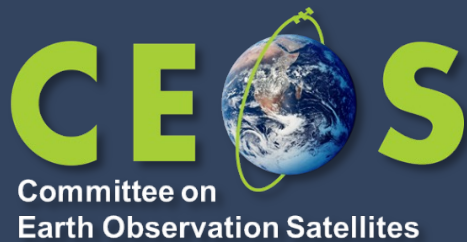


Working Group on Disasters

An overview



Lorant Czaran, UNOOSA
Agenda Item 1.9
WGISS-61 and WGDisaster-25
16-20 March, 2026
Dehradun, India

WGDisasters Fundamentals



Earth observations to address risk:
identification of natural **hazards**, **exposure** of
people, assets and livelihoods, and related
vulnerabilities

CEOS WG Disasters Work Plan is aligned with
the **Sendai Framework** on Disaster Risk
Reduction (DRR)

GEO4DRM



International Charter
Space and Major Disasters
and Copernicus EMS



WGDisasters Objectives



- ❖ Support **Disaster Risk Management (DRM) authorities** by means of **satellite-based EO** and **science-based analyses**.
- ❖ Support the **Sendai Framework**, (mainly Priority1 “Understanding Risk”, Priority4 “Build Back Better”).
- ❖ Support **international initiatives** such as GEO, and the efforts of UNOOSA and UN-SPIDER to increase the use of satellites for DRM.
- ❖ Raise the **awareness of Governments, policy-makers, decision-makers, and major stakeholders** of the benefits of using satellite EO in all phases of DRM.
- ❖ Foster **increased use of EO** in support of **DRM and DRR**, and express **related EO capabilities and needs**.



WGDisasters Activities



Pilot (e.g. Wildfire, Flood):

- Provides inventory of EO systems for a specific disaster.
- Explores existing gaps.
- Articulates global stakeholders and user requirements.

Demonstrators (e.g. Landslides, Volcanoes, Seismic hazards & Risk)

- Demonstrate the effective exploitation of satellite EO data across the full cycle of disaster risk management.

Recovery Observatory

- ❖ Showcase contribution of satellite data and products to recovery efforts following major disaster events.
- ❖ Direct input to Post Disaster Needs Assessments and long-term contribution to Recovery Framework.

Geohazards Supersites and Natural Laboratories (GSNL)

- ❖ Improve geophysical and geohazard assessment, promoting EO products uptake for societal benefits over specific geographic areas interested by multi-disasters risk.

Wildfire Pilot I

Leads: J. Johnston, M. de Jong, & C. McFayden, NRCan. D. Dufour CSA. D Morton, NASA.



❖ **OBJECTIVES / OUTCOMES:**

Provides inventory of EO systems suitable for active-fire monitoring.

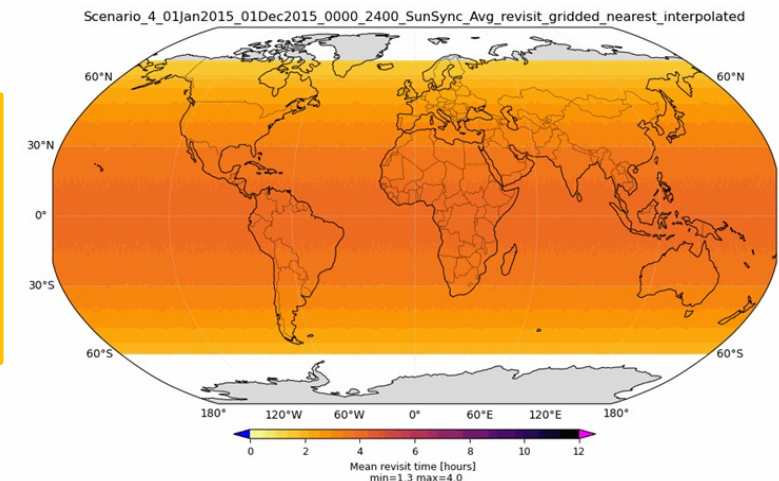
Explores existing gaps in wildfire EO capabilities (existing and proposed).

Articulates global stakeholders and user requirements for active-fire remote sensing monitoring and suggest way-forward for the community.

Example fire 'hotspot' products from MODIS, VIIRS, & Landsat.



Potential changes in satellite active fire monitoring capabilities 2015-2046.



Flood Pilot

Leads: M.U. Quirno, CONAE; S. Helfrich, NOAA; G. Schumann, RSS Hydro



❖ **GOAL:** Explores best practices for optical and radar-based mapping of floods and DRM.

❑ **Lessons Learnt and outcomes:**

- ML techniques for data fusion.
- Merging GEO-LEO and SAR sources.
- Probabilistic inundation maps, with hydrologic models and SAR products.



Submerged (red) and body waters (blue) detected in Australia (2021) with Capella SAR.



Submerged (red areas) and body waters (blue areas) detected in Sacramento by RAPID processing of ALOS and Sentinel-1 SAR Data.

NOA/BEYOND FloodHub and FireHub services mapping over Balkan region. Flood in Feb 2021 (in blue). Sentinel-2 burnt scar mapping (in red).

Volcano Demonstrator

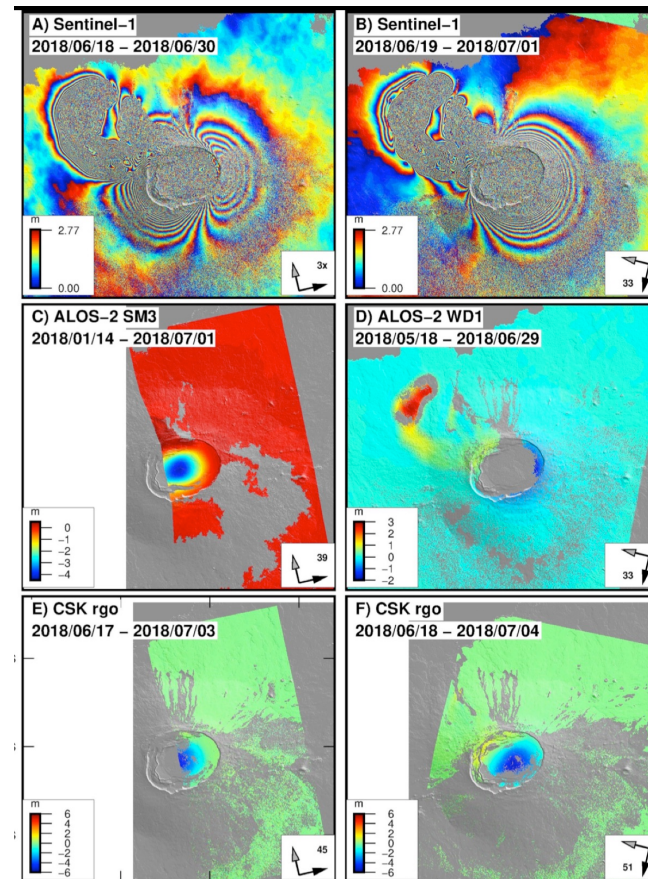
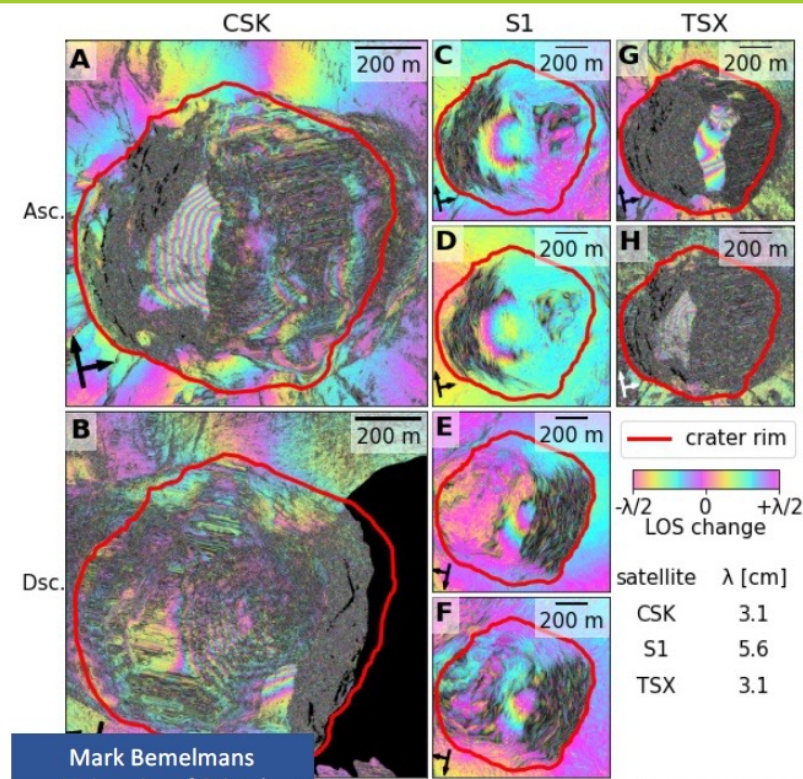
Leads: Mike Poland, USGS; Susi Ebmeier, University of Leeds.



Multi-frequency SAR-products to study Sierra Negra, Galapagos (left panel) and Mount Agung in Indonesia (right panel)

GOALS:

- ❖ EO data for anticipating, detecting, and tracking volcanic eruptions.
- ❖ Supports EO applications that promote volcanic DRR worldwide.
- ❖ Focus on high-risk volcanoes in areas where monitoring is not currently well developed (LAC, Africa, SE Asia).



Leads: H  l  ne de Boissezon, CNES;
Rashmin Gunasekera; World Bank

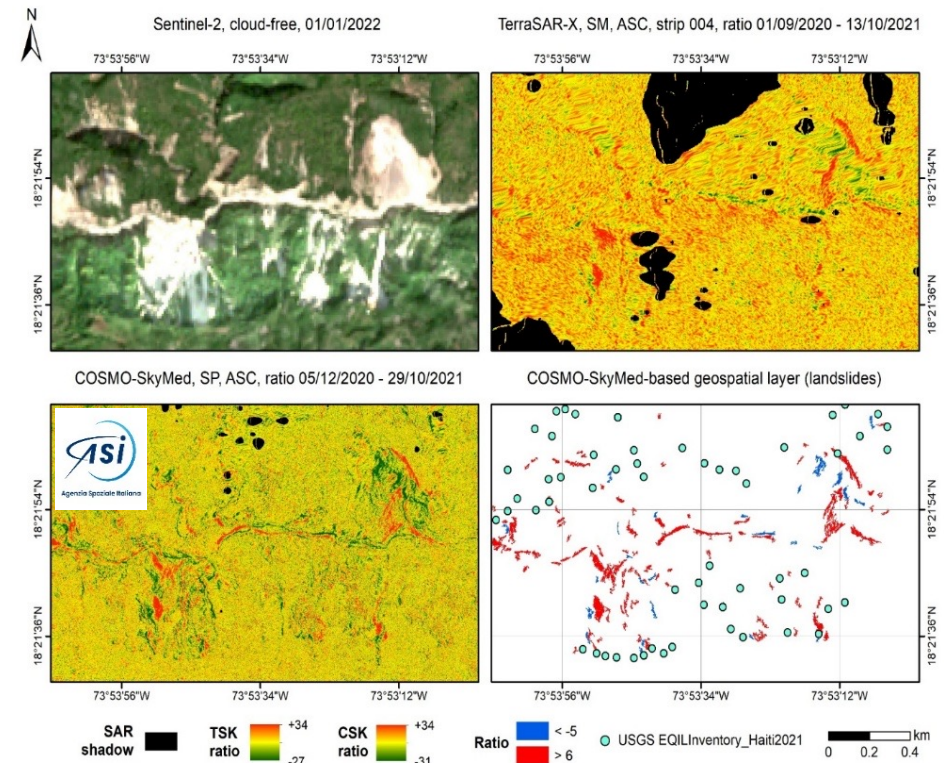


- ❖ Showcase contribution of satellite data to recovery efforts following major disasters.
- ❖ Input to Post Disaster Needs Assessments and long-term contribution to Recovery Framework.

Mean velocity (mm/year)

- < -9.0
- 9.0 - -7.0
- 7.0 - -5.0
- 5.0 - -3.0
- 3.0 - -1.0
- 1.0 - 1.0
- 1.0 - 3.0
- 3.0 - 5.0
- 5.0 - 7.0
- 7.0 - 9.0
- > 9.0

e-geos
AN ASI / TELESPAZIO COMPANY



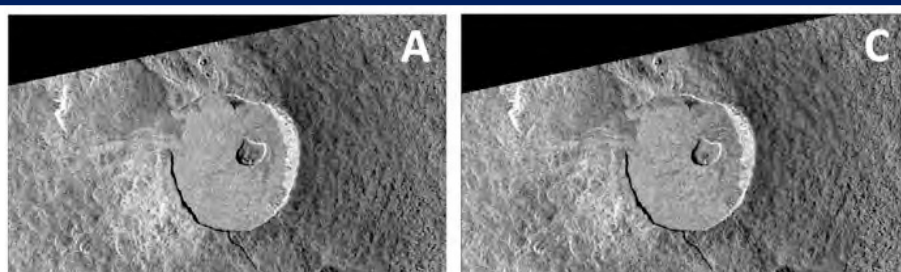
Multi-frequency SAR products relevant to the RO activation for 2021 Haiti earthquake.

Geohazards Supersites and Natural Laboratories (GSNL)

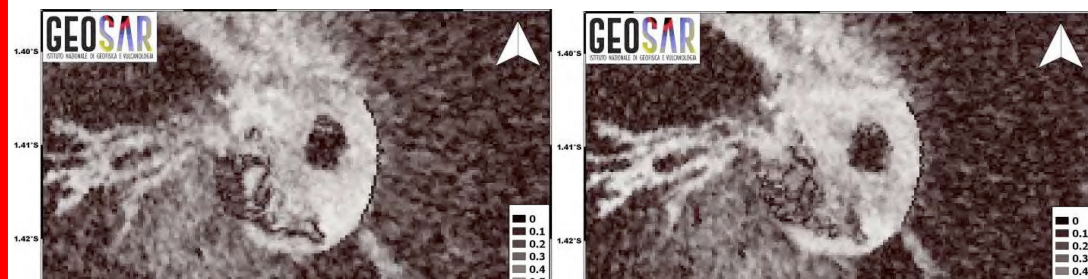
Lead: Stefano Salvi, INGV.



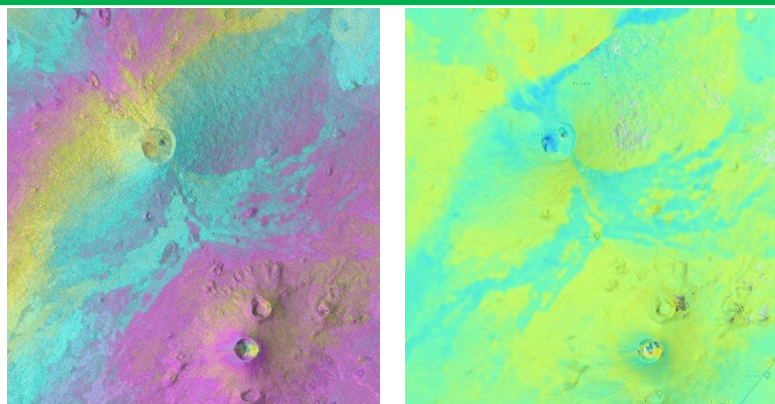
GOALS: Improve geophysical and geohazard assessment, promoting EO products uptake for societal benefits



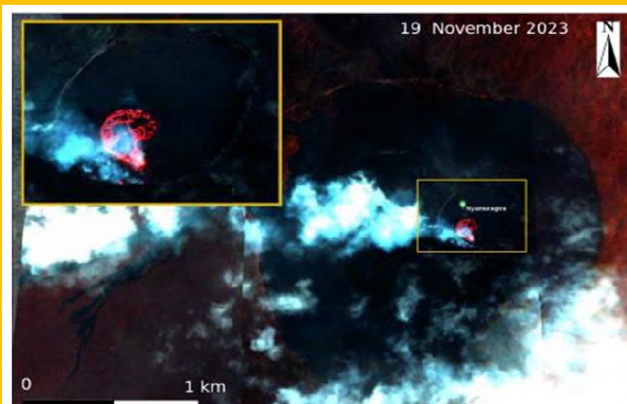
COSMO-SkyMed amplitude images on Oct 3rd (left) and Nov 4th (right) 2023 show changes inside the inner crater.



Sentinel 1 InSAR coherence does not show changes from Oct 20th - Nov 1st (left) to Nov 1st-13th (right) 2023



SAOCOM interferogram (left) and deformation map (right), for the period Oct 13th - Nov 6th 2023, inside the calderas of Nyamuragira and Nyiragongo volcanoes.



Skysat false colour image shows high temperature (molten lava) in the inner crater.

Multi-missions EO results gathered for Nyamulaghira Eruption in 2023 for Virunga Supersites

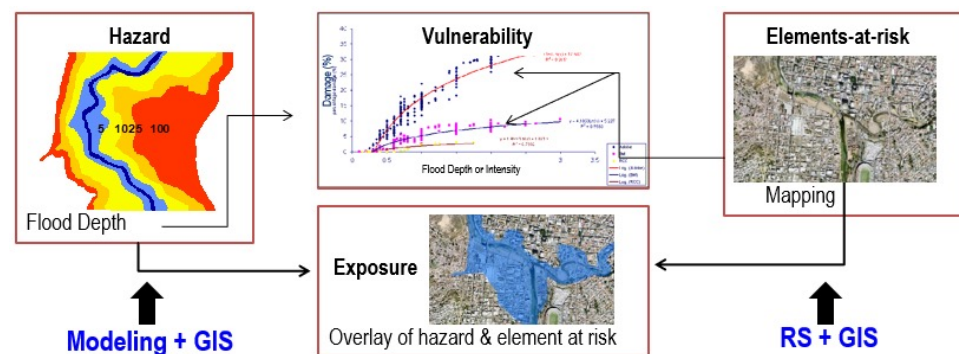
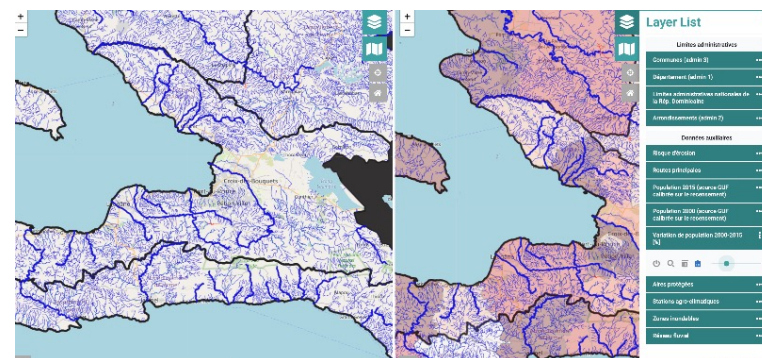
CEOS WGDisasters New Activities (1/4)



Tonga Preparedness Pilot (2024)

- ❖ Support Tonga for improved preparedness and demonstrate usefulness of satellite EO and derived products for EW4All in “big ocean” states (SIDS)
- ❖ Leverage Tonga chairmanship of PIF to showcase innovation in Tonga, scalable to other big ocean states

Lead: Ofa Masiwawa (NEMO) Lorant Czaran (UNOOSA/UN-SPIDER), Andrew Eddy (Athena Global)

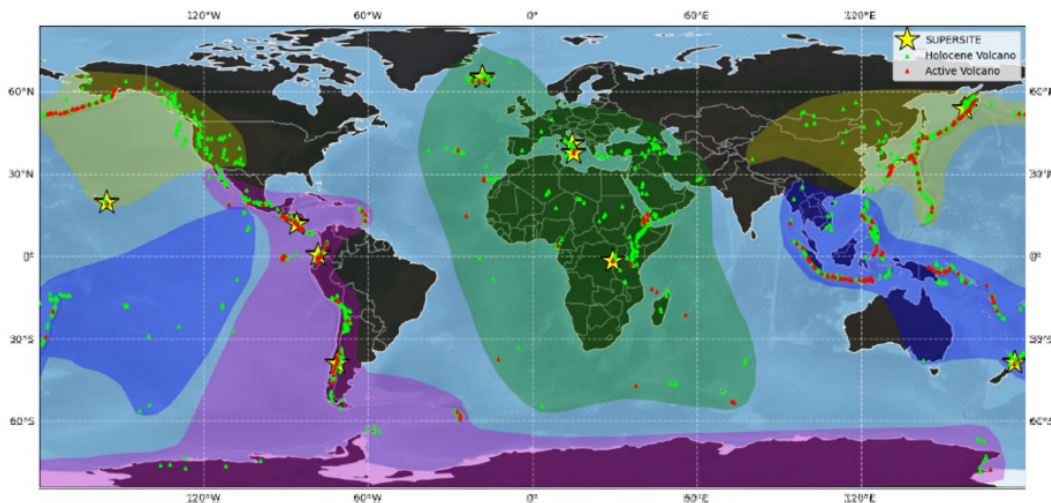


CEOS WGDIsasters New Activities (2/4)

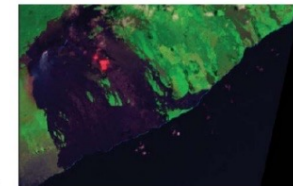
Lead: Mike Poland (USGS),
Susanna Ebmeier (Leeds Univ.)

G-VIEWERS

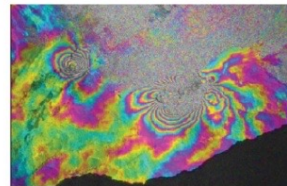
- ❖ Permanent volcano observations building on Demonstrator success
- ❖ Provide eruption response and early warning capabilities
- ❖ Assist local capacity for EO data analysis
- ❖ Train scientist at volcano observatories



Thermal



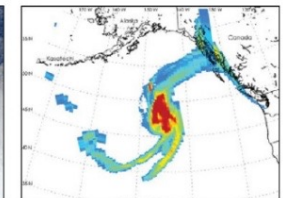
Deformation



Ash



Gas



Marapi – Indonesia (Dec. 2023)

23 deaths



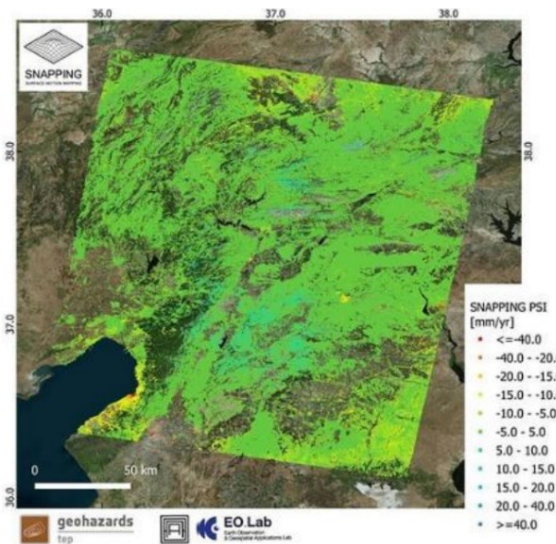
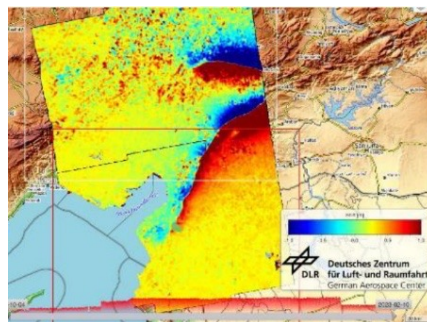
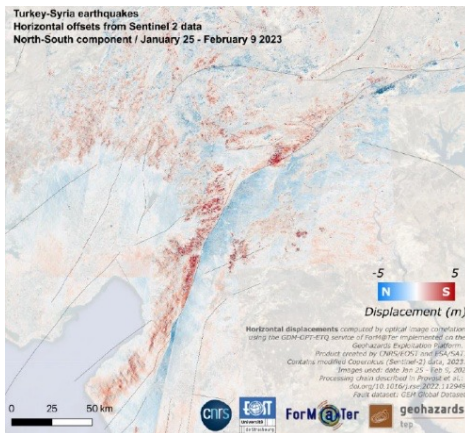
Reykjanes Peninsula - Iceland

(March 2024)

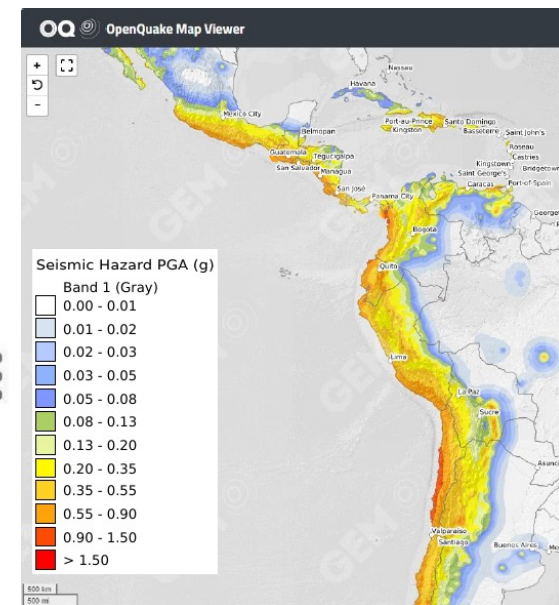
CEOS WGDisasters New Activities (3/4)

Seismic Hazards Demonstrator

- ❖ Develop and demonstrate advanced science products for rapid earthquake response.
- ❖ EO active faults mapping.
- ❖ Articulate relationship with Int. Charter.
- ❖ Support seismic exposure mapping.
- ❖ Focus on Latin America and Caribbean (LAC).



Examples of displacement map retrieved for 2023 Turkey-Syria earthquake with TSX (lower-right), Sentinel-1 (lower-left and upper-left) created on the Geohazards Exploitation Platform (GEP).

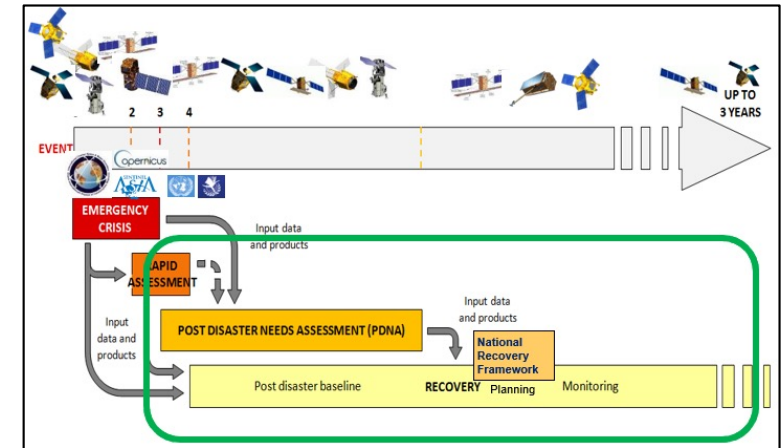


Lead: Philippe Bally (ESA), Stefano Salvi (INGV), Zach Foltz (ARGANS)

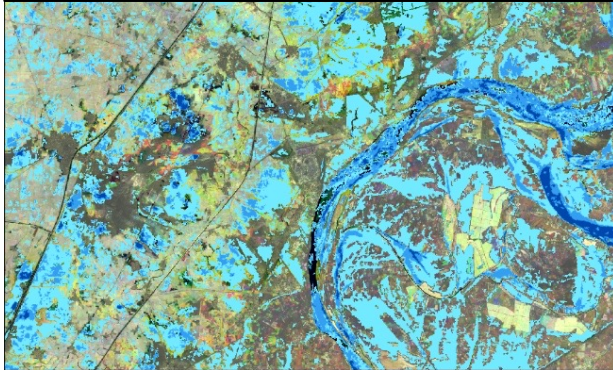
Pre-operational Recovery Observatory

- ❖ Integrated Awareness to support recovery.
- ❖ Inform PDNA.
- ❖ Provide Pre and post disaster protocols.
- ❖ Ensure medium term monitoring.
- ❖ Support Capacity Building assessment &

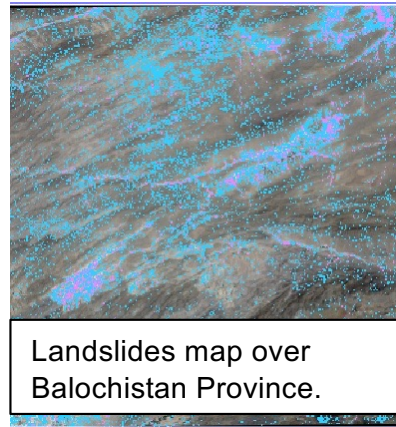
Lead: Aurélien
Sacotte (CNES),
Dominique
Blariaux (EU FPI),
Andrew Eddy
(Athena Global)



Flood map over Pakistan in 2022.



Landslides map over
Balochistan Province.



Damage map for the 2020 Beirut Blast.



New Activities proposed 2026



❖ **Landslide Demonstrator Follow-On (ASI lead)**

Multi-sensor data-based approaches for landslide detection
Impact on urban environments and infrastructure, fragility curves

❖ **Drought Pilot (CONAE and ASI leads)**

Evaluate EO satellite and CEOS contributions to drought monitoring and early warning systems
Identify main geographic areas most prone to drought phenomena.
Identify users and stakeholders for mitigation, preparedness and response activities.

❖ **Biodiversity Pilot (ISRO lead)**

Assess biodiversity status and risks using EO data, focusing on biodiversity hotspots.
Define disasters and related impacts in the context of biodiversity.
Study ecosystem regeneration in damaged areas.

❖ **Wildfire Fuel Pilot (ANU lead)**

Multi-sensor data-based approaches for determining status of wildfire fuels
Development and validation of new methodologies and early demonstrators with users

CEOS WGD Priorities & Successes



❖ Priorities:

Provide and Demonstrate potential **use cases** to build **sustainability paths** for post-demos operations (strengthen ties to international stakeholders, local actors and GEO WGs).

Focusing on **capacity building** in all CEOS WGD activities.

Explore linkages to **climate related activities** (assessment, mitigation, resilience).

Exploit **new technology opportunities** (e.g. new missions, new activities, new data exploitation techniques, New Space contributions).

❖ Lessons learnt:

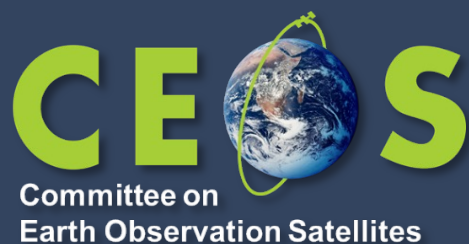
Demonstration of **technical feasibility** for thematic area and/or disaster cycle phase

Provide pre-operational EO-based products and uptake from practitioners and final users, improving and supporting Disaster Risk Management with EO data.

Creation of **partnerships** and **bridging gaps** between **different types of partners**.

Provision of **best practices to use/combine satellite data** to improve understanding and management of risk

Working Group on Disasters



ceos.org/wgdisasters

Lorant Czaran (UNOOSA) - Chair

Antonio Montuori (ASI) – Vice Chair

Andrew Eddy (Athena Global) - Secretary