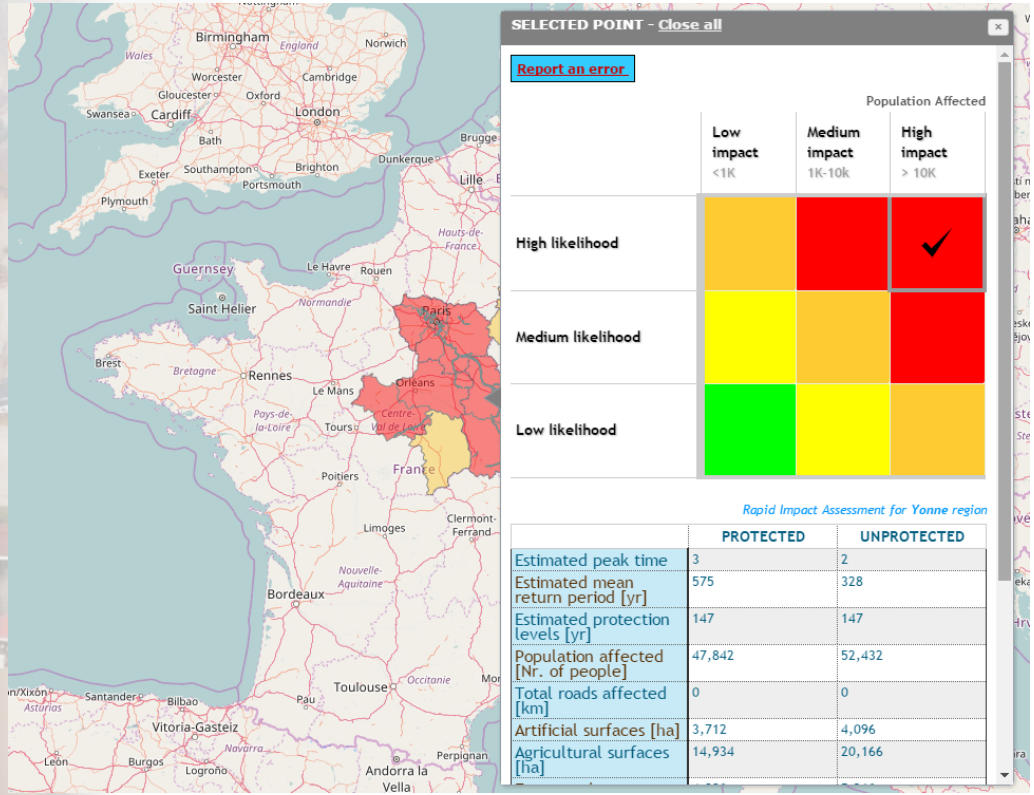
4. Rapid flood hazard assessment



Main characteristics:

- Done twice a day, based on EFAS probabilistic flood forecast
- Provides a flood hazard assessment on the fly for areas likely to be impacted by flooding within the forecasting period
  - Affected population
  - Affected roads
  - Potential monetary damages, etc
- uses pan European exposure datasets

	HIGH	MEDIUM	LOW
Impact	>10k	1k-10k	<1k
Likelihood	<48hours	2-6 days	>6days

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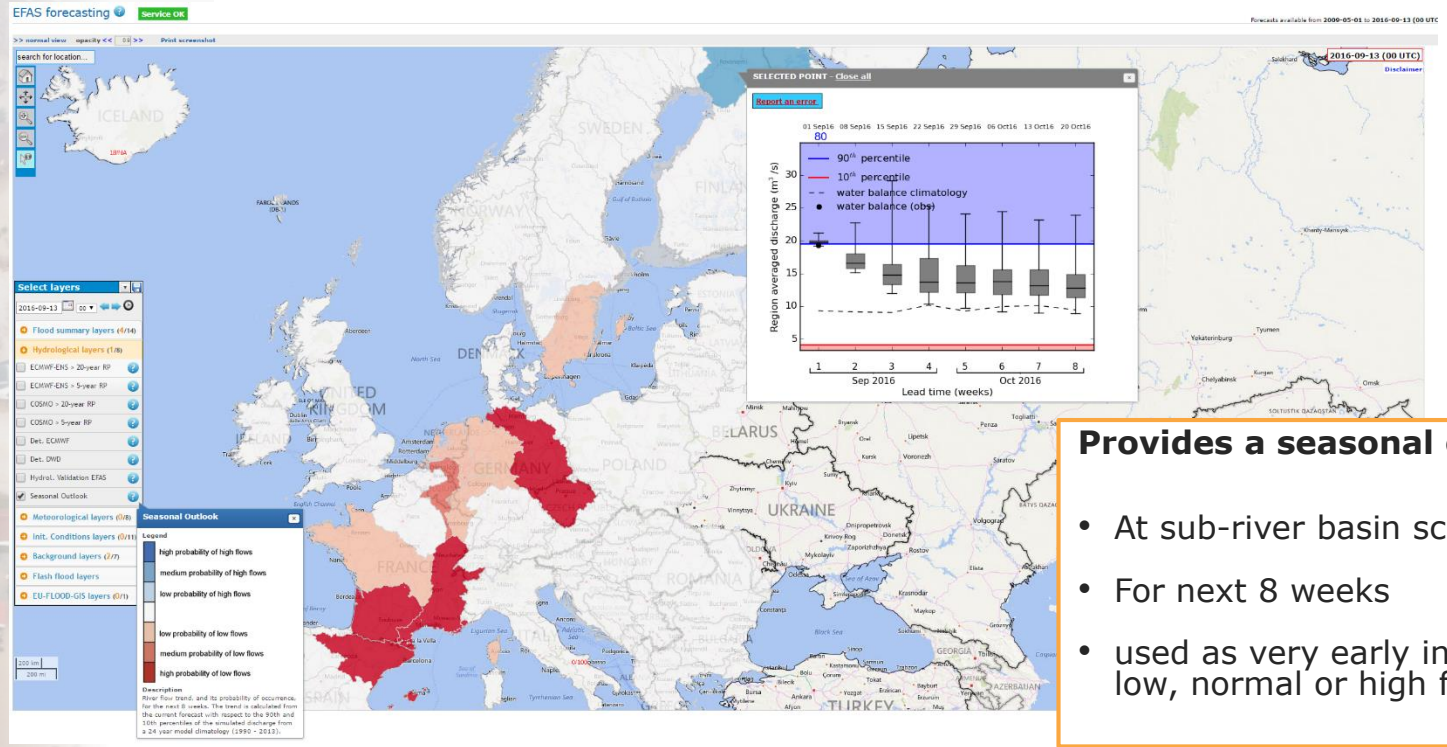
5. Seasonal outlook



Provides a seasonal outlook:

- At sub-river basin scale
- For next 8 weeks
- used as very early indicator for low, normal or high flows

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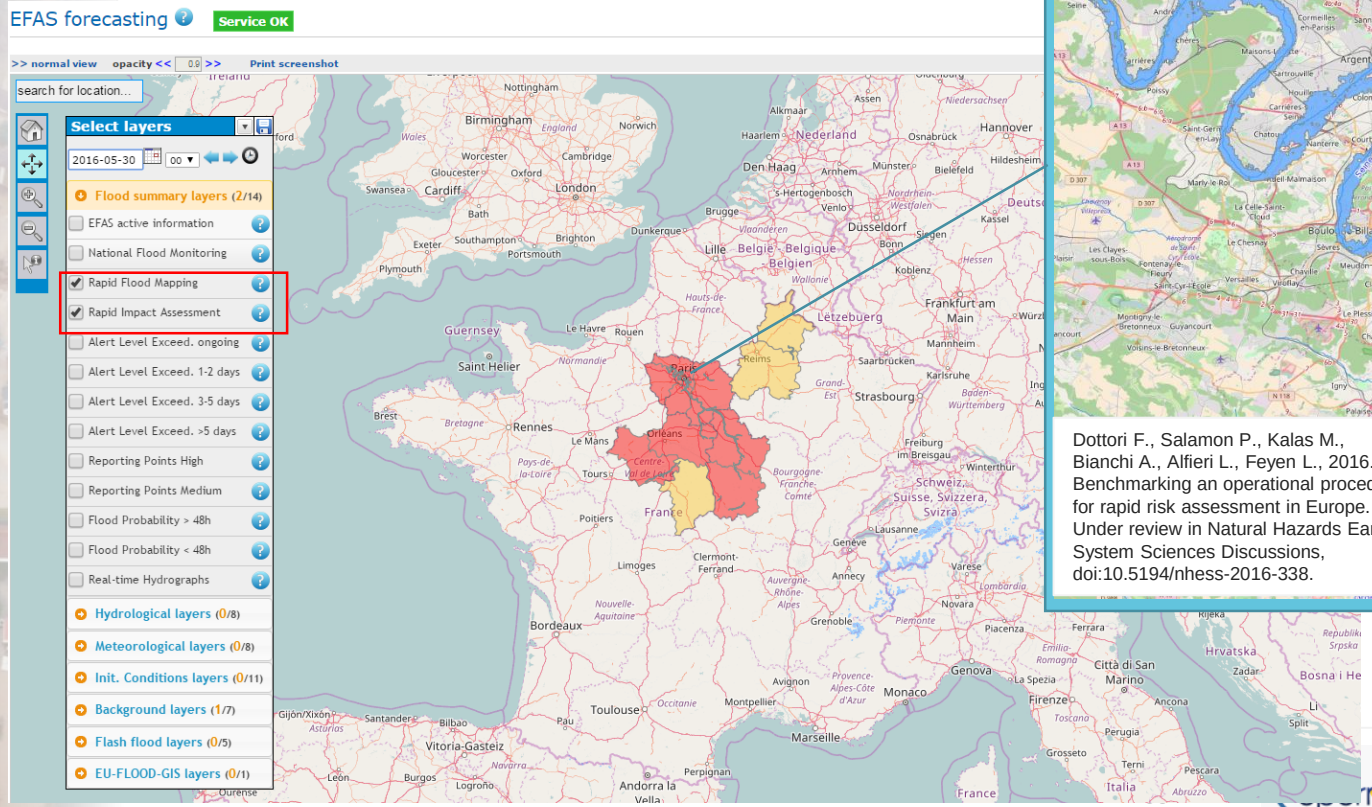
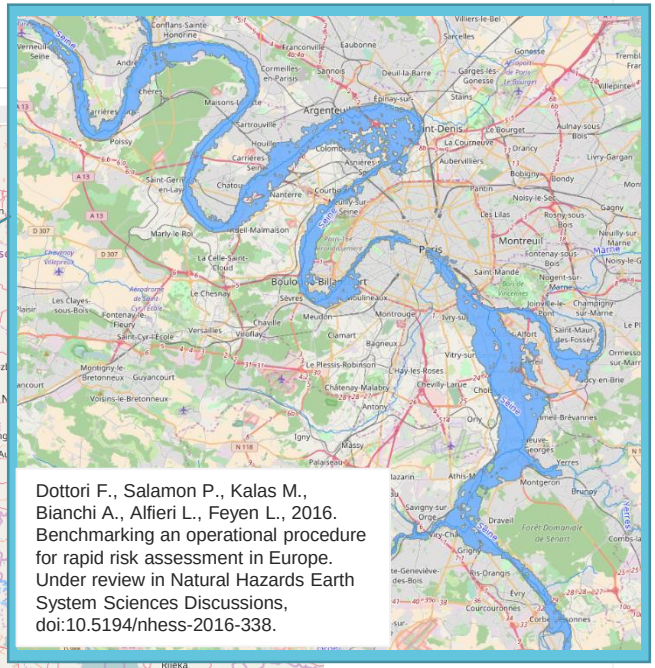
6. Event-based flood inundation mapping

Main characteristics:





Dottori F., Salamon P., Kalas M., Bianchi A., Alfieri L., Feyen L., 2016. Benchmarking an operational procedure for rapid risk assessment in Europe. Under review in Natural Hazards Earth System Sciences Discussions, doi:10.5194/nhess-2016-338.

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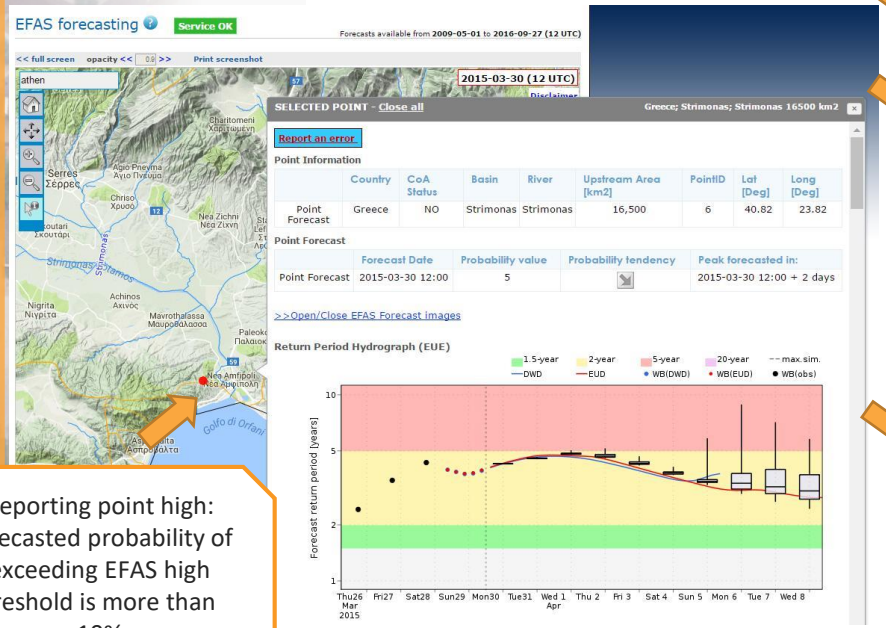
Pre-tasking of satellite images

EFAS flood summary layer – 30.03.2015



Reporting point high: forecasted probability of exceeding EFAS high treshold is more than 10%

EMS Rapid Mapping activation – 31.03.2015

EMSR122: Flood in Greece

Event Time (UTC): 2015-03-30 15:00

Activation Time (UTC): 2015-03-31 12:41

Delineation maps produced: 12

Grading maps produced: 0

Activation Status: Closed

Affected Countries/Territories:

Hellenic Republic

Area Descriptor: Central Macedonia

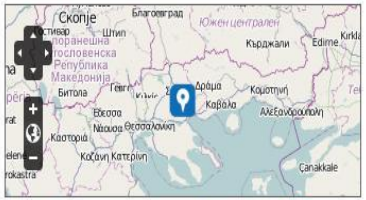
Authorized User:

Greece|General secretariat for Civil protection - Directorate for Emergency Planning and Response

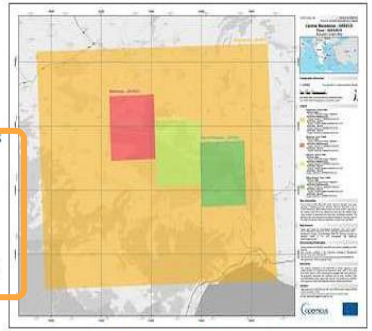
Activation Reason:

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 contacts

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