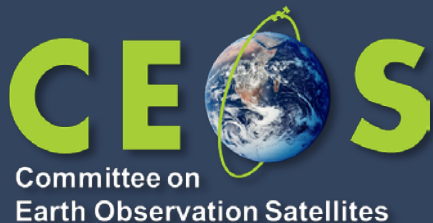


WGDisasters

Pilot Projects and Synergies with other CEOS entities



Antonio Montuori, ASI

Agenda Item 2.5

SIT TW 2026

Washington DC, USA

8-10 September, 2026

WGDisasters Objectives



- ❖ Support **Disaster Risk Management (DRM) authorities** by means of **satellite-based EO** and **science-based analyses**.
- ❖ Support the **UNDRR Sendai Framework**, (mainly Priority1 “Understanding Risk”, Priority4 “Build Back Better”).
- ❖ Support **international initiatives** such as GEO.
- ❖ 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**.



Pilot (e.g. Wildfire, Flood, Landslides, Drought):

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

Demonstrators (e.g. 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)

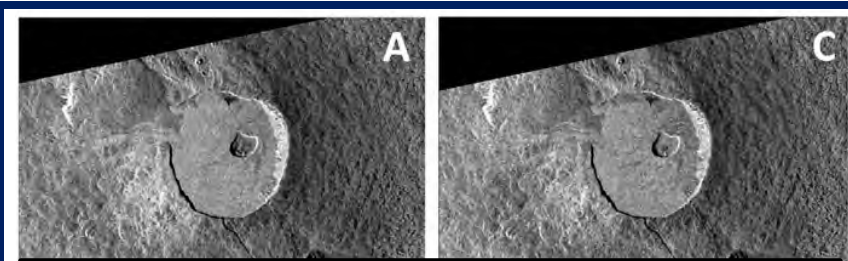
- ❖ Improve geophysical and geohazard assessment, promoting EO products uptake for societal benefits over specific geographic areas interested by multi-disasters risk.

Geohazards Supersites and Natural Laboratories (GSNL)

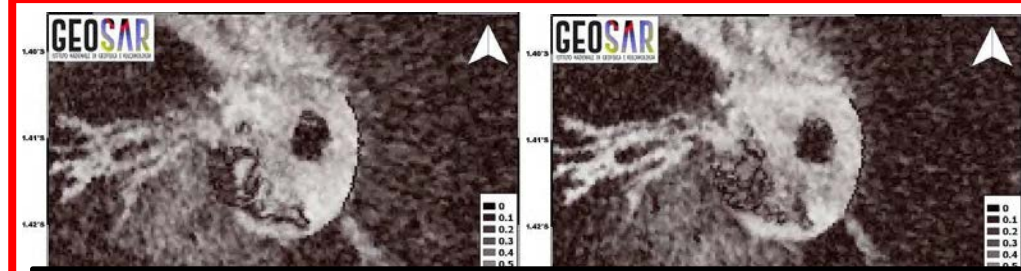
Lead: Michelle Parks, IMO



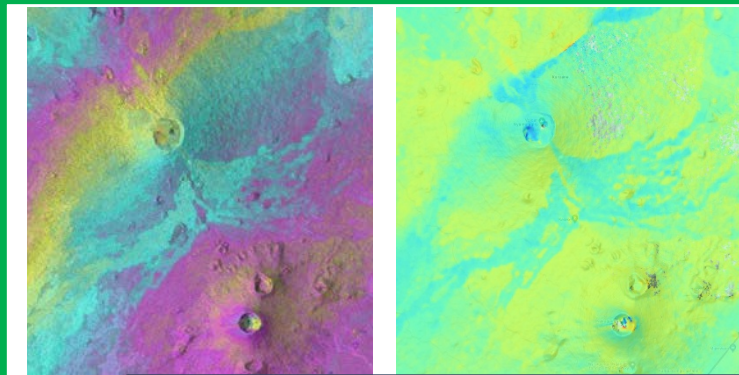
GOALS: Improve geophysical and geohazard assessment, promoting EO products uptake for societal benefits



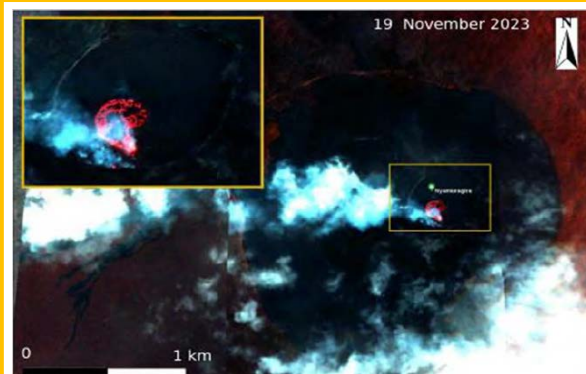
COSMO-SkyMed amplitude images on Oct 3rd (left) and Nov 4th (right) 2023 show changes inside the inner crater.



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 Niyragongo volcanoes.



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

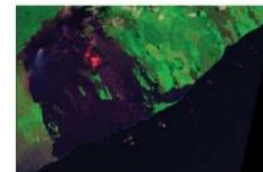
Multi-missions EO results gathered for Nyamulaghira Eruption in 2023 for Virunga Supersites

Lead: Marco Bagnardi (USGS),
Susanna Ebmeier (Leeds Univ.)

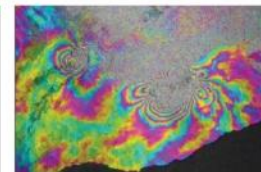
G-VIEWERS

- ❖ 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



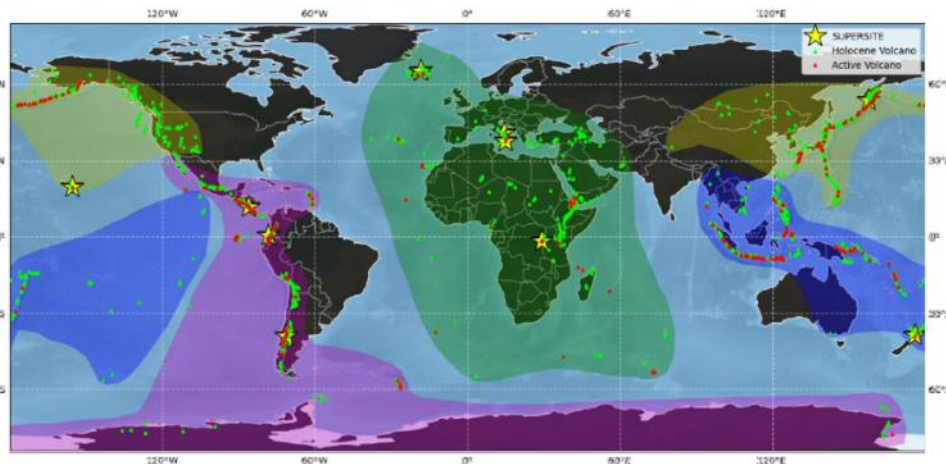
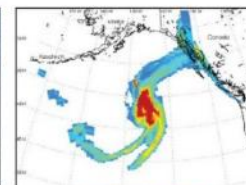
Deformation



Ash



Gas



Marapi – Indonesia (Dec. 2023)

23 deaths



Reykjanes Peninsula - Iceland

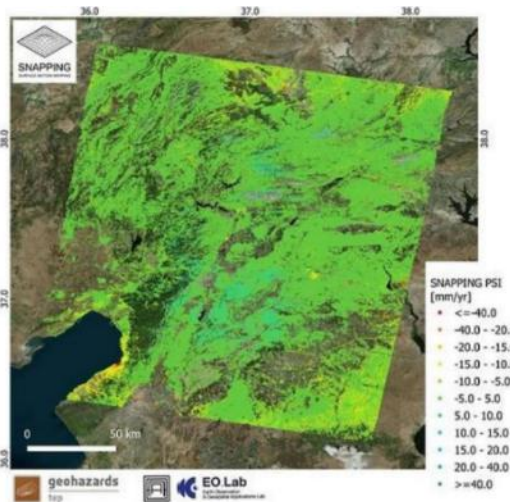
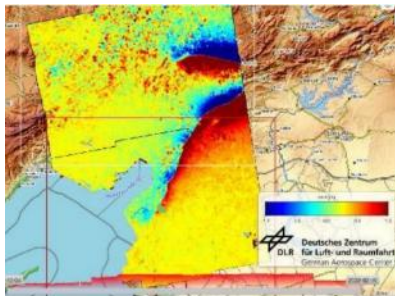
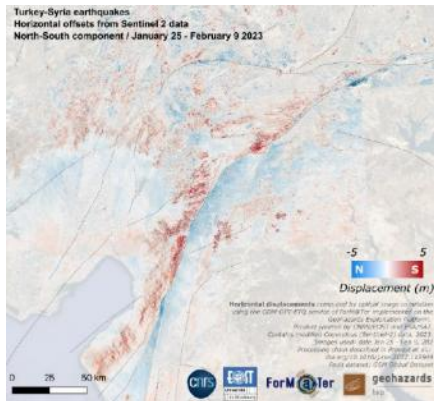
(March 2024)

New Seismic Risk Demonstrator

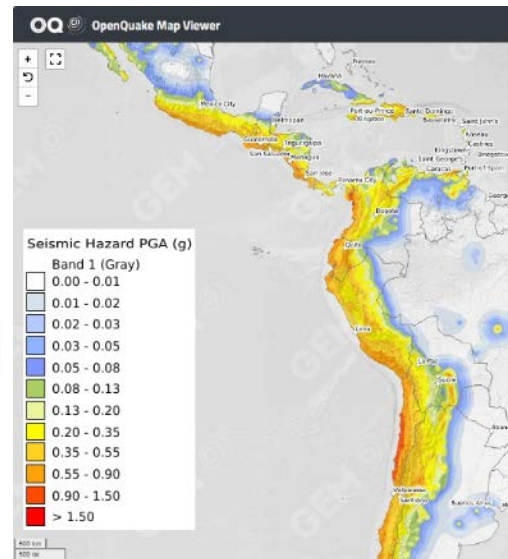


New Seismic Risk Demonstrator

- ❖ Develop and demonstrate advanced science products for rapid earthquake response.
- ❖ EO active faults mapping.
- ❖ Articulate relationship with Int. Charter.
- ❖ Support seismic exposure mapping.
- ❖ Initial focus on Latin America and Caribbean (LAC) now expanded to be global (2026)



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).

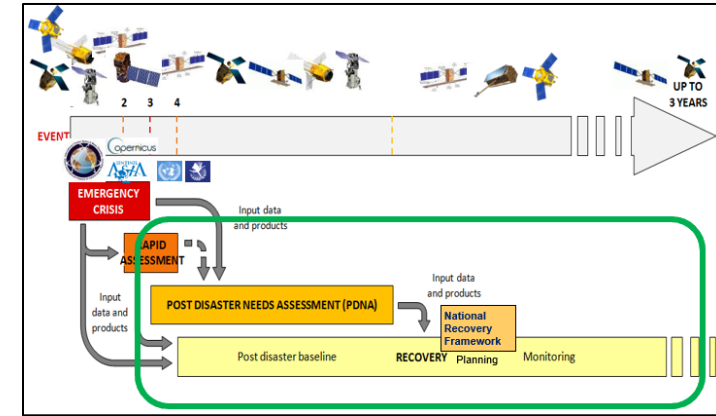


Lead: Philippe Bally (ESA), Stefano Salvi (INGV), Zach Foltz (ARGANS)

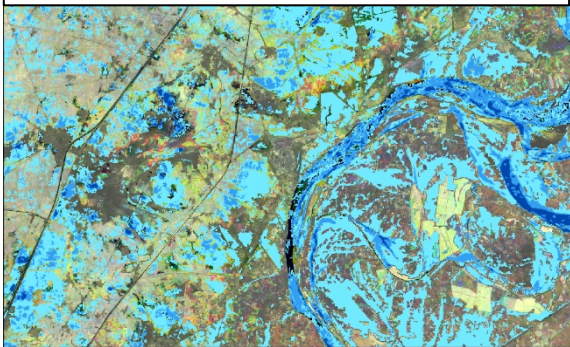
Pre-operational Recovery Observatory

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

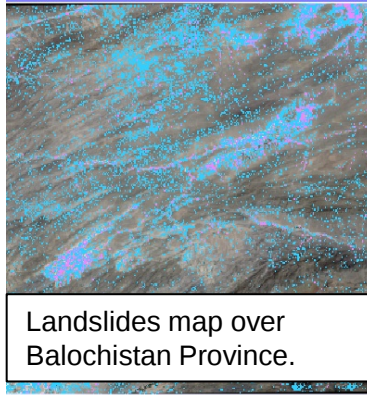
Lead: Aurélien Sacotte (CNES),
Dominique Blariaux (EU FPI).



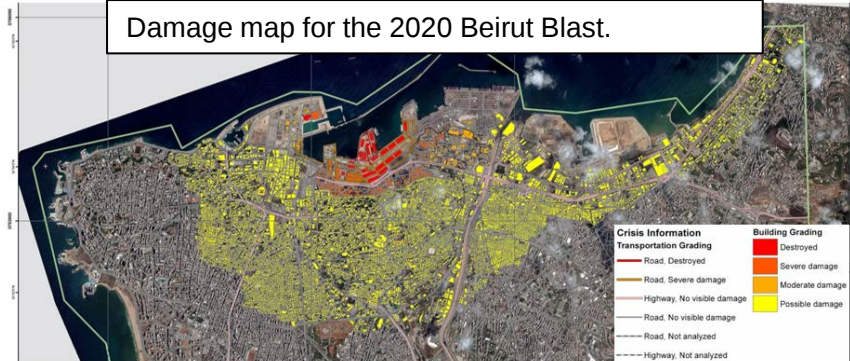
Flood map over Pakistan in 2022.



Landslides map over
Balochistan Province.



Damage map for the 2020 Beirut Blast.



❖ **Landslide Initiative (ASI lead, Co-Lead being identified)**

- 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)**

- 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)**

- 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 Preparedness Pilot (ANU and ISRO lead)**

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

- Led by ASI (PI: Deodato Tapete, Co-PI: Antonio Montuori)
- 5 initial topics, partially rejuvenating the Demonstrator and partially expanding the portfolio:
 - o #1 – Multi-sensor EO data-based approaches for landslides
 - o #2 – AI 4 Landslides
 - o #3 – EO-based landslide vulnerability assessment
 - o #4 – Landslides in humanitarian contexts
 - o #5 – Landslides & Climate Change
- Focus on risk – not only hazard
- Several agencies and organisations involved (e.g. ESA, ISRO, CNES, CONAE, GSNL, VNSC, BGS, WFP)
- Address SIT Chair priorities over Earth's water cycle (Priority 1)

Schedule

- **Pilot Kick-off:** WGDisasters-26 meeting (15 September 2026)
- **Pilot duration:** 3 years (end 2026 – 2029) – also to match ASI's vice-chairmanship + chairmanship
- A clear set of target users and expected outputs for each objective
- **Mid-term review:** after 1.5 years (also to check achievements towards existing objectives and/or opportunity to add further objectives or expand the existing ones)
- **Intermediate Milestones:** presentations at WGDisasters meetings (2/yr) with updates during periodic WG Teleconferences + annual reporting to CEOS Plenary
- **Final Milestone:** final presentation and report of pilot activities at WGDisasters-33

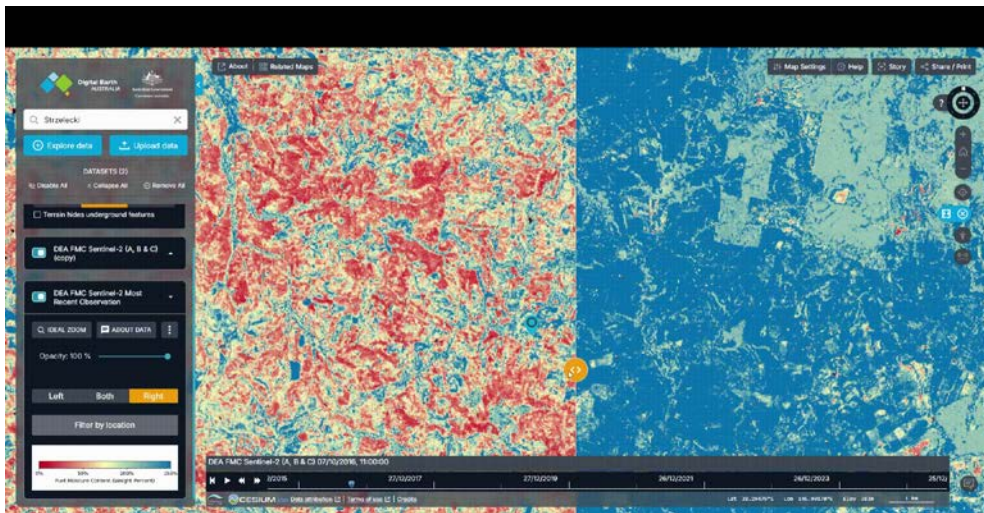
Wildfire Preparedness Pilot



Benchmark and operationalise globally consistent fuel dryness indicators to support anticipatory fire management.

Main objectives and outcomes

- An increase in wildfire EO focus to anticipatory risk forecasting.
- Increased uptake of EO by wildfire agencies for prevention and preparedness.
- Clear global requirements for fuel dryness products.
- A coordinated CEOS pathway to purpose-built pre-fire monitoring satellites and operational services, addressing SIT “water cycle” priority.



Source: <https://maps.dea.ga.gov.au>

Wildfire Workplan/Phases



Phase 1 – Global Landscape Analysis

- Inventory of existing methods
- Evaluation of operational fire danger integration



Phase 2 – Global Harmonised Benchmarking

- Coordinated benchmarking framework for EO-based LFMC approaches
- Systematic validation coverage in underrepresented regions



Phase 3 - Sensor Capability Assessment

- Comparative multi-mission assessment of LFMC and flammability sensitivity
- Identification of capability gaps to inform future CEOS mission coordination



Phase 4- Operational Integration & Uptake

- Endorse harmonised LFMC methodologies
- Enable integration through CEOS and partner platforms (GWIS, Digital Earth, GEE)
- Co-develop operational demonstration use cases with agencies

Scientific Co-Leads:

- ❖ Prof Marta Yebra (Australian National University) Overall scientific pilot coordination, Synthesis and reporting
- ❖ ISRO, Dr. Arijit Roy (IIRS)

Collaborators:

- ❖ NRCan (Canada): coordination with active fire monitoring activities under the LSI-VC Wildfire Subgroup
- ❖ Scientific Networks: WRCC (Canada), GOFC-GOLD Fire IT (Global): provide global coordination, technical exchange, and interoperability support.

Tier 1 – Global Baseline

- ❖ Global vegetated landmass
- ❖ Focused on benchmarking products

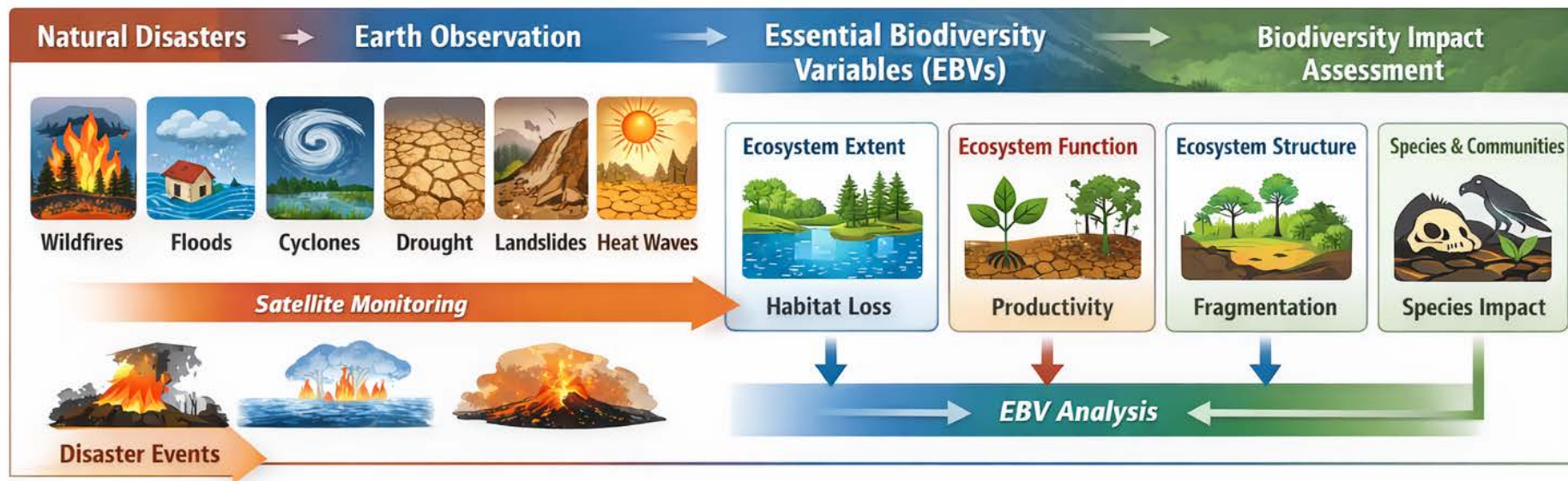
Tier 2 – Regional Demonstrations

- ❖ 6–8 selected regions (~10,000–50,000 km² each) + a specific smaller fire-prone area
- ❖ Focused on regional validation and operational testing

Biodiversity Pilot



ISRO Lead: Dr. Sudakhar Reddy



- ❖ Assess biodiversity status and risks using EO data, in areas prone to disasters that are also biodiversity hotspots
- ❖ Identify major disasters and evaluate their impacts on biodiversity patterns and ecosystem integrity
- ❖ Develop EO based indicators for monitoring biodiversity changes and vegetation recovery following disaster events

5-Years Work Plan

- Year 1: Foundation, Data Acquisition & Disaster Event Archive
- Year 2: Disaster Impact Mapping & Baseline Biodiversity Assessment
- Year 3: Recovery Trajectory Modelling & AI/ML Development
- Year 4: Biodiversity-Recovery Linkage & Resilience Analysis
- Year 5: Synthesis, Decision-Support Tools & Dissemination

MAIN OUTCOMES

- Establish collaboration.
- Identify priority disaster types and ecosystems.
- Develop the conceptual framework for disaster-biodiversity monitoring.
- Integrate biodiversity datasets with satellite-derived variables.
- Conduct spatial analysis of habitat change and vegetation recovery patterns.
- Analyze disaster impacts on biodiversity and identify relevant indicators.
- Conduct capacity building programs / training workshops.
- Share data and methods.

Drought Pilot: Objectives and Benefits



Identify and evaluate how EO satellite sources, measurements and processing techniques could **improve** drought monitoring and early warning systems (IDM Pillar 1), drought vulnerability and impact assessment (IDM Pillar 2), mitigation, preparedness and response (IDM Pillar 3).

Identify main geographic areas most prone to drought phenomena, distinguishing those covered or not by satellite acquisition (IDM Pillar 2), in order to identify: a) those areas where EO data processing and protocols could be applied, in view of testing activities to be promoted within a “Demonstrator project” framework; b) a possible EO strategy to put in place and proposed for adoption to face drought phenomena within IDM framework pillars.

Identify users and stakeholders to be involved in mitigation, preparedness and response activities (IDM Pillar 3), as priority, for possible future demonstrator project activities.

AOI identified: Kenya, Botswana, Malawi, Somalia, Uganda, Colorado (Western US), Argentina, Apulian Tavoliere (Italy), Po Plain (Italy), Cyprus.

Implementation Plan

First Year: Global Scale Analyses

- Inventory of Drought Parameters, Indices and Datasets
- User Requirements and Gap Analysis
- EO Data Sources and Constellation Assessment

Second Year: Regional to local Scale Analyses

- Identification / selection of Drought-Prone Areas
- Drought hazard / risk analyses over selected
- Methodological Framework for EO and Big Data Processing

Third Year:

- Drought hazard / risk analyses over selected
- Multi-Scale Observation Framework definition
- Scientific Validation and Data Integration Plan
- Geospatial Drought-Prone Areas Assessment Report
- Refinement of previous activities
- Final Report.

Drought Pilot: Objectives and Benefits



Agency	Responsible	Governance Roles & Responsibilities
National Commission on Space Activities (CONAE, Argentina)	Principal Investigator (PI): Marcelo Uriburu Quirno (muriburu@conae.gob.ar)	- Technical, Management and Scientific Coordination. - Team Formation: assess institutional capabilities and define feasible contributions. - Stakeholder Engagement: Reach out to CEOS agencies to gauge interest and gather contributions aligned with the overarching goals of the Drought Pilot. - Scientific Community Involvement: Engage relevant academic institutions, research organizations, and domain experts to ensure the Pilot incorporates cutting-edge science and benefits from external validation and insight. - EO Data Access: Coordinate EO data access, availability and planning.
Italian Space Agency (ASI)	Co-PI: Antonio Montuori (antonio.montuori@asi.it) Scientific Co-PI: Deodato Tapete (deodato.tapete@asi.it)	
Regional Center for Mapping of Resources for Development (RCMRD)	Co-PI: James Nyaga (inyaga@rcmrd.org) Scientific Co-PI: Paul Mwangi (pmwangi@rcmrd.org)	

CEOS Partners

Romanian Space Agency (ROSA)

UNOOSA

ISRO

Vietnam National Space Center (VNSC)

NASA

Non-CEOS Partners

World Food Programme (WFP)

Climate Hazards Center (CHC)

ERATOSTHENES Centre of Excellence

Université Paris Cité, Institut de physique du globe de Paris (CNRS)

Drought Pilot Key Outputs

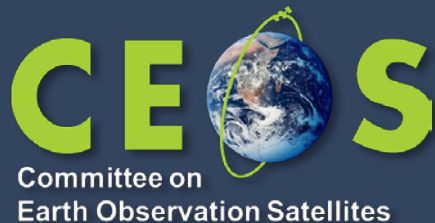


Key output	Geographic focus	Target users	Output format
A Regional Multi-Scale Observation Framework defining appropriate temporal and spatial scales for drought monitoring, including integration pathways toward national-level meteorological datasets.	Global & Regional to local (minimum targets: at least 2 per year and, overall, at least 1 per continent) Prioritize areas where multi-mission data are already available (e.g. Italy, ASI's SAOCOM ZoE, Argentina/Andes, sites covered by BCK missions)	Scientific community, geospatial services companies, CEOS Agencies, Pilot partners, decision-makers, technical officers in administration in charge of DRM, Civil Protection and supporting Centres, professionals (e.g. geologists, engineers, urban planners)	Report (e.g. in the form of a white paper or a PPT) To be agree and defined
A Consolidated Inventory of Drought Parameters, Indices and Datasets, compiling established methodologies, literature references, and global drought management practices.			
A Geospatial Drought-Prone Areas Assessment Report, identifying and mapping regions affected by past drought events using EO data archives.			
A User Requirements and Gap Analysis Report, documenting observational needs, identified limitations, and priority areas for improvement.			
An EO Data Sources and Constellation Assessment Study, evaluating current and upcoming space missions, including analysis of their contribution to drought risk components (hazard, vulnerability, exposure), and assessing data policy and sustainability aspects.			
A Methodological Framework for EO and Big Data Processing, outlining recommended techniques to derive drought hazard indicators and proxies at multiple scales.			
A Scientific Validation and Data Integration Plan, identifying priority study areas and defining validation activities based on EO and in-situ datasets.			

- ❖ Interoperability Demonstrators and EO-GPT Demonstrator (biodiversity and flood) being considered for joint implementation with WGISS
- ❖ Contribution of Landslides, Biodiversity and Drought projects to address NASA SIT Chair priorities.
- ❖ Discussion between WGD, GSNL and WGISS about:
 - Resilience interoperability demonstrators (discussion is ongoing among WGD, NASA, GSNL and WGISS with updated by early September);
 - Data access solutions for disaster applications (Postponed in early September the discussion among GSNL, WGD and Earthscope, with updates by WGD26);
 - Integration of ARD and AI-ready data into operational workflows (discussion is ongoing with WGISS and NASA on EOGPT demonstrator).
- ❖ Contribution of WGD disasters community to AI/ML white paper for section “disasters” (To be Coordinated with WGD scientific community).
- ❖ Internal discussion on EW4All EO contributions 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).

- ❖ Cooperation with WGCapD for the exiting and new pilots to increase capacity building is under discussion with WGD.
- ❖ Participation in the Earth Observation (EO) for Resilience and Humanitarian Aid training in Vienna (March 2026), delivered by UNOOSA, UNU-INWEH, and CEOS partners (ASI, CNES, DLR, and ESA) and closely linked to the work of UN-SPIDER; the training was aimed at equipping UN entities with knowledge about different EO technologies, data and tools.
- ❖ Growth in members, new organisations active roles and/or expressing interest in WGD disasters activities: ISRO, VNSC, UN WFP, RCMRD, POLSA, Malaysian Space Agency, HSA, PhilSA, ROSA, and AfSA.
- ❖ Re-engagement of agencies who had reduced participation during last years: CSA, JAXA, DLR.

WGDisasters



ceos.org/wgdisasters

Lorant Czaran (UNOOSA) - Chair

Antonio Montuori (ASI) – Vice Chair

Andrew Eddy (Athena Global) - Secretary