

# WG Disasters

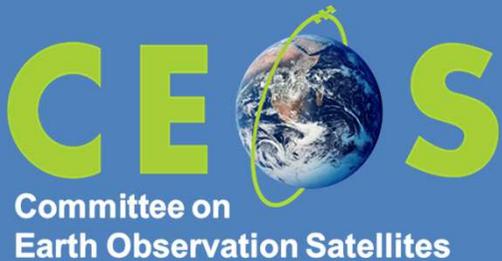
## New Proposals for Plenary 2023

(presentation to SIT TW for information)

- *Volcano Monitoring: G-VEWERS*
- *Recovery Observatory: pre-operational RO 2024-26*

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# Volcano Monitoring: The Problem

- Volcanic eruptions threaten life, infrastructure, and the global economy, but eruptions can be forecasted if monitoring data are recorded and analyzed before the onset of unrest
- Only about 35% of the ~ 600 volcanoes that have erupted since 1500 CE have continuous ground monitoring
- **Satellite data** can make up for some of this gap, BUT:
  - We need the **right data** at the **right volcanoes** at the **right times**
  - Data should be freely accessible
  - Acquisition plans should be flexible (especially during a crisis)
  - Data latency should be low
  - Capacity building is critical
- The **CEOS Volcano Pilot** (2014–17) and **Demonstrator** (2019–23) are a **blueprint for global volcano monitoring and early warning**



# Proposal: G-VEWERS

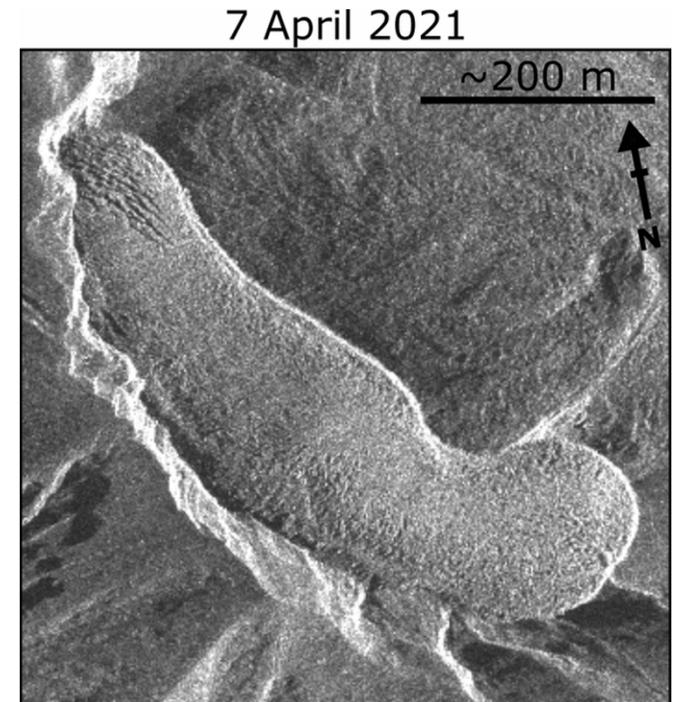
Q: How do we achieve the goals of the global volcanology community to better monitor volcanoes and mitigate their hazards?

A: Create a permanent **Global Volcano Early Warning and Eruption Response System (G-VEWERS)**

- Permanent virtual facility for remote volcano monitoring
- Biennial renewable quotas (akin to Supersites)
- Made possible by best-effort contributions from academic institutions, volcano observatories, and space agencies
- Leverage local capacity for monitoring and support local needs
- Timely response to hazardous volcanic eruptions (dozens per year, daily monitoring needed)
- Tracking of restless volcanoes (~200 per year, weekly monitoring needed)
- Background monitoring of quiescent volcanoes (~1400, quarterly to every few years needed)

# G-VEWERS: Partners and Management

- G-VEWERS is a partnership
  - Space Agencies (*provide data and expertise*)
  - Academic institutions (*develop new derived products and conduct capacity building*)
  - Volcano Observatories (*utilize data products and build capacity to aid volcanic hazards mitigation*)
- Management and oversight will be provided by an advisory panel composed of scientists representing the above institutions
- USGS will provide operational support



Soufriere St. Vincent  
10x increase in extrusion rate  
~48 hours before onset of  
explosive eruption

*Dualeh et al. (2023)*

# G-VEWERS: Requested Data Contributions from CEOS agencies

- 4000 scenes/year each for **TSX and CSK** for global volcano monitoring and early warning, provides for:
  - Daily monitoring of erupting volcanoes (30 VEI2 eruptions per year, averaging 75 days each is 2300 scenes per year)
  - Weekly monitoring of restless volcanoes (230 average restless volcanoes is 6000 scenes per year)
  - Background monitoring of quiescent volcanoes (quarterly to every few years is 300 scenes per year)
- **TDX** access for DEM generation
- 1000 scenes/year for **SAOCOM** (L-band for vegetated volcanoes)
- 20,000 km<sup>2</sup>/year for **Pleiades** (DEMs and change detection)
- Access to **SPOT6–7** (high-res change detection)
- Archived **SAR scenes** as needed (hundreds per year)
- **Other data** to be requested periodically through WG Disasters on as required basis (biannual quota)



# G-VEWERS: Outcomes

- **Outcomes:**
  - Showcase how CEOS data can be used to enhance public safety around the world
  - Empower local volcano observatories and academic institutions to develop new skills and capabilities
  - Enlarge the community of active users of satellite data
  - Serve as a model for hazards assessment and mitigation
- **Deliverables:**
  - Biennial report documenting responses to active eruptions and monitoring
  - Academic presentations and publications
  - Capacity building (site visits, workshops, students)

**Ultimate goal is a safer global society due to better monitoring and forecasting volcanic activity**

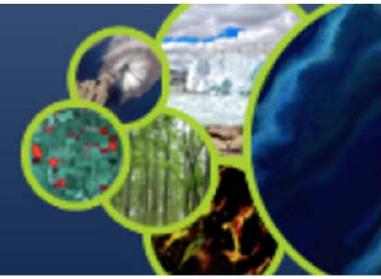




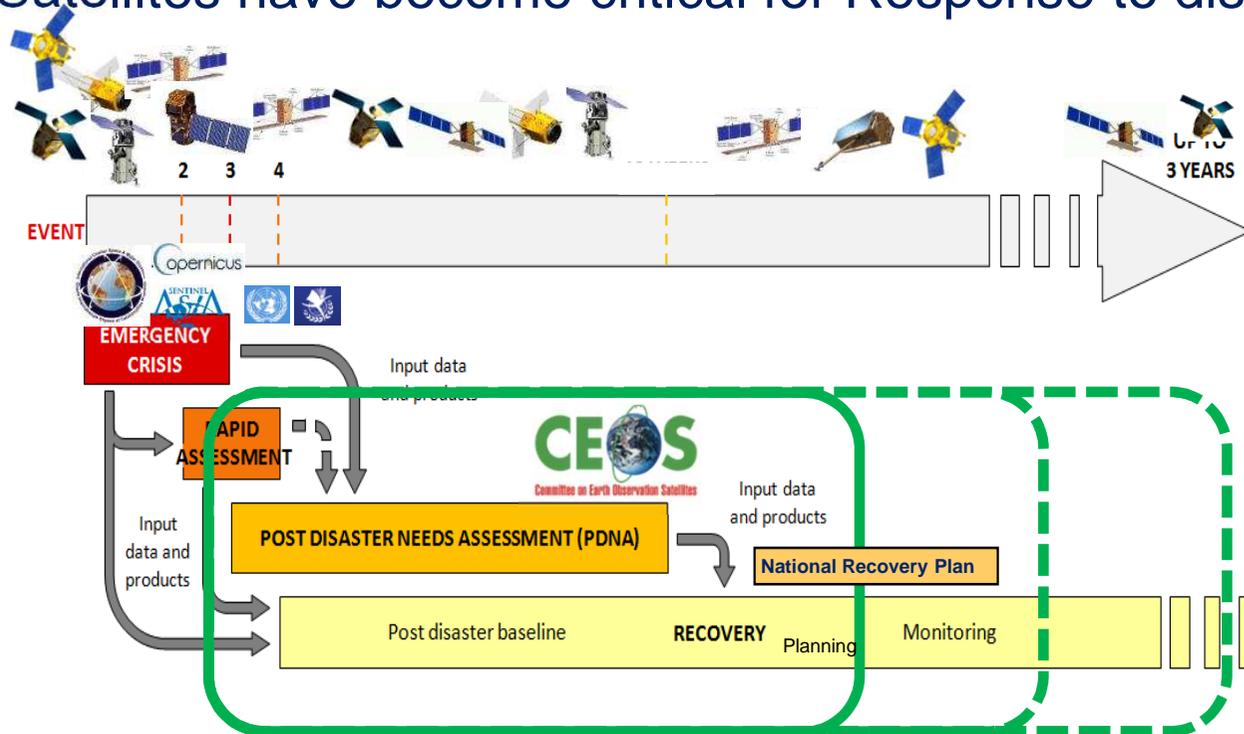
Committee on Earth Observation Satellites

# Proposal to establish a pre-operational Recovery Observatory 2024-2026

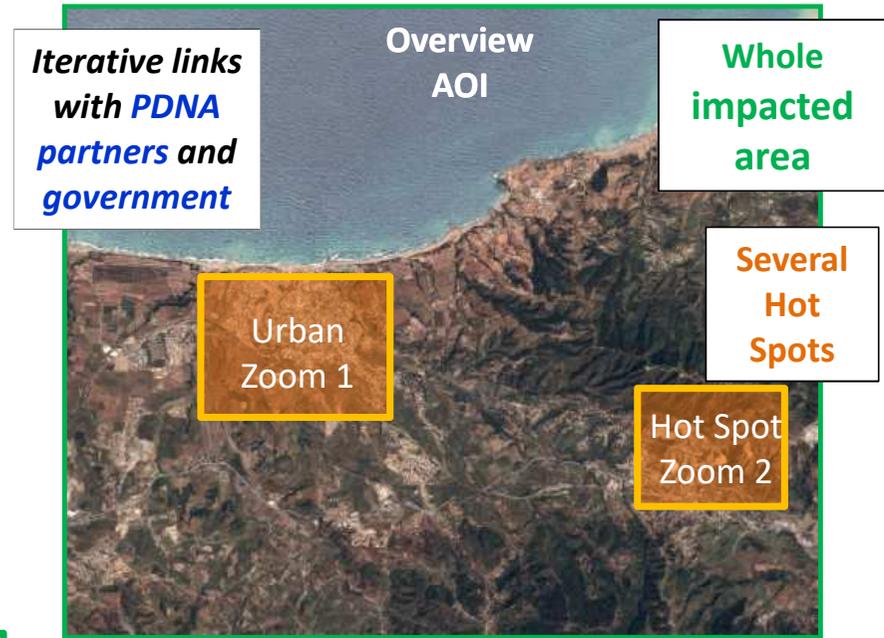




Satellites have become critical for Response to disasters ... but what about Recovery?



Collection of **satellite images and maps** at several scales during ~ 6 months **after a major disaster**



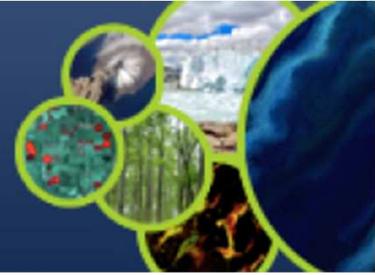
*Ancillary data are indispensable: terrain validation data, aerial and drone data, statistics, cartography, ....*

**“Recovery Observatory”** : Process allowing operational use of EO for PDNA, Recovery Planning, then M&E

# Summary of RO Demo activations



Activation	Pros	Cons	Comments
<b>1. Beirut blaze</b>	Synthetic update of situation	Very small area not representative of typical activation	Coordination with Copernicus but no other added CEOS value
<b>2. Eta-Iota hurricanes</b>	Excellent. Multinational coordination. Innovative products (e.g. interferometry Sula Valley)	Request came months after events; no direct impact on early recovery	Demonstrated need for increased tripartite coordination
<b>3. Haiti EQ</b>	Activation in days; results in PDNA only input for agriculture and environment	None	Excellent showcase Successful Capacity Building example
<b>4. Pakistan floods</b>	Excellent quality of CEOS products for two areas retained for Phase 1; strong interest in DRF products (agriculture)	Lack of coordination; evolving need analysis led to gaps in EO products; poor uptake in PDNA	Large events (Pakistan, Nepal EQ, ...), pose unique coordination challenges
Turkey/Syria EQ	Strong willingness of CEOS to contribute; linkages to GSNL	Complex political situation postponed decision to activate indefinitely	No activation but support provided in determining all remote sensing data available
Myanmar	Strong technical case for quality product	Impossible to deliver in proposed timeline	Need to fast-track activation requests
<b>5. Libya floods : activated last Friday</b>			



- After nearly 3 years of activity, an efficient **RO Demonstrator community** working in **best effort** mode :
  - ✓ **Data providers:** ASI, CNES, ESA/Copernicus, DLR, International Charter Space & Major Disasters
  - ✓ **Value adder contributors:** Copernicus EMS, BGC, NASA, CIMA, LIST, CNIGS, ICube-SERTIT
- **Operational results :**
  - ✓ **Lebanon :** reconstruction monitoring regularly provided to **Reform, Recovery & Reconstruction Framework (3RF)**
  - ✓ **Eta-Iota :** demonstration that very complex products can be delivered and used for improved understanding of long-term recovery (interferometric SAR for mm level subsidence analysis)
  - ✓ **Haiti EQ :** first products delivered in a relative rush mode that **directly inform the PDNA with quantitative data (environmental and agricultural damage)**
  - ✓ **Pakistan :** first products delivered in rush mode; some critical areas not addressed; coordination issues with broader recovery effort; better coordination of resources could have provided more comprehensive results.
- **Various** products generated and diverse types of satellite made available
- Excellent **collaboration** between the **stakeholders** and the **RO team**; RO team responsive to the emergence of new needs. Products welcomed by the recovery community to help reconstruction and better prepare to future events

# RO Demo partner contributions



Openly available  
response data and  
products

- International Charter Space and Major Disasters
- Copernicus EMS RM
- Sentinel-Asia
- UNOSAT
- Open-source sat data (Landsat, Sentinels, DTM)
- Data bases (landcover, population,..)

CEOS best efforts RO  
data and products

- Dedicated acquisitions of commercial data
- Complex satellite products (e.g. SAR interferometry)
- RO liaison officer and overall coordination
- Value adding services
- Capacity building

Ad hoc contributions:  
academia, international  
organizations  
(e.g. CEMS RRM, FAO,  
UN)

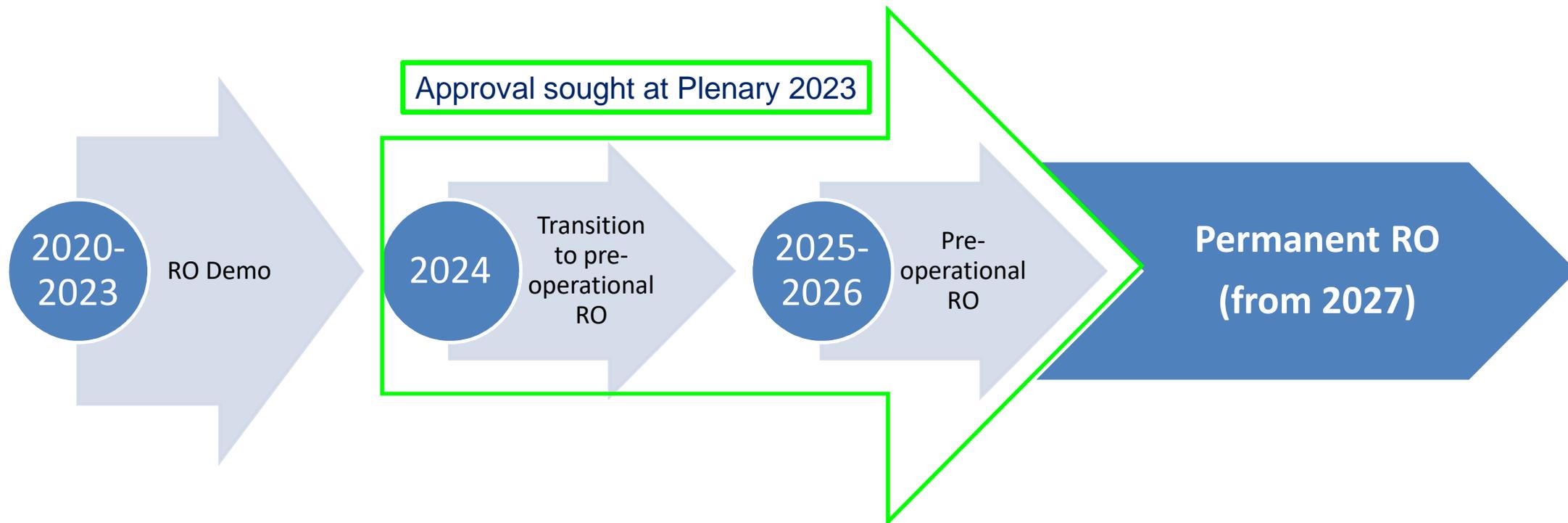
- Linkages to Copernicus Risk and Recovery Mapping
- Value adding services
- Expert analysis
- Integration of other advanced data sources (e.g. social media, drones, ...)

## Integrated Situational Awareness

to support recovery:

- Inform PDNA;
- Pre and post disaster baselines;
  - Medium term monitoring;
- Capacity Building assessment & plan.

# Establishment of Pre operational RO Implementation Timeline



# Necessary “Core” RO

## Establishment of pre-Operational RO



*RO Secretariat and RO Liaison functions (transition by 2025/2026 to recovery stakeholders)*

- **Secretariat:**
  - *Identify **dedicated RO funds** that can be activated on demand – WB/GFDRR and GDA, EU PDNA support, UNDP SOP for UNOSAT, etc*
- **Liaison:**
  - *Document and encourage **satellite and value adding contributions** from wide array of sources*
  - *Understand needs and **coordinate tasking** of CEOS satellites*
  - *Prepare **dedicated PDNA contribution** (rapid phase 1 for each activation)*
  - *Serve as **principal PoC for satellite community** with recovery stakeholders*
- **Capacity building:** *involve local and regional technical expertise and propose reinforced capacity after each activation, in conjunction with EU Copernicus, WB, and CEOS WGCapD*

# CEOS Data Contributions

## Establishment of pre-Operational RO



- ***Assume 2 to 4 activations per year for 2024-2026***
- ***Imagery requirements:***
  - ***VHR optical: ~2,000 sq km per activation***
  - ***X-band SAR: dedicated acquisitions to provide change detection products; hundreds of images (archived and new) per activation if interferometric analysis is useful***
  - ***L-band SAR: dedicated acquisitions to provide change detection products***
- ***Not significantly higher than existing RO Demo contribution, from same agencies (CNES, ASI, DLR, CONAE)***
- ***Transition to commercial data provision after 2026***

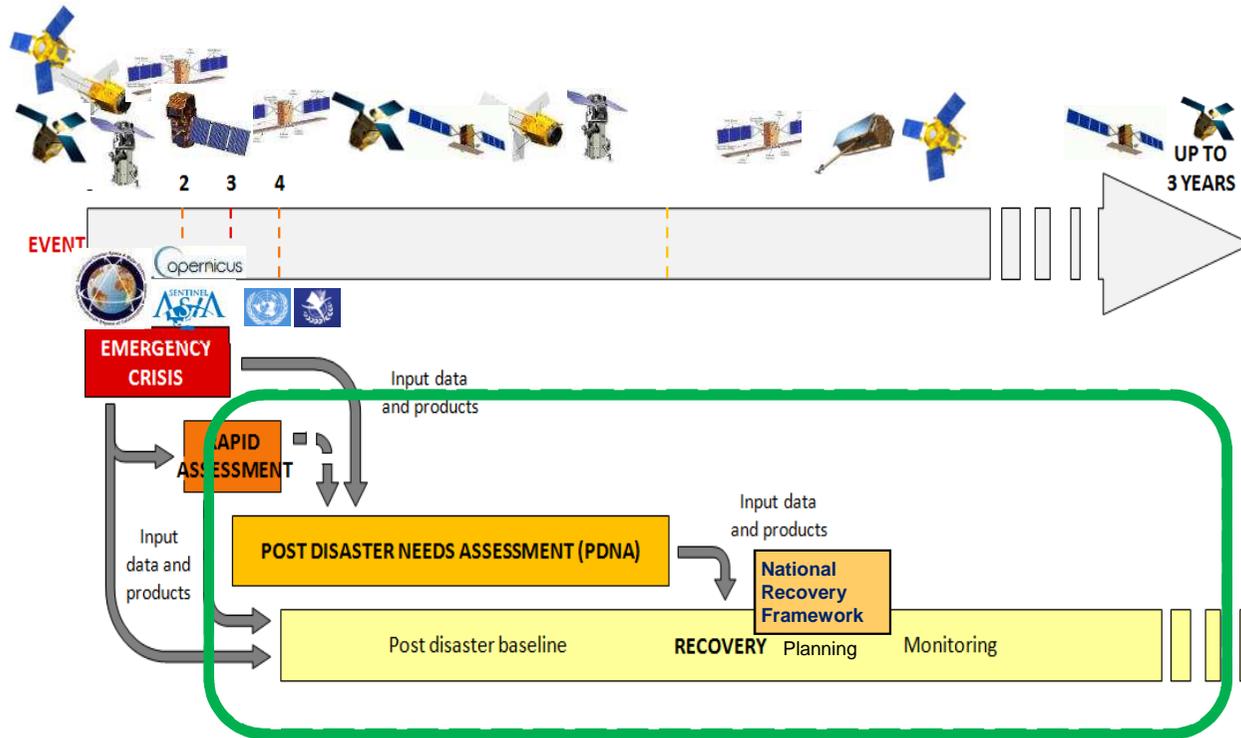
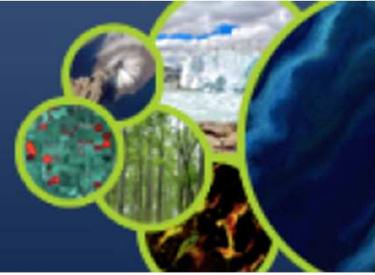
# Action Plan Proposal for 2024-2026

## Establishment of pre-Operational RO



- **Establish a capacity to provide 2 to 4 Recovery Observatories for the next three years beginning in 2024:**
  - **Target :**
    - one event per **semester** in 2024;
    - one event per **quarter** in 2025 and 2026;
  - **Initially provide resources through *ad hoc best efforts* mechanisms (as in demonstrator);**
  - **Q1/Q2 2024 work with partners to establish *mechanisms for private sector and intergovernmental organisation* RO activation (operational Q1 2025)**
    - **WB/GFDRR** mechanism to activate *pre-qualified private sector support* in conjunction with **CB** in country
    - Work with **UNDP and UNDP Crisis Bureau** to activate **UNOSAT** on regular basis for RO activations
    - Work with **EU** to task **Copernicus EMS RRM** to rapidly respond to recovery intervention requests
    - Access existing **EU framework contracts on PDNAs** to ensure PDNAs benefit from satellite support in a coordinated fashion

# Outcome: RO integrated into Recovery process



**“Recovery Observatory”** : Process allowing operational use of EO for Rapid Assessments, PDNA, Recovery planning & Recovery M&E