



Committee on Earth Observation Satellites

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

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Outline



- **EO in Recovery**
- **Status of G-RO ad hoc Team**
- **G-RO Activity update**
 - **World Reconstruction Conference 4 Session**
- **G-RO Advocacy Paper**
- **G-RO Concept Paper development**
- **G-RO Plans for 2020**
- **In a nutshell (summary)**

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) Haiti 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 years);

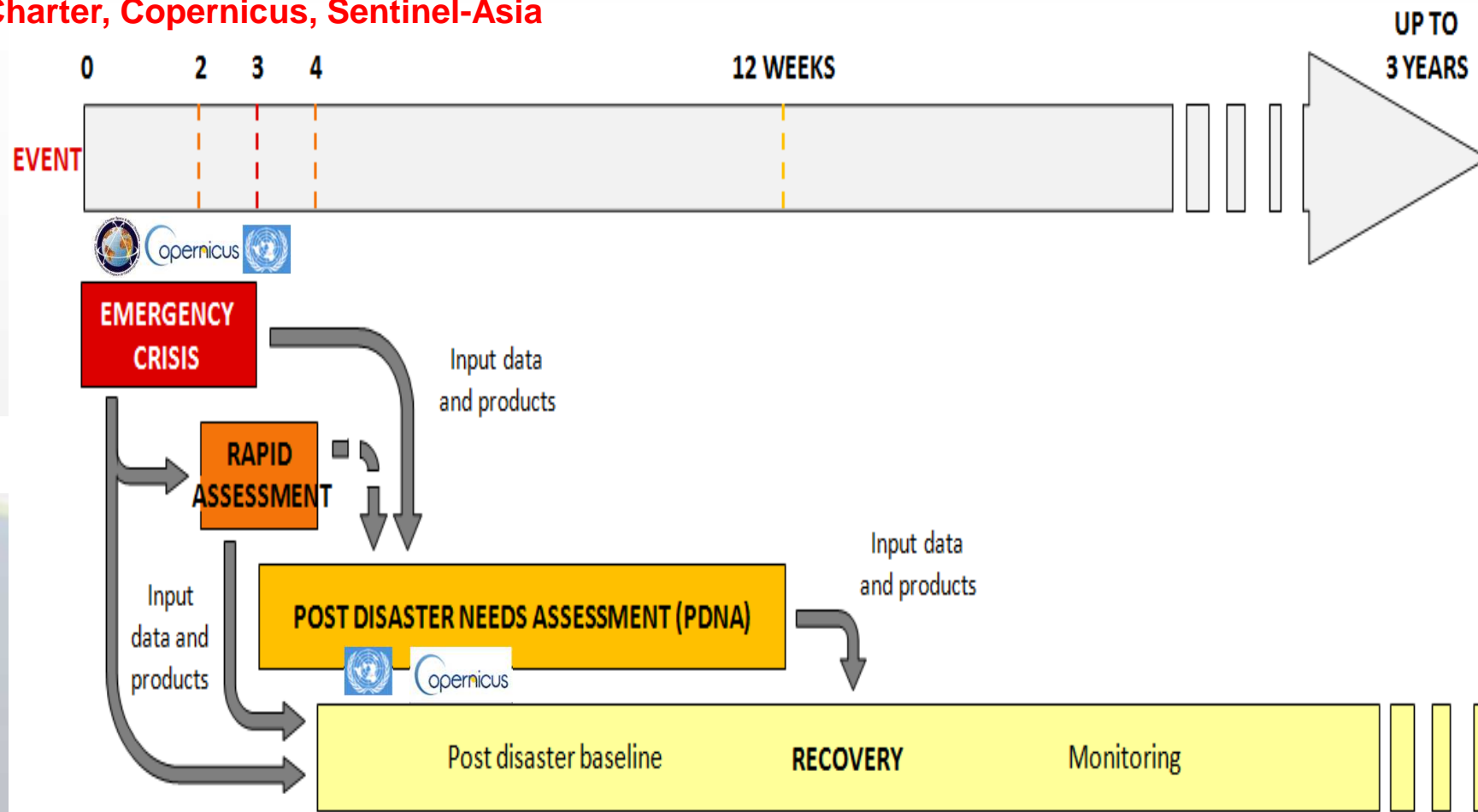
Definition of a ***generic and replicable RO***, for further use by international stakeholders (best practice, recommendations, ITT ...).



The Recovery Observatory and the post-crisis period



“Urgent response”:
Charter, Copernicus, Sentinel-Asia



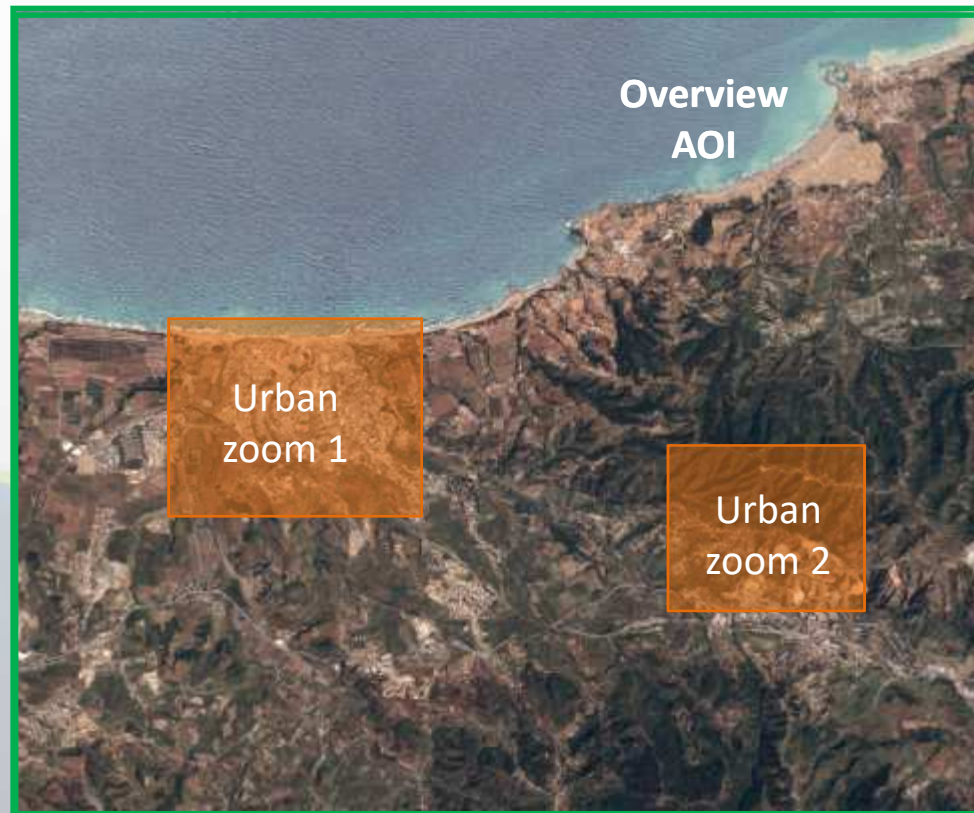
“Recovery Observatory” : long-term recovery monitoring
Contributions could be made throughout early and later recovery



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,

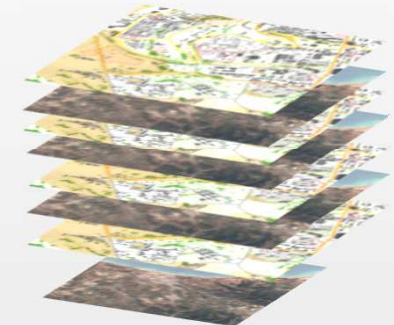
Overview area

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	<ul style="list-style-type: none"> • Buildings footprint mapping • Building attributes (roof type, height indication, collapsed or partially collapsed) <ul style="list-style-type: none"> • Indicate density of damaged buildings • Urban blocks with indication of damage 	<ul style="list-style-type: none"> • Building removal and construction • Change in urban land use, morphology and density <ul style="list-style-type: none"> • Indicate type of dwelling reconstruction
Camps	<ul style="list-style-type: none"> • Location of spontaneous and organized gathering areas • Location of temporary dwellings <ul style="list-style-type: none"> • Land use, open spaces 	<ul style="list-style-type: none"> • Camp removal and installation • Tent removal and installation • New land use / open spaces
Transport	<ul style="list-style-type: none"> • Accurate transport network mapping with detailed metadata (type, damage level) <ul style="list-style-type: none"> • Accessibility analysis • Proximity analysis • Traffic activity analysis 	<ul style="list-style-type: none"> • Rebuilt transport facilities • New transport facilities • Removal of transport facilities <ul style="list-style-type: none"> • Accessibility analysis • Proximity analysis • Traffic activity analysis
Infrastructures	<ul style="list-style-type: none"> • Mapping of utilities and services infrastructures (administration, education, healthcare, power - water - sanitation facilities...) with detailed metadata (type, level of damage) 	<ul style="list-style-type: none"> • Recovered infrastructures • Infrastructure removal and construction
Environment	<ul style="list-style-type: none"> • Landcover, open spaces • Affected landcover (e.g. burn scar with fire damage severity...) 	<ul style="list-style-type: none"> • Change in landcover, open spaces <ul style="list-style-type: none"> • Indicate loss of vegetation • Vegetation re-growth
Topography	<ul style="list-style-type: none"> • Risk analysis (vulnerability to flood, to water run-off risk, to soil erosion...) 	<p>Significant external input required</p> <ul style="list-style-type: none"> • Risk analysis



Status of ad hoc Team



- Team working within recovery community to define a sustainable vision for increased use of satellite EO in support of recovery.
- Building on Haiti RO experience but also numerous contributions to PDNAs and GRADE assessments after disasters (some 70 PDNAs to date)
- Team established in September 2018.
- 5 telcons to date (latest 4 September) and 1 face to face meeting in December 2018 – next meeting planned December 2019 @ UNDP HQ

Generic RO ad hoc team

- 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)
- + CEOS/WGD: Dave Borges (NASA)
- + GEO Sec: James Norris



WRC 4 Session



World Reconstruction Conference 4 Geneva May 2019

Event proposed to G-RO ad hoc team by UNDP (WRC4 organizer), and fully supported by WB and UE.

GFDRR and CNES co-led a session: **Facilitating Recovery and Inclusion through Satellite EO Technology**

The session had 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.

Session results were highlighted in WRC 4 report to Global Platform Plenary in May 2019

- 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 and how can inclusive Recovery be advanced through them?
- 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 sudden disasters than for **recurring or protracted crises**?
- How can satellite EO be used to **better prepare for disaster Recovery**?
- How can **early action** support prioritization of response and reduce the impact on vulnerable populations?



Advocacy Paper Status



Objectives:

- Present a thorough review of current state-of-the-art in application of satellite EO to Recovery
- Draft a document that can serve as backgrounder for development of demonstrator with international Recovery stakeholder community

Status:

- Paper compiled with input from CEOS, UNDP, WB/GFDRR, UNOSAT, and European Union in early-mid 2019
- Text underwent peer review from WB and UNDP in September 2019 as pre-cursor to publication (4 peer reviewers)
- Text to be e-published by GFDRR in fall 2019



Advocacy Paper ToC



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Advocacy paper draft circulated to WGDisasters and to WGISS September 2019



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 GRADE/PDNA process	Need for predefined procedures (between G-RO and Charter/Copernicus/SA, 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 in European value-added providers; Suited to PDNA, but offers no long-term benefit for local capacity.
\$US 300,000	Dedicated satellite targeted 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.

Preliminary estimation



G-RO Concept Paper



Objectives:

- Articulate critical linkages and governance scenarios for further Recovery collaboration
- Propose ideas for future WGD demonstrator(s)
- Develop a clear baseline for partner contributions to the future demonstrator(s)

Status:

- Consensus achieved (UNDP/WB/GFDRR/EU/CEOS) on structure and objectives of Concept Paper, and philosophy behind demonstrator(s)
- Paper to be drafted this fall/winter
- Face-to-face meeting planned in December for review of Concept Paper progress and development of proposal to CEOS and possible other frameworks (e.g. ESA/GDA, Copernicus, other TBD)



G-RO Concept Paper ToC



1. Overview – definition of concept
2. Critical linkages
 - 2.1 Sat EO
 - 2.2 Recovery Frameworks and processes
 - 2.3 Institutional frameworks (relationships) and processes
3. How, Where, When EO derived info could be integrated into existing processes?
4. Cost benefit – revisit section from AP and detail/update – three main points – free data/ \$ data/ VA \$ and services
5. Capacity building and linkages to local nodes of expertise
6. Scenarios for demonstrators



G-RO Plans for 2020



- Finalization and e-publication of **Concept Paper**
- Development and presentation of **G-RO Demonstrator** proposal for **SIT April 2020** or **Plenary 2020**
- Demonstrator to begin with **case study of recent PDNA** and survey of past PDNA leaders
- Demonstrator will be **led by international recovery stakeholders** who will select events for support
- **CEOS agencies** asked to contribute data, perhaps value adding resources – Linkage to **other frameworks** to be analyzed (ESA/GDA, Copernicus,.....)
- Duration of observatories to be reduced to **six-twelve months**
- Targeting **4-6 major events** over a 2-3 year period late 2020 to late 2022/23



... 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) – a demonstrator required to showcase value achieved through investment in VA
- **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**



Photo: A. Eddy, 2017

THANK YOU!
MERCI!