

European Crises Management Laboratory (ECML): scientific analyses, systems and services

United Nations Geospatial Network Data Hub: One UN Geospatial
Situation Room, 15 November 2023

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Directorate for Space, Security and Migration
Disaster Risk Management Unit (JRC E1)

No matter the level of complexity of the situation, **when a disaster strikes**, questions are recurrent, simple...



...and urgent!

Joint Research Centre

The JRC provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society.

Near real time

Global coverage

Daily expert's monitoring

- Datasets
- Methods
- Services
- Analyses *for DRM*

Multi hazard & cross-sectoral

Conflicts & complex crises

Natural & man made disasters

1. The **ECML**^(*) creates enhanced situational awareness for crisis management
2. The **DRMKC**^(**) builds the knowledge base for understanding and acting on future risks & opportunities
3. The **CEMS**^(***) operates 24/7 systems for DRM action, in the short as well in the mid-long term

We work for all phases of the DRM cycle & we inform all phases of the POLICY cycle

^(*) European Crisis Management Laboratory
^(**) Disaster Risk Management Knowledge Centre
^(***) Copernicus Emergency Management Service

The image displays four screenshots of digital interfaces related to disaster risk management:

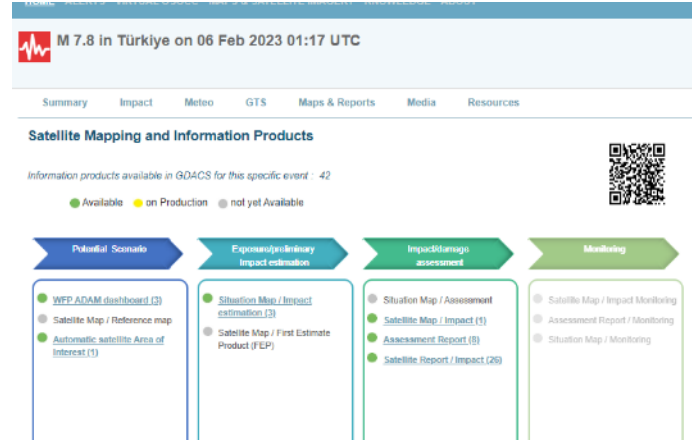
- GDAACS (Global Disaster Alert and Coordination System):** Shows a world map with various hazard alerts and a navigation menu.
- JRC TECHNICAL REPORT:** A report titled "M7.8 and M7.5 Earthquakes in Türkiye" with a summary and a map of the affected region.
- INFORM Risk Index:** A dashboard for the INFORM Risk Index, featuring a world map color-coded by risk level, a line graph showing the "Average score trend" from 2015 to 2024, and a scatter plot of "Empirical Correlations".
- Copernicus EMSR708 - Flood in Belgium:** A detailed map showing flood extent in Belgium, with a sidebar listing event details and monitoring points (e.g., Westhoek, Kachtem).

Main users of JRC scientific analyses

BRUSSELS
Union Civil Protection
Mechanism – through
 \Emergency Response
 Coordination Centre
 (ERCC)



IN FIELD
UN OCHA - short term,
Humanitarian Needs
Assessment
 through Assessment
 & Analysis Cell +
 UNDAC system



GENEVA
Humanitarian
international
community through
 the Global Disaster
 Alert and
 Coordination
 System (GDACS)

EEAS –
Sit Room
 European
 External Action
 Service

EU
INTCEN -
 EU Intelligence
 Centre of the
 EEAS

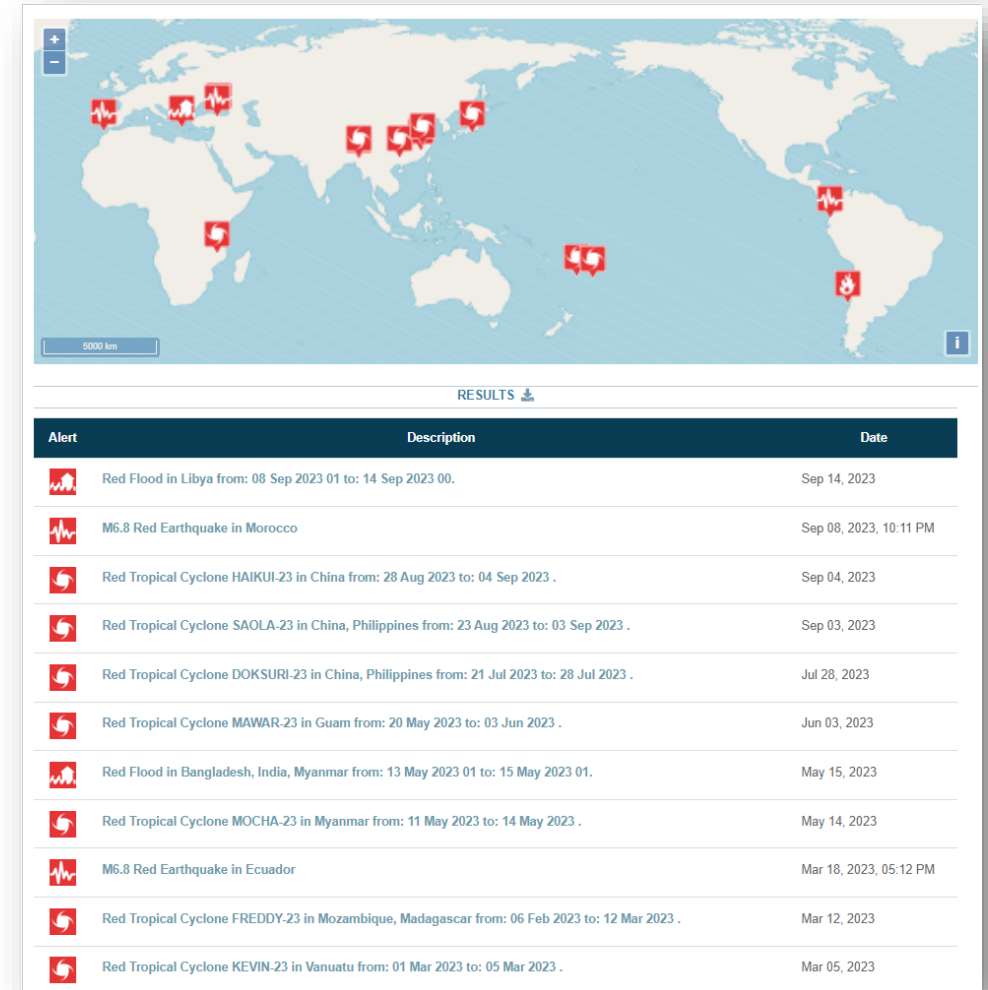
Joint EU-UNDP long
term Post
 Disaster Needs
 Assessment
 process



FPI - Foreign
 Policy
 Instruments

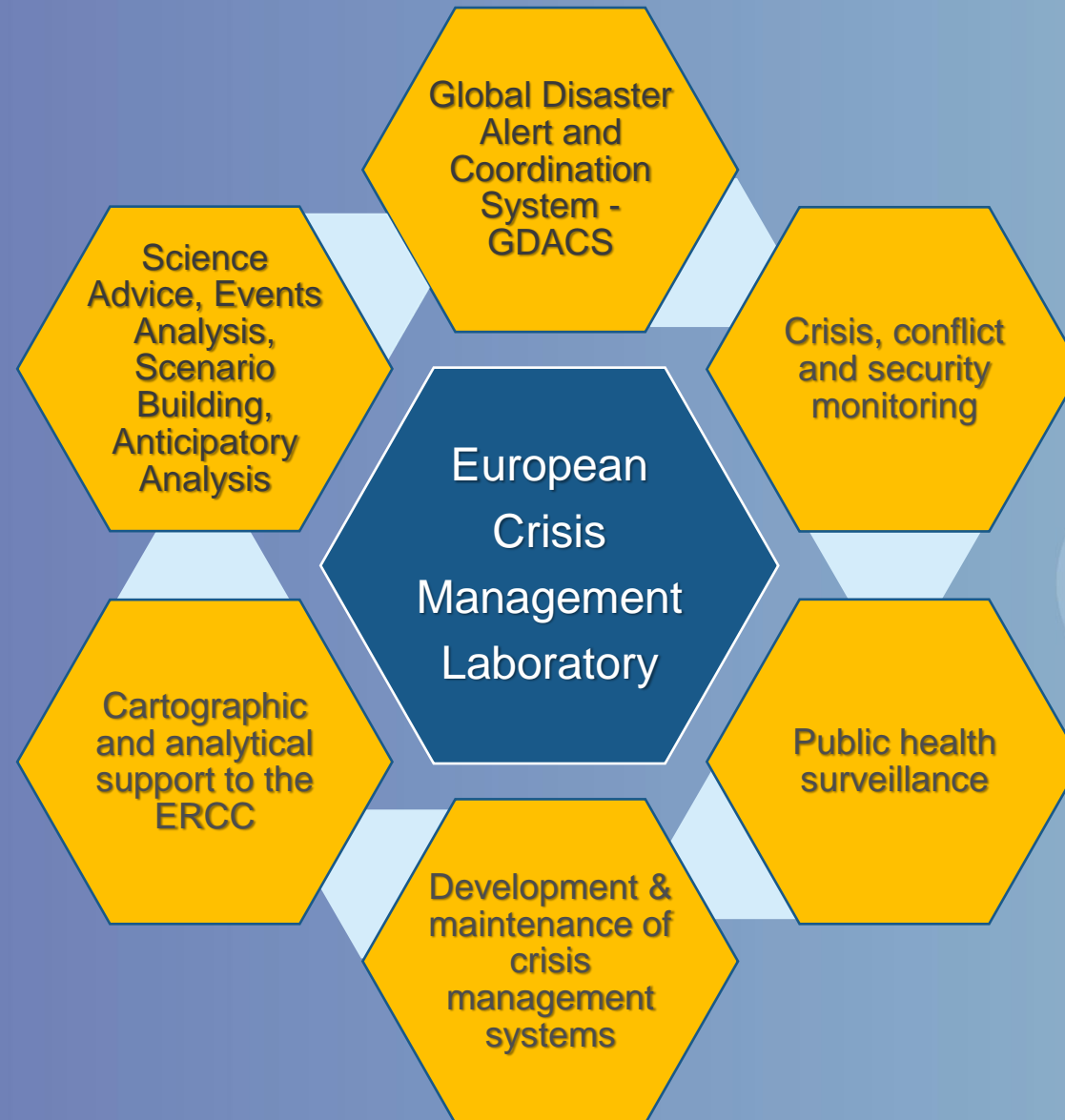
First 11 months of 2023: some of the complex emergencies analysed

- 6 February 2023, **earthquakes** in Türkiye and Syria
- 6 February – 12 March 2023 **tropical cyclone** for FREDDY
- 26 May 2023, **floods and landslides** in Emilia Romagna (Italy)
- 6 June 2023, Nova Kakhovka **dam breach**
- 8 September 2023, **earthquake** in Morocco
- 11 September 2023, **floods + dam breach** in Libya
- 7 October 2023, Israel/OPT: **Attacks** against Israel
M 6.3 **earthquake** in Afghanistan
- **Seasonal, El Niño climate variation**, forecasted impact (July-Nov 2023)
- **Continuous**, Russia's **war** on Ukraine
- **Continuous**, **migration** crisis & trends towards EU



Source: [GDACS](#)

Examples of scientific analyses of ECML



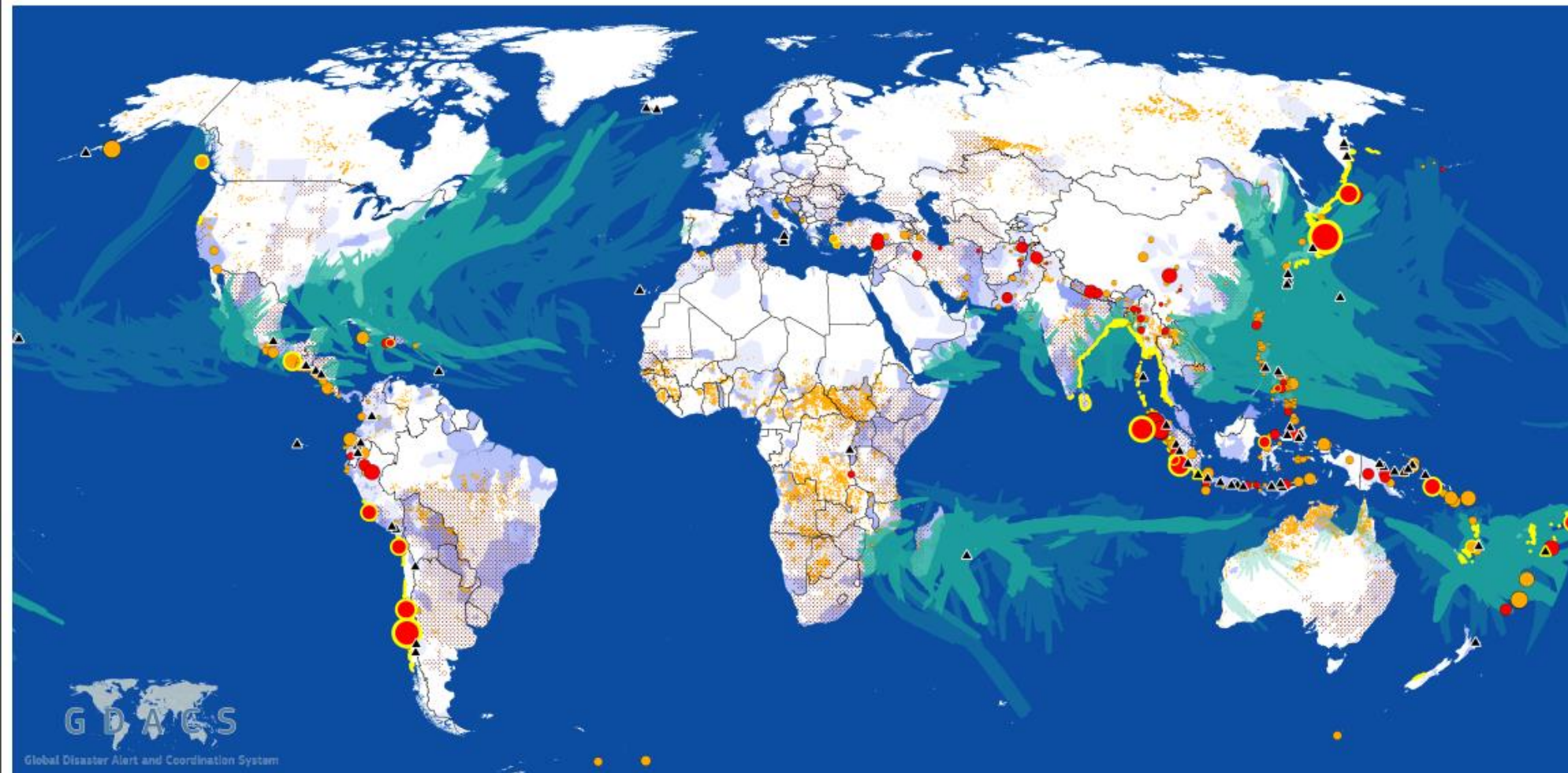


GDACS - Global Disaster Alert and Coordination System



20 years of operations
GDACS' 3 components
 (www.gdacs.org):

- Multi hazard Early Warning System (MHEWS) – JRC
- Virtual On-Site Operations Coordination Centre (VOSOCC) – UN OCHA
- Satellite Mapping Coordination System (SMCS) - UNOSAT



GDACS
 Global Disaster Alert and Coordination System

Significant events (2004-2023)



Earthquakes
 (since 2004)

- GDACS Red Alert
- Magnitude
 - 9.1 M
 - 7 M
 - 5.1 M
- GDACS Orange Alert
- Magnitude
 - 8.2 M
 - 7 M
 - 5.1 M

Volcanoes
 (since 2004)

- All GDACS Alerts
- ▲ Volcanic eruption

Tsunamis
 (since 2004)

- All GDACS Alerts
- > 1.0m observed/calculated wave height
- Earthquake that generated tsunami
- ▲ Volcano that generated tsunami

Tropical cyclones
 (since 2010)

- GDACS Red Alerts
- GDACS Orange Alerts
 - Wind speed > 118 km/h
- GDACS Green Alerts
 - Wind speed > 118 km/h

Floods
 (since 2004)

- GDACS Alerts
- Affected area/administrative division

Droughts
 (since 2004)

- GDACS Red Alert
- GDACS Orange Alert
- Affected area/administrative division
- Arid/Hyper-arid area (Aridity Index < 0.2)
- Drought does not take into account these areas

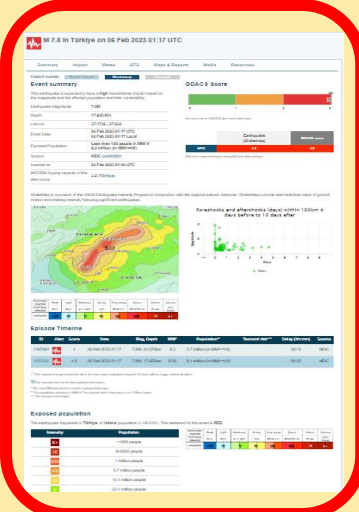
Forest fires
 (since 2004)

- All GDACS Alerts
- Affected area

All events are updated to 31 March 2023. For sources of all events, including the JRC, please refer to the GDACS website.



The wake up call
minutes/hours

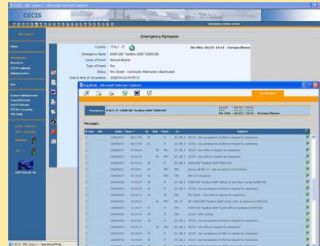


GDACS Multi Hazard Early Warning System - MHEWS

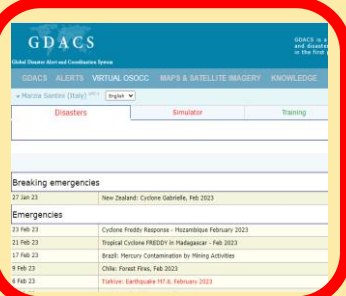
operational coordination
hours/days/weeks



Decision on activation of other decision support systems and on mobilization

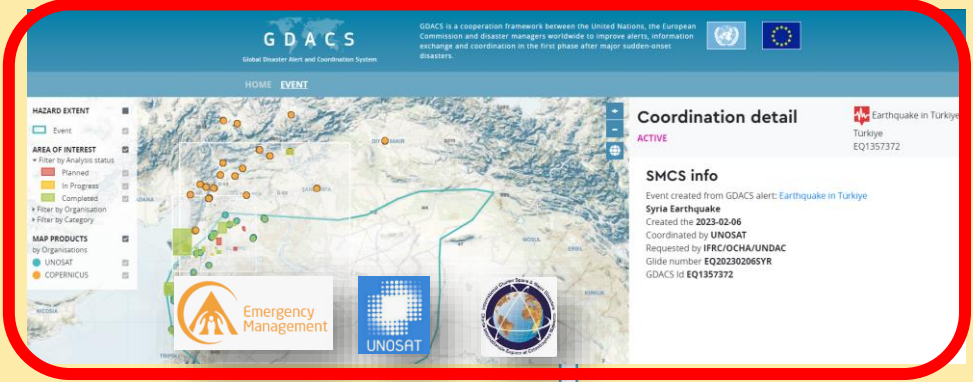


Decision on activation of other decision support systems and on mobilization



GDACS Virtual On Site Operations Coordination Centre - VOSOCC

coordination in the field
days/weeks



GDACS Satellite Mapping Coordination System - SMCS

PDNA & reconstruction
months/years

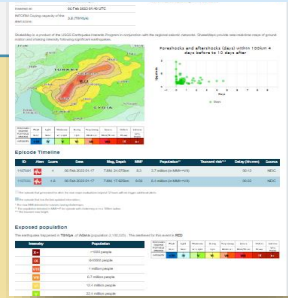


Geopolitical implications of crises

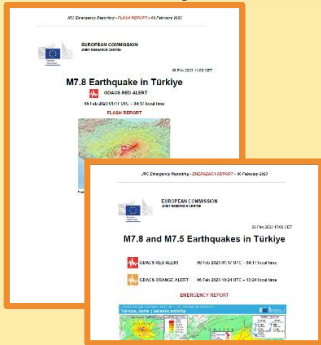
JRC analysis of the Earthquakes in Türkiye and Syria started 06 Feb 2023



The wake up call



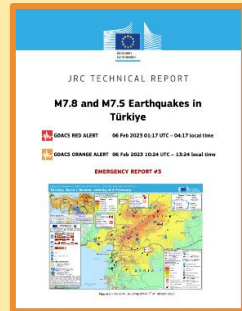
6 February



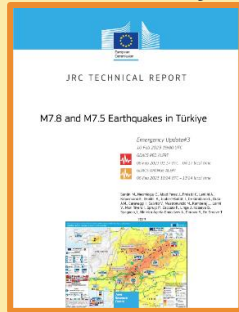
operational coordination

days/weeks

7 February



10 February

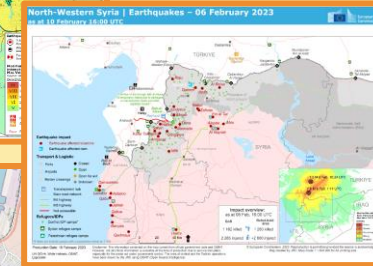
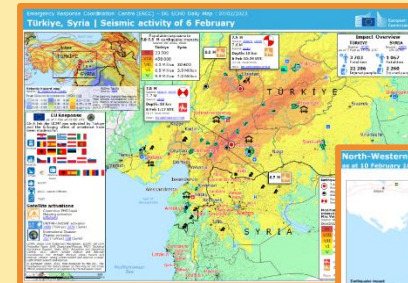


17 February



coordination in the field

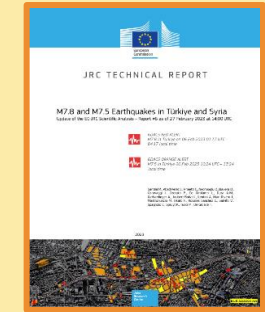
days/weeks



PDNA & reconstruction

months/years

27 February



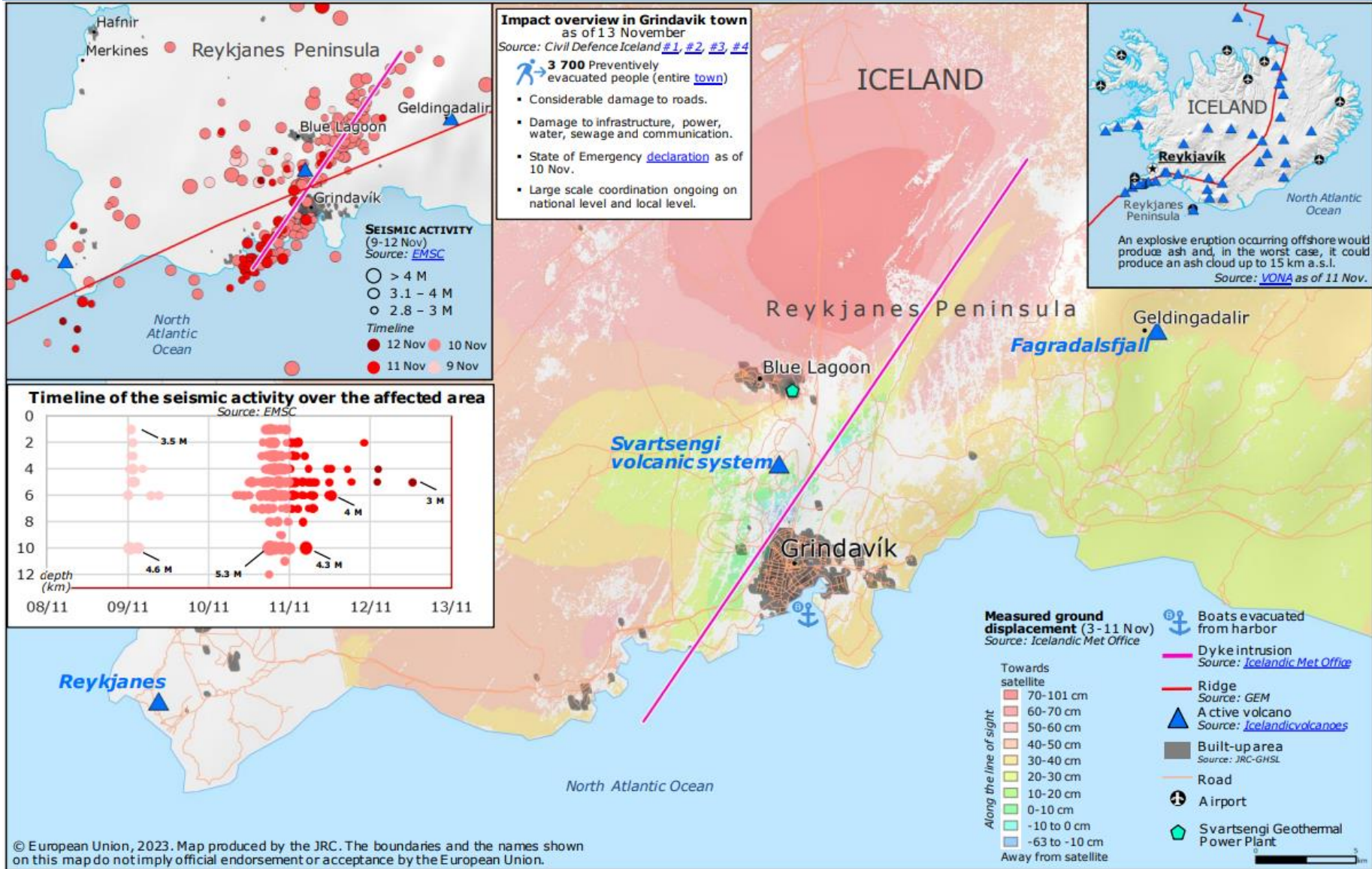
Estimated population in the 20 AOIs: 3,950,866	Affected roads: 84 km	Affected building blocks: 4,522	Temporary/Spontaneous camps: 644 (No.) / 46 (Ha., for larger camps)

- **Seismo tectonic** analysis and assessment, incl. historical seismicity and tsunami warnings
- **Impact on human life, built environment** (incl. analysis of the Turkish building code and building census; cultural heritage)
- **Pre-existing humanitarian crisis in Syria** due to ongoing conflict (e.g. monitoring of Persons of Concern)
- **Conflict related damage** in Syria
 - **Health system capacity and health related issues** using EIOS (Epidemic Intelligence from Open Sources)
 - **Drought** situation and its mid-term consequences
 - **Cascading effects**: most significant critical infrastructure incidents arising from the earthquake
 - **Modelling of the affected dams**, including modelling of potential flooding due to dam breach in 2 cases

- **Social media** analysis (incl. input to S&R teams for messages and calls for help)
- **International assistance** situation
- **EO mapping mechanisms**
 - **Misinformation narratives**
 - **Volume of debris** estimation
 - **Geopolitical brainstorming** on long term, large scale potential impact of this crisis

**JRC Situational Awareness portfolio
25 at work! (Unit E1, E2, E3, E5, T5)**

Iceland | Reykjanes peninsula volcanic unrest



Daily Flash, Daily Maps, Situation Maps & thematic analyses

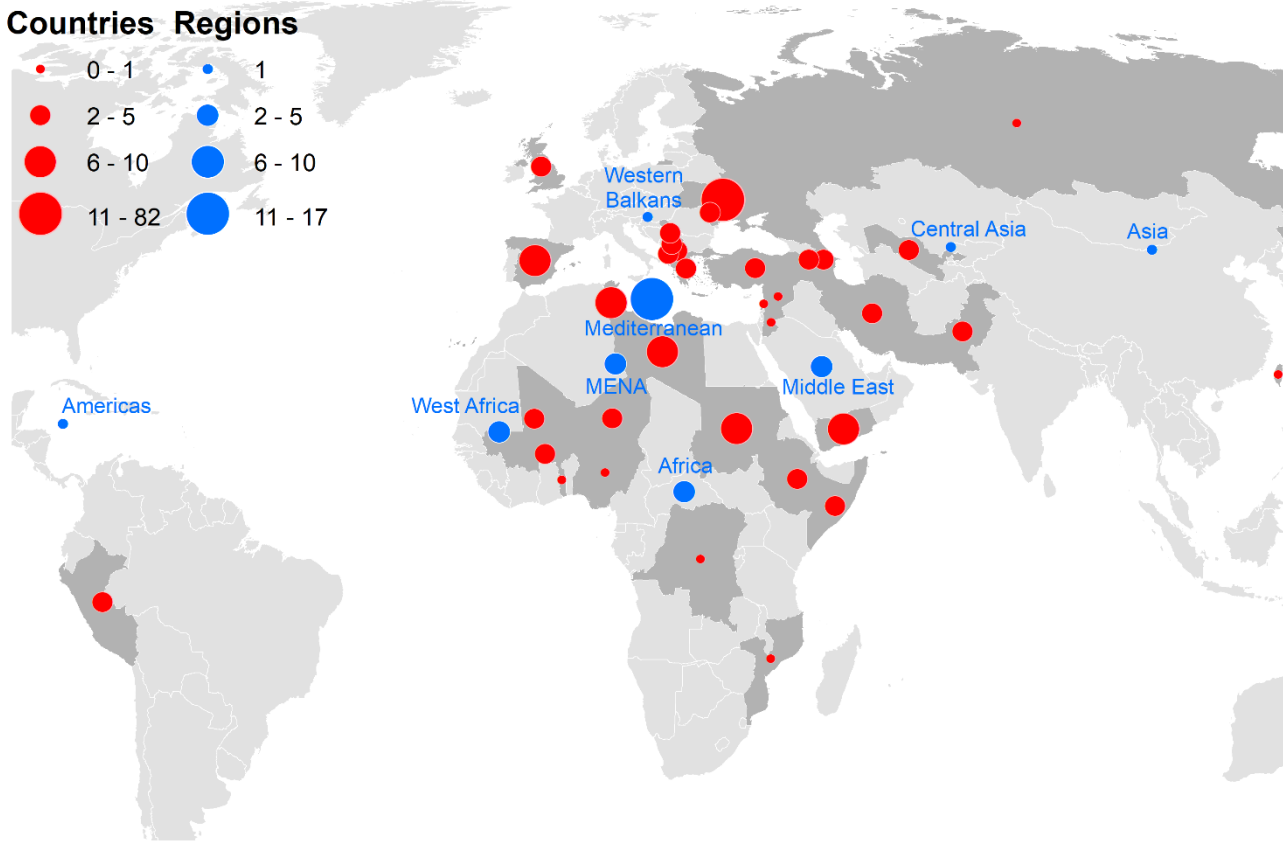
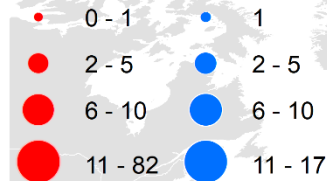
Total number of Daily maps + Situation Maps in 2023: 274 (1 Jan - 13 November 2023)

Crisis, Conflict and Security Monitoring and Mapping Activities



Total maps produced/updated 256 (01 Jan - 14 Sept 2023)

Countries Regions



Source: JRC

Anticipation
Situational awareness
Daily monitoring

Endemic instability
Crises and conflicts

Prevention
Preparedness
Response
Recovery

**+ 250 maps produced in 2023
EEAS SITROOM, EU INTCCN & FPI**

4 MAIN TYPES OF PRODUCTS:

1. **Regular monitoring products** (e.g. to identify trends in conflict dynamics)
2. **Ad-hoc urgent mapping** (e.g. at the outbreak of a crisis)
3. **Maps for policy support** (e.g. activities carried out by FPI at global, continental, and national level)
4. **Thematic maps** contribute to identify and highlight relevant aspects for security and hybrid threats (e.g. migration routes)

EIOS EPIDEMIC INTELLIGENCE FROM OPEN SOURCES **Monitoring** Documents Dashboards Training Help and Feedback SANTINI, Marzia Logout

JRC Explore Latest Activities Sources Manage Communications

Select board + Exit current board

Current board: **Earthquake M 6.8 in Morocco on 08 Sep 2023 22:11 UTC**

Board info Edit info

JRC ECML Members: 11 user(s)

Created by Spagnolo, Luigi on 09 Sep 07:28 UTC | Last Modified by Spagnolo, Luigi on 10 Sep 19:13 UTC

BOARD COMMUNICATIONS AND COMMENTS

Search text within articles...

← Board: **Earthquake M 6.8 in Morocco on 08 Sep 2023 22:11 UTC**

Categories: Earthquakes Mentioned countries/territories: Morocco Filter definition

700 TOTAL ARTICLES 1 of 14

Any article Import Date

Location markers and heatmap Select contextual information

200 km 100 mi



EIOS EPIDEMIC INTELLIGENCE FROM OPEN SOURCES

A global multi-disciplinary community for public health surveillance

- More than **2000 active users** from **60+ organisations/networks worldwide**
- Key stakeholders: **HERA** (AA for developments 2023-2025), **WHO** (lead/owner), **ECDC** (part of the EIOS Coordination group and key user)

Our vision: **EIOS for EU services/agencies**

- Advocating coordination and information exchange among JRC, HERA, ECDC, ECHO and potentially EFSA, EEAS, EMA and member states
- Interoperability with other EU EWSs: integrating public health into crisis management with a multi-hazard perspective

JRC Explore Latest Activities Sources Manage Communications

Select board + Exit current board

Current board: **Libya Floods (Storm Daniel, Sep 2023) - Potential health issues**

Board info Edit info

BOARD COMMUNICATIONS AND COMMENTS

Search text within articles...

TIME PERIOD

Period: (Import Date) Last 10 Days

← Board: **Libya Floods (Storm Daniel, Sep 2023) - Potential health issues**

Categories: Floods AND Cholera, Diarrhoea, Epidemic, Escherichia coli Infection, Gastroenteric Symptoms ... - 8. Mentioned countries/territories: Libya Filter definition

587 TOTAL ARTICLES 1 of 12

Any article Import Date

Location markers and heatmap Select contextual information

50 km 50 mi

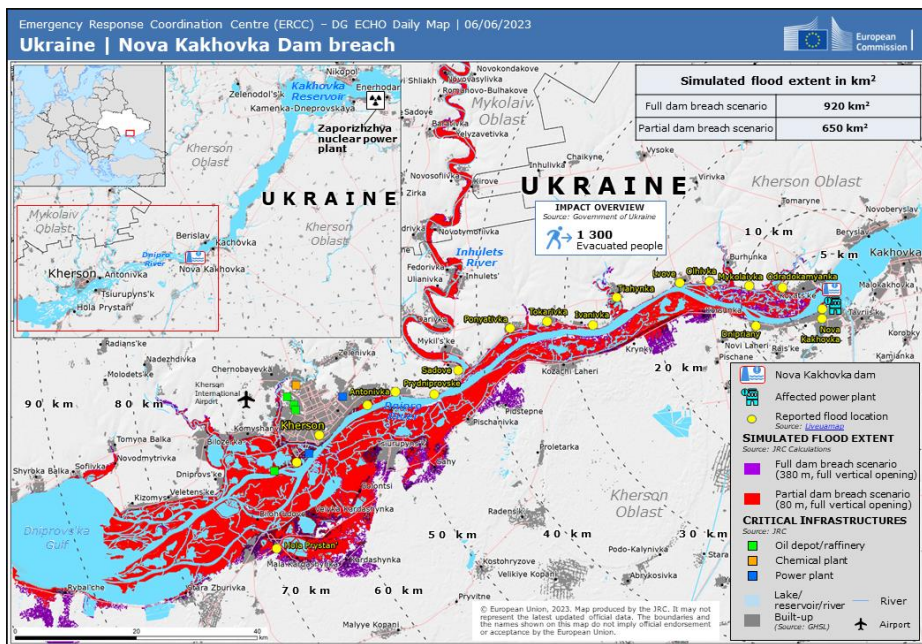
● almarsad 12:02 UTC Epidemic, Floods Libya, Republic of Korea

● middleeastmonitor 12:01 UTC UN warns of spread of disease in Libya's storm-hit Derna Diarrhoea, Floods, Natural Disasters, Refugees and Internally Displaced Persons ... +2. Libya

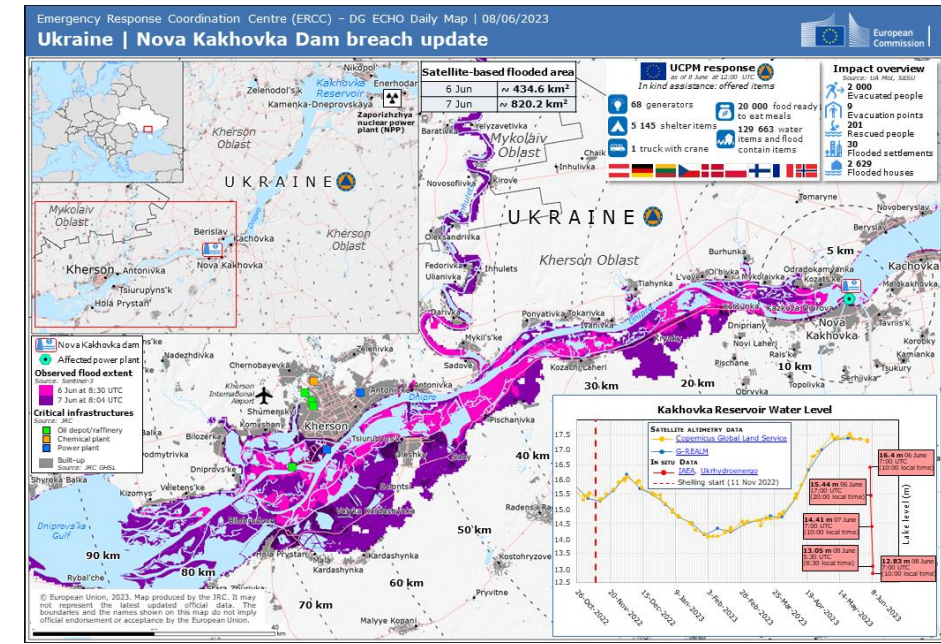
Anticipated and integrated situational awareness Kakhovka Dam Breach, 6 June 2023



BEFORE



AFTER



Model underestimation

~ 17%

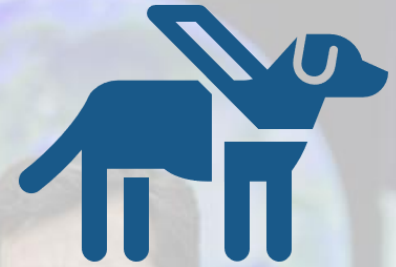
Model overestimation

~ 23%

CALCULATED dam breach scenarios, anticipatory analysis conducted in November 2022, after the shelling and partial damage to the dam (no rupture of it at the time)

OBSERVED flood extent after the dam breach event of the 6 of February 2023 (Sentinel image on 07 June 2023 at 8:04 UTC)

Our lessons learnt from 20 years of science advice



Thank you

