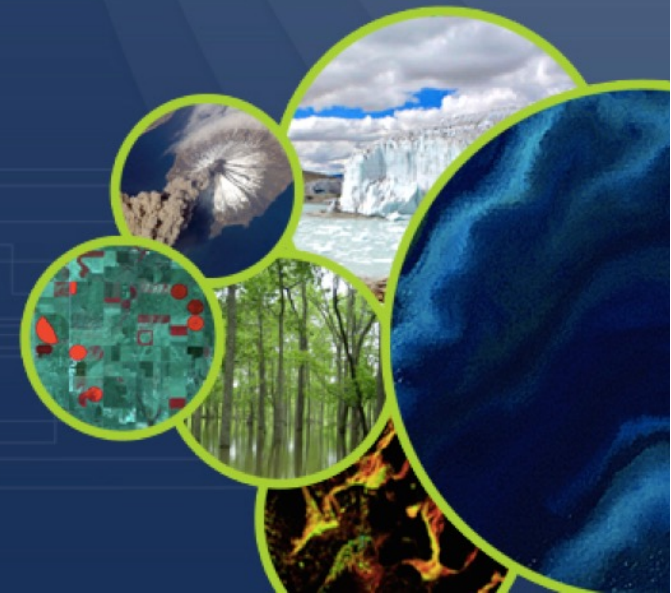


Cote d'Azur University - Academy 3
WG Disasters Conference
October 3rd 2022

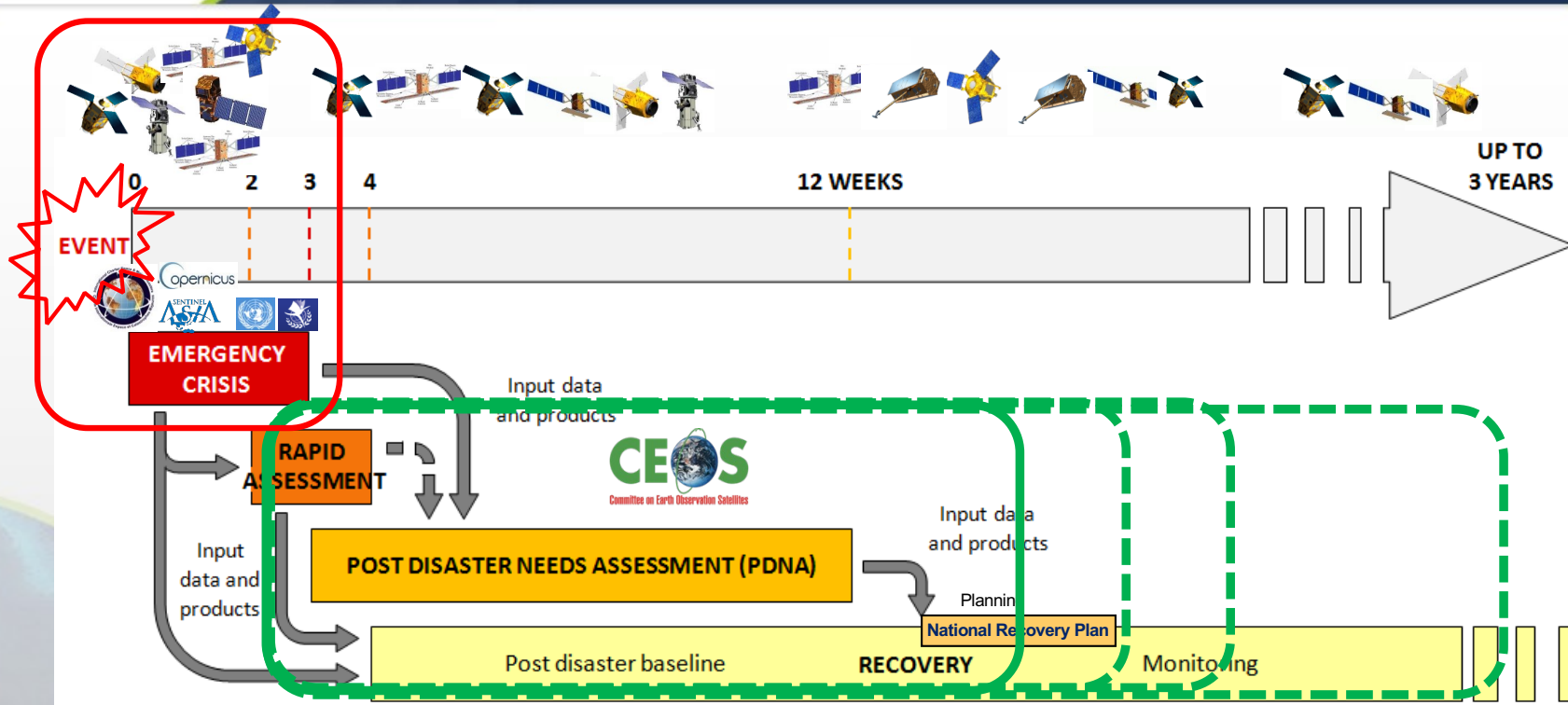
Recovery Observatory (RO) Demonstrator Highlights and successes

CEOS-led initiative with World Bank, UNDP and the EU/FPI

Helene de Boissezon (CNES)
Andrew Eddy (Athena Global)
and several members of WG Disasters



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

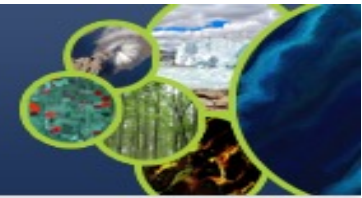


“Recovery Observatory” :

Process allowing operational use of EO for post Disaster phases :
 Post Disaster Needs Assessment (PDNA), Recovery planning & Monitoring & Evaluation



Recovery Observatory (RO) Concept



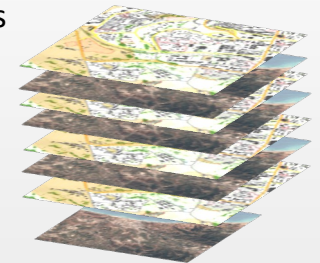
Collection of **satellite images and maps** at several scales
For 3 to 6 months **after a major disaster**

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 weeks to months



Hot spot zooms

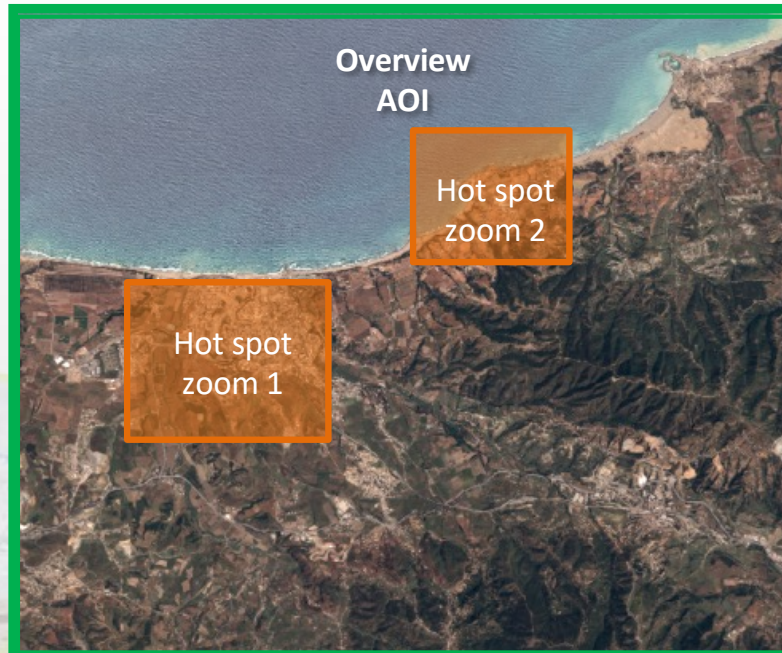
Large scale products from very high resolution data

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

Update frequency: every 1 to 2 months

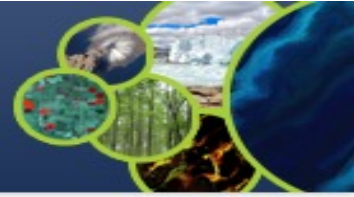
Iterative links with PDNA partners and government

Capacity Building needs assessment



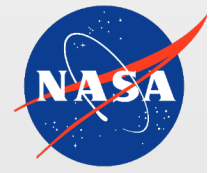
Ancillary data are indispensable: terrain validation data, aerial and drone data, statistics, cartography,

Recovery Observatory (RO) Partners



RO team leadership

PDNA tripartite agreement



When and how satellite and remote sensing may be used in Recovery



Emergency & Humanitarian Response: satellite imagery of affected area, infrastructure and population

Assessment process supported by more focused, sector specific images of pre and post disaster situation: agriculture, environment, infrastructure, housing, connectivity networks

Continued use of selected imagery to monitor and document recovery processes 6 Months +

RO Pilot (post Matthew Haiti)



When and how satellite and remote sensing may be used in Recovery

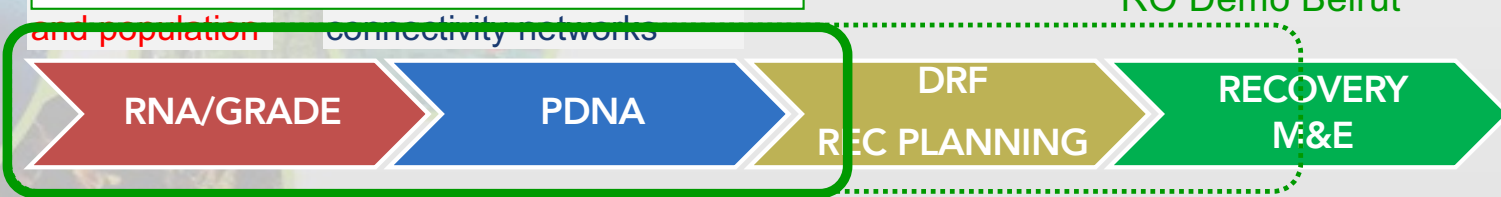


Emergency & Humanitarian Response: satellite imagery of

Assessment process supported by more focused, sector specific images of pre and post disaster situation:

Continued use of selected imagery to monitor and document recovery processes 6 Months +

3 -5 RO Demonstrators



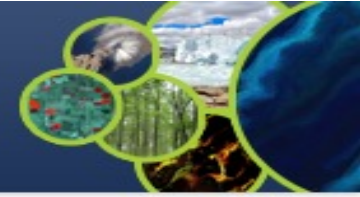
RO Demo Beirut

and population

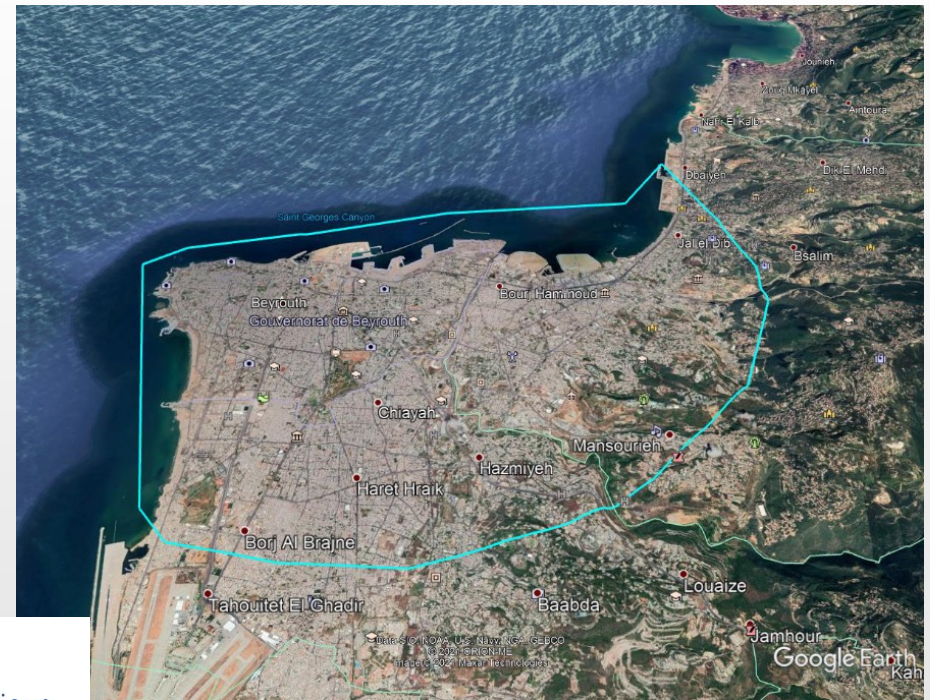
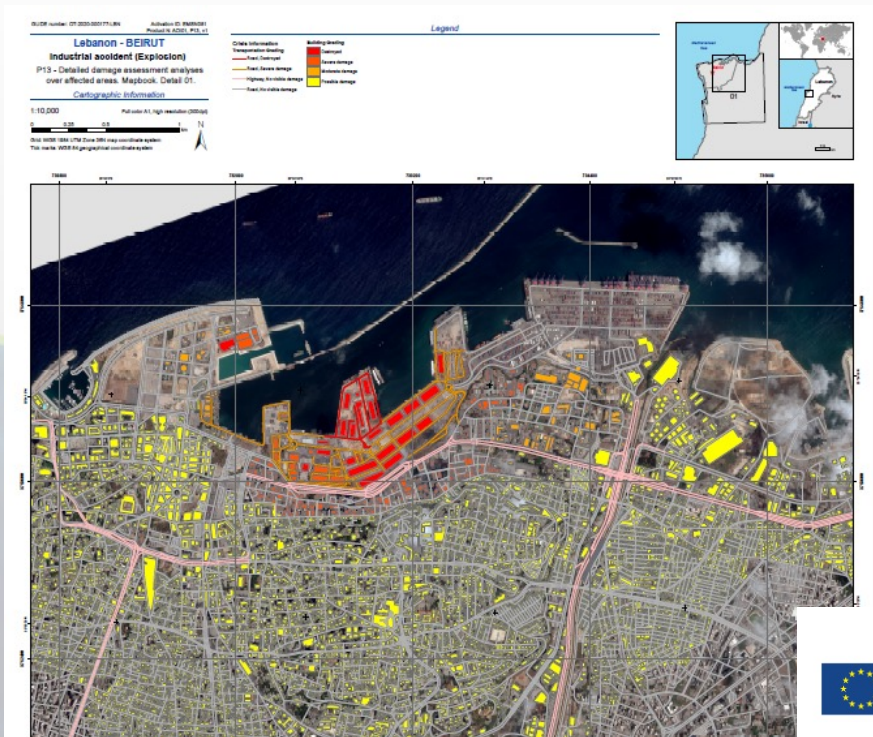
connectivity networks



RO Demonstrator #1 : Beirut blaze, Lebanon



RO test case : **Beirut blazes** - activated by European Union Foreign Policy Instrument (+ UNDP, WB) in Jan 2021
Copernicus Risk & Recovery mapping activation (from fall 2020) : updated every three months for one year



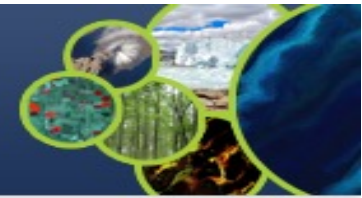


RO Demo#2 on post **Eta/Iota** hurricane in **Central America**

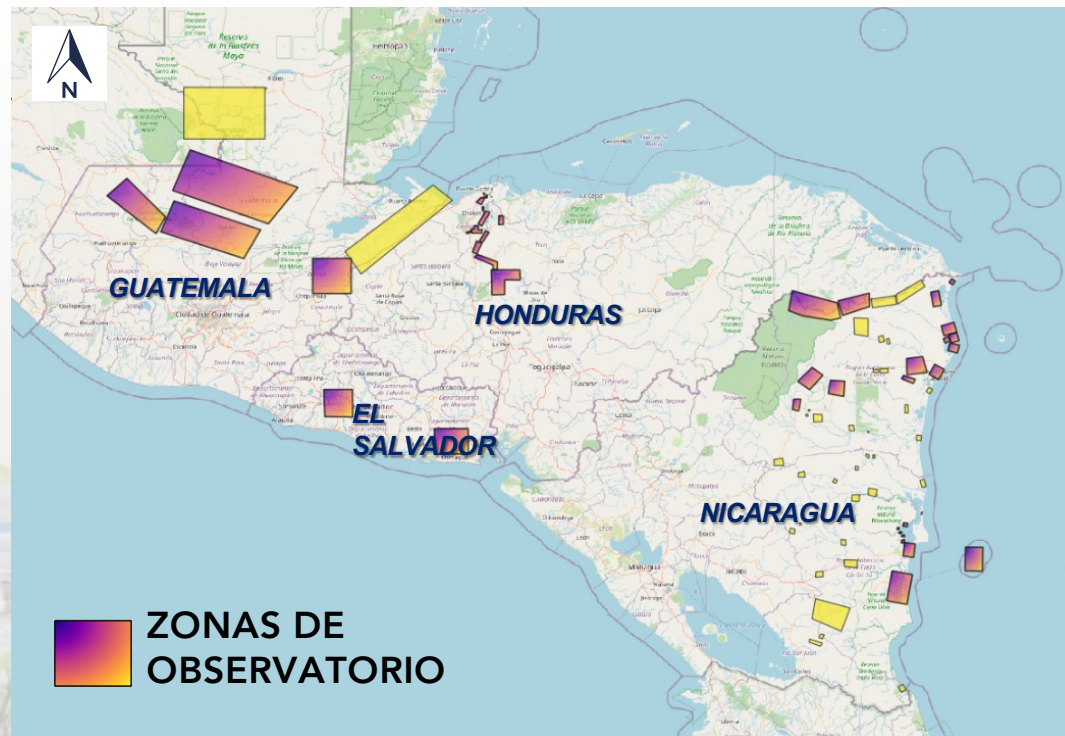




RO Demo#2 : Priority Damage Zones post **Eta/Iota** hurricane



Required information:
Damages to agriculture
Flood extension
Hydrological analysis and
vegetation change
Damages to built up areas
Landslides estimation

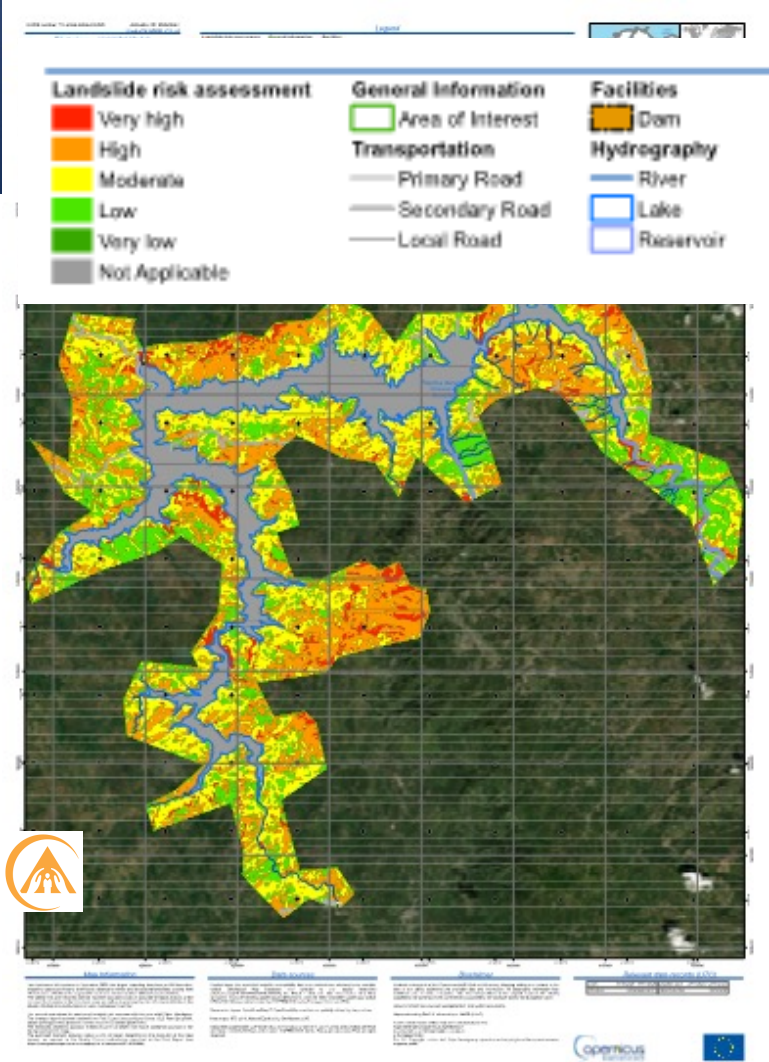
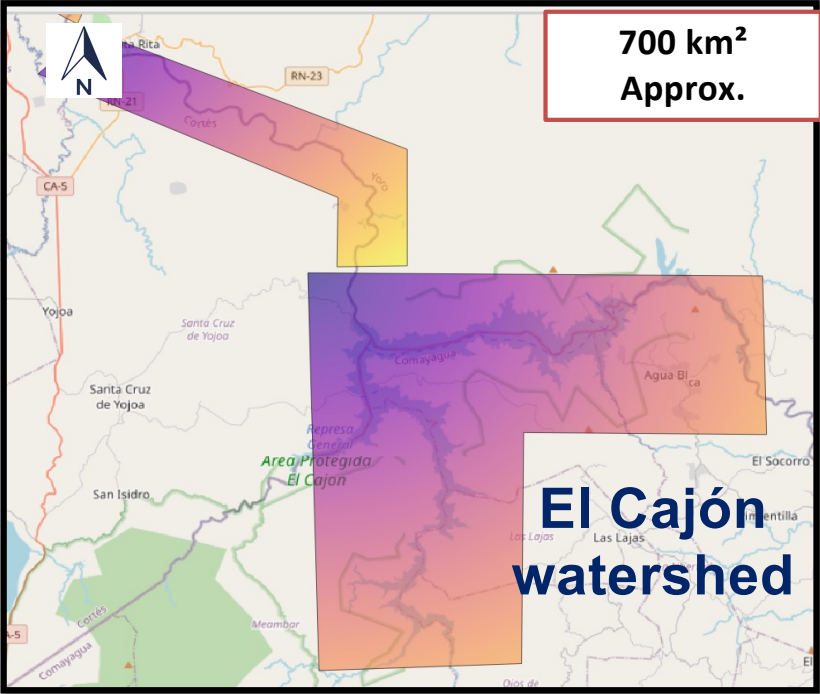


Priority Damage Zones
defined by CEPREDENAC
and 4 country partners
at 9th April 2021 “needs id
entification” meeting

Honduras (1,200 km²)
El Salvador (1,900 km²)
Nicaragua (7,500 km²)
Guatemala (20,000 km²)



Eta/Iota Honduras : El Cajon, Sula Valley



Request : Hydrological modeling and Landslide risk assessment
in El Cajon Reservoir above Sula Valley.

<https://emergency.copernicus.eu/mapping/list-of-components/EMSN084>





RO Demo#3 : Haiti 2021 Earthquake & Grace tropical storm



3rd RO activation: September 6th, at request of EU on behalf of tripartite team, in support of PDNA and emerging Recovery Framework

Support Haiti Recovery from EQ and Grace through EO-derived products:

- to augment and validate **PDNA** analysis (by end of September 2021) => **PHASE 1**
- to support the **Recovery Framework** elaboration => **PHASE 2**

Contributors/Partners

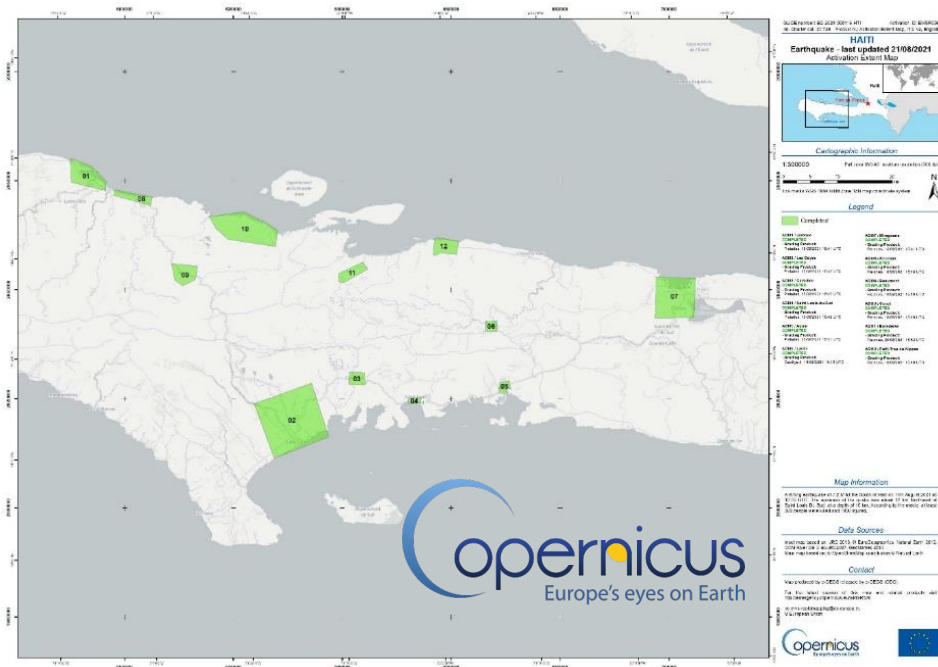
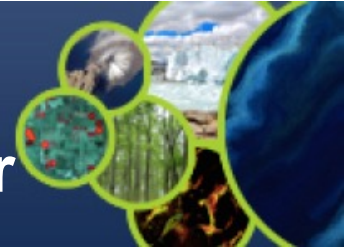


The grid of logos includes the following entities:

- Space Agencies:** CNES (Centre National d'Etudes Spatiales), ASI (Agenzia Spaziale Italiana), NASA, UNOSAT, DLR (German Aerospace Establishment).
- Government & Academic:** Sertit (CUBE), CIMI (CIMI Research Foundation), LIST (Luxembourg Institute of Science and Technology), Université de Strasbourg.
- Haitian Government:** Ministère de l'Environnement, République d'Haïti (PRIMATURE), République d'Haïti (Agriculture, Ress. Naturelles, Développement Rural), MPECE, IOM/OIM.
- International Organizations:** CIAT (Comité Interaméricain d'Arrangement de Territoire), CARIBACT, MPCE, IOM/OIM.
- European Union:** Commission européenne, EU Delegation in Haiti, Foreign Policy Instruments.
- Other:** particip, THE WORLD BANK, UNDP.



Haiti 2021 Earthquake : Emergency Response by CEMS, Charter



14 AUGUST 2021

Earthquake in Haiti

[Browse activations on map](#)

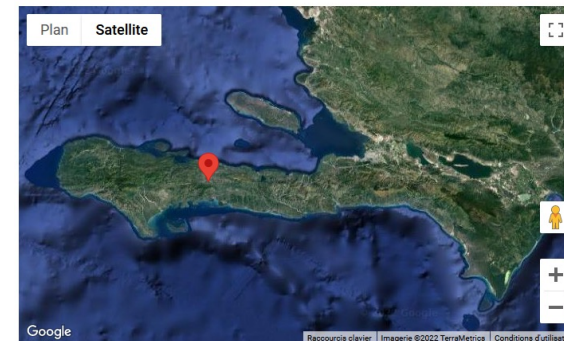


| | |
|----------------------|--|
| Type of Event: | Earthquake |
| Location of Event: | Haiti |
| Date of Charter | 2021-08-14 |
| Activation: | 22:20 |
| Time of Charter | 22:20 |
| Time zone of Charter | UTC+02:00 |
| Activation: | Direction de la Protection Civile de Haiti UNITAR on behalf of UN Operations and Crisis Center (UNOCC) CENAPRED |
| Charter Requestor: | |
| Activation ID: | 729 |
| Project Management: | ICube-SERTIT |

17 AUGUST 2021

Flooding in Haiti

[Browse activations on map](#)

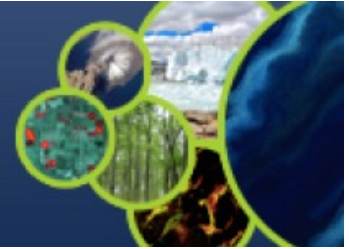


| | |
|----------------------|--|
| Type of Event: | Flood |
| Location of Event: | Haiti |
| Date of Charter | 2021-08-17 |
| Activation: | 20:15 |
| Time of Charter | 20:15 |
| Time zone of Charter | UTC+02:00 |
| Activation: | Direction de la Protection Civile de Haiti |
| Charter Requestor: | 730 |
| Activation ID: | |
| Project Management: | ICube-SERTIT |

- 2 International Charter Space & Major Disasters activations (earthquake, then flood events)
- 1 EMS Copernicus Rapid Mapping activation (earthquake)



RO Demo#3 : **Haiti Earthquake 2021** Earthquake & Grace tropical storm

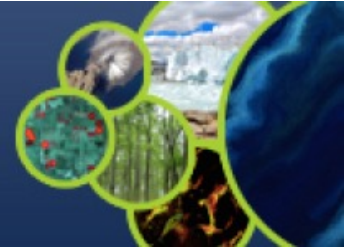


Macaya park view from Chantal, 30/11/2021 ©Michèle Oriol (CIAT)

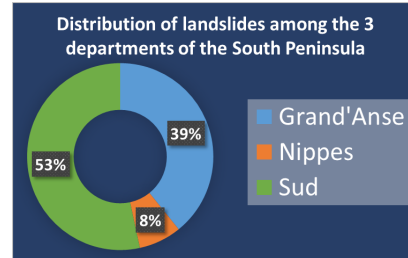


RO Demo#3 : Haiti Earthquake 2021

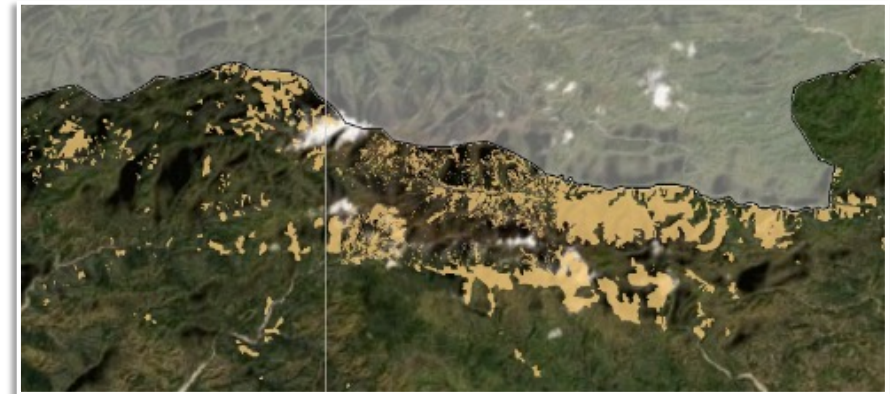
Phase 1: support to the PDNA



P01: Assessment and qualification of areas where EQ/Grace landslides have occurred, in South Peninsula



Landslides
South Peninsula: 6949.02 ha
Sud area: 3709.94 ha



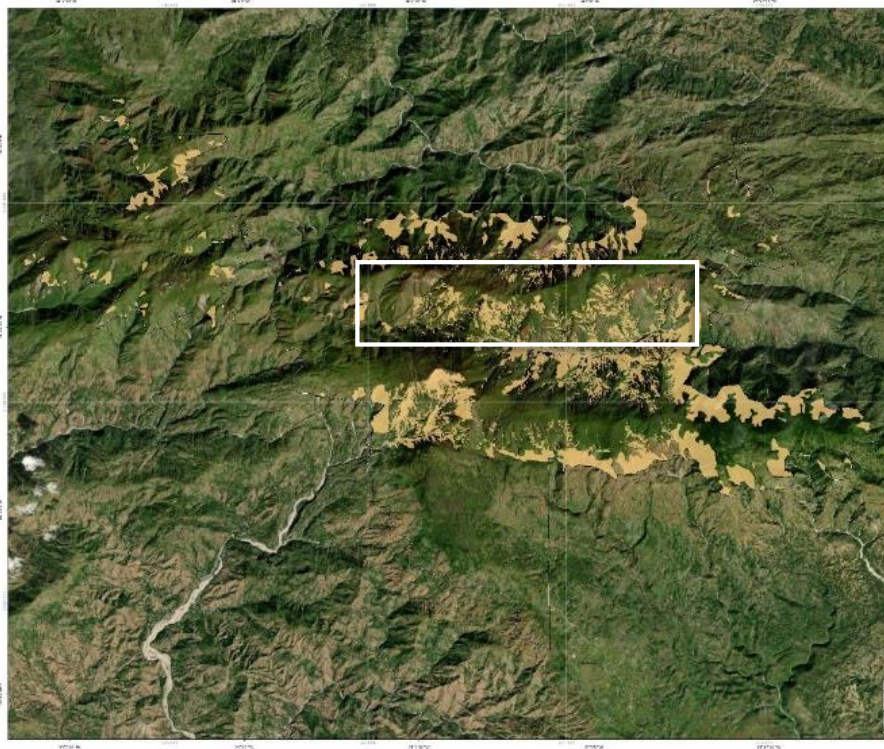


RO Demo#3 : Haiti Earthquake 2021

Phase 1: support to the PDNA



P01: Assessment and qualification of areas where EQ/Grace landslides have occurred, in South Peninsula



Haiti - Parc Macaya
 Glissements de terrain
 Obtenus après le 17/08/2021
 Carte de Jean Serrin

Information géographique
 0 200 400
 Projection: WGS 1984 UTM Zone 18N
 SRS: EPSG:31470
 Unité: Mètre

Legende
 Glissements de terrain
 Glissements de terrain

Informations
 Le 17 août 2021, une séismes de magnitude 7,2 a secoué la région du sud de l'île de Haïti. Cet événement a entraîné de nombreuses victimes et a provoqué de graves dommages matériels. Les zones les plus touchées sont situées dans le sud de l'île, notamment dans le Parc National Macaya.

Statistiques des données
 Glissements de terrain
 1901,66 ha

Créé par : Jean Serrin
 Date de mise à jour : 17/08/2021
 Contact : jean.serrin@unesco.org

Landslides

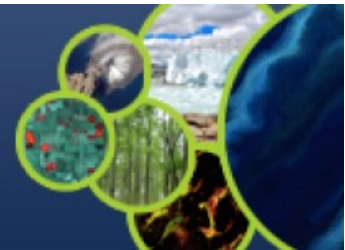
South Peninsula: 6949.02 ha
 Macaya Park area: 1901.66 ha (27%)





RO Demo#3 : Haiti Earthquake 2021

PDNA including RO results and figures



P01: EO: a valuable tool for assessing the agricultural, environmental and economic impact

Les images satellites que nous avons pu recueillir auprès du CEOS¹¹⁵, font état d'un total de 6, 949,02 ha de **glissements de terrain** dans l'ensemble des trois départements. Ces informations, croisées avec des données antérieures d'occupation des sols, ont permis de constater une **perte de 4,114 ha de végétation arborée** : Grand'Anse/ 1,687 ha, Nippes/ 297 ha et Sud : 2,130 ha.

Selon une analyse établie par le SERTIT, plus de 431 Ha de cultures agricoles denses, 567 ha de systèmes agro-forestiers denses, 1251 ha de cultures agricoles moyennement denses et 154 ha de pâturages auraient été affectés par les **glissements de terrains** dans les trois départements.⁴⁶

Les Dommages : les dommages les plus importants se retrouvent dans le sous-secteur des cultures, avec des dommages sérieux sur les **terres agricoles, perdues à la suite des nombreux glissements de terrains et éboulements** (13,9 millions \$US) et sur les **infrastructures hydro-agricoles**, principalement dans le département du Sud (2,4 millions \$US). Le sous-secteur de l'**élevage** a subi un montant total de dommage de 4,9 millions \$US, notamment avec la disparition d'animaux et les destructions d'infrastructures (poulaillers, porcheries) et pâturages. Dans le sous-secteur de la **pêche**, les dommages consistent principalement en la destruction ou l'ensevelissement des outils de pêche (0,55 million \$US)³¹.

RAPPORTS SECTORIELS

Évaluation Post-Désastre En Haïti



Séisme du 14 août 2021 dans la péninsule sud



Avec l'appui de






RO Demo#3 : Haiti Earthquake 2021

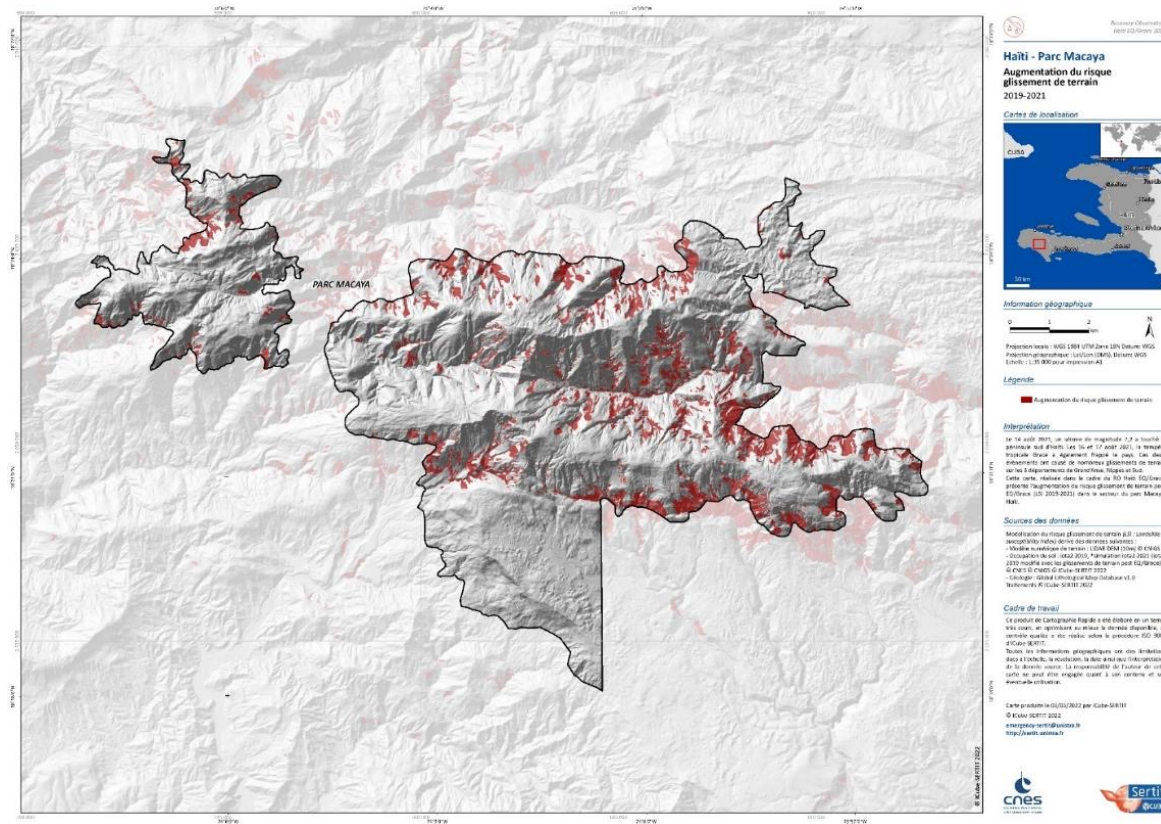
Phase 2: support to Recovery Framework



P01bis: Computation of a Landslide susceptibility index (LSI) over the South Peninsula

2019-2021

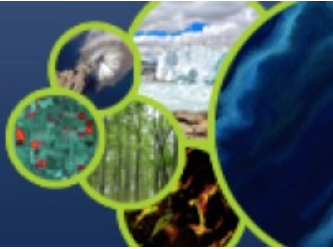
 Landslide risk increase



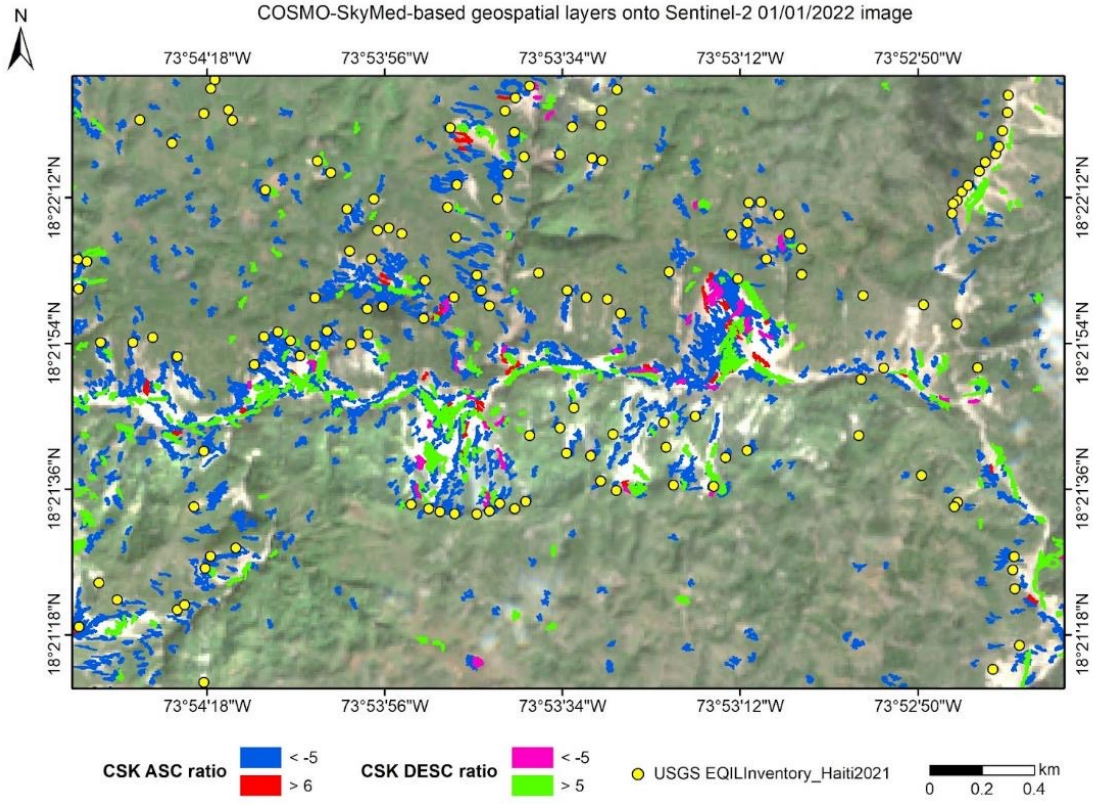


RO Demo#3 : Haiti Earthquake 2021

Phase 2: support to Recovery Framework



P02: Comparison of landcover maps and change detection maps (ASI) – Landslide detection



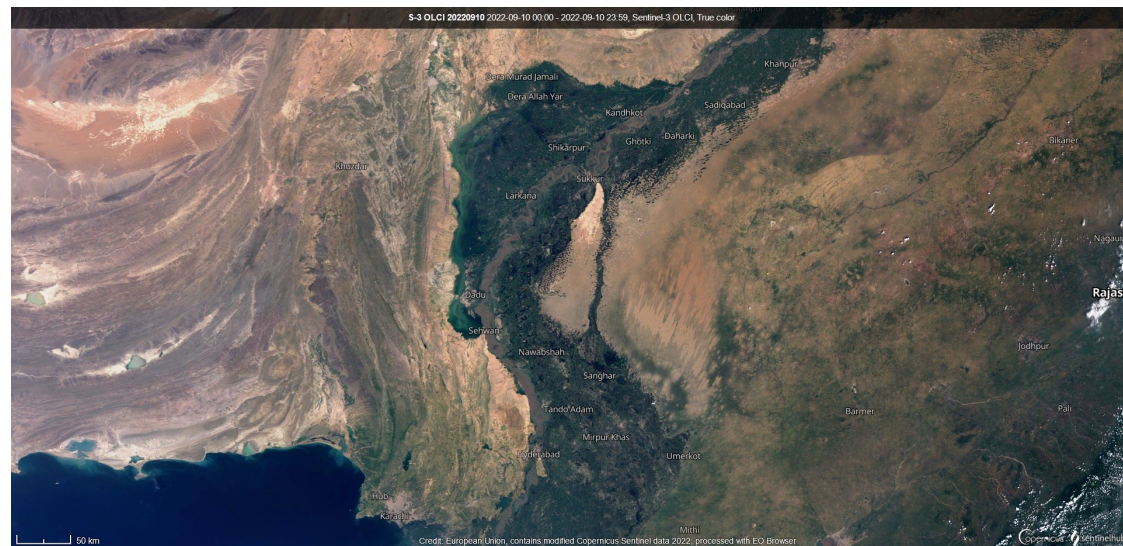
Landslides detection around Camp Perrin using CSK SAR data (ASC + DESC)

RO Demo#4 : 2022 Floods in Pakistan



The 4th **Recovery Observatory Demonstrator** has been triggered on **20th sept 2022** at request of EU, on behalf of the PDNA tripartite team (**EU, World Bank, UNDP**), in support of:

- the **Post Disaster Need Assessment (PDNA)**
- the **Recovery Framework**

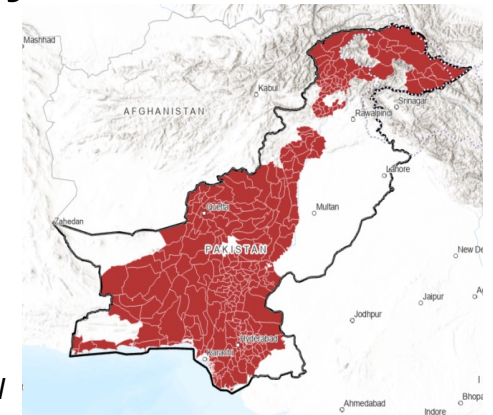


THE WORLD BANK

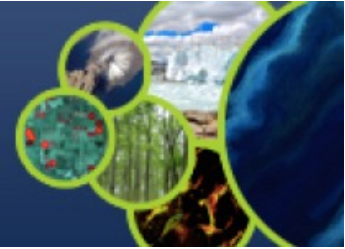


RO Demo#4 : **Floods Pakistan-** PDNA needs **CEOS**

- PDNA officially requested by Pakistan government on September 16, 2022
- EU coordinates the PDNA process and leads the agriculture sector
- The PDNA report is expected for mid-October
- **RO activation** would focus on providing **complementary information** to that have been already (or is being) committed (e.g. IPSOS for WB and CIMA/LIST for ADB/ESA)
- The analysis will focus on **84 districts identified as « calamity districts »**
- Needs have been expressed concerning:
 - **potential landslides** that may have impacted **orchards**
 - potential impacted **Natural Parks and Reserves**



*The 84 calamity districts
with a priority level*



- After nearly 2 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 :**
 - ✓ **on Lebanon :** monitoring of reconstruction regularly provided to **Reform, Recovery and Reconstruction Framework (3RF)**
 - ✓ **on Haiti :** First products delivered in a relative rush mode that **directly inform the PDNA with quantitative data (environmental and agricultural damage)**

- Excellent **collaboration** between the **stakeholders** and the **RO team:** responsive RO team; products welcomed by the recovery community to help reconstruction and better prepare to future events

- **Perspectives :**
 - ✓ 1 (2 ?) more activations between now and late 2023
 - ✓ Strong focus on **RO sustainable process** proposal after Demonstrator phase
 - ✓ Final report and **recommendations to CEOS and global stakeholder community late 2023**



Emergency & Humanitarian Response: satellite imagery of

Assessment process supported by more focused, sector specific images of pre and post disaster situation:

Continued use of selected imagery to monitor and document recovery processes 6 Months +

Sustainable RO, integrated into Recovery process

and population connectivity networks

