Copernicus Emergency Management Service (CEMS)

Emergency Management

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Joint Research Centre

Copernicus4Regions
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Emergency Management

- **Operational since April 2012**
- **Provides information on natural and man-made disasters for entire DRM cycle**
  - ➢ Warnings & risk assessments
  - ➢ Information on the impact of disasters
- **Free and open data**
- **Complementary to national efforts**
- **Focus on Europe but available globally**
- **Users:**
  - **EU's Emergency Response & Coordination Centre (ERCC)**
  - **EU national, regional, local users from different fields (Civil Protection, forest fire services, environmental-, hydrological services)**
  - **Development agencies, international aid organizations, UN, private sector**
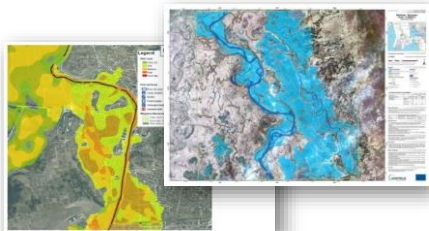
RESILIENCE

RECOVERY

EMERGENCY RESPONSE

PREPAREDNESS

Tsunami
Industrial accidents
Floods
Volcano eruptions
Fires
Other urgent events
Emergency Mapping Services
Geoinformation on demand
Earthquakes
Landslides
Hurricanes
Conflicts

2

Emergency
Management

ON-DEMAND MAPPING

Risk & Recovery Mapping

Rapid Mapping
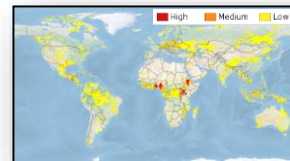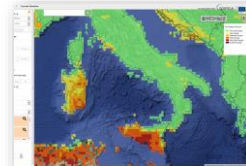
RESILIENCE

RECOVERY

EMERGENCY   RESPONSE

PREPAREDNESS

Operational
since 2012

**EARLY WARNING &
MONITORING SYSTEMS**

European Forest
Fire Information
Systems

European &
Global **Drought**
Observatory

High   Medium   Low

European &
Global **Flood**
Awareness
Systems

Copernicus
Europe's eyes on Earth

European
Commission

- Mapping of specific areas, for a specific disaster event, at user defined scales
- Requires activation by Authorised Users (Civil Protection)
  - 32 AU (focal points): 28 EU MS + Norway + Iceland + EC Services + EEAS
  - = entry point for non-authorised users
- Available globally, all event types

Risk & Recovery Mapping
- During working hours
- Supports preparedenss & recovery activities
- Delivery in 15 days (standard products) or 2 months (tailored studies)
- Uses EO and other data
- https://emergency.copernicus.eu/mapping/list-of-activations-risk-and-recovery

Rapid Mapping
- 24/7/365
- Supports emergency response
- Highly standardised workflow & products
- Rapid tasking of satellite images
- Delivery in 24h (avg.), max 5 days
- Uses only EO data
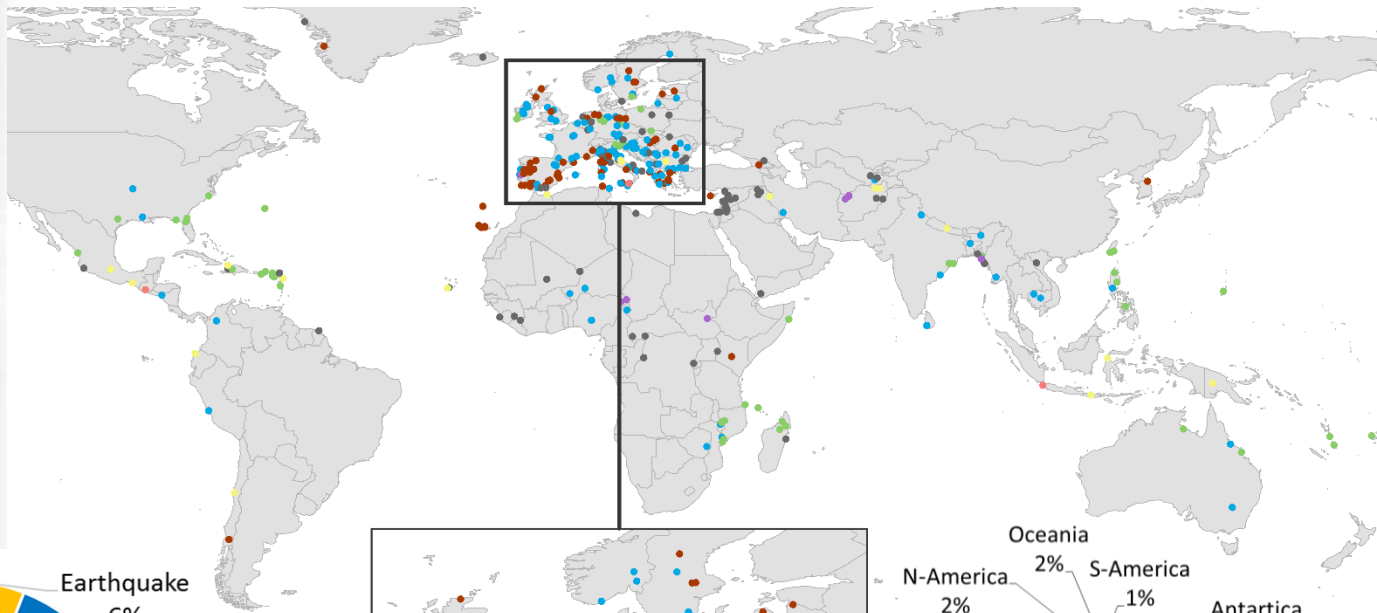- https://emergency.copernicus.eu/mapping/list-of-activations-rapid

Validation
Service improvements (technical and qualitative evaluation, user interviews)

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Rapid Mapping Activations 2012-2019
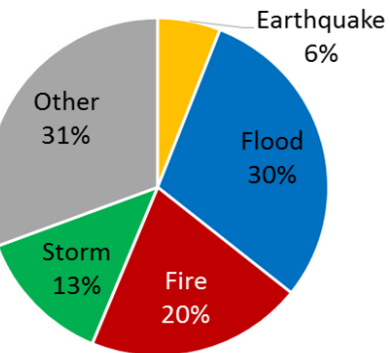
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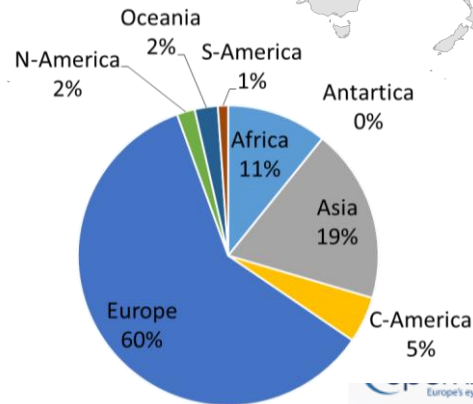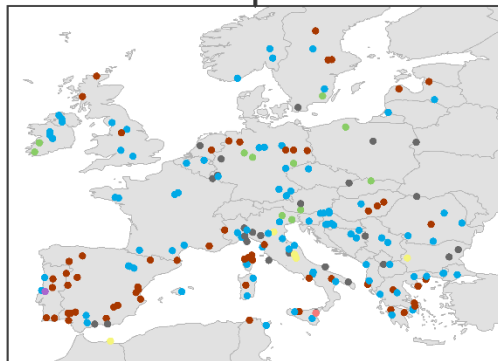
Standard Products	Content	Delivery time (h) after image reception
Reference	Pre-event situation	10
First Estimate	Fast impact assessment	2
Delineation	Detailed impact assessment (extent)	7
Grading	Detailed assessment (extent & damage grade)	10

Post-event

Grading Product example

Tropical Cyclone Dorian Bahamas (EMSR385)

Post-event image: Pleiades 0.5m
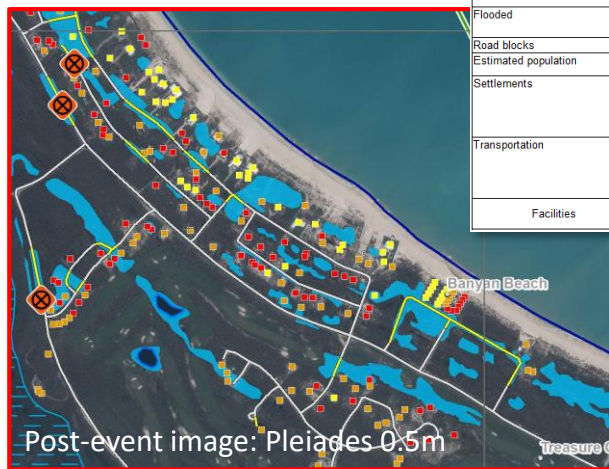
Consequences within the AOI		Unit of measurement	Destroyed	Damaged	Possibly damaged	Total affected	Total in AOI
Flooded		ha		73.6			73.6
Road blocks		No.		6		6	
Estimated population		Number of inhabitants				800	800
Settlements	Residential	No.	421	503	171	1095	1095
	Industrial building and warehouse	No.	4	10	3	17	17
	Industrial	No.	0	0	2	2	2
	Non-residential farm	No.	0	0	2	2	2
Transportation	Bridge and elevated highway	No.	0	0	0	1	1
	Secondary Road	km.	0.0	0.0	0.1	0.1	7.4
	Local Road	km.	0.0	0.2	5.6	5.8	37.6
	Cart Track	km.	0.1	0.4	2.1	2.6	10.1
Facilities	Berthing Structure	km.	0.2	0.4	0.8	1.4	1.4
	Harbour	ha	0.0	6.0	0.0	6.0	6.0

Crisis Information

⊗ Road block / interruption

Flooded Area (05/09/2019 15:50 UTC)

Built Up Grading
- 🟥 Destroyed
- 🟧 Damaged
- 🟨 Possibly damaged

Transportation Grading

🌉 Bridge and elevated highways, No visible damage

— Road, Destroyed
— Road, Damaged
— Road, Possibly damaged
— Road, No visible damage

Facilities Grading
- Destroyed
- Damaged
- Possibly damaged
- Damaged

European Commission

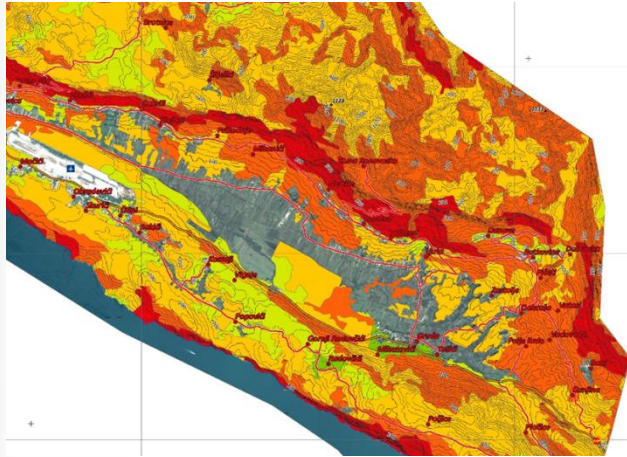Emergency
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## Pre-disaster forest fire risk assessments in S-Croatia (EMSN059)

Products:

- Reference information
- Forest fire exposure and risk, vulnerability of people and assets
- Suggestion of risk - specific mitigation measures
- Critical information for the development and management of first response
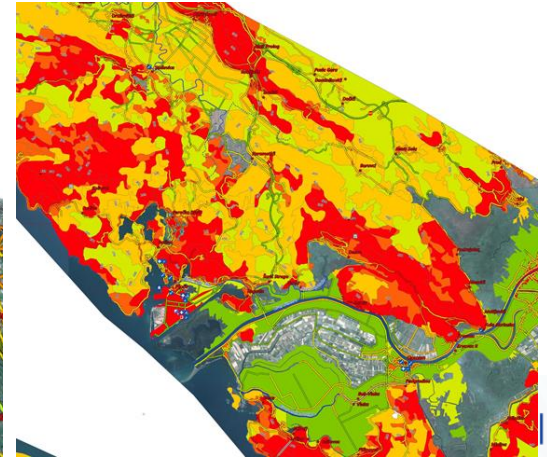
**Assets & Population Exposure
& Vulnerability**

**Transportation Network
Vulnerability to Disruption**
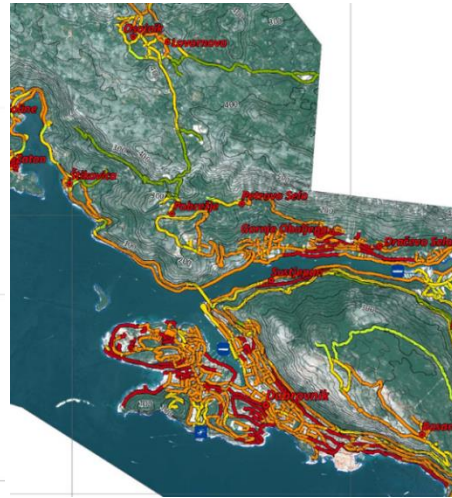
**Population, Assets &
Transportation Network at Risk**

# Flood Awareness System

Emergency Management

- **Increase preparedness** for riverine flood across Europe and **support the decision making**

- **At country level**: to provide complementary forecasts (e.g. up to 10 days, river basin wide, comparing to local forecasts, additional products)

- **At the EU level**: to provide a harmonized picture on a larger scale (Europe or global)

Users:
- ERCC, national/regional hydrological and civil protection services
- Development agencies, international aid organizations, private sector

Main outputs
- River-basin wide, probabilistic, 10 (EFAS)/30 (GloFAS) day flood forecasts
- Specific additional forecast products: flash floods, seasonal outlook, impact forecasts

www.efas.eu   www.globalfloods.eu

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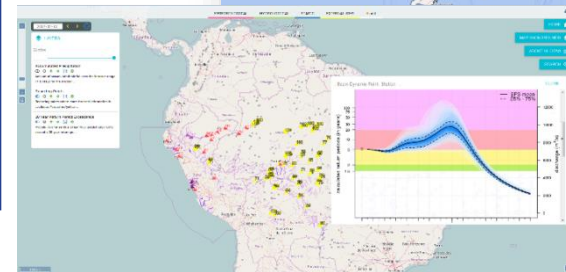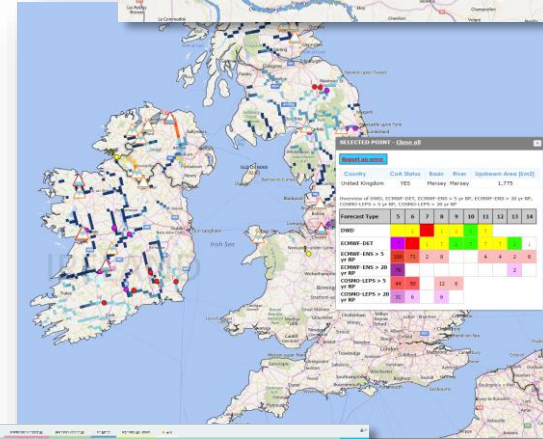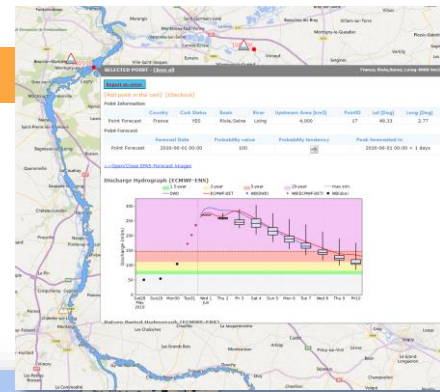
- Provides **EU-level assessments** during both **pre- and post-fire** phases

- Complements national fire information systems through the provision of **harmonised data, methods and standards**

- Expansion to global scale is ongoing (GWIS)

- **Users**: EC DGs and Services, EP, national/regional forest fire and civil protection services, FAO, UNECE, UNISDR

Fire Danger

Main outputs
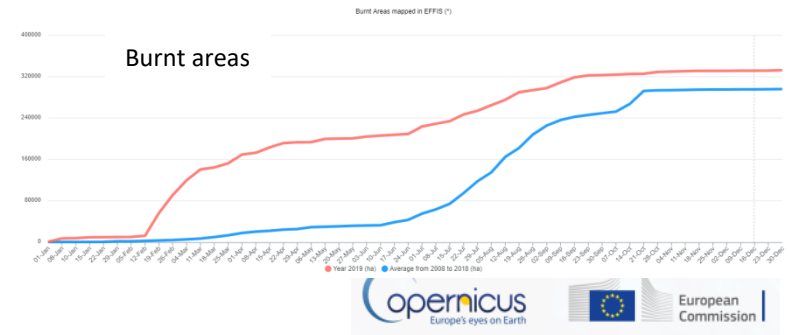
➤ **Fire danger forecast**
- Short and long-term fire danger forecast
- Monthly and seasonal fire weather forecast

➤ **Active fire and burnt area mapping**
- Active fire mapping (MODIS/VIIRS/Sentinel2&3)
- Burnt area mapping:
1) Medium spatial resolution (~ 300 m) near-real time (2x/day)
2) High spatial resolution (~10-30 m) weekly (or bi-weekly)

Burnt Area in EU

Burnt areas

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

Emergency Management

- Monitoring (and forecasting) of drought & heat indicators (<u>hazard</u>, H), based on satellite, hydro-meteorological model & in-situ data

- Analysing <u>exposure</u> (E) and <u>vulnerability</u> (V) for different sectors

- Assessing the dynamic <u>risk</u> (R) for drought impacts in different sectors (R=H∗E∗V)

- Contributing to the development of a nested global drought information system (GEO) and the Integrated Drought Management Programme (WMO & GWP)


Combined Drought Indicator

Risk of Drought Impact

Main outputs

➢ **Drought monitoring and forecasting**
- Continuous monitoring of drought hazard at different scales
- Medium to seasonal forecasting (under development)

➢ **Analysing the risk of impacts (every 10 days)**
- Analysing the number of people and area affected
- Warning for likely impacts in different sectors

http://edo.jrc.ec.europa.eu   http://edo.jrc.ec.europa.eu/gdo

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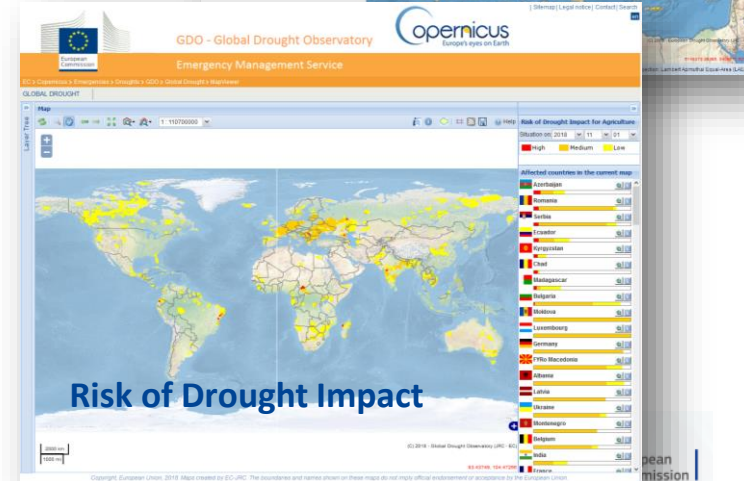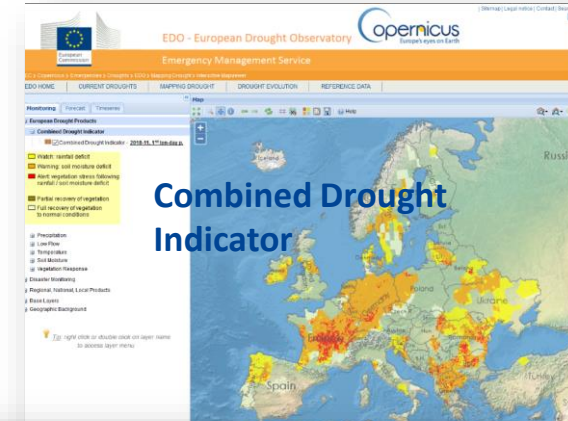
- Linking early warning & on-demand mapping

- Integration of GDACS (multi-hazard early warning & monitoring)

- Always-on services (hazard specific)
  - Drought observation system added in 2018
  - Systematic satellite based global NRT flood monitoring (expected 2021)

- Maximise exploitation of image, in-situ & modelling products
  - New sources of imagery
  - Improve resolution & algorithms of models
  - Increase in-situ observations & other sources of data (social media, crowd, drones, HAPS)

European Commission
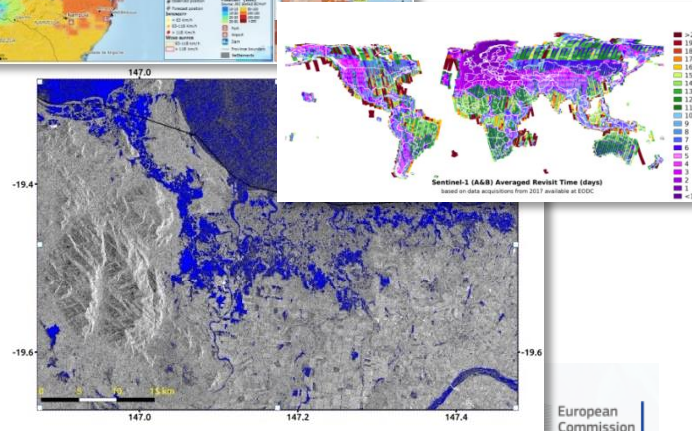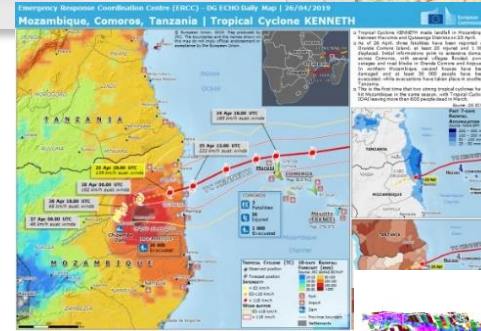
Thank you!

emergency.copernicus.eu

Questions?

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