

On-demand  
mapping



Rapid  
Mapping



Risk and Recovery  
Mapping

Early warning  
and monitoring



Floods



Fires



Droughts

Exposure  
Mapping



Population



Built-up  
areas



# Copernicus Emergency Management Service Overview

UN-SPIDER Bonn International Conference (virtual) Space-based  
Solutions for Disaster Management in Africa



Presented by Vera Thiemig on behalf of the CEMS Flood group  
17 November 2021



## EU's Earth Observation Programme





### OPERATIONS

- CEMS operational activity since 2012
- Managed by the Joint Research Center of the European Commission

### PURPOSE AND IMPACT

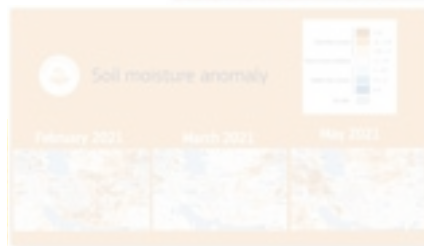
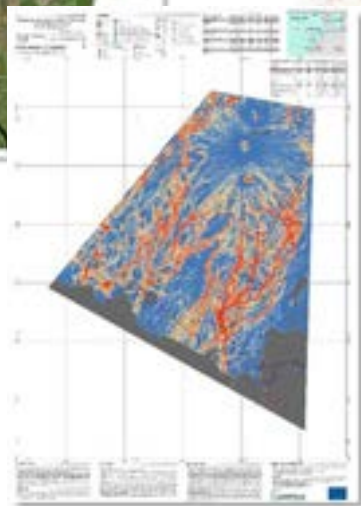
- Supports all actors involved in the management of natural or manmade disasters and in particular the EU's Emergency Response & Coordination Centre (ERCC)
- Addresses all phases of the disaster management cycle from preparedness, response to recovery and prevention
  - Preparedness: forecasts
  - Response: rapid maps and monitoring of events
  - Recovery & prevention: risk assessment for specific hazards and post-disaster recovery maps



Emergency  
Management

## Overview of CEMS

# THE COPERNICUS EMERGENCY MANAGEMENT SERVICE





# On Demand Mapping : Overview

Check three major goals of your request to select the best product serving your needs:



Rapid Mapping portfolio

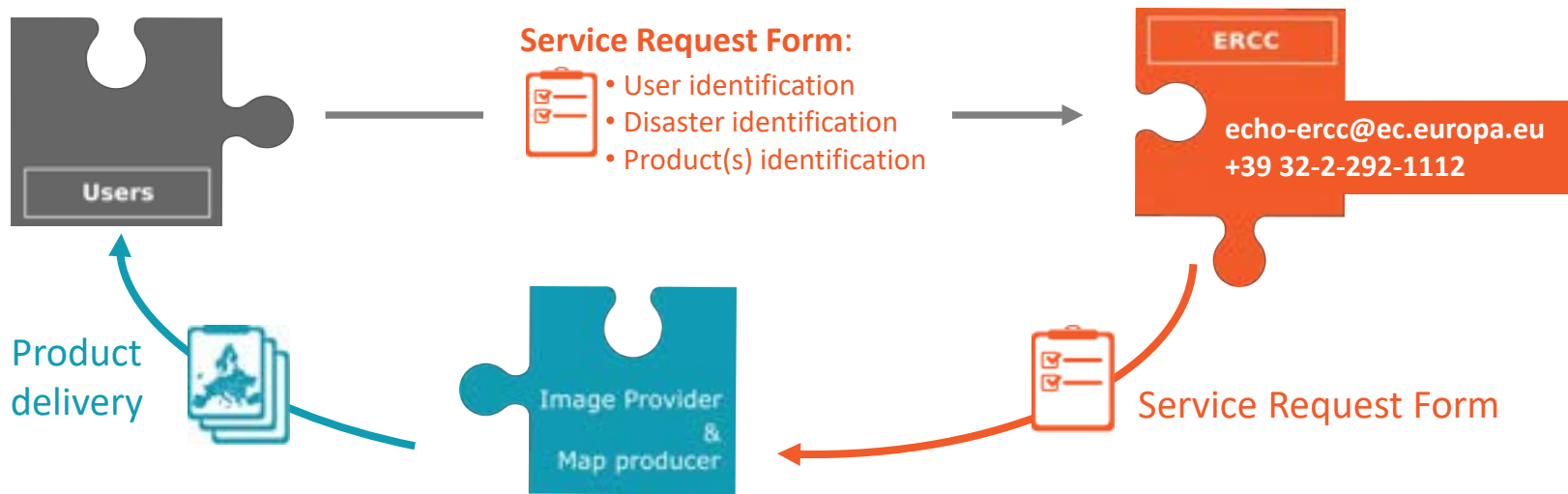


Risk and Recovery Mapping portfolio



# Workflow for On-Demand Mapping

- Direct activation only by **Authorised Users** (Civil Protection):
  - 31 focal points: 27 EU MS + Norway + Iceland + UK + EC Services + EEAS
- Not-authorized users incl. international users can activate through the EU's Emergency Response Coordination Centre (**ERCC**)





Emergency Management

# Rapid Mapping Product Portfolio

PRE-EVENT

Reference (10h\*)



Pre-volcanic eruption in the Philippines, 2019 (EMSR418)

POST-EVENT

First Estimate (2h\*)

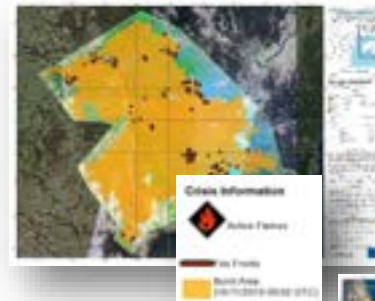


Flood delineation in France, 2019 (EMSR411)

Delineation (7h\*)

Grading (10h\*)

Delineation

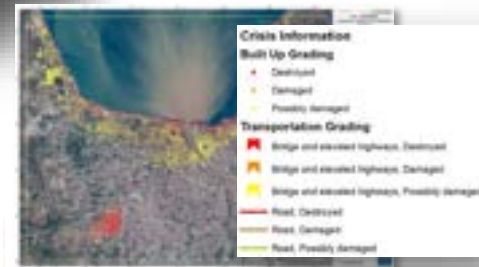


Wildfires Australia, 2019 (EMSR408)

Monitoring

Monitoring

Detailed damage assessment



\* Production time after image reception

1° impact info delivery within **24h** from user request



Earthquake & Tsunami in Indonesia, 2018 (EMSR317)

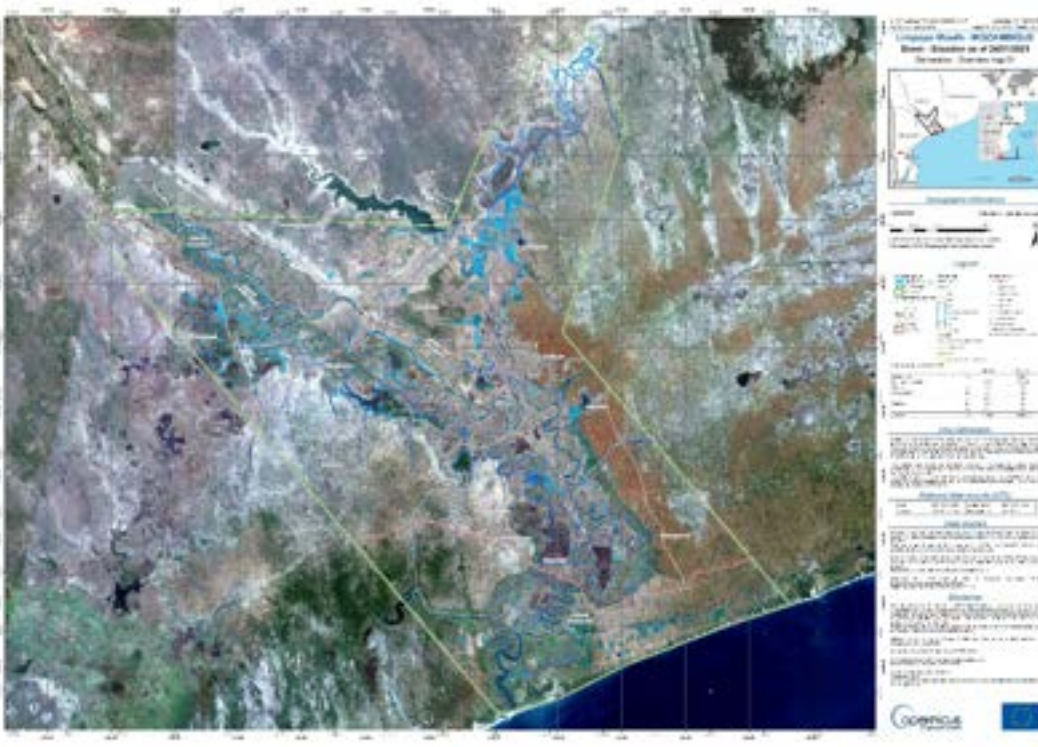
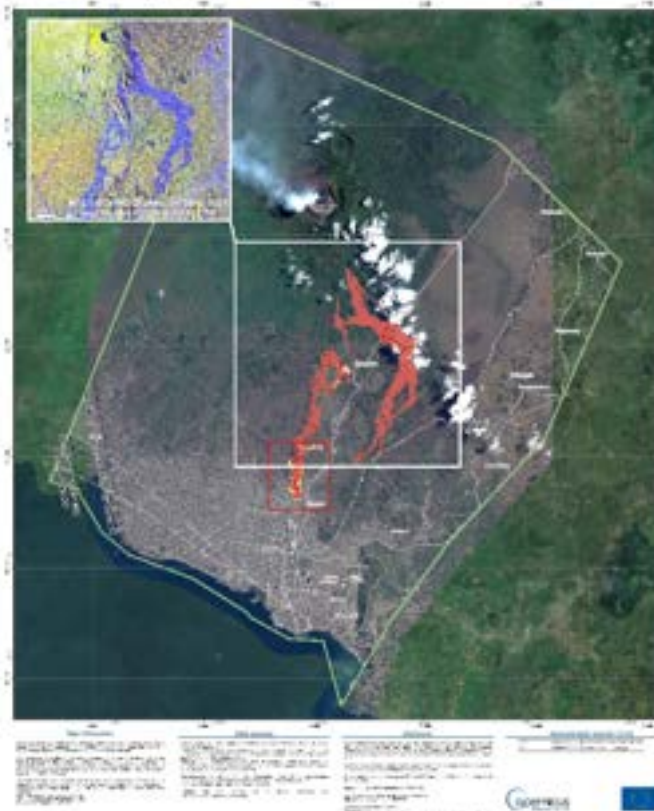


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# Rapid Mapping Examples

**Tropical Cyclone Eloise 22-23  
January 2021, Mozambique**  
(<https://emergency.copernicus.eu/mapping/list-of-components/EMSR495> )

**Nyiragongo volcano 22 May 2021,  
Congo, Rwanda**  
(<https://emergency.copernicus.eu/mapping/list-of-components/EMSR513> )







# Risk & Recovery Portfolio

- **Production** during working hours
- Supports preparedness & recovery activities
- **Delivery** in days (standard products) or 1-2 month (tailored studies)
- Uses satellite imagery and other data

## Standard Products (examples)

- Digital Surface Model
- Modelled flood extent for major events
- Temporal analyses of occurred flood events
- Reconstruction monitoring
- Ground deformation analyses
- Impact assessment/exposure analysis for assets & population
- Post-disaster soil erosion risk assessment
- Post-disaster landslide risk assessment
- Population displacement location





## Post-event analysis tropical cyclone Eloise

- Two areas of interest (proximity of Beira)
- DG ECHO/African Risk Capacity Agency
- <https://emergency.copernicus.eu/mapping/list-of-components/EMSN086>





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# CEMS Flood forecast and monitoring service



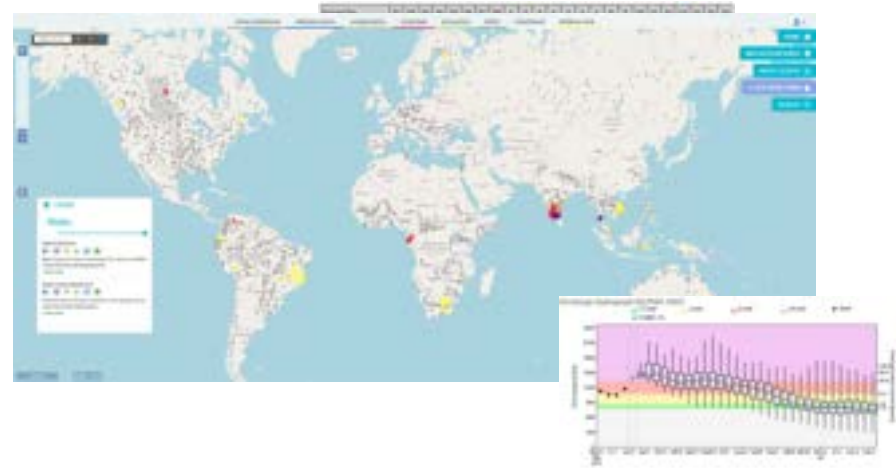
<https://www.globalfloods.eu/>

**GloFAS = Global Flood Awareness System**

**GFM = Global Flood Monitoring**

GloFAS and GFM provide:

- Global **hydrological ensemble forecasts** updated daily
- Global, **SAR-based, flood monitoring** with timeliness of >8hours and revisit frequency of 3-12 days at 20m resolution (under dev.)
- **Map products and datasets** through dedicated web and data services
- **Highlights** of expected flooding and associated flood risk level over next 30 days
- **Seasonal hydrological outlook** showing wet/dry anomalies over next 16 weeks

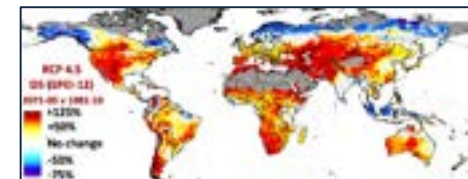
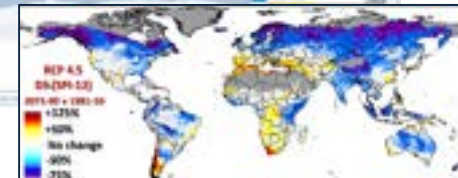




<https://edo.jrc.ec.europa.eu/>

## GDO = Global Drought Observatory

- GDO provides
  - **Early warning, monitoring and forecasting of droughts** and their likely **impacts**, based on satellite data, hydro-meteorological modelling and in-situ observations.
  - Based on a conceptual model of **drought risk**
- For Whom?
  - European **Emergency Response Coordination Centre (ERCC)**
  - Global Disaster Alert and Coordination System (**GDACS**)
  - International aid organizations, EEAS, UNCCD





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# Forest Fire Information System



<http://gwis.jrc.ec.europa.eu>

- Joint initiative between GEO, NASA and JRC
- Not yet fully operational in CEMS (integration ongoing)
- provide a comprehensive view and evaluation of fire regimes and fire effects at global level
- provide tools to support operational wildfire management from national to global scales.
- Complements national fire information systems through the provision of **harmonised data, methods and standards**
- **Users:** EC DGs and Services, EP, national/regional forest fire and civil protection services, FAO, UNECE, UNISDR



## Main outputs

### ➤ Fire danger forecast

- Fire danger forecast up to 10 days in advance on the bases of the Canadian Fire Weather Index (FWI)

### ➤ Active fire detection (MODIS, VIIRS)

### ➤ Near real time burnt areas (MODIS, VIIRS)

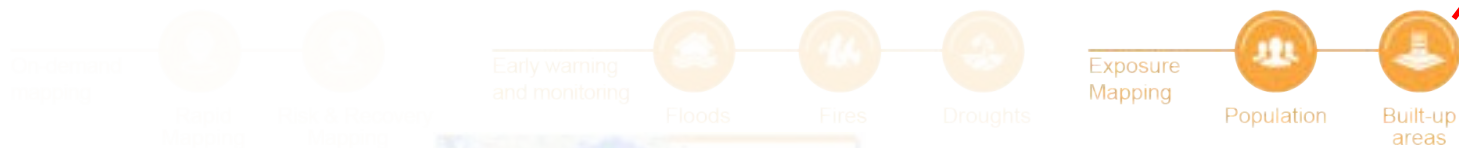
### ➤ Country profiles (fire regimes)



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## Exposure Mapping: the Global Human Settlement Layer



### Exposure Mapping

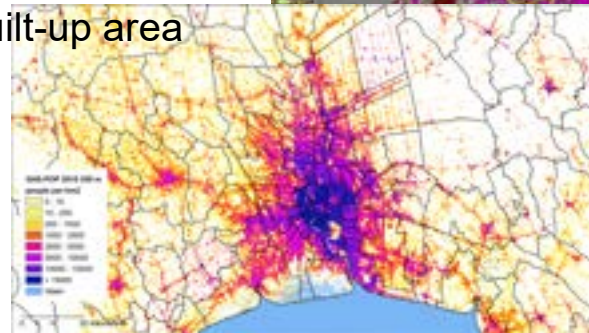
- Information on **exposed population, housing** and other assets is fundamental to manage crisis and reduce disaster risk
- The new CEMS component provides accurate information derived from satellite and census data on the **presence and characteristics** of settlements and population
- Products are already used by all CMES services





### The GHSL exposure mapping products

- **Global built-up** fraction data at 10 m spatial resolution based on Copernicus Sentinel data
- **Global built-up change** from historical Landsat data (1975-2018)
- **Global Population** density maps at 100 m spatial resolution
- **Annual updates** of spatial grids
- Planned starting date of built-up area production 2022



All services and products presented are free and open for everyone!

<https://emergency.copernicus.eu/>

