



Copernicus EMS

Early warning and
monitoring of wildfire
danger and floods

Copernicus Emergency Management Service

Samokov – 3 July 2017 - afternoon



*Source: National Institute of Meteorology and Hydrology BAS Bulgaria
Report on floods in 2017*

Monday, 03 July 2017 11:52

EFAS Flood Notification - Type: Informal*

Country(ies): **Bulgaria and Romania**

River(s): **Danube, section Olt - Yantra (Danube basin)**

Predicted start of event: **Monday 3rd of July 2017**

Earliest predicted peak: **Wednesday 5th of July 2017**

Probability to exceed a 5-year return period magnitude: **80%**

Probability to exceed a 20-year return period magnitude: **61%**

Forecast date: **2017-07-03 00 UTC**

Comment: This EFAS Flood Notification is only informal due to the the short forecast lead-time (< 48 hours).

Monday, 03 July 2017 05:32

EFAS Flash Flood Notification*

Country(ies): **Bulgaria**

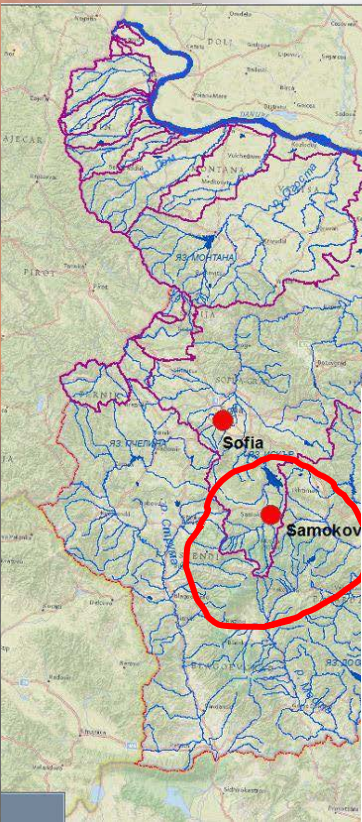
Region(s): **Montana Region**

Earliest predicted peak: **Monday 3rd of July 2017 18:00**

Percent of affected area susceptible to landslides: very high **9%**, high **15%**, moderate **18%**

Forecast date: **2017-07-02 12 UTC**

Comment: -



Increasing threats for Europe

- **Climate change** is amplifying the impacts of extreme weather events in Europe and worldwide. Recently, **tropical cyclones** severely affected the EU outermost regions and the European overseas territories in the Caribbean. **Hurricane Ophelia** caused flash floods in Ireland and the United Kingdom and affected large parts of North-western Europe. Deadly severe storms following intense heat waves hit Central Europe earlier this summer.
- Over one million hectares of wildland areas destroyed by **wildfires in Europe** in 2017, an area four times the size of Luxembourg and over ten times the size of Berlin.
- Destruction of property and **major impacts on the economy** including to network infrastructure, businesses, agricultural and forestry activities. Over **100 people killed** only in Portugal

Source: Strengthening EU Disaster Management - rescEU Solidarity with Responsibility (COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL AND THE COMMITTEE OF THE REGIONS)

Preparedness and prevention are crucial

Increase the relevance, effectiveness, efficiency and coherence of the Union Civil Protection Mechanism (UCPM) by

1 € spent in
prevention saves up
to 7 € during
response



The Copernicus Emergency Management Service components

Risk and Recovery Mapping

Delivery of maps within weeks or months to support recovery, disaster risk reduction, prevention, and preparedness



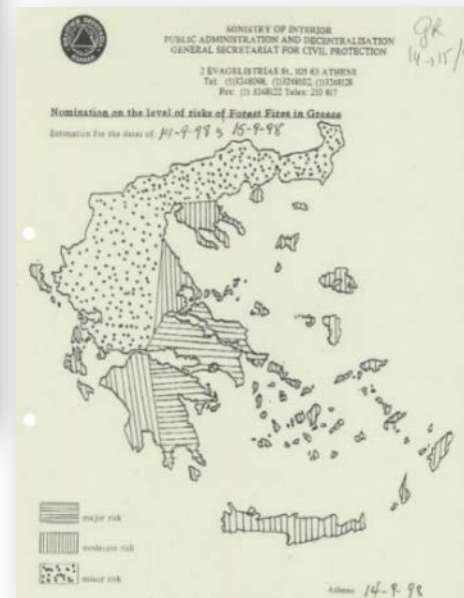
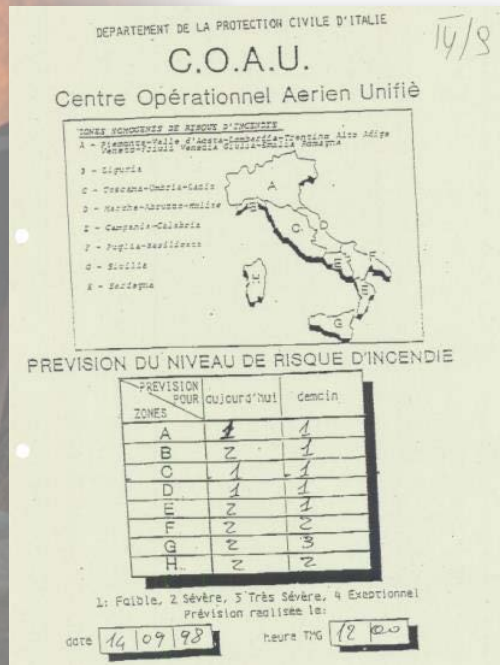
Rapid Mapping

Delivery of maps soon immediately following a catastrophic events

Early Warning & Monitoring

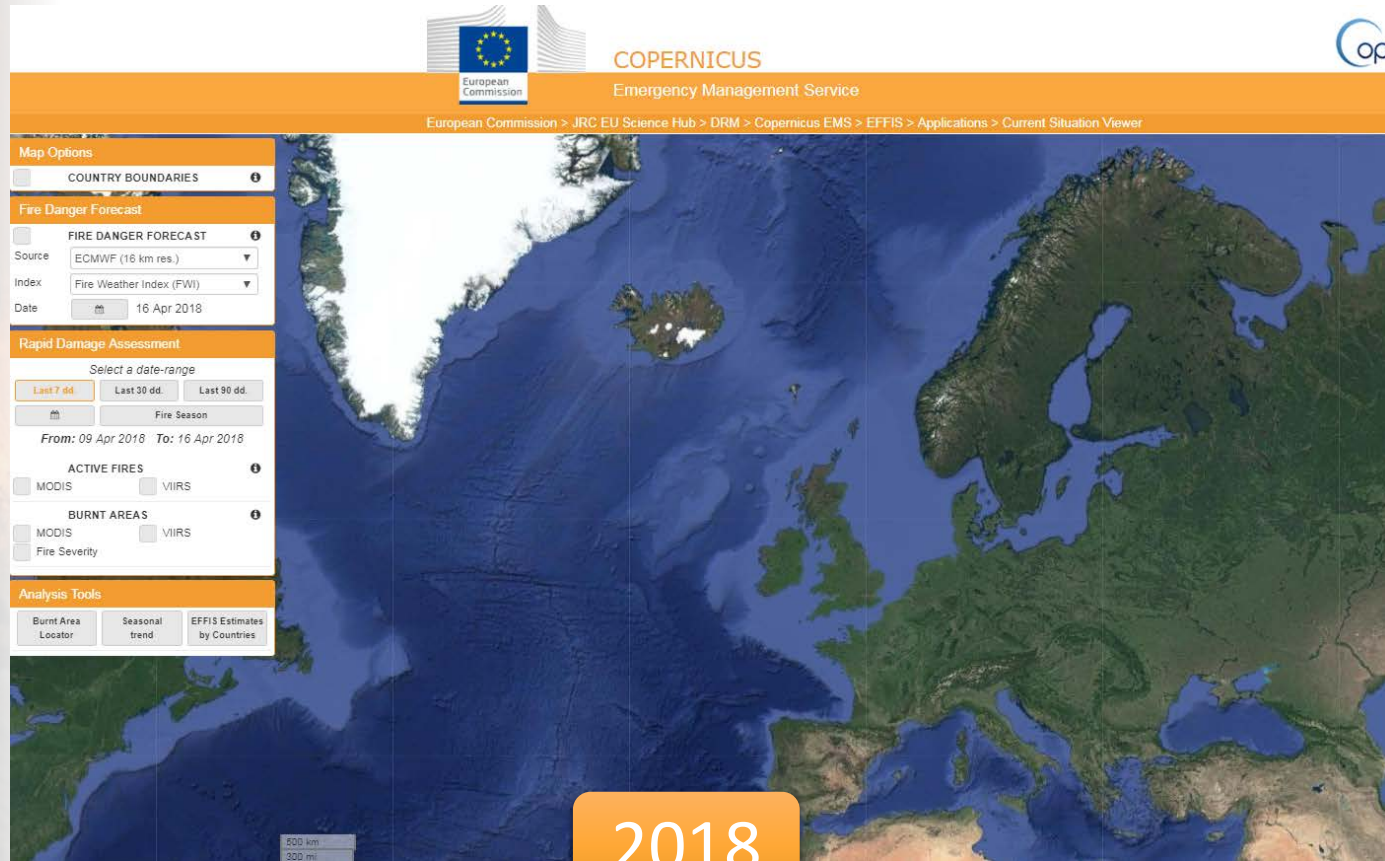
Flood alerts, wildfire danger predictions and near-real time monitoring of wildfire impacts

The long road towards a Europe that protects



1998

EFFIS - current status 2018



2018



Emergency
Management

EFAS – the European Flood Awareness System

2002

Elbe and Danube floods. The European Commission commits to support flood management activities

2003

National authorities and scientific communities build a **partner network**, to collect meteorological and hydrological data. The European Flood Alert System is launched

2004

Collaboration agreement with the European Centre for Medium-Range Weather Forecasts (ECMWF) to use the ensemble prediction

2007

EFAS becomes **operational**

2010

Daily dissemination of results to the **European Civil Protection**

Company General Use



The long road towards a Europe that protects



COPERNICUS

Emergency Management Service



LATEST NEWS : 2018-02-27 | Copernicus Emergency Management Service Monitors the Impact of Floods in Greece

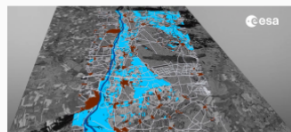
Copernicus Emergency Management Service

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 situations resulting from natural or man-made disasters. Satellite imagery is used as the main datasource. The service covers in particular:

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



0:00 / 1:22

Copernicus EMS - Mapping

European Flood Awareness System

The European Flood Awareness System (EFAS) is the first operational system that monitors and forecasts flood events across Europe. It provides its partners (national/regional authorities, as well as the European Commission's Emergency Response Coordination Centre) with a wide range of complementary, added value flood early warning information including related risk assessments up to 10 days in advance.



European Flood Awareness System

European Forest Fire Information System (EFFIS) and Global Wildfire Information System (GWIS)

The European Forest Fire Information System (EFFIS) monitors forest fire activity in near-real time and archives historical information on forests fires in Europe, Middle East and North Africa. The Global Wildfire Information System (GWIS) is a joint initiative of the Copernicus EMS and the Group on Earth Observations (GEO) work programs aiming at monitoring wildfire occurrence and impact at the global level. Both, EFFIS & GWIS, support wildfire management at national, regional and global levels.



Access to EFFIS and GWIS application is available at:

EFFIS and GWIS Systems

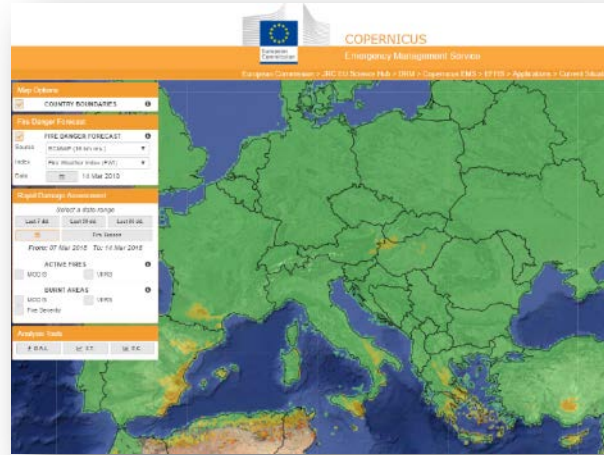
The EFFIS network

- Experts on forest fires meeting in Spring and Autumn before and after the fire season to **improve forest fire prevention** in Europe and Med countries
 - **40 european Countries** , international organizations such as FAO, and EC Services
- Bulgaria is represented by the **Executive Forest Agency**



[illegible]

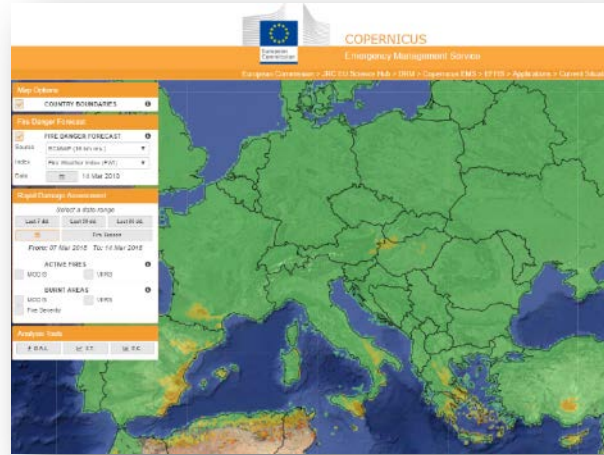
Current situation



Active Fires Detection: fires are located by comparing the temperature of a potential fire with the temperature of the land cover around.

Hot Spots are detected using MODIS/VIIRS and Sentinel2&3

Current situation



Rapid Damage Assessment: daily update of the perimeters of burnt areas in Europe for fires of about 30 ha or larger, providing location, fire duration, total burnt area and land cover affected

Active fire detection



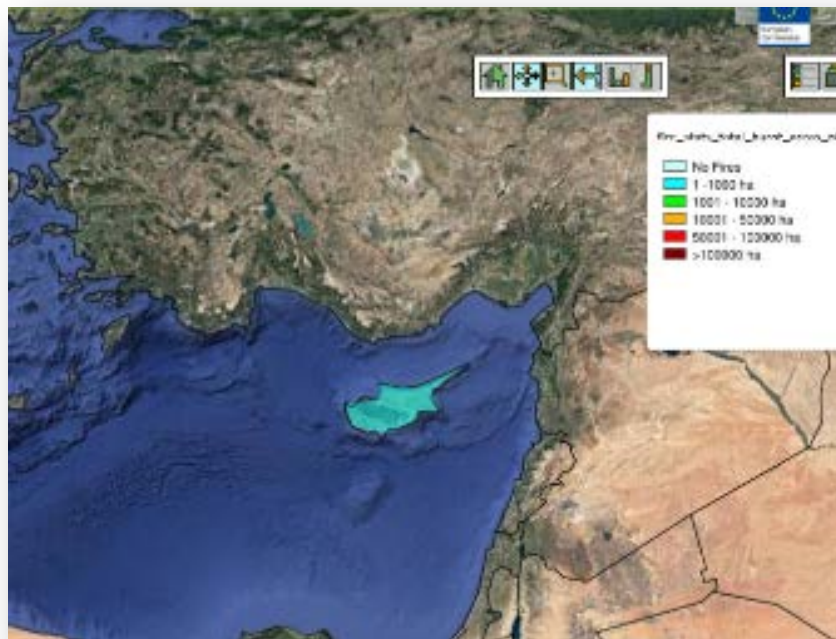
Active fire detection in Cyprus June 1st – September 31st

Post fire 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



Fire history




Build customized historical fire maps by querying the European Fire Database on number of fires, average burned area size in a selected year

Fire news

Fire News

Find a location




















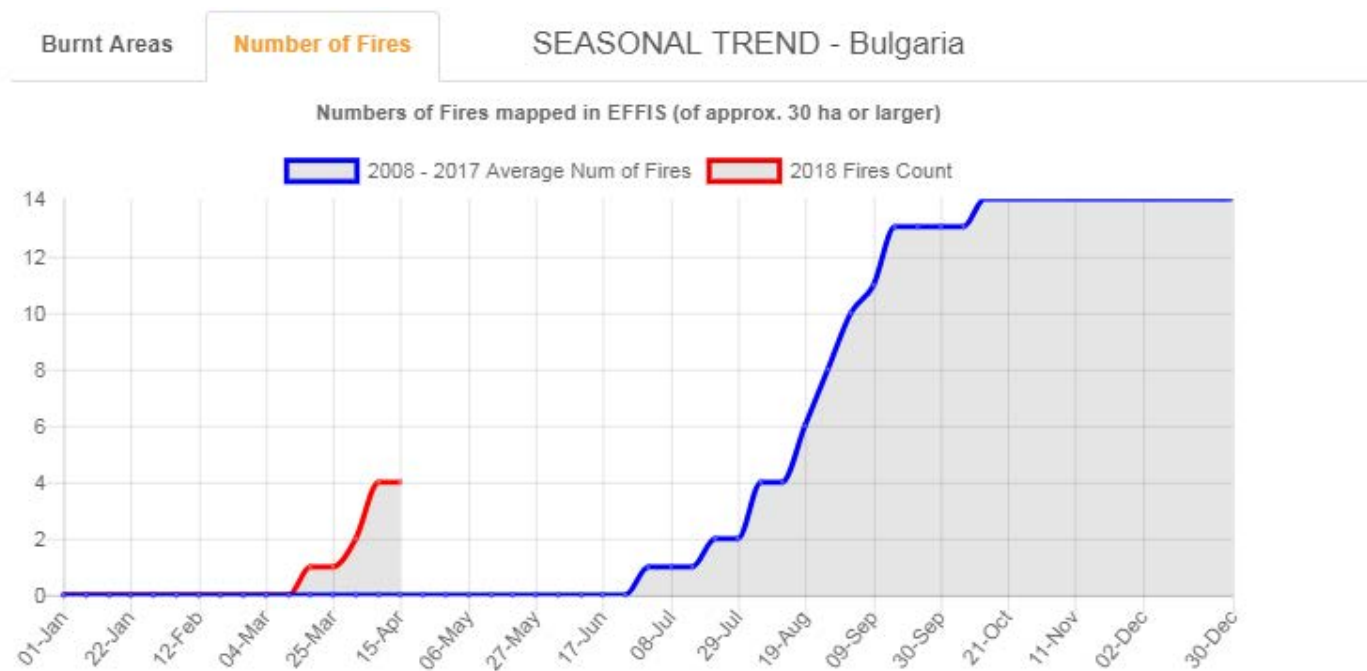
Search: Filter: Date: Size: Country:

Country	Place	Date	Size	Category	Status
Germany	Waldbrand	2023-07-21	100000 m²	Forest	Active
France	Forêt, incendie	2023-07-21	100000 m²	Forest	Active
Spain	Incendio forestal	2023-07-21	100000 m²	Forest	Active
Italy	Incendio forestale	2023-07-21	100000 m²	Forest	Active
Greece	Incendio forestale	2023-07-21	100000 m²	Forest	Active
Portugal	Incendio forestal	2023-07-21	100000 m²	Forest	Active
Belgium	Incendio forestal	2023-07-21	100000 m²	Forest	Active
Germany	Incendio forestal	2023-07-21	100000 m²	Forest	Active
Italy	Incendio forestale	2023-07-21	100000 m²	Forest	Active
Spain	Incendio forestal	2023-07-21	100000 m²	Forest	Active
France	Incendio forestal	2023-07-21	100000 m²	Forest	Active

Daily updates wildfire related news from Internet in all EU languages
News are geo-located and can be easily browsed by date, size, country



EFFIS tools - seasonal trend of number of fires

EU countries	
	Total EU
	Belgium
	Bulgaria
	Croatia
	Cyprus
	Czech republic
	Denmark
	Estonia
	Finland
	France
	Germany
	Greece
	Hungary
	Ireland
	Italy
	Latvia
	Poland



Period	2018 Fires Count	2008 - 2017 Average Burnt Areas
01-Jan	0	0
08-Jan	0	0

The long road towards a Europe that protects



COPERNICUS

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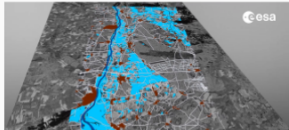
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EFFIS and GWIS Systems

2018

Company General Use

The EFAS partners

- EFAS partners are regional or local authority having a role in flood risk management such as national **hydro-met or civil protection services**
- EFAS partners sign a condition of access (CoA), and then **get access to real time services** and products through the EFAS Information System (EFAS-IS): www.efas.eu
- Currently **62 authorities** are EFAS partners
- Bulgaria is represented by the **National Institute of Meteorology and Hydrology (NIMH)**

Company General Use





➤ 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, event-based impact assessment and inundation mapping.

➤ Hydrological layers (0/6)

Forecasts based on different meteorological deterministic and ensemble models

➤ Flash flood layers (0/2)

Flash flood forecasts are generated using the methodology of the Enhanced Runoff Index based on Climatology, whereas flash flood nowcast is based on the propagation of radar data.

➤ 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)

EFAS products

1. Probabilistic flood forecasts

Main characteristics:

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

EFAS forecasting

Service OK

>> normal view opacity << 0.9 >> Print screenshot

search for location...

Select layers

2016-05-28 12 UTC

Flood summary layers (3/14)

☐ EFAS active information

☐ National Flood Monitoring

☐ Rapid Flood Mapping

☐ Rapid Impact Assessment

☐ Alert Level Exceed. ongoing

☐ Alert Level Exceed. 1-2 days

☐ Alert Level Exceed. 3-5 days

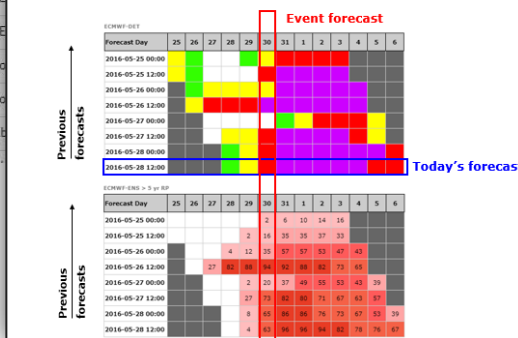
☐ Alert Level Exceed. 6-10 days

☐ Alert Level Exceed. 11-15 days

☒ Reporting Point

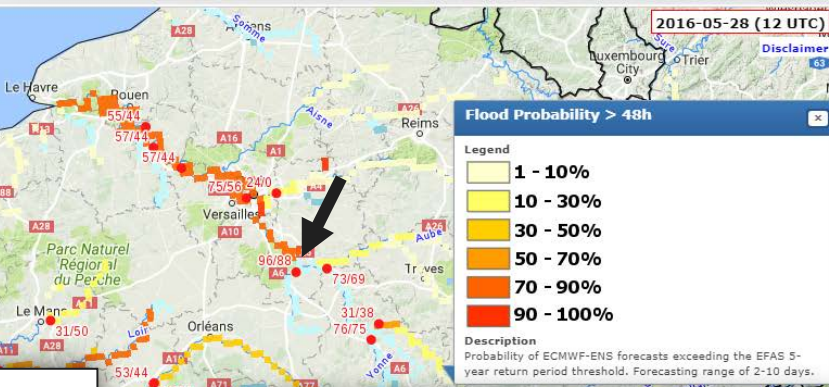
☒ Flood Probability

Threshold exceedance

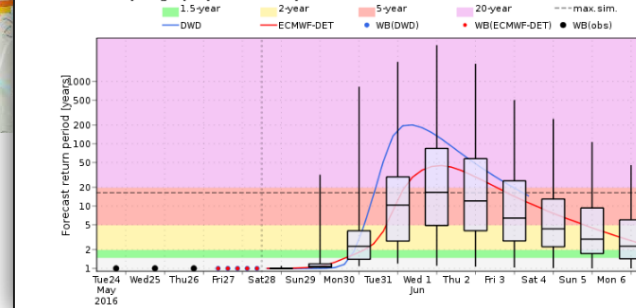


Point Information

	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			



Return Period Hydrograph (ECMWF-ENS)



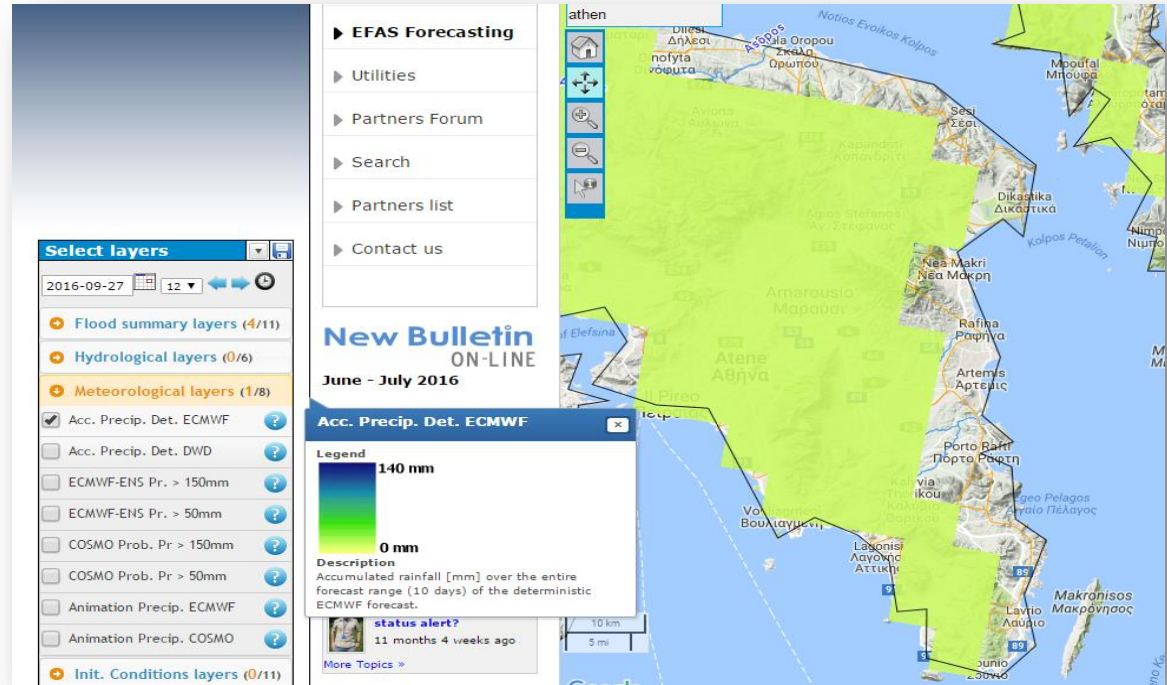
2. Meteorological forecasts

- **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



3. Flash flood

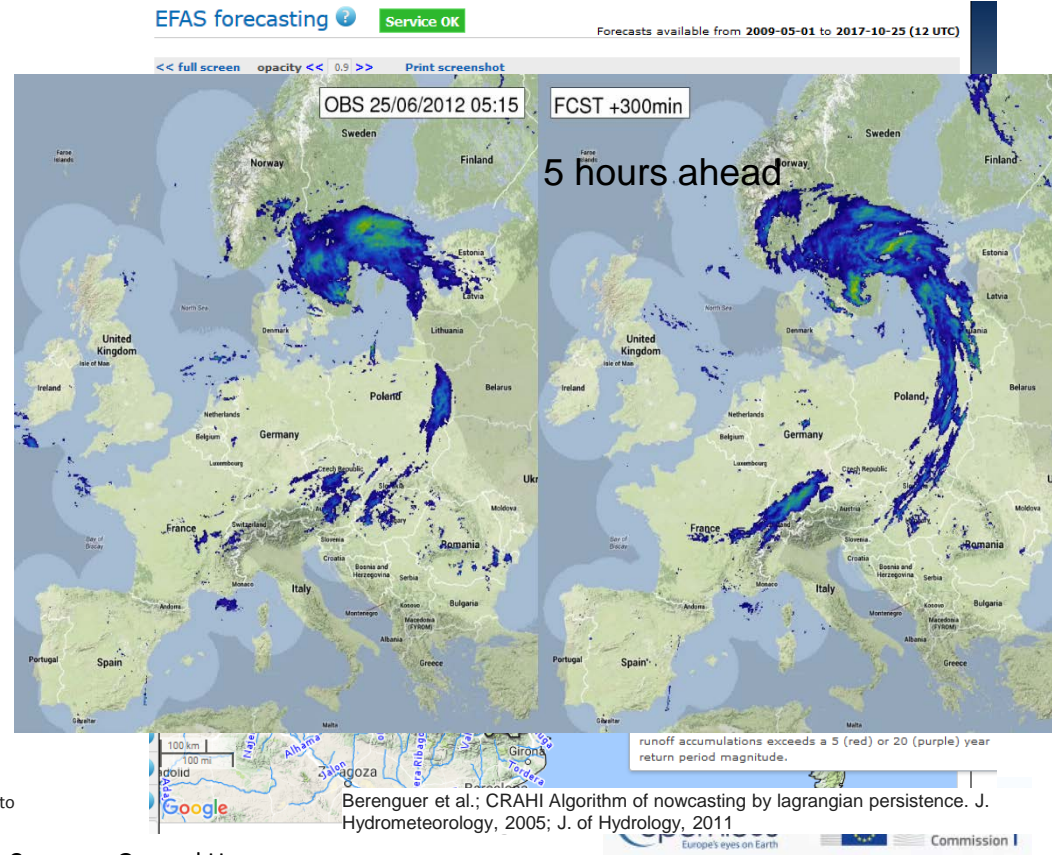
Forecasting, ERIC indicator

- Based on forecast accumulated upstream precipitation for durations up to 24 hours (no hydrological simulation)
- Cover river network at 1 km resolution for catchments between 25-2000km²
Probabilistic return period shown for lead time range 12-120 hours

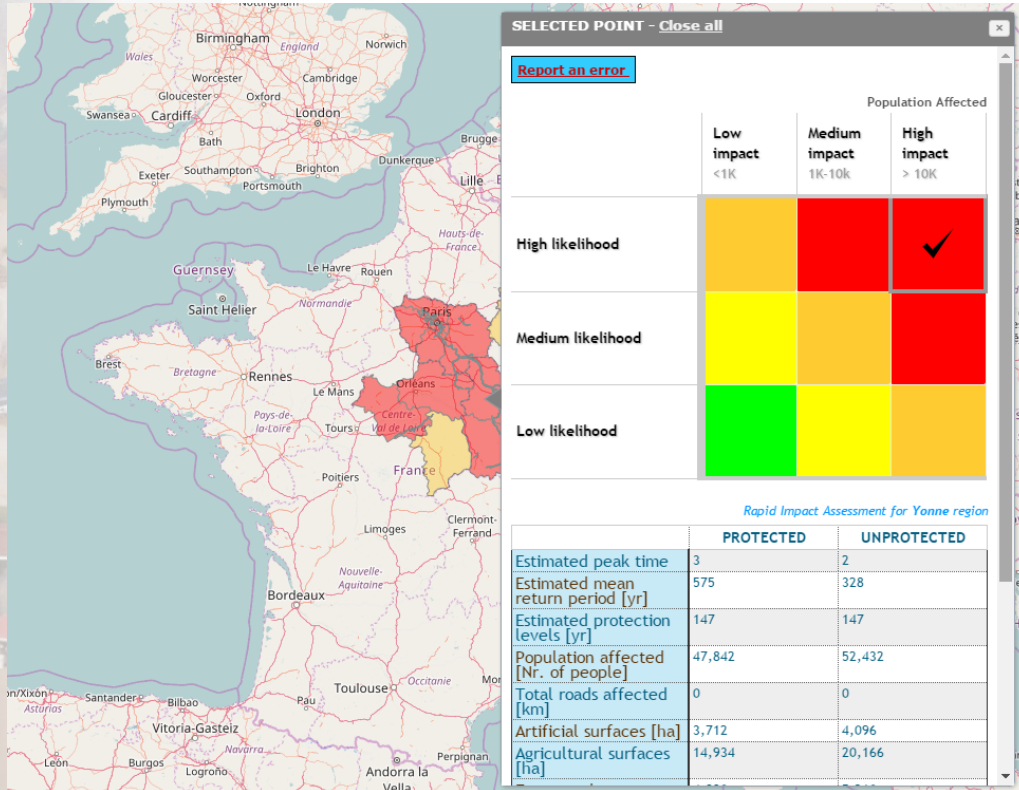
Nowcasting, ERICA indicator

- 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

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



4. Rapid flood hazard assessment

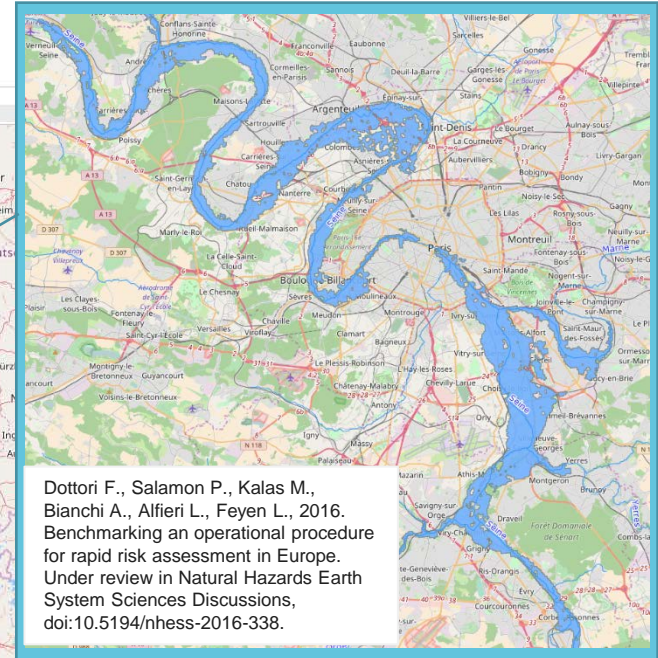
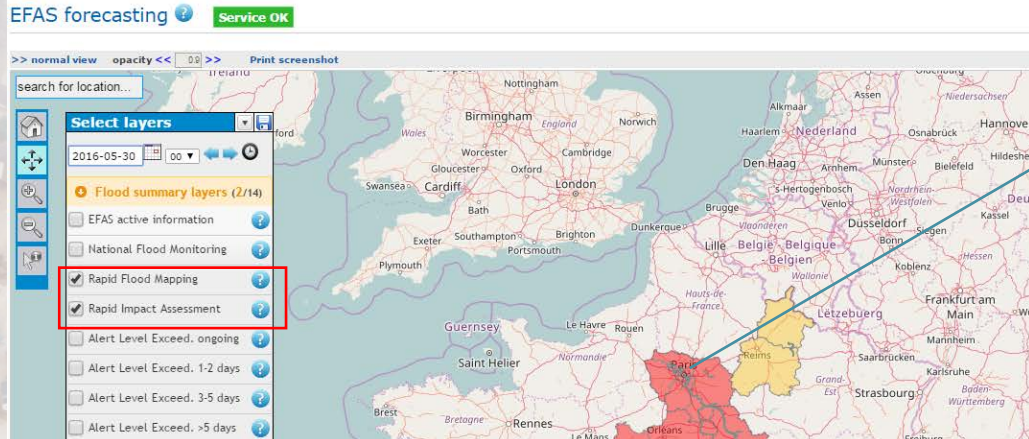


Main characteristics:

- Done twice a day, based on EFAS probabilistic flood forecast
- Provides a flood hazard assessment on the fly using pan European exposure datasets
 - Affected population [no. of people]
 - Affected roads [km]
 - Surfaces (urban, agriculture and forest) affected [ha]
 - Potential monetary damage [M €]
 - Cities affected

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

6. Event-based flood inundation mapping



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.

Main characteristics:

- Done for flood prone areas
- Based on simulations with 2D hydrodynamic model LISFLOOD-FP
- Spatial resolution of 100 m

How can I access EFFIS?

- EFFIS data and application 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/>
- Get additional support to access data which are no more available through the EFFIS web services (e.g. historic data, extracts of the fire database, or raw burned area perimeters) can be asked.



How can I access EFAS?



- To access the EFAS-IS go to www.efas.eu
- Personal login is required to access forecasts and notifications
- To contact the EFAS team please email info@efas.eu