

WP23_25: Earth Observations for Disaster Risk Management

1433,264

Basic Information

Full title of the Initiative

Earth Observations for Disaster Risk Management

Short Title or Acronym

EO4DRM

Current category in the 2020-2022 GWP

Community Activity

Proposed category in the 2023-2025 GWP

GEO Initiative

Points of Contact

First Name	Last/Family Name	Email
Helene	DeBoissezon	helene.deboissezon@cnes.fr

Purpose

Objective

Increase the use of satellites for disaster risk management activities relating to natural hazards.

Please provide a short description of the Initiative

EO4DRM coordinates a series of risk related activities involving the use of satellite data and its integration in standard risk management practices, including work relating to hazards, vulnerability and exposure, across the full cycle of DRM. This activity serves this purpose by bringing together efforts from CEOS WGDisasters (leveraging satellite observations), in coordination and collaboration with GEO DRR-WG. Satellite-based solutions are developed and tested in pilot (standalone activity) and demonstrator (towards sustainability and scale-up) phases in the areas of numerous natural hazards such as flood, volcanoes, landslides, seismic events and wildfire, as well as multi-thematic issues on post-disaster support. Within EO4DRM, there are 6 pilot and demonstrator activities in accordance with each of the thematic areas: Wildfire Pilot, Flood Pilot, Seismic Hazards Demonstrator, Volcano Demonstrator, Landslide Demonstrator, and Recovery Observatory Demonstrator.

Why is this Initiative needed?

DRR/DRM has always been an important global issue, as evident in the adoption of the global agreement, Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030.

The role of Earth observations, including satellites, can play in contributing to the SFDRR is well recognized that

DRR has been GEO's Engagement Priority and that CEOS has created a permanent Working Group for the topic. However, data on progress towards the global targets of the SFDRR reveal a mixed picture of progress and challenges. As described in the 2021 Report of the Secretary-General to the General Assembly (A/76/240), for example, only 79 countries report having access to multi-hazard early warning systems, and 28 countries report having access to appropriate disaster risk information and assessments (global target G). EO4DRM tries to fill the gap through promoting the uptake of satellite data by risk managers and explores on a pilot and demonstrator basis methodologies and best practices for use of satellites for DRR/DRM. In the context of SFDRR halfway, the initiative may provide recommendations to DRR/DRM community for how to accelerate the implementation of the framework, benefiting from Earth observation data and tools.

What evidence is there to support this need?

The need is evident from fact that EO4DRM activities have succeeded in partnering with users, such as the European Union, the World Bank, UNDP, insurance communities and various national governments.

Is this Initiative open to participation by representatives of any GEO Member, Participating Organization, and GEO Associate?

Yes

Are you aware of other projects or initiatives at a global or regional scale (both in GEO and externally) that provide similar products or services?

No

Please identify the most important actual and/or intended outputs (products, services, etc.) produced by the Initiative, along with their intended and/or actual users. This list does not need to be comprehensive but should identify the outputs which are most used and are expected to have the greatest potential impact.

Output	Status	Users	Additional info
Landslide susceptibility maps	Occasionally updated	World Bank, Practitioners, Insurance	produced by Landslide Demonstrator
Landslide impact map	Occasionally updated	World Bank, Practitioners, Insurance	produced by Landslide Demonstrator
Lava flow hazard map	Regularly updated	Crisis centers, Practitioners	produced by Volcano Demonstrator
Estimation of volcanoes effusion rate & flow modelling	Occasionally updated	Crisis centers, Practitioners	produced by Volcano Demonstrator
Ground displacement map after earthquake	Occasionally updated	Crisis centers, Practitioners	produced by Seismic Demonstrator
Impact assessment maps for PDNA	Occasionally updated	PDNA team, Governments	Produced by RO Demonstrator - PDNA : Post Disaster Need Assessment
Fault cartography	Occasionally updated	Practitioners	produced by Seismic Demonstrator

If needed, please provide additional comments or explanation to accompany the outputs table

Example of the Recovery Observatory (RO) Demonstrator :

Damage assessment service after extreme events to feed into Post Disaster Needs Assessment and Recovery Framework.

Status: demonstrating services to conduct Post-Disaster Needs Assessments for EU, UNDP and the World Bank in 3-5

sets of cases (2021-2023)

Users: UNDP-EU-World Bank partnership for PDNA and governments from disaster-hit developing countries

Additional info: featured in EO Risk Toolkit

What kinds of decisions are the outputs of this Initiative primarily intended to support?

Generally, improved Disaster Risk Reduction and Management, through detailed and geolocalized knowledge of hazards of disasters' impacts.

In the specific case of Recovery Observatory : efficient and effective Post Disaster Needs Assessment through the exhaustive, analytic and dynamic view of EO data; effective Recovery Framework elaboration, as well as Recovery Monitoring and Evaluation, along time, with neutral and independant EO observations.

How will these decisions benefit from the outputs of this Initiative?

Contribution to Sendai Framework Priority4 "Building Back Better".

What kinds of impacts (for example, reduced loss of life, monetary savings, conservation of biodiversity, etc.) are anticipated as a result of the use of the outputs of this Initiative?

Benefits are encountered in : supporting livelihood of affected population / governments, monetary saving , supporting agricultural and environmental assets.

Has this Initiative been asked to provide specific information (for example, reports, data, services) on an ongoing basis to an international convention, organization, or other multilateral body?

Yes

Please identify the requesting organization.

For RO : requesting organization = PDNA tripartite agreement team : UNDP-WB-EU

Describe the nature of the request.

For RO : access to neutral and objective measurements of disaster-affected areas - including agricultural and environmental areas in the case of 2021 Earth Quake on Haiti- as reliable sources of information for developing the PDNA.

Please provide supporting documentation of the request.

- no supporting documents provided -

Technical Synopsis

Please provide a brief description of the methods used by the Initiative to produce its (actual or planned) outputs.

CEOS agencies provide satellite data to academic and pre-operational user communities who use them in a wide array of science and applied outputs.

The actors of the initiative are committed to and must be at the state of the art in their scientific field, with a peer review performed through a collective work.

In the RO Demonstrator, the Initiative will provide complementary and follow-up of mapping and analysis done as emergency response support by the international satellite community (e.g. by International Charter Space &

Major Disasters, Sentinel Asia, Copernicus Emergency Management Services), or the United Nations Satellite Centre (UNOSAT) to complete damage assessment and to support recovery planning.

RO Demonstrator supports:

1. Rapid Needs Assessment (RNA) using Global RApid-post-disaster Damage Estimation (GRADE @ World Bank) approaches;
2. Post-Disaster Needs Assessment (PDNA) with UNDP, EU, WB and others for reconstruction and rehabilitation.
3. First estimate of Capacity Building needs in the beneficiary countries as regards remote sensing and geomatics.

In addition, available RO methods and actors may be used for Recovery Framework Monitoring & Evaluation, during the whole duration of the Recovery process.

If you would like to provide further details on the technical methods, you may upload one or more documents here.

- no supporting documents provided -

Are there any significant scientific or technical challenges that need to be resolved by the Initiative during the 2023-2025 period?

Yes

Please describe these challenges and the steps being taken to solve them.

In each thematic area, the pilots and demonstrators are either developing new methodologies using EO to deal with risk, or understanding how to mainstream the application of previously developed methodologies. In the RO : the major challenges are :

- to decide on the level of resolution for imagery and its frequency (very high resolution images are provided on commercial basis, while coarser resolution images are free)
- growing need of standardization for recovery products
- developing standard operating procedures for smooth integration into international stakeholders processes.

Does the Initiative expect to complete any key new outputs, improvements to existing outputs, or improvements to the methods of producing outputs, in the 2023-2025 period?

Yes

Please describe these new outputs or improvements.

Outputs awaited from the 2 Pilots :

Wildfire Pilot : 1) Identification of existing and anticipated gaps in wildfire EO capabilities; 2) Identification of the global community of wildfire stakeholders and end-users, and establishing a framework for ongoing interaction and collaboration; 3) Articulation between user requirements for active-fire remote sensing; 4) Proposal for a way forward to closing existing and future gaps.

Flood Pilot : 1) Identification and inventory of CEOS and CGMS data sources, partners and critical variables that contribute to flood mapping, along with data access and sharing mechanisms ; 2) Collaboration with CEOS and CGMS flood mapping activities to explore the feasibility of integrating whole range of optical images and radar images flood observations, on 2-3 regional case studies of long-lasting, impactful, past flood events and up to 1-2 upcoming scenarios during the pilot work period. 3) Report on best practices developed through preliminary use cases, with clarification of terminology and methods for mapping and data sharing, and identification of remaining gaps.

Outputs awaited from Demonstrators :

Seismic Hazards Demonstrator : the Demonstrator aims to evolve from regional actions led during the Pilot to global coverage, and to response to a higher number of earthquakes. Its main aims are to: 1) Broaden the user base to achieve more impact; Take on board new EO practitioners and other (non-expert) geoscience centres with strong links to End users; and Reach more end users. 2) Develop a collaborative framework with geoscience centres to promote adoption of EO technology by decision makers, establish a consensus methodology for research product generation and dissemination to decision makers. 3) Support local capacity

building in coordination with GSNL and other initiatives to broaden the use and acceptance of EO products by geoscience centres and academia and facilitate end users to with their interpretation.

Volcano Demonstrator: after continuing working with volcano observatories in Latin America, the Demonstrator aims at developing partnerships around the world, for example through the auspices of the new International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) Commission on Volcano Geodesy. Two regional areas are aimed at : 1) Africa, where a number of volcanoes are deforming and experiencing eruptions with attendant thermal and gas emissions, and where in some countries like Tanzania, there are no volcano observatories, 2) then Indonesia and the Philippines—both countries with abundant volcanic activity but little ability for the uptake of remote sensing.

Landslide Demonstrator : the efforts are put on three objectives : 1) Establish effective practices for merging different Earth Observation data (e.g. optical and radar) to better monitor and map landslide activity over time and space. 2) Demonstrate how landslide products, models, and services can support disaster risk management for multi-hazard and cascading landslide events. Specific focus has been done on transportation corridors (operational landslide monitoring of traffic and pipeline corridors in China, European Alps, Canada and on railway corridor vulnerability in French Alps) and on World Bank program requirements for Landslide Risk Financing 3) Engage and partner with data brokers and end users to understand requirements and user expectations and finally build a global landslides data set.

Recovery Observatory Demonstrator : The awaited outputs are : 1) Document past use of satellites during representative recent PDNA/GRADE/RPBA and identify opportunities for improved use of satellites; 2) Develop guidelines for satellite use during the PDNA/RPBA process; 3) Showcase satellite tailored prototype products during 3 to 5 PDNAs or similar requests; 4) Provide timely support in best effort mode to PDNA teams on the ground for the 3 to 5 PDNAs (or similar requests) through the provision of satellite-derived products that aim to meet operational constraints.

Please identify the key tasks that must be implemented to ensure delivery of these changes, with target dates for completion.

- no answer given -

Resources

Have all resources required to implement the Initiative's planned work in the 2023-2025 period been secured?

- Gap in financial resources
- Gap in human resources

What is the estimated funding gap for the 2023-2025 period?

Still being estimated

What are the essential skill sets needed by the Initiative but are not currently resourced?

- Funded value added capacities
- Free and commercial satellite images tasking and acquisition

[The Initiative has secured the Funded Coordinator and Secretariat" and "Funded technical/scientific team manager for major thematic area" positions]

What actions is the Initiative taking to obtain the required resources?

Advocacy towards international DRR/DRM organisations

Please list all financial and non-financial contributions to the Initiative (other than in-

kind, voluntary participation by individual contributors) having a value of more than USD 50,000.

Contributing Organization	GEO Status	Type of Resource	Value	Currency
CNES	France	Financial	390000	euros

Lessons from the 2020-2022 Period

Were all planned activities for the 2020-2022 period implemented as expected?

Yes

Were there any key challenges faced by the Initiative in the 2020-2022 period?

Yes

Please describe.

As the pilot and demonstration phase is completed, there is a challenge to identify resources for sustainable implementation in the medium and long-term, beyond the current CEOS led partnership.

Were there any impacts or changes to operations due to COVID-19?

Yes

Please describe.

Field work was impossible for most tasks, meaning capacity building activities were delayed or reduced. Some demonstrators were delayed as a result (Volcano, Seismic).

Please describe the key changes proposed for the 2023-2025 period, for example, new projects, new areas of focus, or adjustments to the activity governance.

Generally speaking (for all Pilots and Demonstrators), one of key challenge is the coordination and increased collaboration with GEO (DRR WG) and UNDRR and their platforms - GEO Knowledge Hub (GKH), EO Risk Toolkit and Risk Information Exchange (RiX).

For RO Demonstrator, from 2023-2025, the key challenge is to move towards developing standard operating procedures as well as sustainability

(extension of the collaboration, or formal agreements between partners on commitments and resources), higher standardization of recovery products and raising awareness of DRR/DRM decision makers in disaster-prone areas.

Does the Initiative have outputs (products, services, etc.) available to users now, even if only on a pilot or testing basis?

Yes

Please provide any available information describing this usage (for example, user statistics, results of user testing) and/or feedback from users (for example, user comments, evaluations).

In the case of the most advanced Demonstrator (RO) :

- Use case in Haiti post earthquake 2021 : The RO Demonstrator was used as a service to support disaster-hit Haitian government and the Post-Disaster Needs Assessment team (EU, UNDP/UNEP, WB) to make damage estimations for sectors like agriculture and environment, enabling them to use satellite imagery exclusively to quantify acreage affected by earthquake-induced landslides, and then

merge

this information with land cover data to estimate agricultural damage and environmental impact. See description in the GEO DRR EO Risk Toolkit (<https://earthobservation-risk-toolkit-undrr.hub.arcgis.com/pages/recovery-support-following-2021-haiti-earthquake>).

- use case in Honduras, Nicaragua, Guatemala, El Salvador with Hurricane Eta/Iota, in support to CEPRENAC, with WB as key user.

- use case on Beirut explosion, in support to 3RF (Reform, Recovery and Reconstruction Framework) Lebanon, with EU as key user.

Please provide supporting documentation if available.

- no supporting documents provided -

Do you have evidence of any impacts that have occurred in part as a result of using the outputs of the Initiative (for example, policy decisions taken, behaviour changes by users, risks mitigated)?

Yes

Please provide examples, with evidence where available.

For RO : see the official Post Disaster Needs Assessment (PDNA) in Haiti (<https://www1.undp.org/content/dam/rblac/docs/Research%20and%20Publications/DRR%20and%20Recovery/DIPECHO%202020/PDNA%20HAITI%202021%20EXSUM%20English%20FINAL.pdf?download>)

Please provide supporting documentation if available.

- no supporting documents provided -

Have there been any internal or external reviews or evaluations of the Initiative since 2019?

No

Please indicate any GEO Work Programme activities with which you have ongoing collaboration.

- AMERIGEO - Americas Group on Earth Observations
- GEO-DARMA - Data Access for Risk Management
- GSNL - Geohazard Supersites and Natural Laboratories
- SCO - Space Climate Observatory

Please indicate any additional GEO Work Programme activities with which you would like to establish new collaborations.

- AFRIGEO - African Group on Earth Observations
- CLIMATE-OBS - Climate Observation, Simulation and Impacts
- EO4SENDAI-MONITORING - Earth Observation and Copernicus in support of Sendai Monitoring
- EO4SDG - Earth Observations for the Sustainable Development Goals
- HUMAN-PLANET - GEO Human Planet
- GLOFAS - Global Flood Awareness System
- GFRM - Global Flood Risk Monitoring
- GFOI - Global Forest Observation Initiative
- GWIS - Global Wildfire Information System

Stakeholder Engagement and Capacity Building

Are there specific countries or organizations that your Initiative would like to engage?

No

Does your Initiative engage users in the work of the Initiative (for example, consultation, testing, co-design)?

Yes

Please briefly describe the Initiative's approach to engaging users.

The users are engaged within their community of practice on a thematic basis. Each community is organised differently and key organisations (partners) are identified within each community. These relays provide the key access to users and facilitate uptake of satellite-derived products. These may be practitioners or scientific organisations with mandates to provide information relating to risk.

Does the Initiative have a user engagement strategy or similar kind of document?

No

Are there categories of users that are not represented at this time, but you would like to engage?

No

Does the Initiative have a documented capacity development strategy?

No

Please describe the approach to capacity development that is being implemented by the Initiative?

Capacity development actions are undertaken in close cooperation with academia or with WGCapD within CEOS.

Are there any commercial sector organizations participating in this Initiative?

Yes

Please list the commercial sector organizations.

- no answer given -

Are there opportunities for commercial sector uptake of the outputs of the Initiative?

Yes

Please describe these opportunities.

Commercial contributions have been in kind contribution of either satellite data or value adding services. This took place for both the volcano demonstrator and the RO Demonstrator.

Is there already commercial uptake occurring?

No

Are there opportunities for further commercial sector participation in the Initiative?

Yes

Please describe these opportunities.

More commercial contributions of the same sort are expected. New commercial partnerships are being discussed in seismic community.

Does the Initiative have a plan for commercial sector engagement?

Yes

Please describe this plan or upload the relevant document.

Each sector has a different approach.

- no supporting documents provided -

Governance

Please describe the roles of each of the key leadership positions, as well as any team structures involved in day-to-day management.

WG Disasters Lead (2 years) : CNES 2021-23
WG co-lead (2 years) : CONAE 2021-23
Wildfire Pilot: lead NRCan (Canada), FAO
Flood Pilot: lead CONAE, RSS Hydro, NOAA
Seismic Demonstrator: lead ESA
Volcano Demonstrator: lead USGS, University of Leeds, ASI
Landslide Demonstrator : lead NASA, University of Strasbourg, USGS
RO Demonstrator: lead CNES, WB/GFDRR

Is there a steering committee or other governance bodies that advise the Initiative but are not involved in day-to-day management?

Yes

Please describe the roles of each body. If there are multiple governance bodies, please describe the relationships among them (such as through a governance structure diagram).

All activities are coordinated through the CEOS WG Disasters, with structure and procedures as follows :
A WGDisasters Chair and Vice-chair will be designated by the CEOS Plenary and will rotate among WG members every two years.
In addition, WGDisasters Chair will provide administrative support during the whole chairmanship period (Secretariat).
The designated Vice-chair will assume the chair after two years, and a replacement Vice-chair will be designated by Plenary.
The WGDisasters will normally meet twice per year, rotating the meeting venue among its membership or locations conducive to WGDisasters goals. Remote participation at these meetings will be possible. At each meeting, the time, place and host for the next meeting will be established.
The CEOS WG Disasters has a sub group, the Data Coordination team, that is responsible for coordinating the CEOS WG Disasters response to all data requests for disaster related activities.
The WGDisasters will coordinate its work with other CEOS Working Groups and other bodies.

- no supporting documents provided -

What methods does the Initiative use to communicate with its participants?

- Email / e-newsletters
- Regular conference calls
- Website
- Regular events

Please describe the key risks that could delay or obstruct the completion of the planned activities and outputs of the Initiative, along with any actions taken to mitigate these risks.

- no answer given -

What methods are used by the Initiative to monitor its effectiveness?

- Informal discussions with users / beneficiaries
- User or beneficiary surveys
- Website statistics
- Consultations or events
- Evaluations
- Other

Please describe.

CEOS-GEO coordination Meeting and GEO blogs, as well as collaboration with EO Risk Toolkit.
To be noted : a number of WG Disasters members are participating in GEO DRR Working Group.

Would the Initiative be interested in assistance from the GEO Secretariat for developing an impact plan?

No

How are the results of the monitoring and evaluation activities shared with participants and the wider GEO community?

Meetings

Are any monitoring or evaluation activities required by funders/contributors?

No

Participants

Please list the active individual participants in the Initiative

First name	Last name	Email address	Member	Org
Laura	Frulla	lfrulla@conae.gov.ar	Argentina	CNES - National Centre for Space Studies
Helene	de Boissezon	helene.deboissezon@cnes.fr	France	CONAE - Comisión Nacional de Actividades Espaciales
Malet	Jean-Philippe	jeanphilippe.malet@unistra.fr	France	CNRS - Centre National de la Recherche Scientifique
Kirschbaum	Dalia	dalia.b.kirschbaum@nasa.gov	United States	NASA - National Aeronautics and Space Administration
Bally	Philippe	philippe.bally@esa.int	ESA - European Space Agency	ESA - European Space Agency
Salvi	Stefano	stefano.salvi@ingv.it	Italy	INGV - National Institute of Geophysics and Volcanology
Uriburu Quirno	Marcelo	muriburu@conae.gov.ar	Argentina	CONAE - Comisión Nacional de Actividades Espaciales
Schumann	Guy	gjpschumann@gmail.com	Luxembourg	RSS GmbH - Remote Sensing Solutions GmbH
Goldberg	Mitch	mitch.goldberg@noaa.gov	United States	NOAA - National Oceanic and Atmospheric Administration
de Kong	Mark	markdejongcanada@gmail.com	Canada	NRCAN - Natural Resources Canada
Johnston	Joshua	joshua.johnston@nrcan-rncan.gc.ca	Canada	NRCAN - Natural Resources Canada
van Mierlo	Helena	helena.vanmierlo@asc-csa.gc.ca	Canada	CSA ASC - Canadian Space Agency
Moore	Peter	Peter.Moore@fao.org	FAO - Food and Agriculture Organization of the United Nations	FAO - Food and Agriculture Organization of the United Nations
Gunasekara	Rashmin	rgunasekera@worldbank.org	United States	
Eddy	Andrew	andrew.eddy@athe	CEOS - Committee	AthenaGlobal -

		nglobal.com	on Earth Observation Satellites	AthenaGlobal
Blariaux	Dominique	dominique.blariaux @particip.com	Belgium	
Missal	Rita	rita.missal@undp.org	United States	
Chunet	Alex	achunet@worldbank.org	France	ESA - European Space Agency
Belabbes	Samir	Samir.BELABBES @unitar.org	Switzerland	UNITAR - United Nations Institute for Training and Research
Villagran	Juan Carlos	juan-carlos.villagran @un.org	United States	UNOOSA - United Nations Office for Outer Space Affairs

Other information

Please provide any other comments or information that was not included in the previous sections, but you would like to appear in the Implementation Plan.

Private companies that have participated to the EO4DRM activities :

- Icube/SERTIT, France
- eGEOS, Italy,
- ADS Intelligence GmbH
- CIMA Foundation, Italy
- RSS GmbH

- no supporting documents provided -

Co-Editor Management

List of co-editors for this initiative

First name	Last name	Email address
Andrew	Eddy	andrew.eddy@athenaglobal.com
David	Borges	david.borges@nasa.gov