40th CEOS Plenary 2026

CEOS WGDisasters Annual Report 2026

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The CEOS Working Group on Disasters (WGDisasters) ensures the sustained coordination of disaster-related activities undertaken by CEOS Agencies and acts as an interface between CEOS and the community of stakeholders, practitioners, and users involved in risk reduction and disaster risk management.

Increased impacts of global climate change bring more frequent and extreme hydrometeorological events, often leading to consequences such as landslides, flooding, drought, wildfires, or rising sea levels. These hazards and other traditional non-climate hazards such as volcanoes and earthquakes present enhanced opportunities for the EO community to demonstrate the unique scope and reach of satellites in support of the full cycle of risk management.

The primary objectives of the WGDisasters are:

- To promote new scientific advancements in disaster and risk sciences
- To support the efforts of Disaster Risk Management authorities in protecting lives and safeguarding property through satellite-based EO and science-based analyses
- To foster increased use of EO in support of disaster risk management (DRM)
- To support the implementation of the *United Nations Sendai Framework for Disaster Risk Reduction 2015-2030* (focusing on its Priority 1 "Understanding Risk")
- To raise the awareness of politicians, decision makers, and major stakeholders (e.g., GEO, UN Agencies, donor institutions like the Asian Development Bank, World Bank/Global Fund for Disaster Risk Reduction, scientific communities, national resource management agencies, civil protection agencies, local decision makers, and others) of the benefits of using satellite EO in all phases of Disaster Risk Management.

In 2026 WGDisasters supported the ongoing work of international initiatives, including GEO, strived to increase the awareness of decision makers of the critical role of satellite EO, and reinforced the messaging around the necessity of enhanced satellite EO programmes to better address Disaster Risk Management (DRM) needs. The WGDisasters has highlighted the importance of moving from technical demonstrations to sustained application of EO for improved risk management. This is demonstrated by the following major updates which are briefly provided for each WG activity.

- **Pre-Recovery Observatory (RO)** – The RO aims to establish 2 Recovery Observatories (ROs) globally each year and create synergies with the "International Charter on Space and Major Disasters", along with the following major objectives: Integrated Awareness to support recovery;

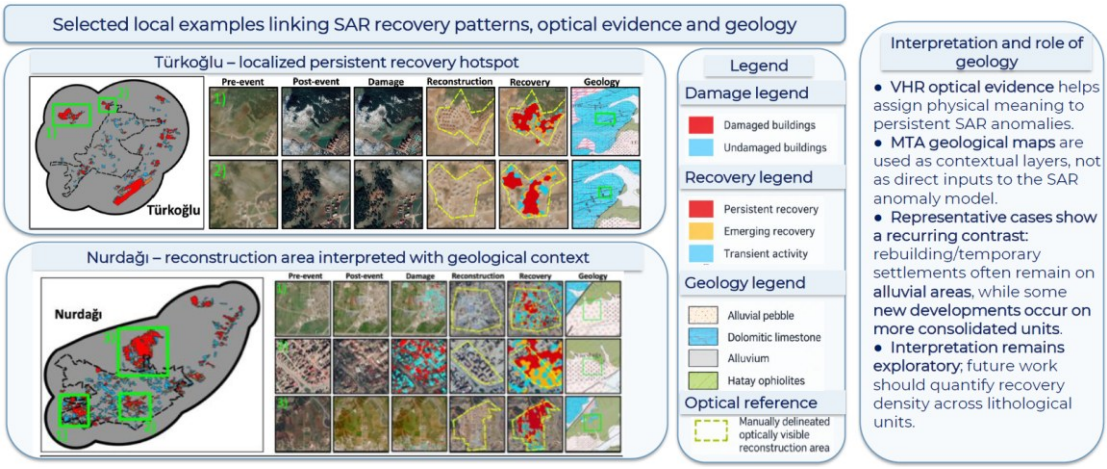
Inform PDNA; Provide Pre and post disaster protocols; Ensure medium term monitoring; Support Capacity Building assessment & plan.
The Recovery Observatory has been recognised by the UN General Assembly in the framework of the Space 2030 Agenda as "a means to increase the contribution of satellite data to recovery from natural disasters" and to contribute to Sendai Framework priority 4: Build Back Better. In this regard, the WGDisasters has successfully engaged new partners to support this critical phase of risk management. Over the past 6 years, the RO has been activated six times in a range of different circumstances, allowing a detailed demonstration of how satellite assets improve decision making relating to recovery from major disasters.

Main relevant updates and outcome recorded during 2026 are here briefly reported:

- Improved coordination and interaction with International Charter and establishment of a test case in late 2026 or early 2027 where Charter and RO will work jointly on an activation.
- Planned transition toward a permanent operational capability, with increasing involvement of recovery stakeholders, and a vision for sustainability with external partners beyond 2027.
- Important coordination with newly updated PDNA processes (2026), addressing value-adding capacity and funding as well as resolving data licensing constraints.
- Enhanced and renewed contributions from partners, including academics, in cooperation with CEOS agencies (e.g. CNES, ASI, NASA, etc.).

Main relevant outputs recorded during 2026 are here briefly reported:

- New collaboration agreement with the Charter for testing joint activations
- Integration of other WGD activities in the Recovery topic reflexion, e.g. the 2023 Syria-Turkey Earthquake from Seismic Risk Initiative. Image courtesy of Luigi Russo (UNIPV).



- **G-VEWERS** – In 2026, G-VEWERS focussed on implementing the vision outlined in 2025 of a global volcano monitoring system. The project aims to demonstrate the effective exploitation of satellite EO data across the full cycle of disaster risk management, with the following objectives: a) Establish permanent Holocene era volcano observations worldwide; b) Provide assistance to local observatories for eruption response and enhance early warning capabilities; c) Assist local scientists for EO data analysis; d) Train scientists at volcano observatories.
  An incremental approach for global monitoring with scalable options has been implemented to ensure risk reduction and improved volcano response over quiescent, restless and erupting

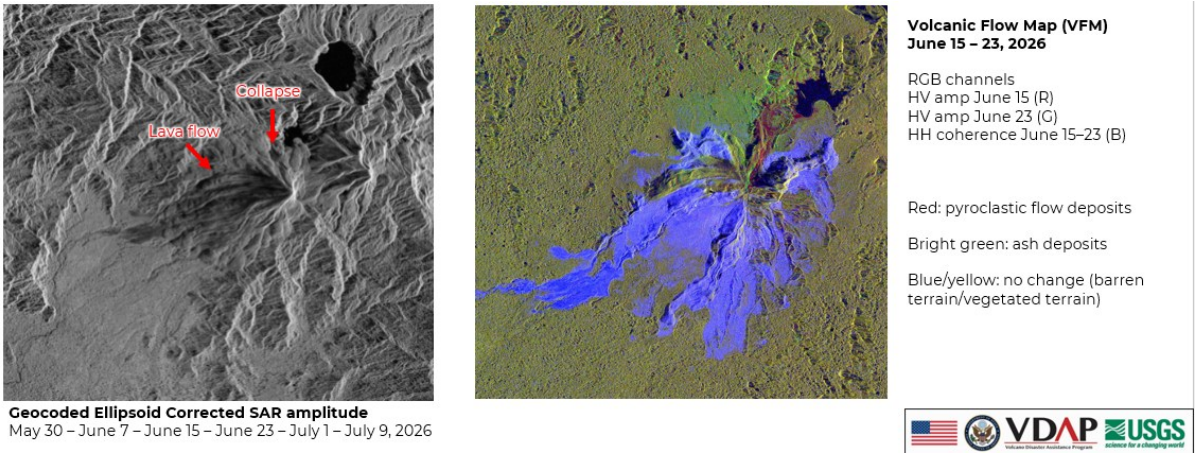
volcanoes with yearly, weekly, and daily observations, respectively.

Main relevant updates and outcomes recorded during 2026 are here briefly reported:

- Data requests and analyses have proceeded over new volcanoes along with the agreed implementation plan, avoiding duplication and improving synergy with other WGDisasters initiatives (e.g. GSNL).
- Established direct connections between G-VEWERS and volcano observatories with CapB activities, e.g. Univ. of Colima (Mexico), OVSICORI (Costa Rica), MARN (El Salvador), SGC (Colombia), Ecuador, Peru, , Univ. of Mendoza (Argentina).
- 2 Articles have been published on Peer Reviewed Journals in 2026:
  - Poland, M. P., Biggs, J., Pritchard, M. E., Bagnardi, M., Ebmeier, S. K., Wauthier, C., ... & Zoffoli, S. (2026). Steps toward a satellite-based global volcano monitoring and early warning system: from pilot to demonstrator to GVEWERS. Bulletin of Volcanology, 88(7), 74.
  - Pritchard, M. E., Poland, M., Bagnardi, M., Ebmeier, S. K., Biggs, J., Dualeh, E. W., ... & Wauthier, C. (2026). What a difference a day makes: when and where are daily satellite observations of morphology and deformation needed during volcanic eruptions and unrest? Bulletin of Volcanology, 88(7), 75.

Some relevant results and outputs provided during 2026 are here briefly reported:

- Bagana, Papua New Guinea (late June, 2026), Courtesy of M. Bagnardi (USGS)



- **<u>New Seismic Risk initiative</u>**: started in 2025, the initiative aims to: a) Develop and demonstrate advanced science products for rapid earthquake response; b) Provide and support EO-based active faults mapping; c) Formulate relationship with International Charter; d) Support seismic exposure mapping; e) Initially focusing on Latin America and Caribbean (LAC) and now expanded to be global (2026)

  The project is in the process of finalizing data requests over agreed AOI (Latin American and Caribbean – LAC). Specific efforts have been devoted to engaging organisations and scientific teams working on selected test areas, in synergy with the EU LAC Digital Alliance and the Copernicus LAC initiative. This initiative focuses on analysing risk and ensuring preparedness for major events in the future. Main relevant updates and outcomes recorded during 2026 are here briefly reported:

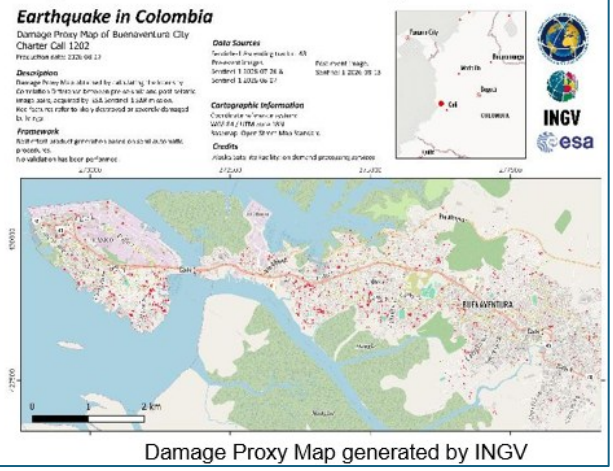
- Main scientific activities have focused on active fault mapping, seismic exposure mapping and earthquake response support.
- Engagement with research teams, stakeholders, urban planners and civil protection depts working on active fault systems and DRM activities, have taken place and been reinforced;
- The project team has supported the organization of field campaigns.
- Improved synergies have been recorded with Internation Charter.

Some relevant results and outputs provided during 2026 are here briefly reported:

- 2026 Earthquake in Colombia

The SRI was engaged for the large earthquake in Colombia in August 2026

- ❖ The collaboration agreement between CEOS WGD and the International Charter was activated to grant SRI partners access to Charter data
- ❖ INGV acted as value-adder in the Charter activation to generate damage maps
- ❖ 3 Value added products were published top the Charter webpage by INGV

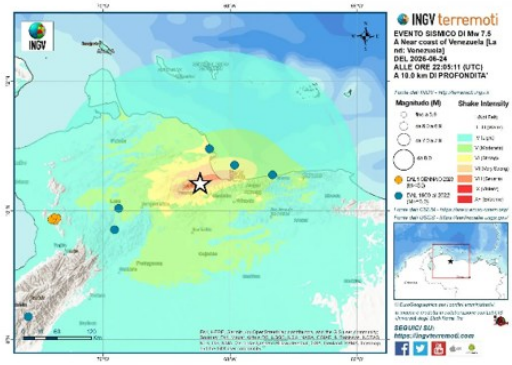


Damage Proxy Map generated by INGV

- 2026 Earthquake in Venezuela

The SRI was engaged for the large earthquake in Venezuela in June 2026

- ❖ EUCENTRE requested access to CSK and CSG data for exposure mapping
- ❖ INGV identified the existing STRIPMAP data on Caracas (unfortunately the city was not part of the SRI background mission)
- ❖ Four images have been requested and delivered, investigations are under way



Shaking intensity Map generated by INGV

· **Flood Pilot**: started in 2024, the project will conclude at the end of the year. It has explored and demonstrated best practices for combining optical and radar data to map floods and improve vulnerability, exposure and hazard information. The project has focused on: a) flood risk management, b) best practices analyses coming from combination of LEO-GEO SAR data, c) improved coordination with global stakeholders and users involved in flood response and management; d) developing SAR-based flood mapping methodologies.

Main relevant updates and outcome recorded during 2026 are here briefly reported:

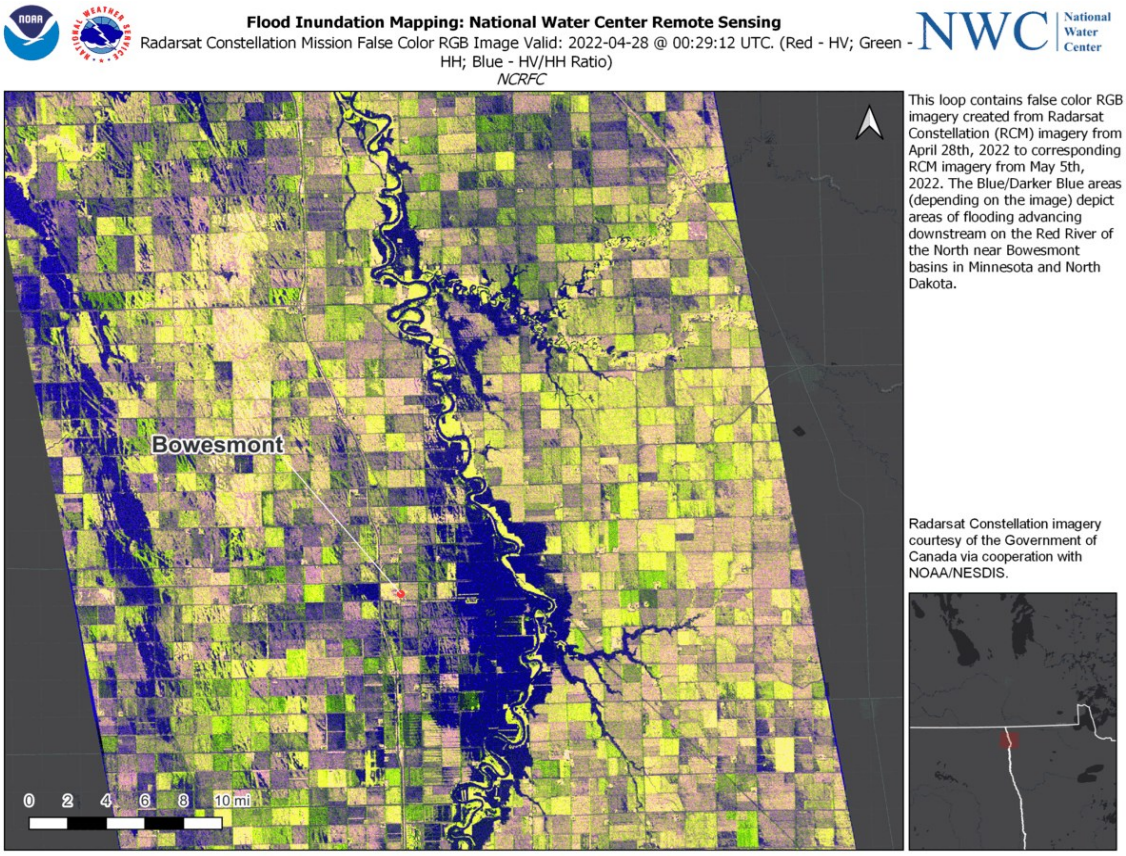
- Pilot will produce a final report by the end of 2026: new flood activities being established

with ISRO and CNES proposed as Pilot Co-Leads in substitution to CONAE and exploiting invitation to WGD members, including also new agency contributions.

- The role of EO and ML techniques have been successfully exploited in supporting both response and preparedness phases, as well as the potential to EW4All, risk and vulnerability assessments and other WGD pilots (e.g. drought, landslides).
- The project has successfully analysed the maturity level of data, approaches and methodologies for future integration into national and regional decision-making systems, especially considering probabilistic inundation maps to be assimilated with hydrologic models and SAR products.
- Main sub-projects promoted by the pilot have included the following studies:
  - **Red River of the North (NRCan & NOAA):** Detailing operational optical and SAR products (VIIRS, ABI/AHI, RAPID), machine learning blending, and Copernicus DEM-based 30m flood depth downscaling utilized by FEMA, WFP, FAO, and the World Bank
  - **Balkans (NOA):** Showcasing the Evros river basin Flood Diachronic Mapping Service, automated Sentinel-1 Random Forest water mapping, and the critical spatial correlation analysis linking 2020 forest fire burn scars to exacerbated 2021 flooding.
  - **Flood Detection Alert & Mapping Digital Twin (CNES & NASA):** a pre-operational digital twin prototype developed jointly by CNES and NASA (ESTO/AIST) to detect, monitor, assess, and forecast floods across local and global scales.
- Final report is going to be finalized together with a way-forward strategy for the new pilot

Main relevant results and outputs provided during 2026 are here briefly reported:

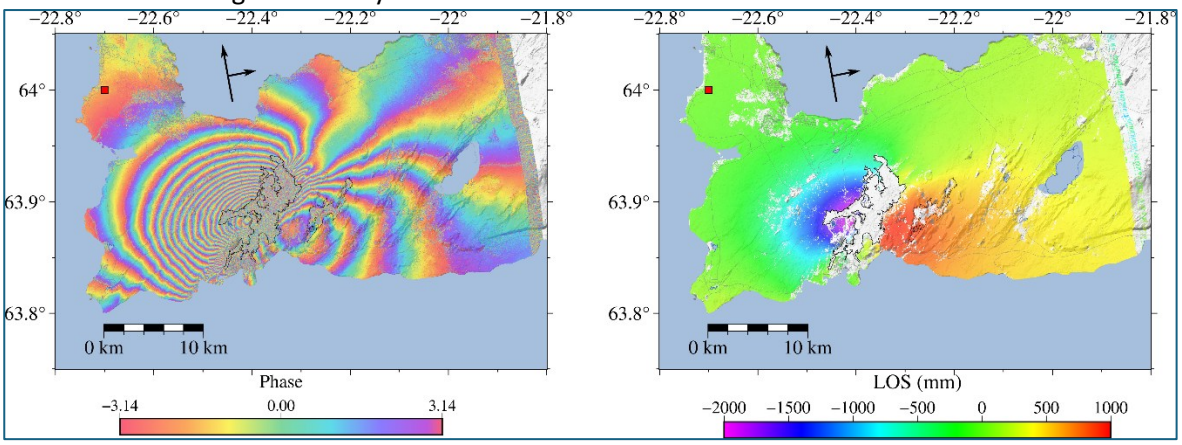
- Red river Flood



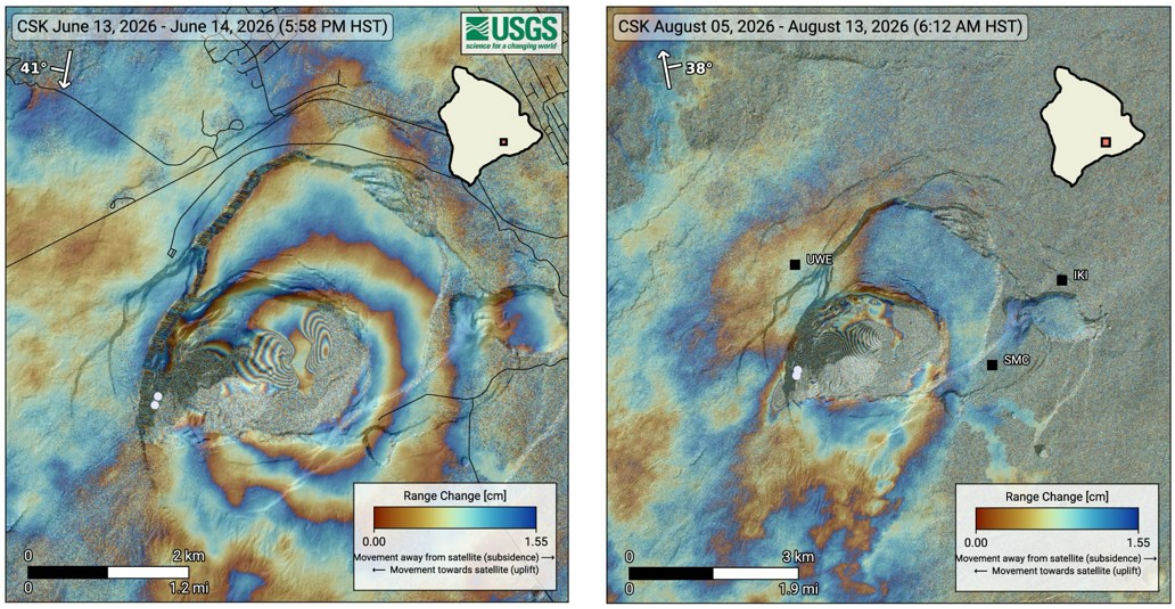
- **<u>Geohazard Supersites and Natural Laboratories initiative (GSNL):</u>** The GSNL aims to improve the monitoring and management of seismic and volcanic hazards, providing access to new EO data, facilitating capacity development especially in developing countries, e.g., in the Africa, Latin America and Caribbean (LAC) regions, and promoting the uptake of near-real time results in decision making processes. Periodic reports are submitted by the Supersites for evaluation and verification of progress. WGDisasters has continued supporting GSNL with SAR data and scientific contributions by main CEOS Space Agencies. Main relevant updates, outputs and outcoms recorded during 2026 are here briefly reported:
    - 6 Supersites renewed (Iceland, Ecuador, New Zealand, San Andreas Fault NL, Southern Andes, Virunga) and 2 Supersite under renewal (Kamchatka and Marmara).
    - New coordination activities discussed during EGU-26 under UNOOSA facilities. New GSNL chair presented (Michelle Parks by IMO), and establishment of a new GSNL Steering Committee (2026–2028).
    - In discussions with EarthScope (NGO) and WGISS the utilization of a unique web-platform solution for data searching and cataloguing.
    - Contribution from Etna and Hawaii Supersites have been confirmed for WGISS Resilience Interoperability Demonstrator and CEOS ARD.
    - Through a coordinated approach among SIT Chair, GSNL, WGISS and WGDisasters, a new concept of Interoperability Demonstrator has been exploited to support SIT Chair priority 2 on “Connected Data for Community Resilience”.

Main relevant results and outputs provided in 2026 are here briefly reported:

- Iceland Supersite (Images courtesy of Chiara Lanzi, IMO): SAOCOM long-term interferogram - Ascending track 24 October 2023 – 21 August 2026, spanning 11 dike intrusions and 9 eruptions within the Svartsengi volcanic system

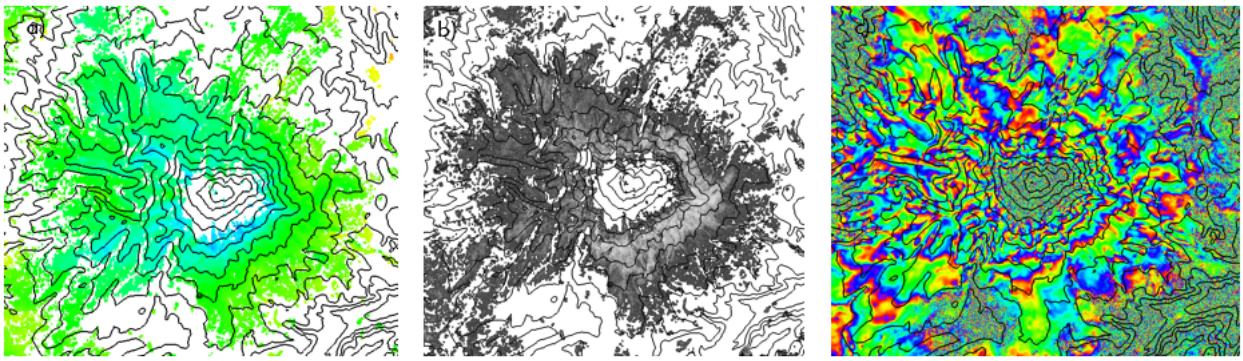


- Hawaii Supersites (courtesy of M. Poland and M. Bagnardi, USGS): CSK interferograms revealing 2026 deformation caused by shallow magma reorganization within the crater at Kilauea



- Ecuador Supersite (image courtesy of S. Aguaiza)

Cayambe, InSAR Processing, CosmoSky Med, May - September 2026



a) Velocity map b) coherence map and c) interferogram of Cayambe volcano. Green color in velocity map shows almost null deformation.

S. Aguaiza

- **New pilot proposals approved** (implementation plan presented at last WGD-26 meeting):
  - **Landslide Initiative (ASI lead, Co-Lead being identified).** Main project objectives are:
    - Multi-sensor data-based approaches for landslide detection
    - Use of Artificial Intelligence (AI) algorithms
    - Impact on urban environments and infrastructure, fragility curves
    - Landslides & Climate Change
  - **Drought Pilot (CONAE, ASI and RCMRD as Lead).** Main project objectives are:
    - 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, Co-Lead being identified).** Main project objectives are:
    - 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 and ISRO lead).** Main project objectives are:

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

- **Synergies with other WGs and CEOS entities -** Main relevant updates, outputs and outcome recorded during 2026 are here briefly reported:
  - New contributions from new pilots addressing Landslides, Biodiversity, Wildfire, and Drought projects have been confirmed to address NASA SIT Chair priorities.
  - Discussion between WGD, GSNL and WGISS proceeded about:
    - Resilience interoperability demonstrators (discussion is ongoing among WGD, NASA, GSNL, and WGISS);
    - Data access solutions for disaster applications (discussion will continue between GSNL, WGD and Earthscope, with updates expected late 2026);
    - Integration of ARD and AI-ready data into operational workflows (discussion is ongoing with WGISS and NASA on EOGPT demonstrator).
  - WGDisasters has successfully contributed to AI/ML white paper for section "disasters" (in coordination with scientific community).
  - Internal discussion on EW4All EO contributions has proceeded with focus on hazard monitoring, forecasting and decision support, also exploiting DRD concept and synergies with other WGD initiatives (e.g. landslide, wildfire, drought, earthquakes).
  - Collaboration with WGCapD is planned and will be set up for new pilot projects to increase capacity building components.
  - WGD maintains close coordination with GEO activities concerning the use of Earth Observations for Disaster Risk Management (EO4DRM) initiatives, with discussion about CEOS Global Stocktake Strategy (GST) recommendations included in this CEOS Work Plan, concerning the on-going analysis related to space-based observations, derived products, and delivery systems to inform disaster preparedness.

- **WGDisasters Strategy and Activities:** following last meetings, WGDisasters has begun a revision of its strategy along the following lines:
  - continue strategic shift from hazard monitoring toward risk reduction
  - expansion of disasters-related activities, e.g. climate–disaster interactions; urban and infrastructure resilience; broader risk-informed decision-making
  - strengthen dialogue with potential funding partners
  - importance of awareness raising and policy engagement, particularly with GEO and UNDRR
  - improve tracking of project outcomes and impacts across WG activities, showing main case studies, results and EO data benefits & limitations for DRM & DRR
  - strengthening links between science, operations, and policy

This flurry of new activity reflects the vibrant dynamic within the WG, which has seen a growth in members over the last two years with new organisations taking up active roles or expressing interest in WGDisasters activities, e.g. ISRO, VSC, UN WFP, RCMRD, POLSA, IEEC, Malaysian Space Agency, HSC, PhilSA, ROSA, and AfSA. Re-engagement of CSA within WGDisasters successfully took place during the last WGD meeting 26.

- **WGDisasters Deliverables**

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
DIS-15-04	Implementation of data coordination for the GEO GSNL initiative	2030 Q4	WGDisasters
DIS-20-02	GNSL evolution feasibility study	2026 Q4	WGDisasters
DIS-22-01	Flood Pilot with GEO-LEO-SAR "Understanding Flood Risk from Space"	2026 Q4	WGDisasters
DIS-24-01	G-VEWERS	2030 Q4	WGDisasters
DIS-24-02	Pre-operational RO	2026 Q4	WGDisasters
DIS-24-04	Data provision to the GEO GSNL initiative	2030 Q4	WGDisasters
DIS-24-05	GEO-GSNL contribution to the WGDisasters	2030 Q4	WGDisasters
DIS-26-01	New Seismic Risk Initiative	2028 Q4	WGDisasters

- Upcoming meetings and events (for written reference only):
    - WGD-Telecon: TBD by the end of 2026
    - WGD-27 in Vienna at UNOOSA HDQ (March-April 2027 before or after the EGU-27)
    - WGD-28 in Romania (sept 2027) with ROSA as hosting Agency.
    - EGU 2026 NH Session about CEOS WGD activities submitted and under review.