Committee on Earth Observation Satellites

Generic Recovery Observatory (G-RO) : status and next steps

Presentation to WGD#11
Athens, 5 March 2019

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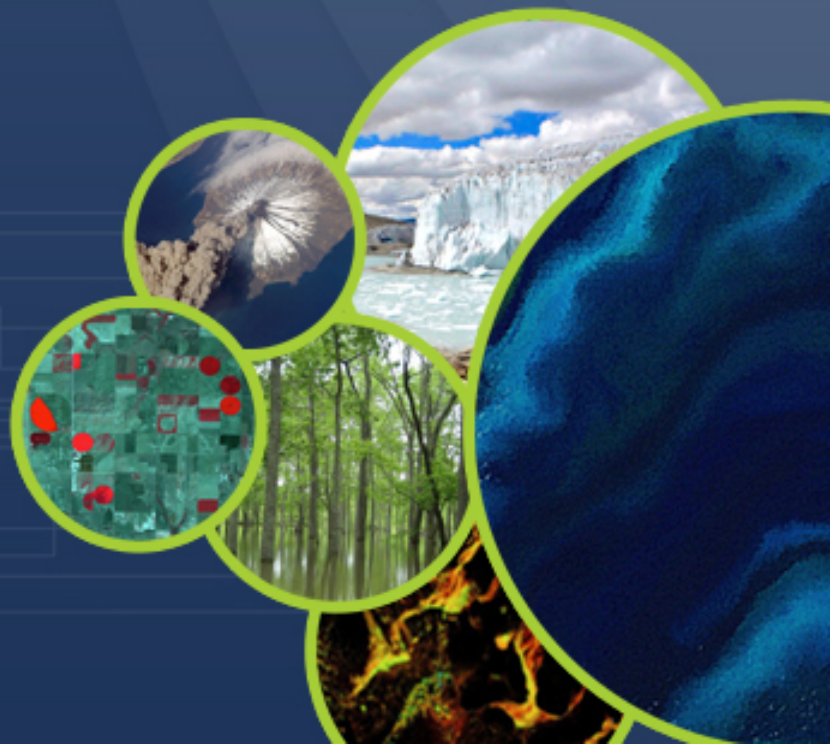
G-RO ad hoc Team co-lead



Outline

- EO in Recovery
- Genesis of ad hoc G-RO Team
- 5 December Meeting
- Advocacy Paper
- World Reconstruction Conference 4 Session
- In a nutshell (summary)
- Haiti RO achievements and lessons learned
- Next steps

EARTH OBSERVATION IN RECOVERY

Earth Observation is already part of "response", but there is little contribution to the "post-crisis" part of the DRM cycle.

Concept of ***"Recovery Observatory"***

- Access to EO derived products in the Recovery phase
- EO data acquired during the full Recovery period (months, years)
- Strong ties to local users and to international organisations

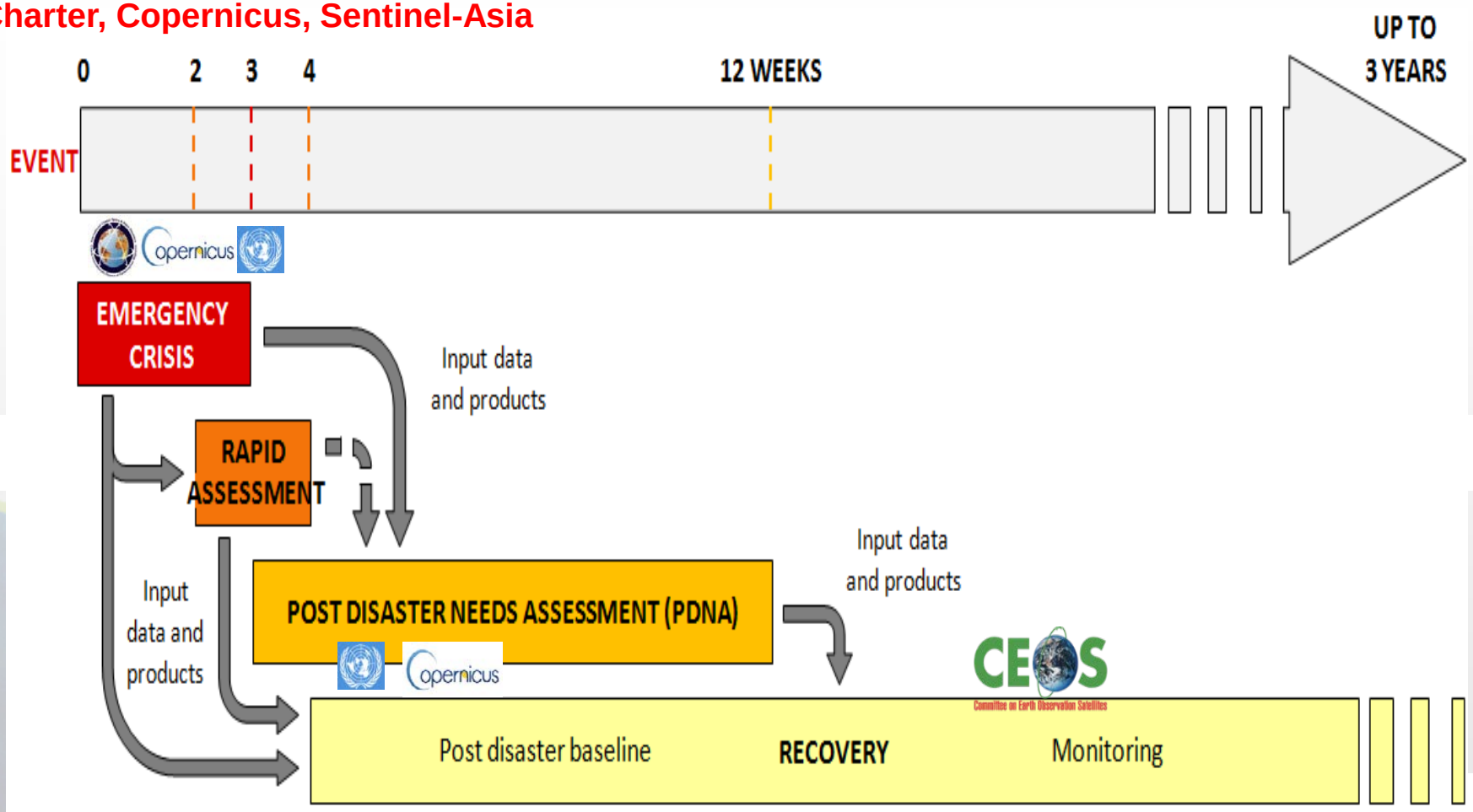
CEOS WG Disasters **"Recovery Observatory" (RO) pilot :**
High-profile **demonstration in a real case** of value of using satellite EO to support Recovery from a major disaster :

- Near-term (rapid assessments, post PDNA);
- Long-term (major recovery planning and implementation, estimated 3-4 years);

Definition of a ***generic and replicable RO***, for further use by international stakeholders (best practice, recommendations, ITT …).

The Recovery Observatory and the post-crisis period

"Urgent response":
Charter, Copernicus, Sentinel-Asia



"Recovery Observatory" : long-term recovery monitoring

Imagery for a G-RO

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

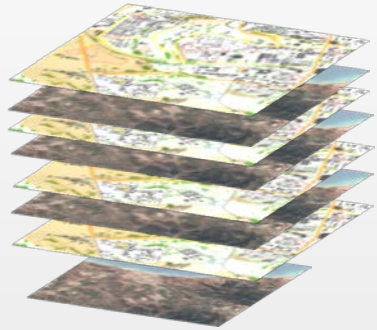
***Ancillary data remain indispensable*: terrain validation data, aerial and drone data, statistics, cartography, ….**

Overview area

Mid-scale products from Sentinel data at 10m resolution

- Change in landcover, open spaces
- Vegetation loss or re-growth
- Agriculture

Update frequency:
every 10 days to 6 months



Hot spot zooms

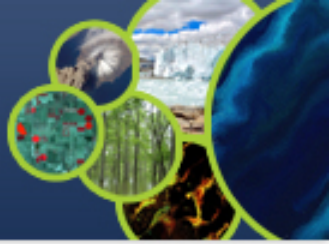
Large scale products from very high resolution data

- Urban areas, housing, ….
- Transport infrastructure, coastal areas, …
- IDP camps, …
- Specific areas of interest

Update frequency: every 1 to 2 months

Mainly EO based	Baseline mapping	Monitoring
Buildings, shelters	• **Buildings footprint mapping** • Building attributes (roof type, height indication, collapsed or partially collapsed) • Indicate density of damaged buildings • **Urban blocks with indication of damage**	• **Building removal and construction** • **Change in urban land use, morphology and density** • Indicate type of dwelling reconstruction
Camps	• **Location of spontaneous and organized gathering areas** • **Location of temporary dwellings** • **Land use, open spaces**	• **Camp removal and installation** • **Tent removal and installation** • **New land use / open spaces**
Transport	• Accurate transport network mapping with detailed metadata (type, damage level) • **Accessibility analysis** • **Proximity analysis** • Traffic activity analysis	• **Rebuilt transport facilities** • **New transport facilities** • **Removal of transport facilities** • **Accessibility analysis** • **Proximity analysis** • Traffic activity analysis
Infrastructures	• Mapping of utilities and services infrastructures (administration, education, healthcare, power - water - sanitation facilities…) with detailed metadata (type, level of damage)	• Recovered infrastructures • **Infrastructure removal and construction**
Environment	• **Landcover, open spaces** • **Affected landcover (e.g. burn scar with fire damage severity…)**	• **Change in landcover, open spaces** • **Indicate loss of vegetation** • **Vegetation re-growth**
Topography	• Risk analysis (vulnerability to flood, to water run-off risk, to soil erosion…)	Significant external input required • Risk analysis

Genesis of ad hoc Team



- Initially discussed between GFDRR and CEOS/CNES at UR2018 in Mexico
- Team will work within recovery community to define a sustainable vision for increased use of satellite EO in support of recovery.
- First order of business : draft an advocacy paper documenting existing experience using EO for recovery.
- 1st telcon in Oct.; 2nd telcon Nov; 1st meeting 5 Dec; 3rd telcon Jan.
- How to develop a scalable & replicable Recovery Observatory
- Preparing input to WRC4 – May 2019

Generic RO ad hoc group

- GFDRR/WB: Joe Leitmann, Mare Lo
- CEOS WGD RO: Hélène de Boissezon (CNES, CEOS Haiti RO leader), Andrew Eddy (CEOS WGD, RO Sec, Consultant to CNES)
- WB: Claudia Soto, Roland Bradshaw
- UE/CE: Ricardo Zapata-Marti, Françoise Villette, Peter Spruyt, Pierre Norzeron
- UNDP: Stefanie Afonso, Rita Missal, Krishna Vatsa
- UNOSAT: Samir Belabbes, Einar Bjorgo, Luca Dell'Oro
- CEOS WGD Leader: Simona Zoffoli (ASI)
- CEOS WGD Data Coordination Team: Jens Danzeglocke (DLR)

G-RO Meeting 5 December

09:00 Introductory remarks (J. Leitmann, H. de Boissezon)

09:15 PDNA process and use of satellites (R. Zapata)

09:40 State-of-the-art in the use of satellites for recovery

- 09:40 Copernicus Risk and Recovery (F. Villette by Webex)
- 10:00 UNOSAT recent PDNA involvement (S. Bellabes by Webex)
- 10:15 Haiti RO lessons learned (H. de Boissezon and A. Eddy)
- 10:30 Indonesian lessons learned (S. Afonso, R. Missal)

10:45 Coffee break

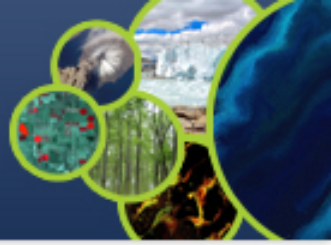
11:00 Challenges for increased satellite data use for Recovery

11:40 Towards a generic RO concept (H. de Boissezon and A. Eddy)

12:00 Box lunch (discussion on input for 13-14 May WRC4)

Advocacy Paper Overview

WRC 4 Session



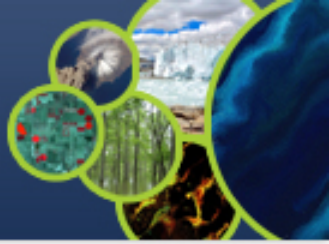
World Reconstruction Conference 4 to be held in Geneva 13 and 14 May

GFDRR and CNES will co-lead a session: **Facilitating Recovery and Inclusion through Satellite EO Technology**, May 14, 2019 @ 16:00

The session will have three objectives:

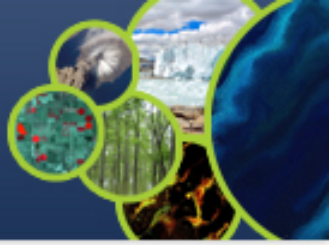
- Increasing awareness on how satellite imagery has been used in the past to scale up inclusion in the recovery process;
- Advocating for the use of satellite EO to enable inclusive recovery efforts;
- Discussing how the use of technology can be improved to support recovery planning and monitoring.

WRC 4 Session Questions



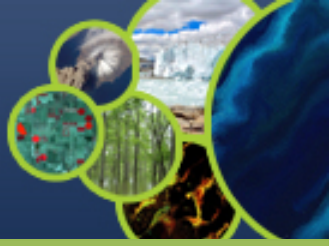
- What are the main benefits of using satellite EO for recovery?
- How has satellite imagery been used to ensure inclusion of vulnerable groups in the recovery planning and monitoring?
- How can we increase the use of EO, in order to apply the full range of EO data to recovery challenges?
- What can be expected in the future in terms of technological innovations that will facilitate recovery monitoring?
- Is there a different approach in the use of satellite EO for major disasters than for recurring or protracted crisis?
- How can satellite EO be used to better prepare for disaster recovery? How can inclusive recovery be advanced using these technologies?
- How can early action support prioritization of response and reduce the impact on vulnerable populations?

Haiti RO Achievements – building blocks for G-RO



- Access for Haitian users to regular imaging of affected areas over a long period, esp. higher resolution data not typically freely available (Pleiades, Cosmo-SKYMED);
- Range of thematic products showing status of southwest Haiti immediately after and one-year after Matthew (Built areas in Jeremie and Les Cayes, Agriculture, Parc Macaya, mangroves near Port-Louis);
- Key data sets compiled in a single framework to use seamlessly
- Key information (analytical, geospatial) about Recovery progress to support decision-making processes;
- Capacity building initiatives tied to optical and SAR data processing for CNIGS;
- Full-scale demonstrator to identify where EO can support Recovery.

Towards a Generic RO: Lessons Learned in Haiti



Lesson Learned	Applicability to G-RO
Critical role of local champions as end users and capacity nodes	Need for clear relay to local users through international stakeholders Involvement of end users without any funding
Necessary local capacity development (producers and users)	Funds to be identified to ensure local capacity development on systematic basis for G-RO
A few standard products can be defined (e.g. annual landcover change map based on Sentinel-2)	Document standard product methodology and develop technology transfer procedure
Challenging linkages with Charter/Copernicus and PDNA process	Need for predefined procedures (between G-RO and Charter, and PDNA, but also with data providers for data licensing) and clear end-to-end approach from event through to National Recovery Plan
Long lead time to establish RO	Need to fast-track roll-out and plan for legacy strategies at outset
Value-adding budget is critical stumbling block, which was partially addressed in RO through Copernicus support	Need to define at outset value-adding approach and determine level of effort (sliding scale of benefits)

Budget	Data and Products	Comments
No cost	Free and Open data sets from imagers that acquire regularly without specific tasking (e.g. Landsat, Sentinels).	Lower resolution offers synoptic but not detailed view; Interpretation straightforward.
$US 50,000	Merge open data with selected acquisitions of commercial, higher resolution and targeted imagery; Small value adding budget to generate a few tailored recovery products in the weeks following a disaster.	Would require institutional arrangement for fast activation after events; Available now through Copernicus service with European value-added providers; Suited to PDNA, but offers no long-term benefit for local capacity.
$US 300,000	Dedicated satellite-based input to the recovery process over several months including regular use of VHR optical and SAR data over relatively large areas on a recurring basis; Addresses multiple data types and products; Contributes to recovery across a range of different areas (e.g. agriculture, built-up environment, environmental damage, infrastructure, etc.).	Depending on when the products are required, funding may come from a small PDNA-dedicated funding mechanism, or the larger Recovery Plan; Analysis of large volumes of data may require advanced computing resources; Would offer framework for longer-term capacity building support and academic training.

… G-RO in a nutshell…

- **Recovery satellite EO needs** are different from those of other phases of disasters
- **Imaging and value adding** resources present **challenges** (e.g. scope vs resolution, cost-benefit of value adding)
- **Specific approaches and adapted strategies** are required to address them, before events occur
- A coordinated approach **from Event to National Recovery Plan** (including Charter/Copernicus and PDNA) is required
- **Strong involvement of local users** (and providers when applicable) is necessary to success, however **international stakeholder community** is a critical corollary
- **Local capacity building** should be a standard component
- **Lessons learned** to date (in Haiti and elsewhere) offer **valuable** input but can be **challenging to scale up**

Next Steps

- Publication of Advocacy Paper by GFDRR May 2019
- WRC #4 session
- 2nd G-RO meeting during WRC #4 (mid May)
- Ad hoc Team to begin working on scenarios for cooperation
- Defining linkages to other groups (Charter, Copernicus EMS)
- Proposal to CEOS on G-RO collaboration to be developed in 2020

Photo: A. Eddy, 2017

THANK YOU!

MERCI!