WG Disasters #5
Bonn, Germany
8-10 March, 2016

Recovery Observatory: status and next steps

Catherine Proy, CNES
Steven Hosford, CNES
Patrice Benarroche, CNES
Andrew Eddy, Athena Global

Hurricane Katrina
2005

Deepwater Horizon
2009

Indonesian Tsunami
2004

Haiti Earthquake
2010

Tohoku Tsunami
2011

Presentation Outline

- **Status of RO and report on December working session** (30 min)
- Initiation of recovery monitoring demonstration (Malawi) (30 min)
- EO data licensing for disasters – progress and next steps (20 min)
- Recovery input for UR Istanbul event (20 min)
- Sustainability and next steps (10mn)

Oversight Team (ROOT) Membership

Space agencies from CEOS Disaster working group:

CNES (Catherine Proy (Co-Chair), **Patrice Benarroche** and Steven Hosford)
ASI (Simona Zoffoli)
DLR (Jens Danzeglocke)
ESA (Ivan Petiteville and Philippe Bally)
JAXA (Chu Ishida and Nobuyoshi Fujimoto)
NASA (David Green and Stuart Frye)
USGS (Brenda Jones)

DRM Stakeholders:

World Bank/GFDRR (**Joe Leitmann (Co-Chair),** Keiko Saito and Tahir Akbar)
UNDP (Chiara Mellucci)
UNOSAT (Olivier Vandamme and Einar Bjorgo)
European Commission (Francoise Villette and Peter Spruyt)

Other partners:

CURBE (University of Cambridge, Emily So)
COPE (University of Copenhagen, Nathan Clarke)

Secretariat support provided by Athena Global (Andrew Eddy)

Membership is open to all CEOS agencies with an interest in the RO.

Associate Membership is open to donors and DRM stakeholders, and value-adding partners.

What will the Recovery Observatory consist of?

Collection of images and maps at several scales
For 3 to 5 years after a major disaster
(duration to match recovery framework)

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

Urban zooms

Large scale products from very high resolution data

- Buildings
- Infrastructure
- Camps

Update frequency:
every 2 to 4 months

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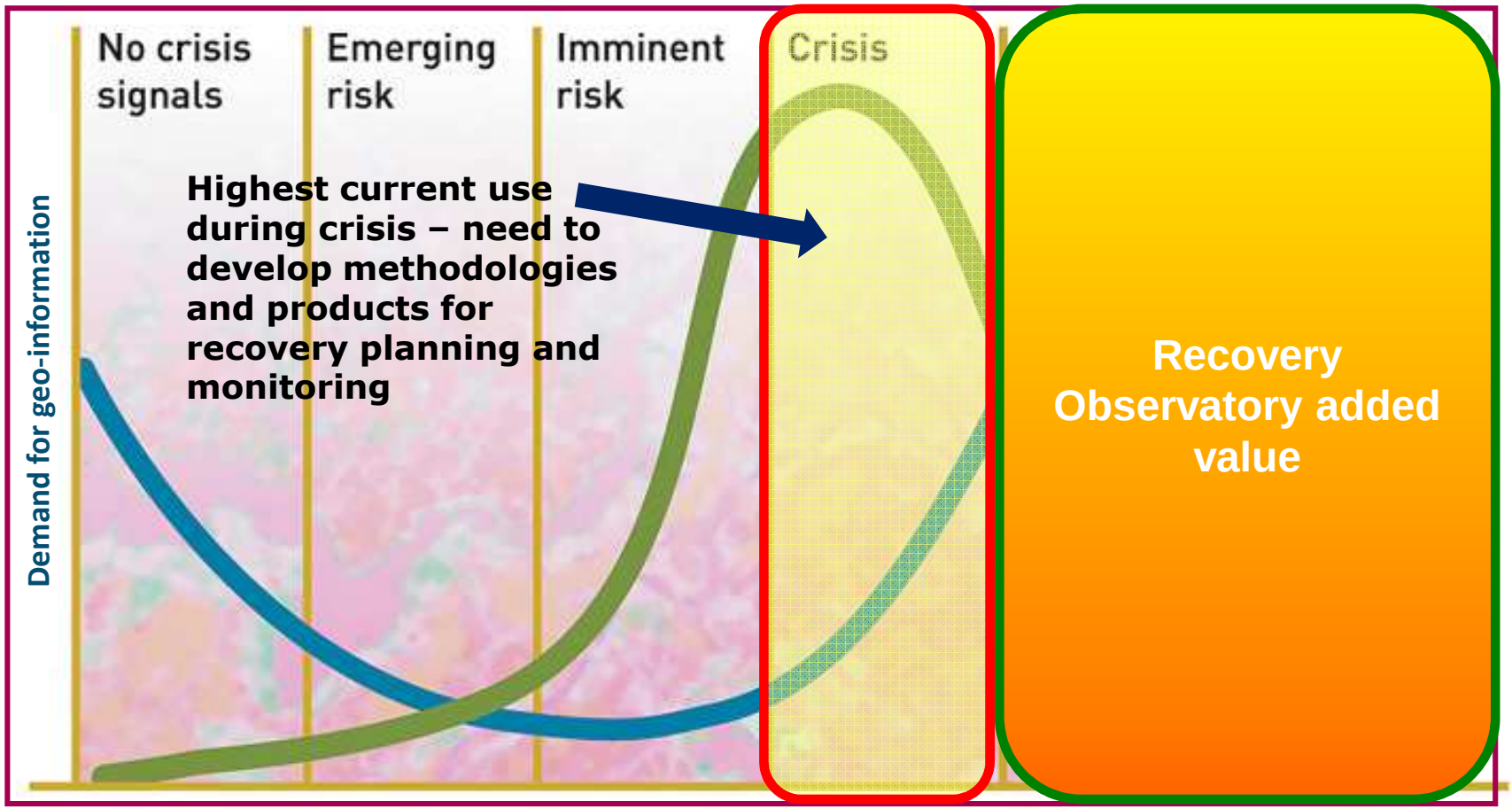
Geo-Information in Response & Recovery



Slide adapted from UNOSAT Luca dell'Oro

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Recovery – Inventory of potential Recovery indicators and products

	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…)**	• **Risk analysis**

RO Status Overview

- Recovery Observatory ready for triggering since 1 January, 2015
- Collaboration attempted on Cyclone Pam (Vanuatu, March/April 2015 – see Lessons Learned Report), highlighting contradictions between Rapid Assessment and Recovery support;
- CNES-commissioned study on RO product definition and image requirements presented to DRM stakeholders;
- Finalization of the RO data infrastructure
- Working session held with DRM stakeholders (GFDRR, WB, UNDP) in Washington December 2015;
- Demonstration to begin March 2016 (Malawi proposed);
- Triggering of the RO after a major event or as follow-on to demonstration work in Malawi (in 2016);
- Evaluation at RO + 6 months;
- Lessons learned and sustainability strategy after evaluation of 1st RO

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Recovery Observatory Infrastructure

Recovery Observatory Infrastructure

First instance available for Haiti in the final version

https://kalideos.kalimsat.eu/drupal/

- Data/Map products/Document selection and metadata display
- Data display at full resolution
- When logged in : data download and posting of edits or results
- Collaborative approach to involve all participants (discussion groups)

DEVELOPMENT STATUS :

- Achieved : Insertion of Ground Control Points, Vector/Shapefiles, Landsat-8, Spot6/7 in addition to SPOT 5 and Pléiades
- Next steps: Insertion of product maps (pdf and jpeg), Sentinel 1&2, Alos-2, CosmoSkyMed, TerraSar-X, Worldview…

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Multi-criteria data search interface

https://kalideos.kalimsat.eu/drupal/features/dfab2aa3-184a-5e10-83de-184cc4ec5671

Product properties

Title: kalhaiti_sertit_voirie_martissant 2016-01-06 15:30:00Z

Time: 2016-01-3T15:30:00Z

Geo/carto system: EPSG:32618

Footprint:

{"coordinates":[[[777872.5877,2048986.5471],[777872.5877,2051827.735],[779280.9299,2051827.735],[779280.9299,2048986.5471],[777872.5877,2048986.5471]]],"type":"Polygon"}

Collection: KALHAITI

Identifier: 3969198251682592

Class: geodatabase

Subclass: line

Published on: 2016-03-1T12:21:26+01:00

Documentation

Description: kalhaiti_sertit_voirie_martissant created on 2016-01-06 at 15:30:00Z

Produced by: SERTIT

Producer identifier: kalhaiti_sertit_voirie_martissant

License:

Lang	Name
fr	Licence Données SERTIT KAL-HAÏTI

Keywords

Location: Tropical

Location: Northern

Location: Coastal

Country: Haiti (58.98 %)

State: Ouest (58.98 %)

Season: Winter

Land use:

Class	Percentage
cultivated	82.17 %
herbaceous	17.82 %

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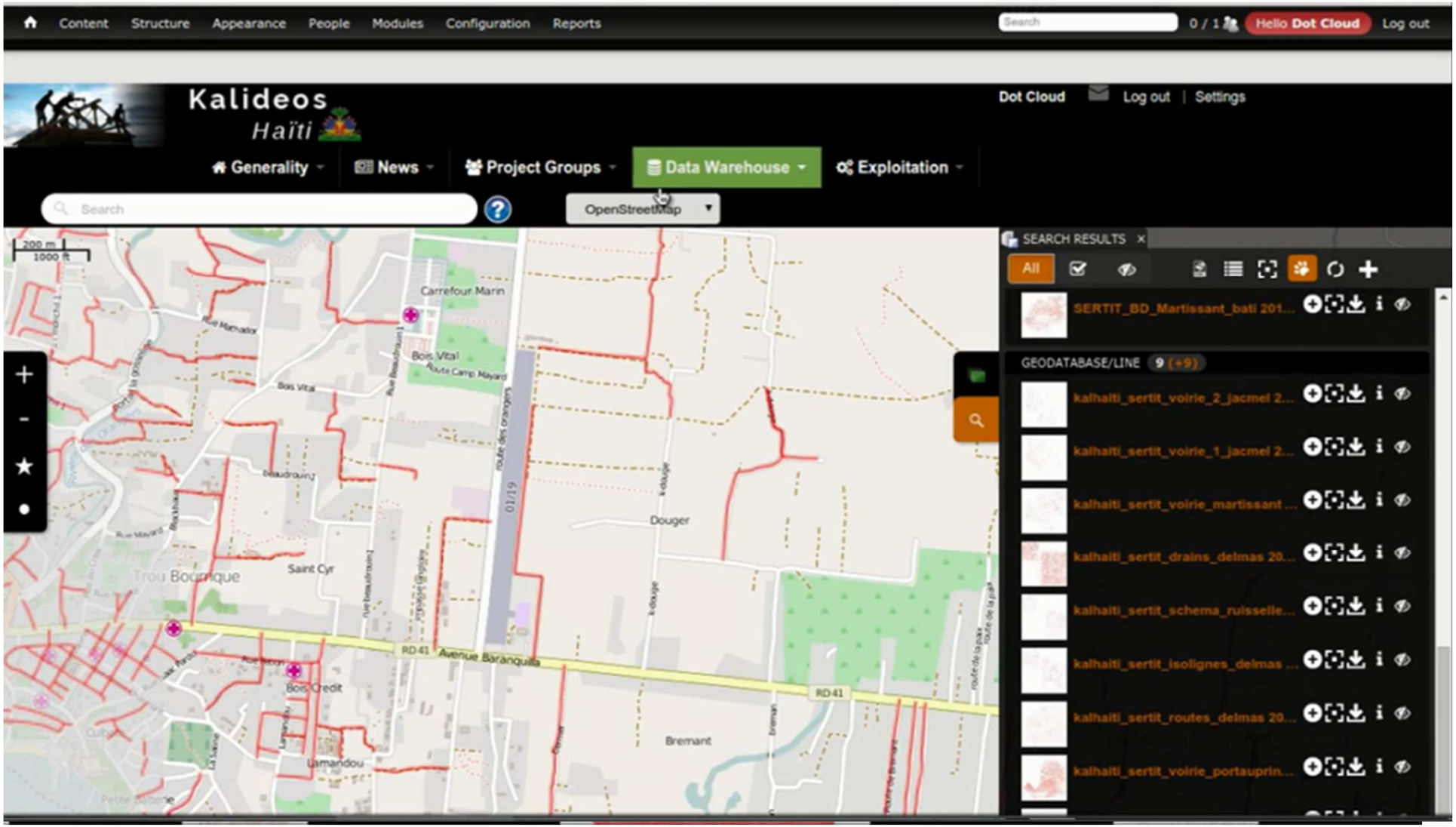
Selection and display of vector data



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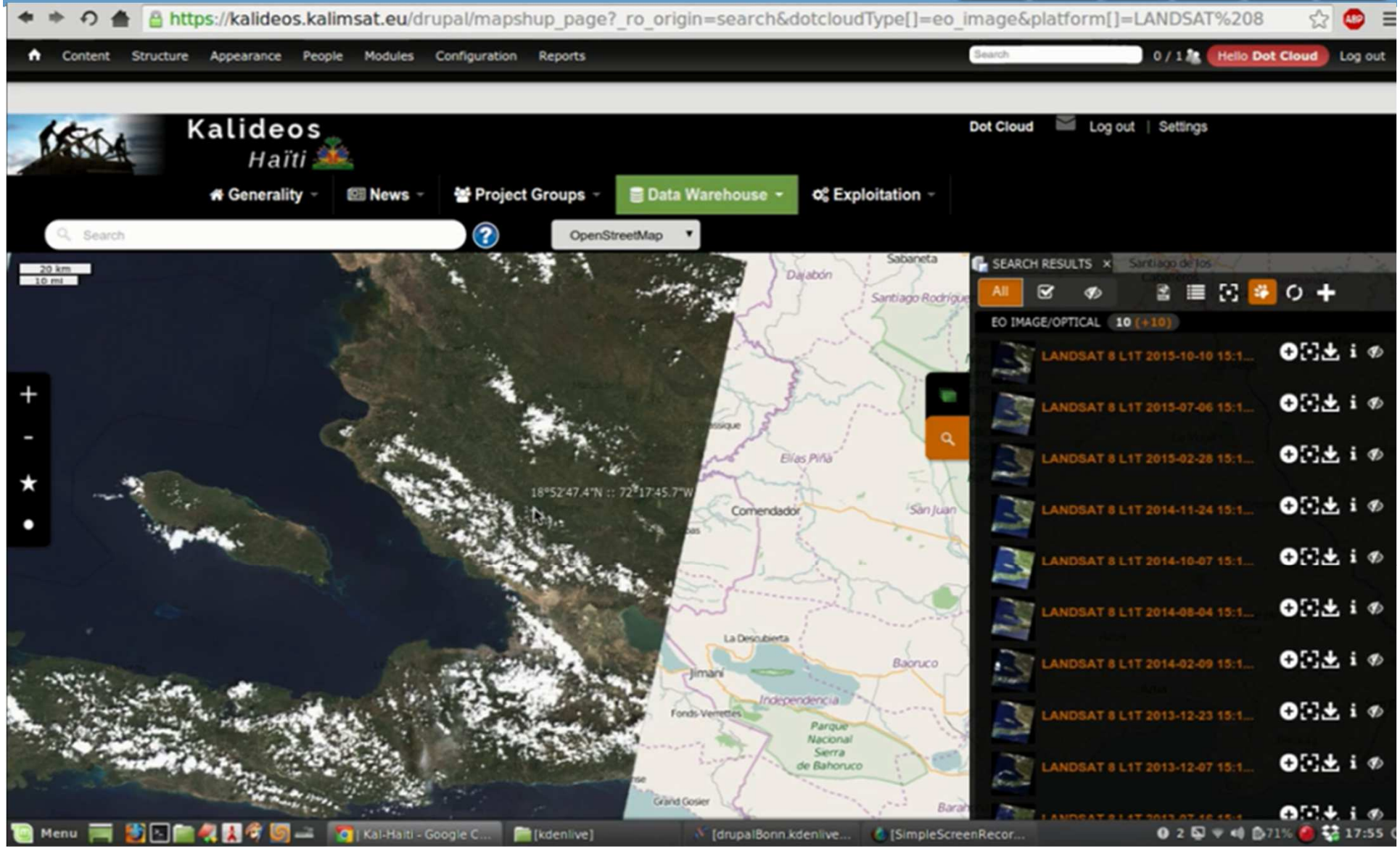
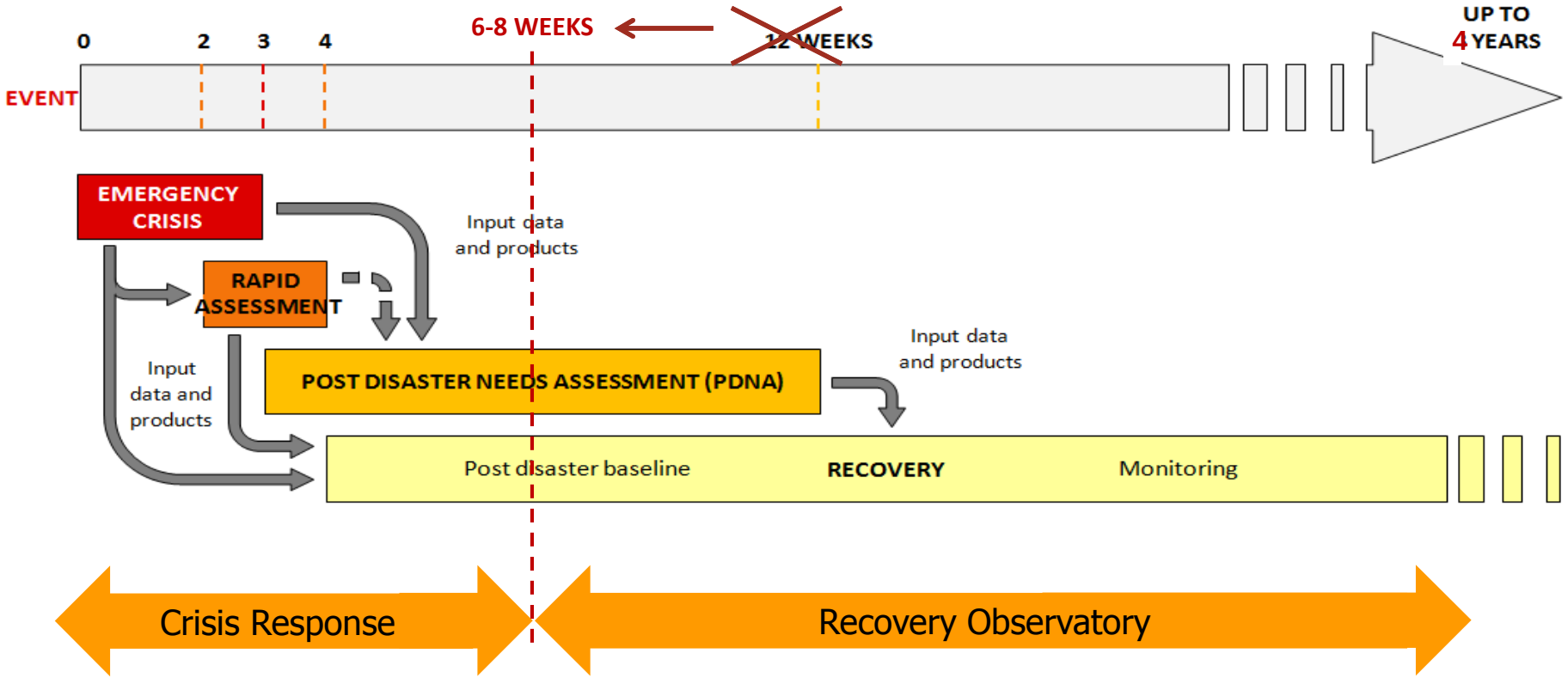
Selection and display of Landsat-8 images



Timeline and RO Role



The RO should focus on long-term planning and monitoring, as rapid assessment and PDNAs are completed in weeks and require very timely contributions; the ROOT has passed on this interest in satellite contributions to the Charter and Copernicus;

High-level Conclusions from ROOT working session Dec 2015

- **Some useful applications have already been developed but are not well-known to the User community;**

- **Perception that satellite work is principally useful for rapid assessments, and lack of understanding of how satellites can contribute over long-term; the RO should correct this perception;**

- **There is a general lack of awareness in DRM community of what is possible and how to obtain data and products; need for :**
  - **Improved 'showcasing' of results for uptake within the users;**
  - **Inclusion of resources for value-adding in recovery planning activities.**

- **GFDRR to inform ROOT of future PDNAs, and to begin a "demonstrator" with ROOT in near future**

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Path to Malawi Demonstrator

- Agreement in Washington at working session to explore possible “demonstrator” that would showcase EO-based products and demonstrate savings or improved results from satellites
- Several possible pilot locations discussed, including Malawi, Mozambique, India, Vanuatu, Dominica, Niger, and others
- WB/GFDRR sent project level documents for analysis of potential EO-contribution
- Short list of India, Mozambique and Malawi established
- Discussion with GFDRR led to selection of Malawi as a possible demonstrator before RO activation
- Discussions engaged with local and DC-based Bank personnel to confirm Malawi government interest

Malawi activities

- Assessment of Recovery Observatory activities in the scope of 2015 Malawi flood recovery.
- Strategy built from existing images:
  - Lansdat and Sentinel for large area issues
  - Spot 6/7 and Pleiades for smaller areas and stereo pairs
- Activities identified are extracted from Malawi National Disaster Recovery Framework document (NDRF) in order to address final user needs as closely as possible
- WB team determined five possible districts for collaboration; ROOT team to select areas of interest from these districts and propose themes for monitoring; monitoring plan on 2 areas to be established in conjunction with Government of Malawi in March; review scheduled for late June or early September

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Malawi activities

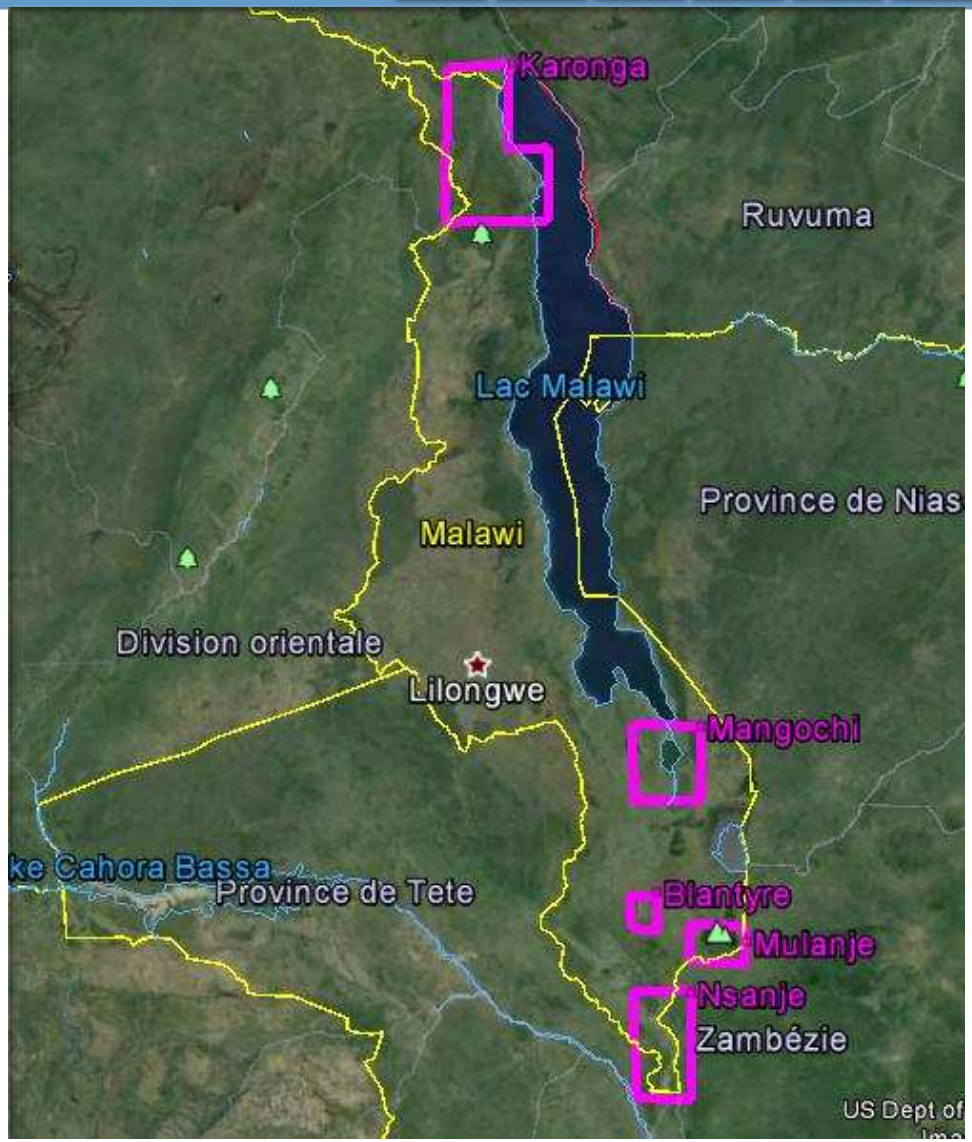
NDRF topics	EO product	Explanation
Transportation, performance management of facilitation of movement of people and goods	Linear communication paths survey such as: Length of roads rehabilitated in km Length of bridges constructed in meters Length of canals rehabilitated in km	Measure length of reconstruction.
DRM: • **Develop Disaster Contingency Plans** • **Dykes/dams reconstruction** **Education, Health, Trade:** • **Relocate assets to safer grounds**	3D flood forecast (extension of potential flood areas) and related applications such as: Safe rebuilding Contingency plans, etc.	Depending on stereoscopic images available, it is possible to construct a Digital Elevation Model of some areas.
Housing, performance management of safer house practices	Building survey New building inventory Rebuilt building inventory Suppressed building inventory	Count number of houses built, indication of the quality of the rebuilt houses (resilient construction) has to be provided from in-situ observers.
Agriculture, environment and Food security, performance management of: • **Resilience to climate change** • **Restored arable lands**	Evolution of areas planted in km^2	This product can be generated for larger areas, even at district scale. Nature of plants may be assessed in this product if information is provided from in-situ observers.
Performance management of relocation of displaced people	Displaced people camp follow-up	Measure area of camps.

Malawi activities

Malawi preliminary assessment from 5 districts chosen by DoDMA / WB:

- Karonga,
- Mangochi,
- Blantyre,
- Mulanje,
- Nsanje.

Purple squares show proposed Earth Observation AoI as explained in following slides.



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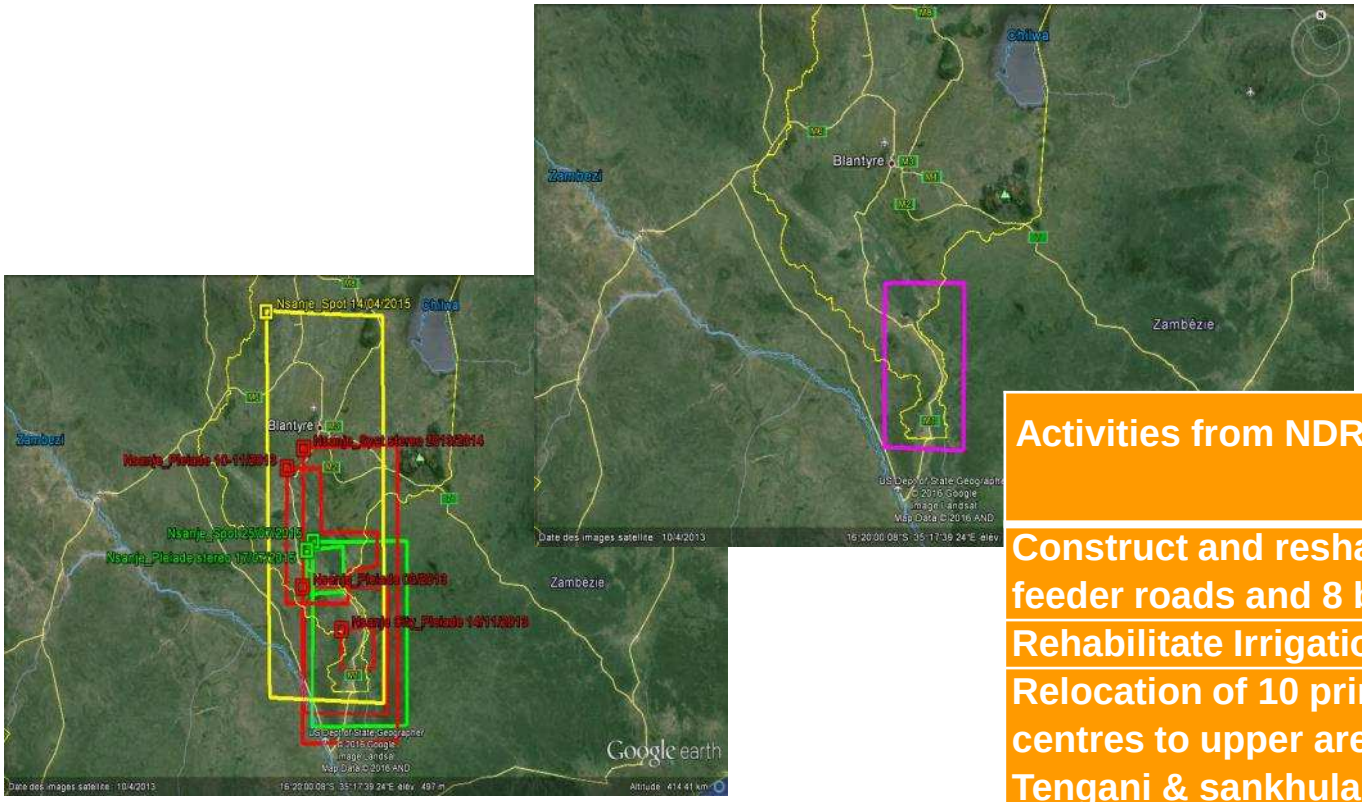
Malawi activities

The district of Nsanje is clearly the most affected by the flood event of 2015.
Farmlands around Bangula present an intensive structure, which is convenient for mapping purposes.



Activities from NDRF to be monitored in Nsanje District
Construct and reshape 154 km damaged rural feeder roads and 8 bridges
Rehabilitate Irrigation schemes
Relocation of 10 primary schools and 4 market centres to upper areas (Makhanga, Bangula, Tengani & sankhulani) including all associated market social amenities
Rehabilitation of flood retention structures Flood Management and Catchment Development - feasibility Study for Ruo

NB: Landsat and Sentinel images not shown as they cover whole district.

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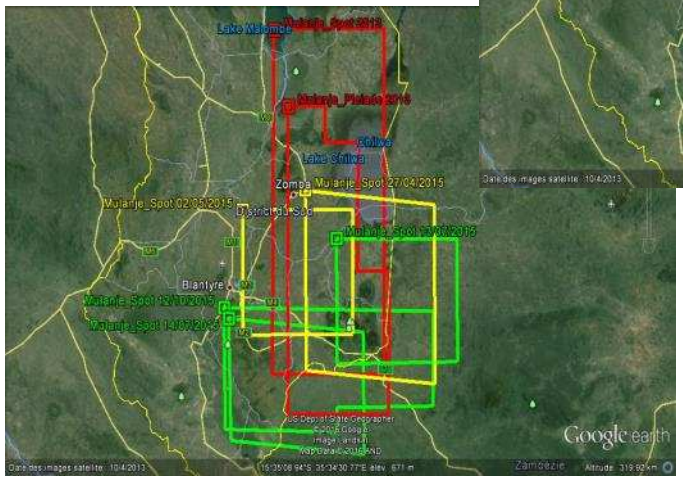
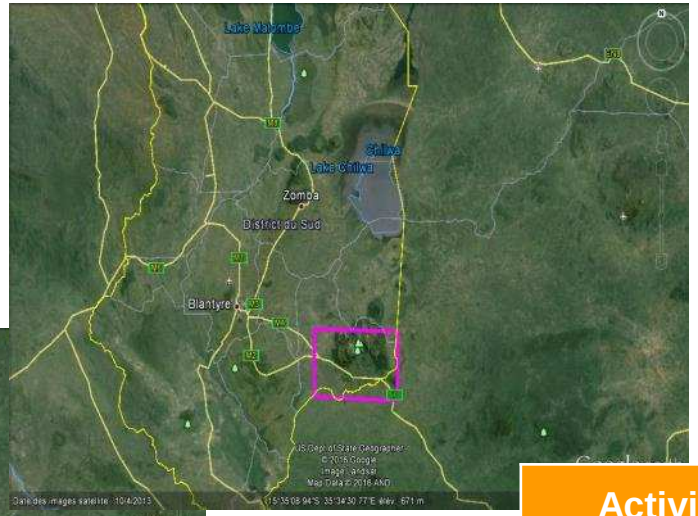
Malawi activities

The district of Mulanje has priorities in most of the sector needs. The proposed AOI is centered over the main populated area, and over the most important farmlands of the region. The very pronounced topography due to the Mulanje Mountain increases the risk of runoff, flood and soil erosion.





Activities from NDRF to be monitored in Mulanje District
Redirect Ruo river to its original course at Sonjeka
Provide river bank embankments on Muloza river at Limbuli
Reconstruct entirely destroyed weir of Msikita scheme and Rehabilitation of damaged 300 m canals of Kuzinja and Gibsani scheme

NB: Landsat and Sentinel images not shown as they cover whole district.

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Malawi activities

The district of Mangochi has mainly priorities for agriculture, education and environment. This district appears to be the less important.

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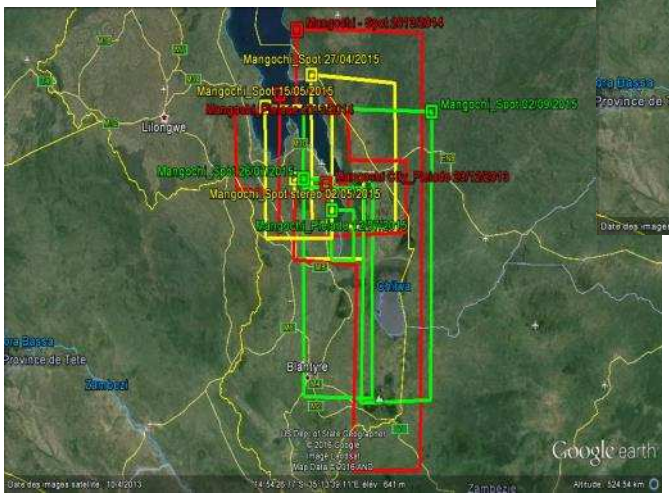

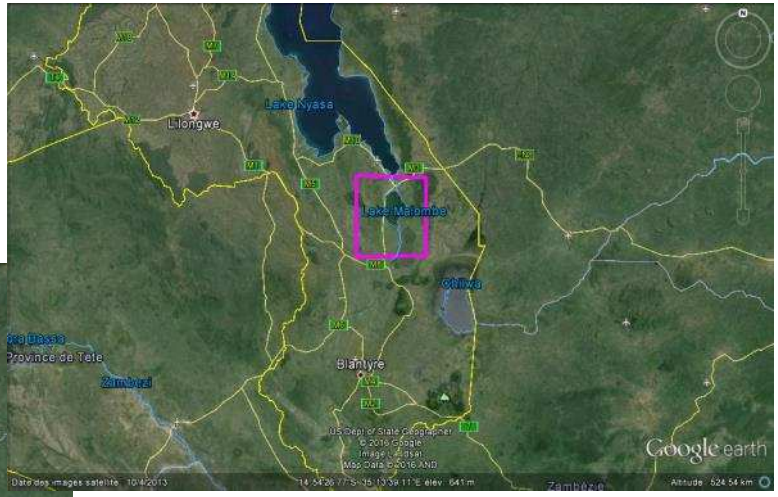

Activities from NDRF to be monitored in Mangochi District

Reconstruct 6850 houses under the recovery using safer construction guidelines

Plant and manage 25000 trees along river banks of all rivers which affected with floods.

NB: Landsat and Sentinel images not shown as they cover whole district.

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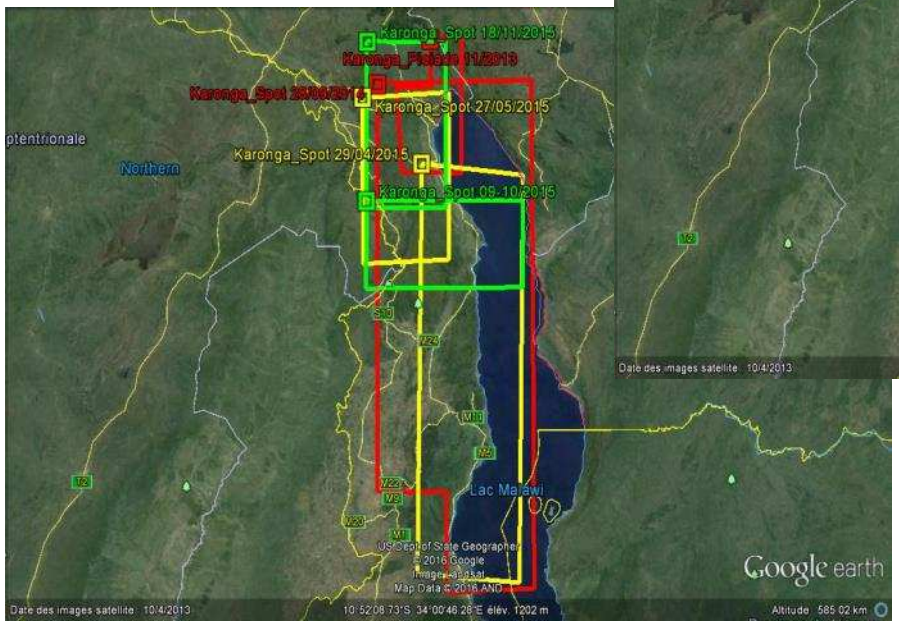
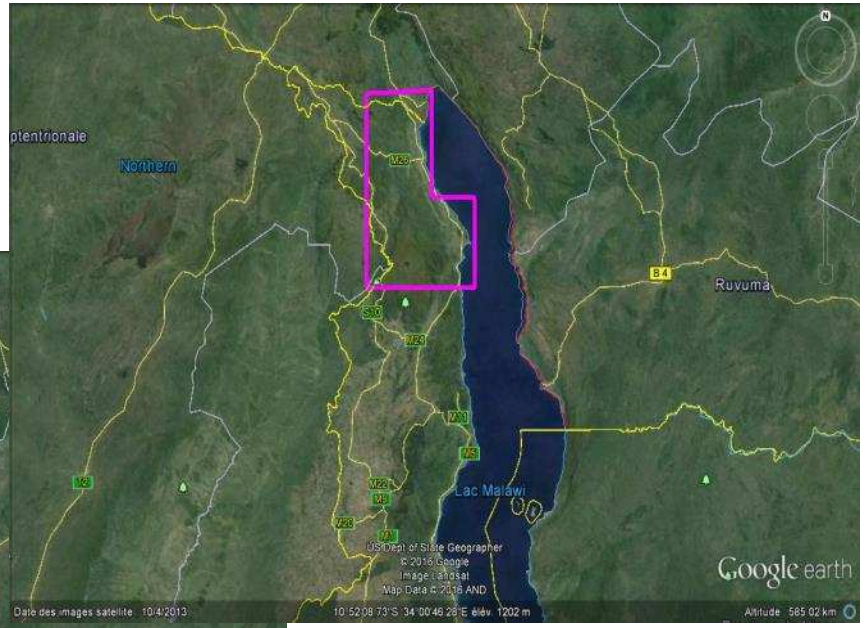
Malawi activities

The district of Karonga was marginally affected during the flood event that occurred in early 2015.





Activities from NDRF to be monitored in Karonga District

- Rehabilitate Fargo and Ngelenge dykes
- Afforestate 80 ha of land in the disaster prone areas

NB: Landsat and Sentinel images not shown as they cover whole district.

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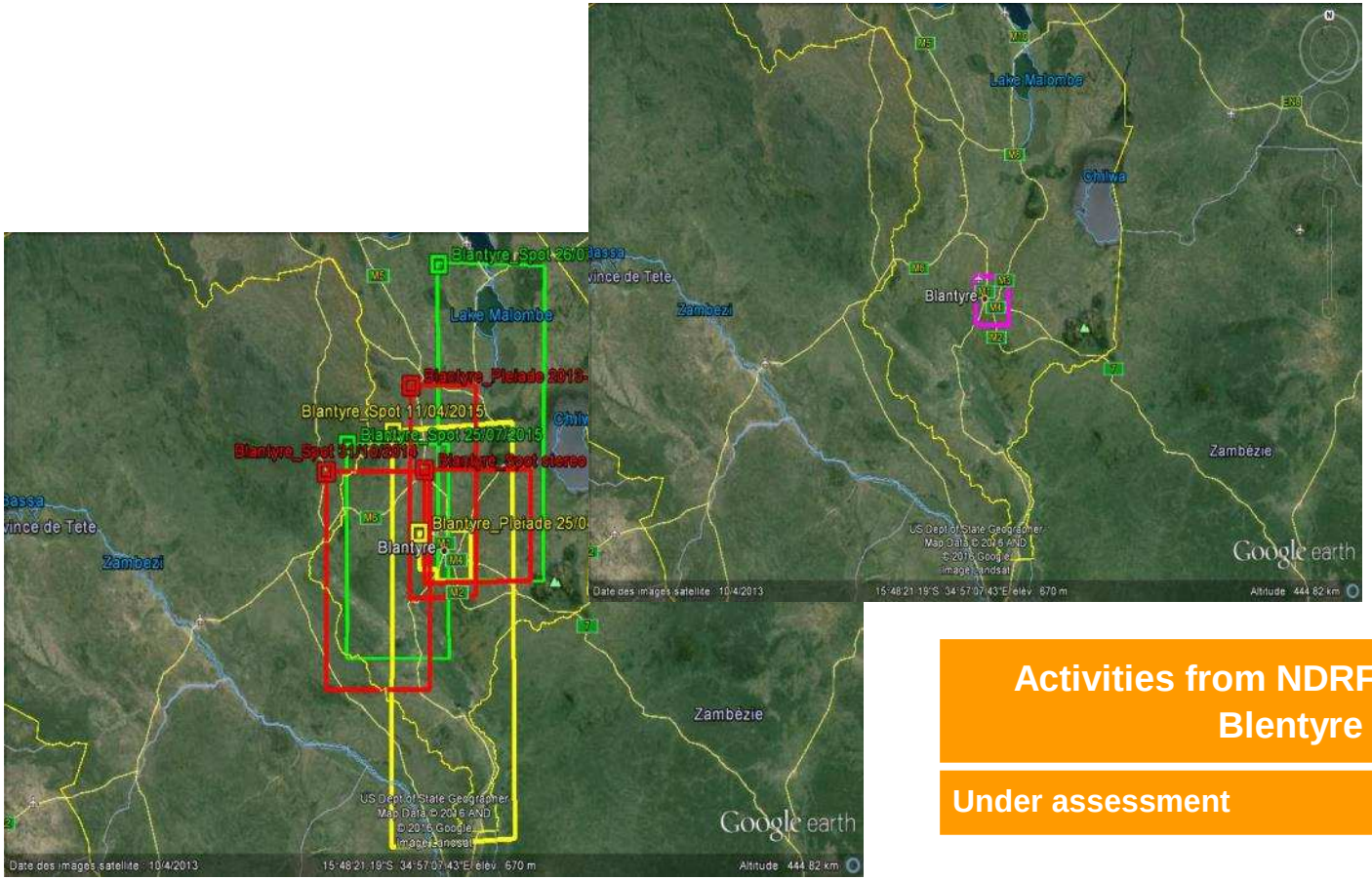
Malawi activities

The district of Blantyre was heavily affected by the flood event of early 2015. The most important damages and recovery efforts are related to health, housing and industry sectors.



Activities from NDRF to be monitored in Blentyre District

Under assessment

NB: Landsat and Sentinel images not shown as they cover whole district.

Malawi activities

CEOS has proposed additional products that can address large area issues or activities common to several districts affected by the disaster.

Zomba **Rehabilitate 20 bridges and 44 km of roads**
Balaka **Promote climate-smart agriculture on 4395 hectares of land, monitor planting evolution**
Ntcheu **Raise and plant 4,000,0000 tree seedlings in four river catchment areas**
Global **Monitor crop production through evolution of area actually cultivated**
Global **Disaster contingency plans**
Global **Reconstruction of resilient houses, health centers, schools, protection centers, nursery schools, etc.**
Global **Various training provided to inhabitants and/or local authorities**

Next steps

Tentative schedule

- March 2016: choice of AOIs by Malawi
- Decision to set up a Malawi RO portal taken in February – to be implemented by May
- June: first products completed and review of results with Malawi local users
- Next CEOS Disasters WG:

CEOS to consider Malawi as candidate for multi-year RO activity depending on pilot phase outcome, considering especially the technical success of monitoring activities and the engagement of the national end user.

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EO data licensing for disasters – overview report from COPE

- ROOT supported University of Copenhagen study on data licensing for disasters
- Licensing conditions for several systems analysed with view to identifying common points and differences:
  - **First Analysis: Identify common (and conflicting) terms and conditions**
    - **Permitted Uses**
    - **Ownership and Attribution**
    - **Categorization of Data**
    - **Registration and Reporting**
  - **Licenses: TerraSAR-X/ TanDEM-X, Pleiades, COSMOS-SkyMed, Alos-2, NextView**

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COPE Report summary

	Registration/ User Types	IPR	Reuse	Re-distribution	Reporting
TerraSAR-X/ TanDEM-X	Online Individuals (in relation to GSNM)	Standard Protected	Open	Authorization required (unclear)	Progress reports Publications Maintain record of delivered products
Pleiades	Online and written Institutions	Standard Protected	Max 10 copies of product for installation, archiving and back-up purposes.	Permitted among Authorized Users. Registration required for, and limited rights given to, contractors and consultants. Print/display restrictions.	Publications
COSMOS-SkyMed	Online and written (unclear) Institutions and Individuals	Standard Protected	Affiliated Users must make a request to ASI. Contractors and consultants may not keep or reuse products.	Registration required for Affiliated Users, contractors, and consultants. Authorization required for distribution of metadata. Web publication restrictions.	Publications
ALOS-2/ PALSAR-2	Online (unclear) Institutions	Standard Protected Derived	100 scenes per year. Duplication of products prohibited (excluding backups).	Third party distribution requires written consent from JAXA. (unclear)	None
NextView	Online Institutions	Open	Open	Open	None

Next steps

- **COPE Report:**
  - **Obtain an overview from data providers of the restrictions on data and information based on international and national policies and legislation.**
  - **Estimate the long-term impact that access and use conditions will have on end users once the RO has finished.**
  - **Examine the license conditions of EO contributions to the RO from commercial providers.**
- **ROOT:**
  - **Create CEOS Task Team on EO Data Licensing for disasters?**
  - **Objective: identify principle hurdles to data dissemination; proposed harmonized approach for easier access by users.**

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UR Istanbul Event

- **CEOS side event 18 May 9:00- 11:30: Satellite data for enhanced risk management and reduction**
- Significant progress made in collaboration with World Bank and Government of Malawi on recovery monitoring – need to showcase this activity at UR2016:
  - Institutional collaboration framework a success;
  - Technical feasibility demonstration status;
  - Vision for scalability and other applications.
- ROOT Chair proposes to present Malawi collaboration as a showcase and participate in panel discussion on how to improve application of satellite data to risk management.

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RO Lifecycle

Preparation

- Institutional relationships
- Infrastructure
- Product
- Recovery demonstrator
- Scenario building

Triggering

- Charter and EMS activation monitoring
- Summary
- Preliminary Data Acquisition Plan
- Decision by ROOT to trigger

Establishment

- Upload of Charter and EMS crisis data and products
- baseline products
- Link to national end user
- activity
- Value-adding coordination
- Protocols for RO operations
- Research and training & capacity development
- Initial reporting

Operations

- Liaison and development of links with end users
- RO database feeding
- Promotion and outreach
- Evaluation (+ 6 months) and lessons learned
- Reporting
- IT maintenance
- Legacy planning

RO Lifecycle

Preparation

- Institutional relationships
- Infrastructure
- Scenario building
- Product definition and development
- Recovery demonstrator

Next Steps and Outstanding Issues

Next Steps :

- Triggering of the RO after a major event or as follow-on to demonstration work in Malawi (in 2016);
- Evaluation at RO + 6 months;
- Lessons learned and sustainability strategy after evaluation of 1st RO

Issues

- Resources for demonstration activities and level of effort
- Decision to trigger RO (new event versus development of demonstration activities)
- Resources for RO (especially value-adding resources)

Conclusions

- Significant progress has been made on the Recovery Observatory in the past six months
- A solid understanding of the scope of the RO activities has been reached with the DRM community, and has sharpened the focus of RO activity
- Awareness is being built within the Recovery community and this will contribute to address certain outstanding issues, including to some extend resources for value-adding
- Further involvement and commitment from other CEOS agencies not currently engaged would be useful and welcome

Thank you!

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