Earth observation for DRR and CCA

Damage mapping, e.g. for Sendai loss indicators

Flood hazard exposure

Population Vulnerability
Copernicus: Europe’s eyes on Earth

★ Satellites, In situ, Services
★ 6 families of satellites: Sentinels + 30 contributing missions
★ In situ and aerial data
Copernicus Climate Change Service (C3S)

- New service
- Observation of climate system for climate indicators
- Sectorial applications
  - Disaster Risk Reduction → Emergency Management Service

First C3S General Assembly

Join us to learn about the latest developments and enhance international cooperation. There will be:
- Service updates
- Coordinated actions
- User requirements and feedback gathering
- Collaboration

Register: https://climate.copernicus.eu/events/C3S-general-assembly
Copernicus Emergency Management Service (CEMS)

- Addressing natural and man-made disasters globally
- EMS components: Mapping (with Validation) and Early Warning
- EMS Mapping: Provides disaster management information based on satellite imagery combined with other information
- EMS Early Warning Systems: provide alerts on flood and forest fire risks
CEMS Services

**Mapping**

**Rapid Mapping**
24/7 on-demand and fast provision of geospatial information

**Risk & Recovery Mapping**
Geospatial information supporting prevention, preparedness, disaster risk reduction and reconstruction, recovery

**European Flood Awareness System (EFAS)**
Flood monitoring and forecasting across Europe

**European Forest Fire Information System (EFFIS)**
Near real-time & historical information on forest fires and forest fire regimes in the European, Middle Eastern and North African regions
EMS services in brief

★ **Rapid Mapping**
★ 24/7 on-demand and fast provision of geo-spatial information
★ Supporting emergency management activities following an event

★ **Risk and Recovery Mapping:**
★ Supporting emergency management activities not related to the immediate response but related to prevention, preparedness, disaster risk reduction and reconstruction/recovery

★ **European Flood Awareness System (EFAS)**
★ 1st operational European system monitoring and forecasting floods across Europe
★ Products include flood monitoring, probabilistic flood forecasts, flash flood indicators, flood impact assessments and seasonal flood risk outlooks

★ **European Forest Fire Information System (EFFIS)**
★ Provides information on forest fires & their ecological impacts in the European, Middle East and North Africa region
★ Encompasses the full fire cycle, comprising near-real time information services regarding the current and future fire danger forecast, active fires and burned areas, and post-fire damage assessments
Service Concept

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
- POST-DISASTER SITUATION MAPS

VALIDATION

EARLY WARNING
- Floods: EFAS
- Forest Fires: EFFIS

CONTINUOUS ALERTS
Risk and Recovery Mapping

- Delivery approx. 2 months
- Products tailored to user needs
  - Reference maps
    - Status of the territory & assets
    - Land use zoning plans
    - Mitigation measures
  - Pre-disaster situation maps
    - Hazard exposure
    - Vulnerability, risk
    - Evacuation plans
  - Post-disaster situation maps
    - Vulnerability, risk after an event
    - Recovery plans
    - Reconstruction monitoring
- 34 activation until now
**RECENT RISK AND RECOVERY MAPPING ACTIVATIONS → 2016**

<table>
<thead>
<tr>
<th>ID</th>
<th>Activation name</th>
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<tbody>
<tr>
<td>EMSN019</td>
<td>Germany - Detailed mapping of major chemical industry for selected sites</td>
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<tr>
<td>EMSN020</td>
<td>Portugal - Multiple natural hazard risk assessment - Planning and Recovery</td>
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<tr>
<td>EMSN021</td>
<td>Austria - Earthquake risk assessment for three areas</td>
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<td>EMSN022</td>
<td>Bulgaria – Post-disaster analysis Flood</td>
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<td>EMSN023</td>
<td>Poland - Risk maps World Youth Day (Krakow)</td>
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<td>EMSN024</td>
<td>Germany – Nationwide assets mapping</td>
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<td>EMSN025</td>
<td>Greece – Forest fire damage assessment</td>
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<tr>
<td>EMSN026</td>
<td>Spain – Post disaster assessment of toxic cloud dispersion</td>
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<tr>
<td>EMSN027</td>
<td>Somalia – Monitoring of drought mitigation measures</td>
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<td>EMSN028</td>
<td>France – flood delineation and damage assessment</td>
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<td>EMSN029</td>
<td>Spain – forest fire damage assessment using UAV imagery</td>
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<tr>
<td>EMSN030</td>
<td>Ukraine – ground deformation mapping and monitoring using DInSAR technique</td>
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<tr>
<td>EMSN031</td>
<td>Portugal - Forest fire damage assessment and landslide risk Madeira Island</td>
</tr>
<tr>
<td>EMSN032</td>
<td>Portugal - Forest fire damage assessment</td>
</tr>
<tr>
<td>EMSN033</td>
<td>Libya – Urban Profiling major cities (in preparation)</td>
</tr>
</tbody>
</table>
EMSN-020: Multi hazard assessment: the Azores Archipelagos case (PT)

- Support efficient design and implementation of mitigation measures and recovery planning based on EO data exploitation
The macro seismic method or empirical vulnerability approach was adopted. It is the Level 1 (LM1 method) of RISK-UE program (Milutinovic and Trendafiloski, 2003), originally proposed by Giovinazzi and Lagomarsino (2004) according to the European Macro seismic Scale (EMS-98, Grünthal, 1998).

Risk-UE-LM1 is suitable for vulnerability, damage and loss assessment in urban environments with adequate estimates on seismic intensity and portfolios large enough, so that any uncertainties associated with standardized indexes can be balanced out. RISK-UE program was launched after the disastrous earthquakes of Izmit and Athens in 1999, and adapted the US methodologies (ATC13, 1985; HAZUS, 1999) into the European structural typologies.
SOME EXAMPLES LANDSLIDES

Assets & Transportation Network at (Landslide) Risk and Mitigation measures
Ribeira Quente (Sao Miguel)

Population at (Landslide) Risk and Mitigation measures
Sao Miguel
Soil erosion hazard & mitigation measures Santa Maria Island
(A) Population at Risk and (B) Environmental Risk over the various LU/LC classes for Pico Island. Population Risk map includes Population & Built-up areas tables which in conjunction with the Environmental Risk map table show the qualitative results of the risk analysis.
Mitigation measures include both construction (coastal defence) and site planning strategies. Structural countermeasures are especially necessary in ports to reduce intrusion into ports, but also onto the land. For both types of measures it is important:

- to estimate the incident profile (height and current with direction) and
- to plan in a cost-effective way.

**Major types of structural countermeasures:**

- Structural reinforcement of assets (ports & other on-land facilities) [A]
- Construction of defences in order to reduce tsunami & storm surges intrusion (Breakwaters, seawalls, groins, quays, dykes / levees) [B]

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**SOME EXAMPLES MITIGATION**
Land use / land cover classes affected by the flood event. Statistics per water depth are given in an associated report.

Maximum flood extent and the associated water depths.
How to trigger Copernicus?

emergency.copernicus.eu

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

- **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 Forest Fire Information System**
  - Specific applications are available in EFFIS:
    - **Current Situation**
      - Latest data on the current fire season in Europe and in the Mediterranean area.
      - Today’s meteorological fire danger maps + forecast up to 4 days, daily maps of hot spots and perimeters.
    - **Fire News**
      - News on wildland fires in Europe updated daily by the EFFIS team.
3rd Call for Expression of Interest

★ Deadline: 30 April 2017
★ Target:
★ stakeholders in the field of disaster management, civil protection and members of NGOs working in the humanitarian field throughout the world
★ How:
★ Contact your “Authorised Users” (MS contact points)
★ Contact JRC peter.spruyt@ec.europa.eu
★ The Commission reserves the right to select most relevant requests as potential activations. AU must approve request.
★ More info:
★ drmhc.jrc.ec.europa.eu or emergency.copernicus.eu