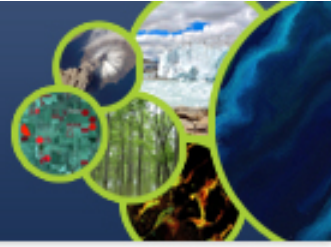


Status of RO and RO Demonstrator

- RO status***
- Malawi Demonstrator (Flood Recovery Monitoring)***
- Nepal (Housing Reconstruction)***
- Syria (Agricultural Sustainability)***

EO Data for Disasters Licensing Sub-Group



Space agencies from CEOS Disaster working group:

CNES (**Patrice Benarroche- Co-chair**)
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)

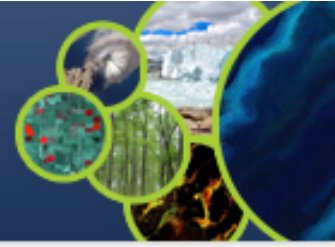
Other partners:

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

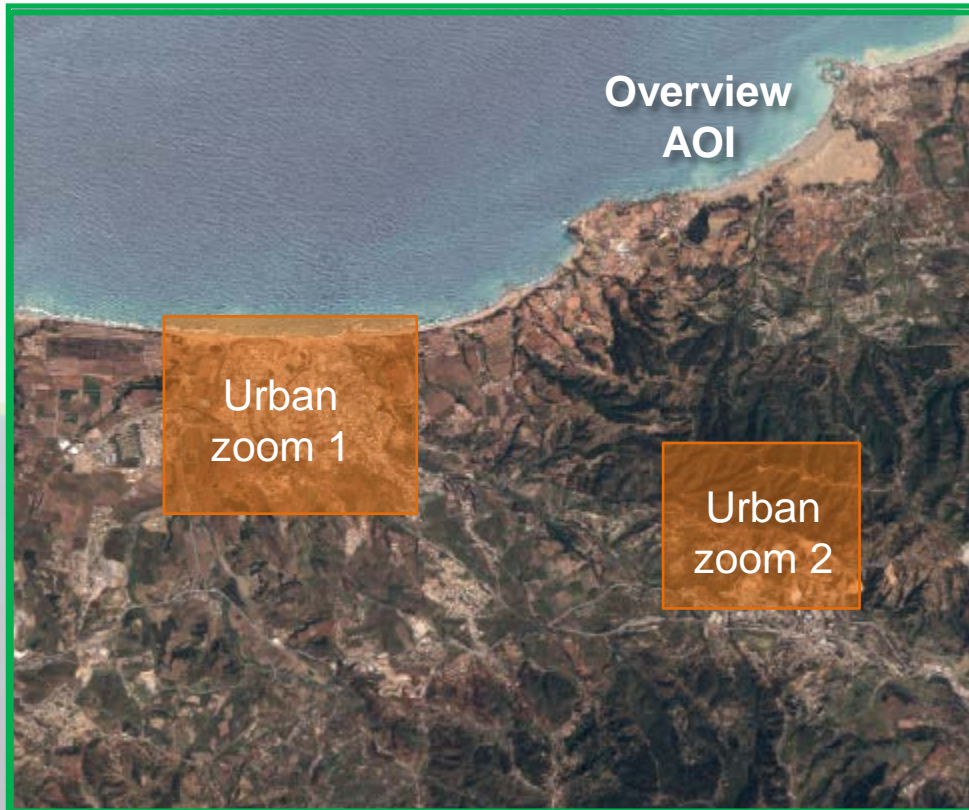
Secretariat support provided by Athena Global (Andrew Eddy)

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.



**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

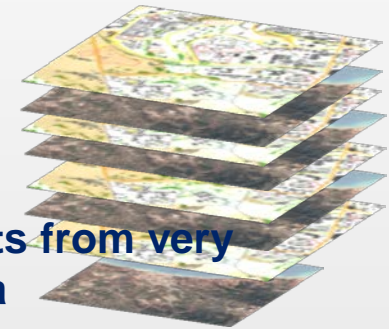
Update frequency:
every 10 days to 6 months

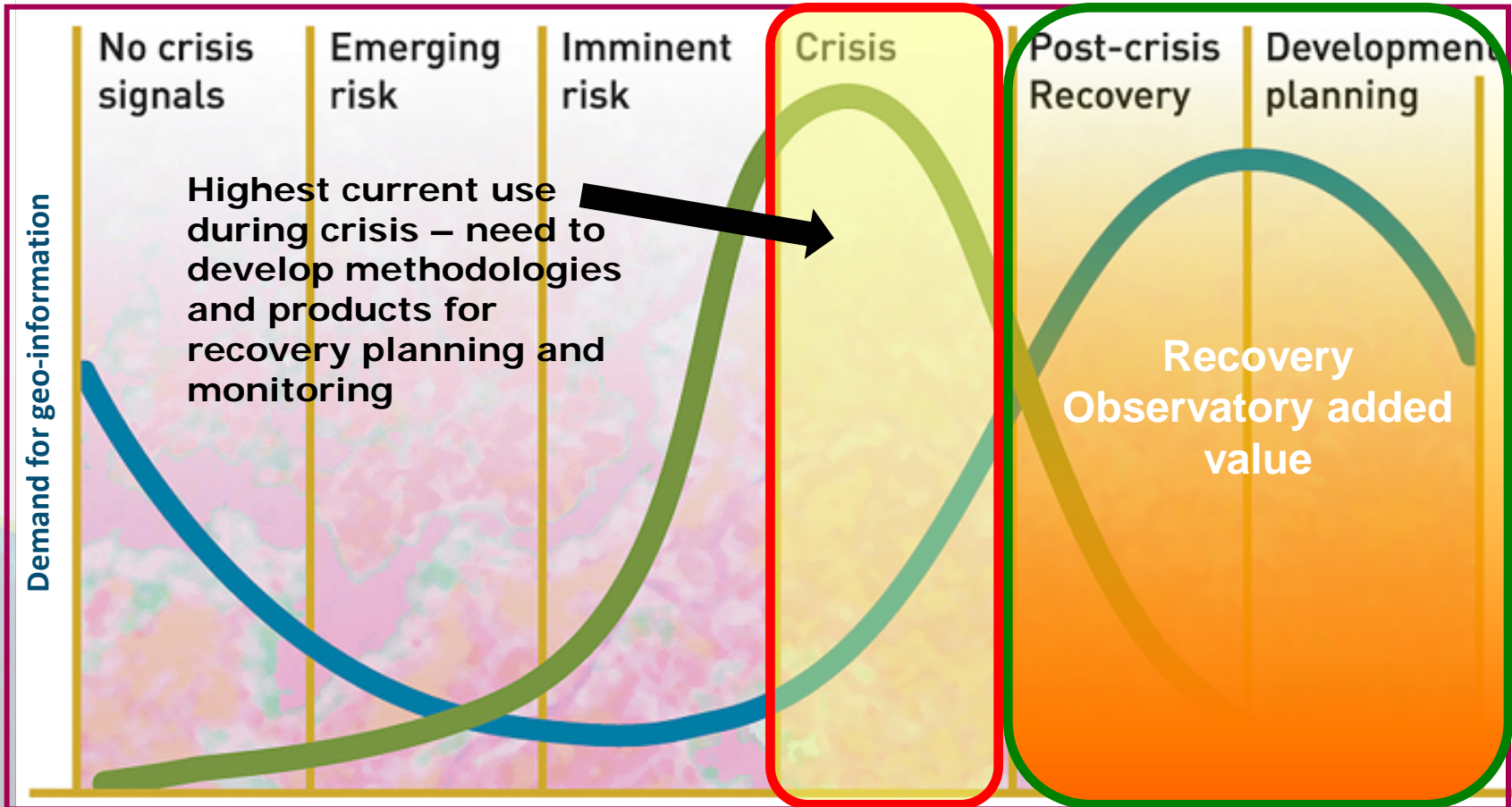
Urban zooms

Large scale products from very high resolution data

- Buildings
- Infrastructure
- Camps

Update frequency:
every 2 to 4 months





Rush demand of basemap



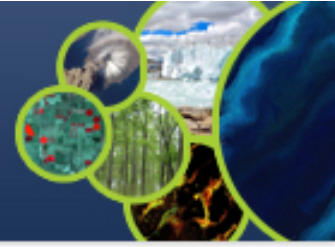
Complex info with added value

- 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 RO data infrastructure fall 2015;
- Demonstrator decided spring 2016 (Malawi; Nepal; Syria?);
- Demonstrator under final definition; acquisitions begun;
- Triggering of the RO after a major event or as follow-on to demonstration work in Malawi (in 2016 or early 2017);
- Evaluation at RO + 6 months;
- Lessons learned and sustainability strategy after evaluation of 1st RO

- **Assessment of a Recovery Observatory « Demonstrator » initiated in the scope of 2015 Malawi flood recovery.**
- **Extensive discussions with end-users (WB and Malawi Govt) led to an extension of the Demonstrator in order to cover more potential areas where the RO may bring useful information. Following WB proposals, it has been agreed during ROOT telecon on the 28th of June to provide additional showcases for building reconstructions (Nepal) and agriculture recovery over large areas (Syria).**

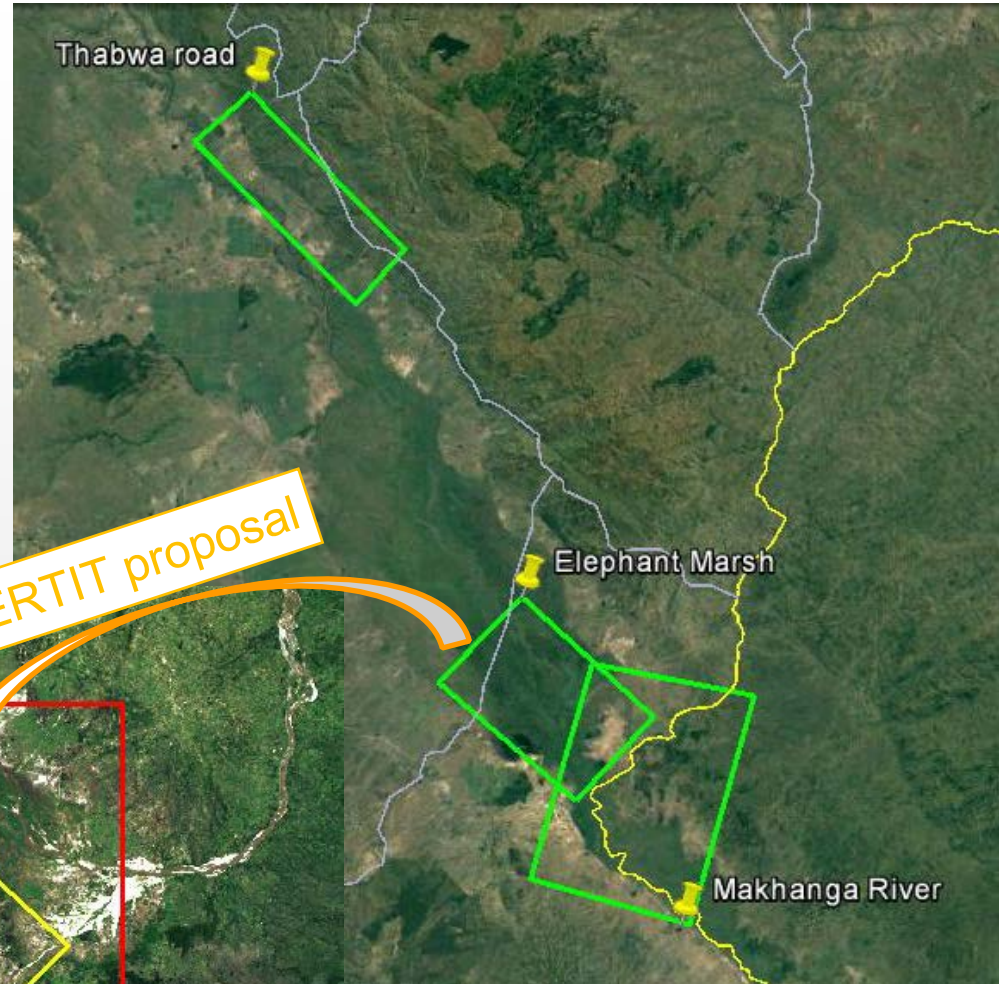
- After several propositions, Aols have converged for Malawi. Final sign-off of Government of Malawi expected September 2016. Agreement in principle is given
- Activities identified are extracted from Malawi National Disaster Recovery Framework document (NDRF) in order to address final user needs as closely as possible



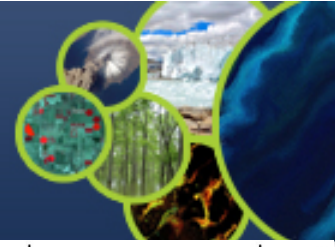


Three Aols retained :

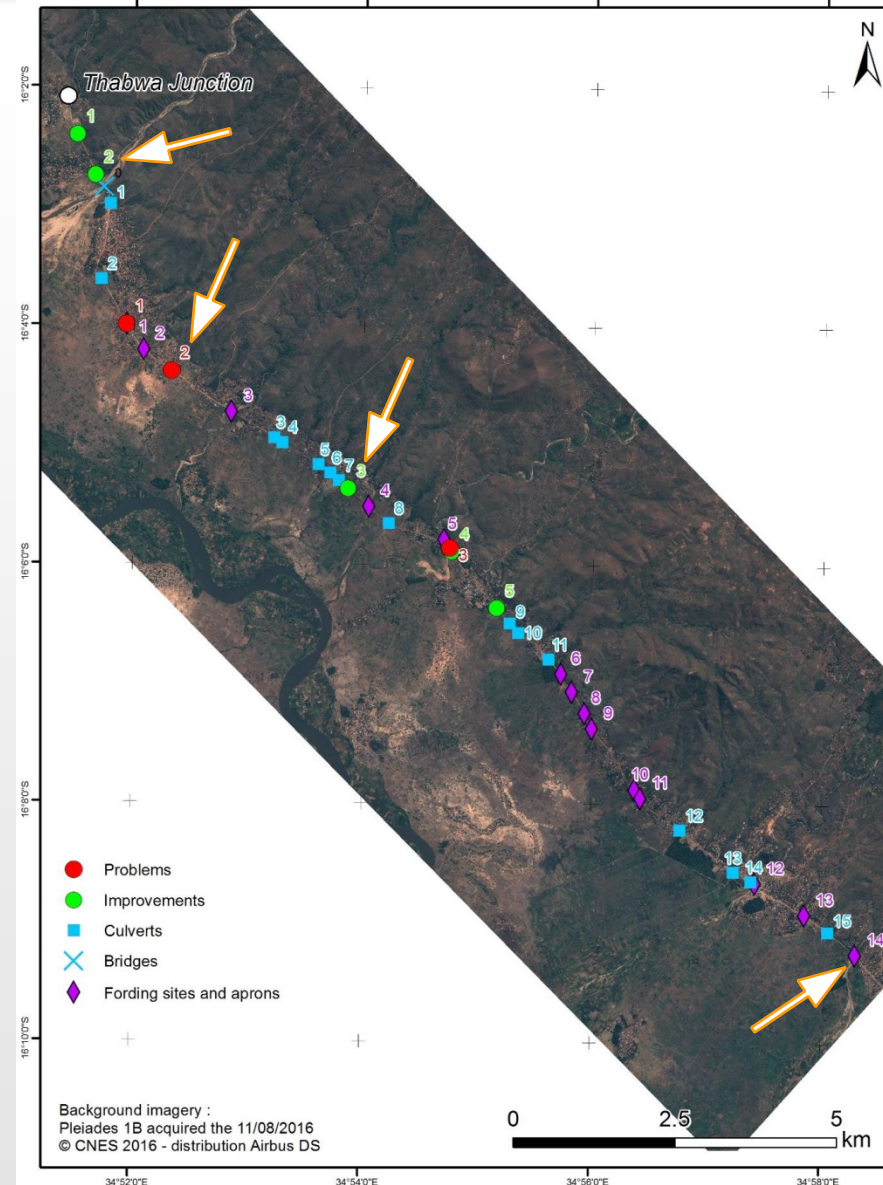
- Makhanga river bed assessment (DEM)
- monitoring for agricultural damage in « Elephant Marsh »
- Thabwa road reconstruction

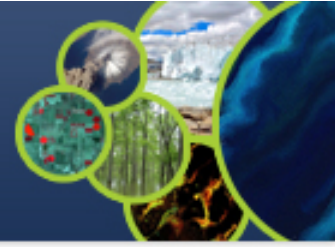


- **ROOT asked for assessment of possible contributions June 2016;**
- **Contributions from ROOT members are under discussions:**
 - **Pleiades acquisitions have started for CNES part,**
 - **Agriculture assessment (CNES subcontractor) started with Landsat images granted by B. Jones, and possibly Sentinel (to be discussed with F. Vilette),**
 - **TerraSarX potential use under assessment by J. Danzeglocke,**
 - **Thabwa and Makhanga contributions under assessment by D. Green,**
 - **Others ??**



- **1 Peiades 1B image acquired 11/08/2016. Extensive interpretation along the road with the following objectives:**
 - **Demonstrate that VHR optical images can give precise assessment of road reconstructions**
 - **Prepare works follow-up with Malawi when road works are identified by Malawi/WB officials**





Situation 20/01/2015

● 2

Image clearly shows crossroad enlargement and roadside drainage project



Image 11/08/2016

0 50 100 m

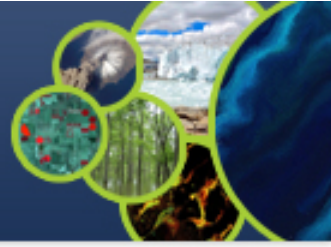
Situation 20/01/2015

● 2

Image clearly shows damage in road structure

Image 11/08/2016

0 25 50
m




Situation 20/01/2015

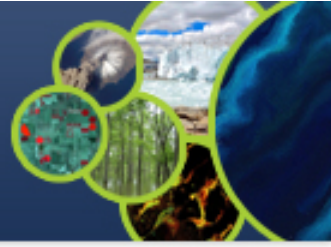


● 3

Image clearly shows road enlargement

Image 11/08/2016 





Situation 20/01/2015

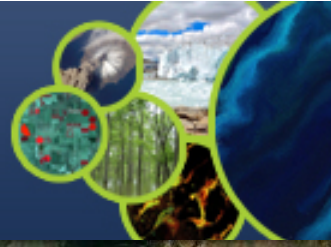
◆ 14

Image clearly shows deck reconstruction and possibly subsequent damage

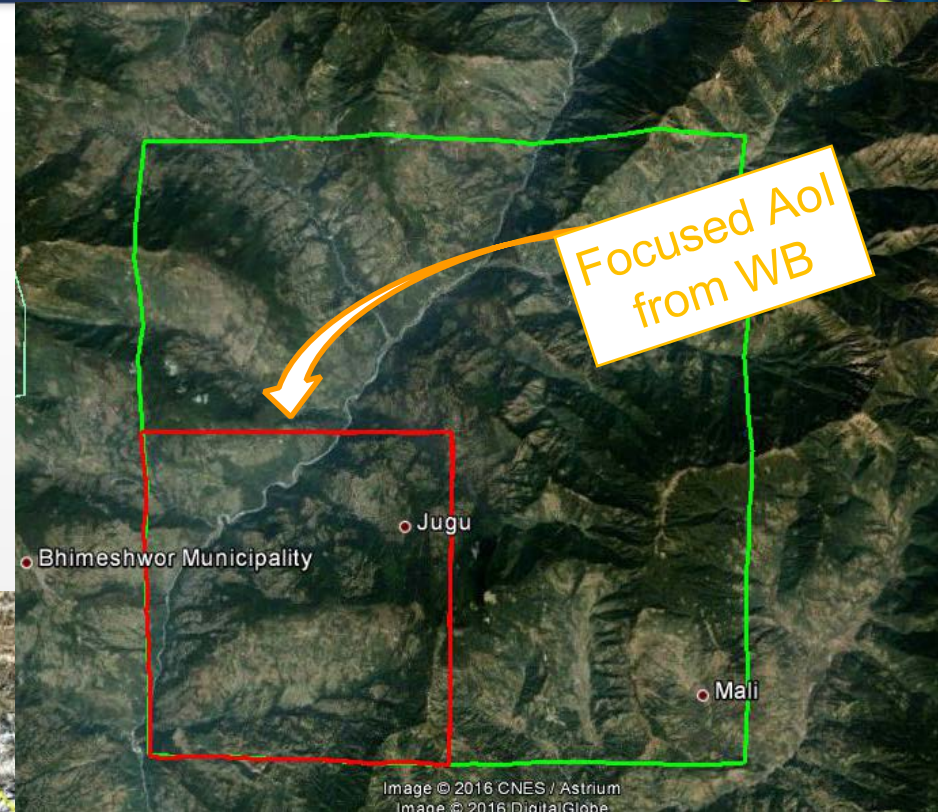


Image 11/08/2016



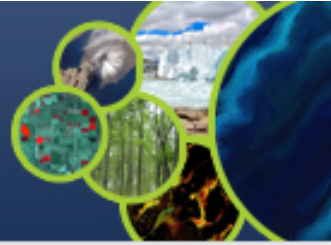


- **1 Aol retained for building reconstruction assessment.**



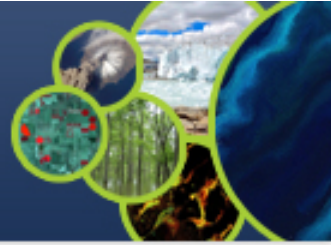
- **Contributions from ROOT members are under discussions:**
 - **Pleiades acquisition is on-going for CNES part,**
 - **TerraSarX potential use under assessment by J. Danzeglocke,**
 - **NASA contributions under assessment by D. Green,**
 - **Others ??**

- **Aol(s) to be defined by WB for an overall agricultural assessment in Syria, and its evolution from 2010 to present day. This option is a global one, with relatively low resolution need to cover global statuses (more like Landsat and/or Sentinel capabilities).**
- **Potential Indicators**
 - **Change in vegetation coverage (ha)**
 - **Change in vegetation coverage of major crops (ha)**
 - **Change in yield for major crops (tons/ha)**



- **Comparison between Recovery indicators identified in previous ROOT working sessions and present Demonstrator showcases**

		Malawi	Nepal	Syria
Buildings, shelters	Building removal and construction		X	
	Change in urban land use, morphology and density			
Camps	Camp removal and installation			
	Tent removal and installation			
	New land use / open spaces			
Transport	Accessibility analysis			
	Proximity analysis			
	Removal of transport facilities			
	New transport facilities			
	Rebuilt transport facilities	X		
Infrastructures	Infrastructure removal and construction		X	
Environment	Change in landcover, open spaces	X		X
	Indicate loss of vegetation	X		X
	Vegetation re-growth	X		X
Topography	Change in topography, future risk assessment	X		



- **Other more general RO objectives are fulfilled in the scope of this Demonstrator**

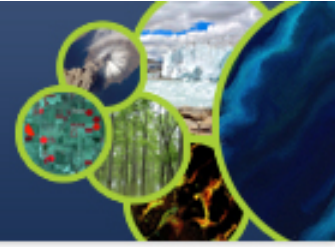
<p>Establish institutional relationships between CEOS and stakeholders from the international recovery community</p>	<p>Dialogue with both WB (now co-chair of ROOT) and Malawi Govt is strongly established</p>
<p>Work with the recovery community to define a sustainable vision for increased use of satellite Earth observations in support of recovery</p>	<p>Dialogue is starting with specialists to define outputs in « clear format »</p>
<p>Foster innovation around high-technology applications to support recovery</p>	<p>Automated analysis of images is under assessment for agriculture monitoring (Malawi and Syria)</p>



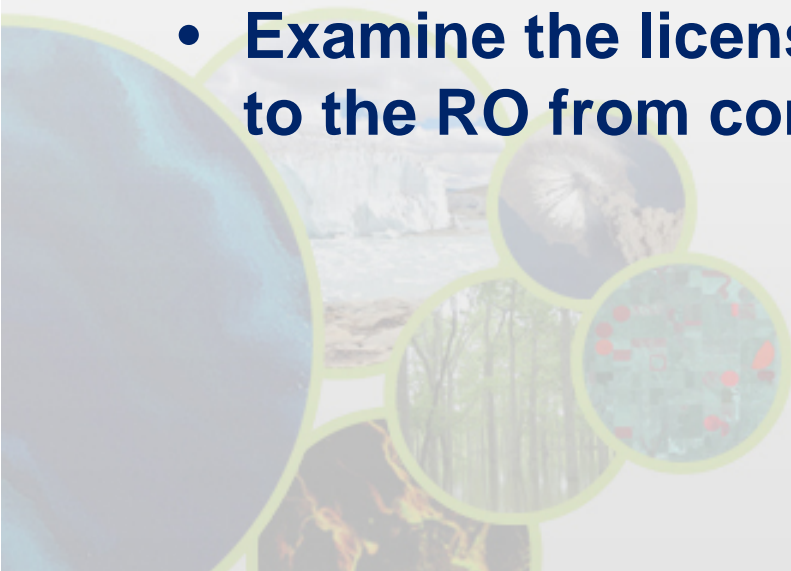
Tentative schedule

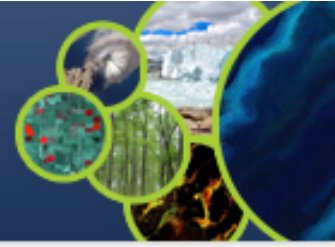
- summer 2016: sign-off of AOI and timeline by Government of Malawi
- September: first products completed;
- October: review of initial results with Malawi users
- March: review of final Demonstrator results and assessment of next steps

- **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:**
- **Sub-group on EO Data Licensing for Disasters created at WGD#5 – first mtg in May 2016, and second mtg in July 2016**
- **Draft harmonized license created for discussion on main terms and conditions to be considered for harmonized approach**



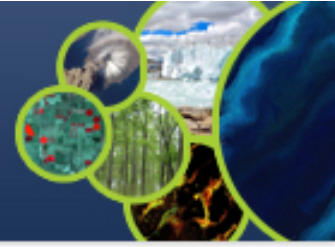
- **Obtain an overview from data providers of the restrictions on data and information based on international and national policies and legislation.**
- **Estimate the long-term impact that access and use conditions will have on end users once the RO has finished.**
- **Examine the license conditions of EO contributions to the RO from commercial providers.**



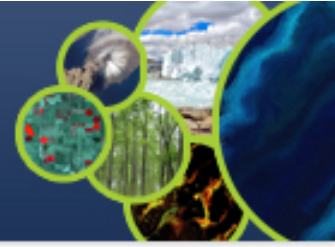


- **Draft license to be reviewed by legal departments of space agencies.**
- **Discussions to be held with commercial partners of agencies on facilitating terms and conditions of data access for full cycle disaster management**
- **Further analysis required for specific terms and conditions of RO data usage in near term (before harmonised licensing)**





- **Significant progress has been made on the Recovery Observatory in the past six months, engaging new users and broadening scope of recovery applications**
- **Further progress expected pending results of Demonstrator activities over coming 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, but resources for value-adding remain a challenge**
- **Further involvement and commitment from additional CEOS agencies not currently engaged would be useful**



Thank you!

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Preparation

- Institutional relationships
- Infrastructure
- Product
- Development
- Recovery demonstration
- Scenario building

Triggering

- Charter and EMS activation monitoring
- Summary
- Primary 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
- Development activity
- Side-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