Committee on Earth Observation Satellites

GEO-DARMA

Status and Update

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WG Disasters # 8

Buenos Aires, Argentina

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GEO-DARMA Overview

Goal:

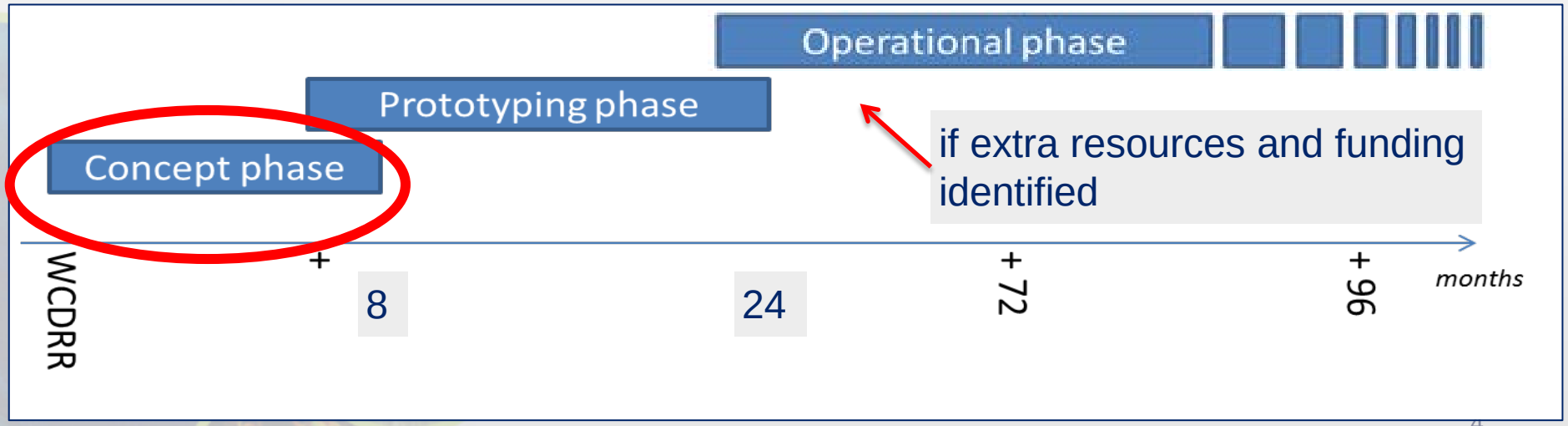
Enhance use of EO data for better-informed Disaster Risk Reduction and Resilience decision making

How:

- Series of end-to-end projects addressing priorities of the “Sendai Framework for Disaster Risk Reduction 2015-2030”.
- International Cooperation. Engagement of all stakeholders (end users, data & risk information providers, internat./national agencies, donor institutions,…)

GEO-DARMA Partnership

Intention: build an international partnership with key stakeholders to define a strategy addressing high priorities of Sendai framework with **resources available, on a best effort basis, adopting a phased approach**



GEO-DARMA Concept Phase

Data providers not fully aware of DRR priorities & user needs, and users not aware of EO potential.

→ Dialogue with knowledgeable regional bodies needed for ….

.. independent assessment of DRR priorities for 2015-2030:

1. **At regional level, 2 or 3 independent and authoritative regional institutions or global stakeholders with regional role, such as World Bank, GFDRR, UNISDR, UNDP, UNESCAP, CDEMA, ECOWAS, RCMRD, others, …** (start with 3 regions: Africa, Asia-Pacific and Latin American and Caribbean)

2. **Identification of hazards affecting most of the countries in the region** (e.g. highest human and economic losses) **or of transboundary risks that require regional and multi-country involvement.**

3. **Identification of 1st set of national projects within the region that could integrate EO in their objectives and delivery.**

GEO-DARMA Prototype Phase

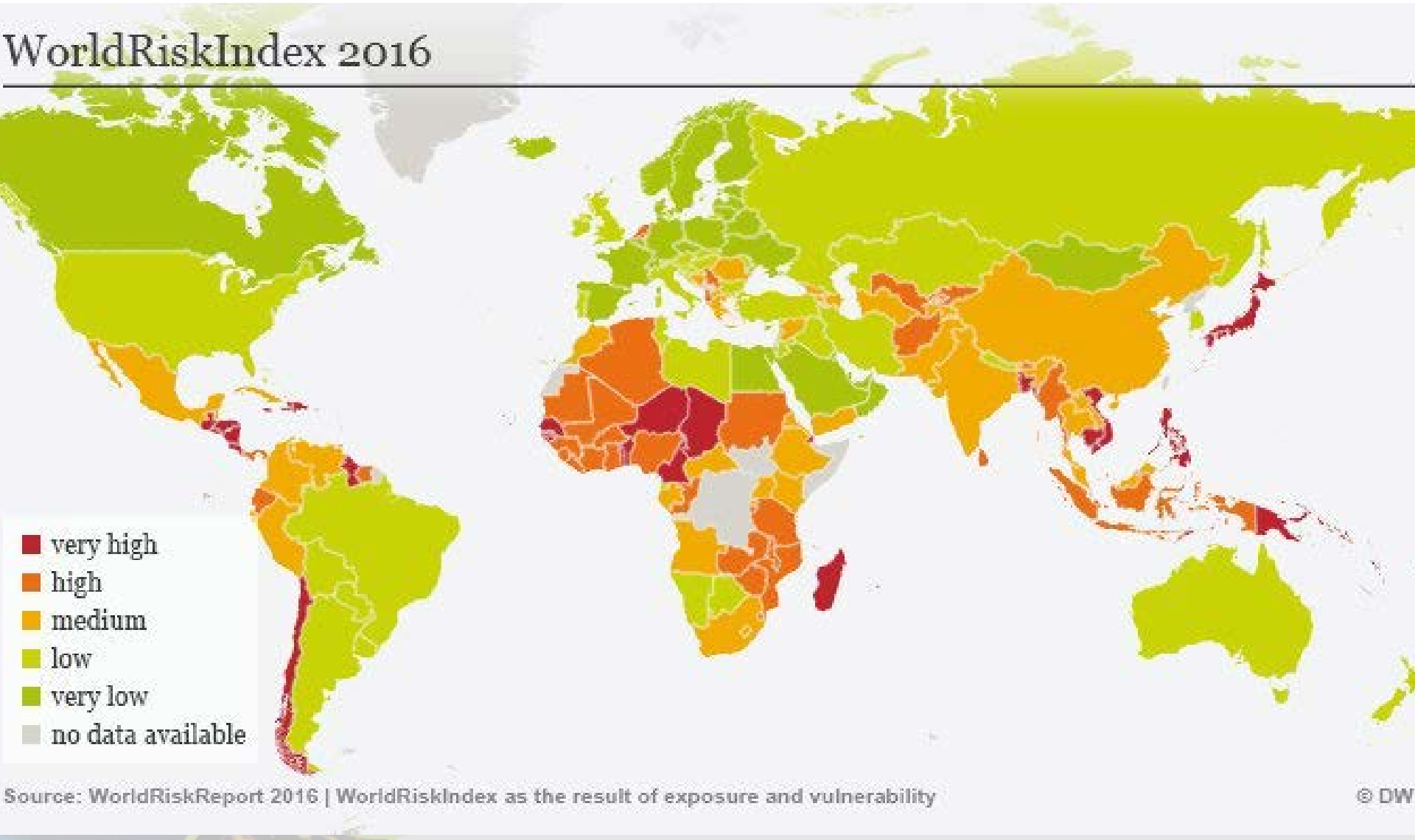
1. Realistic assessment of recommendations from Regional Institutions, given resources from the potential actors (e.g. data providers, value-added information providers, ..)

2. Define and implement possible prototype projects at country level to address recommended priorities;

- close iterations with end users;
- maximum reuse of existing initiatives / activities incl. operational, research, capacity building, …

3. Progressive extension to neighboring countries where applicable.

4. If "successful" prototype projects and if strong request from end users to continue → Assess transition to operation with identification of donors for future operational phase


WorldRiskIndex 2016
very high
high
medium
low
very low
no data available
Source: WorldRiskReport 2016 | WorldRiskIndex as the result of exposure and vulnerability
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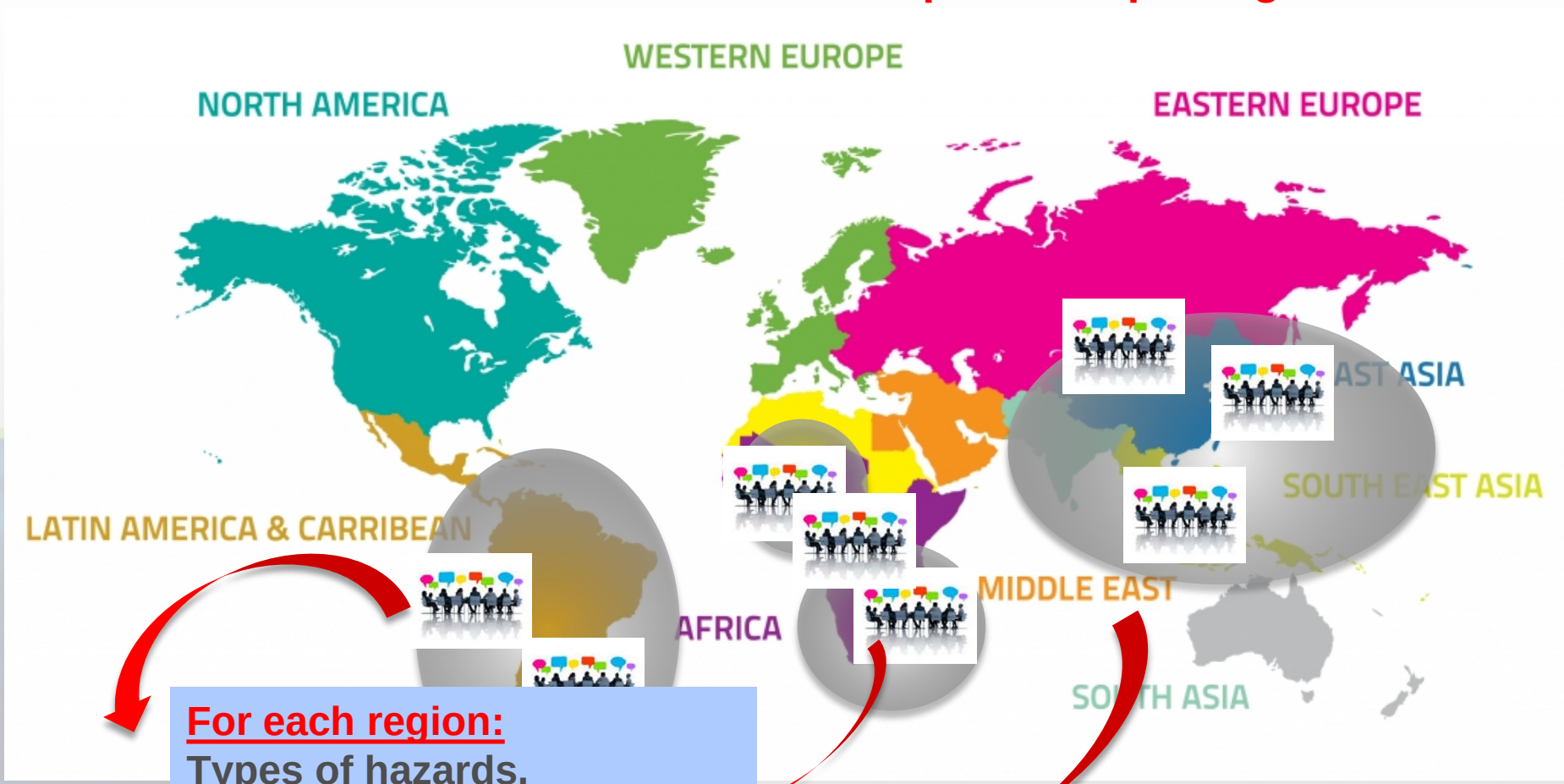
GEO-DARMA Approach

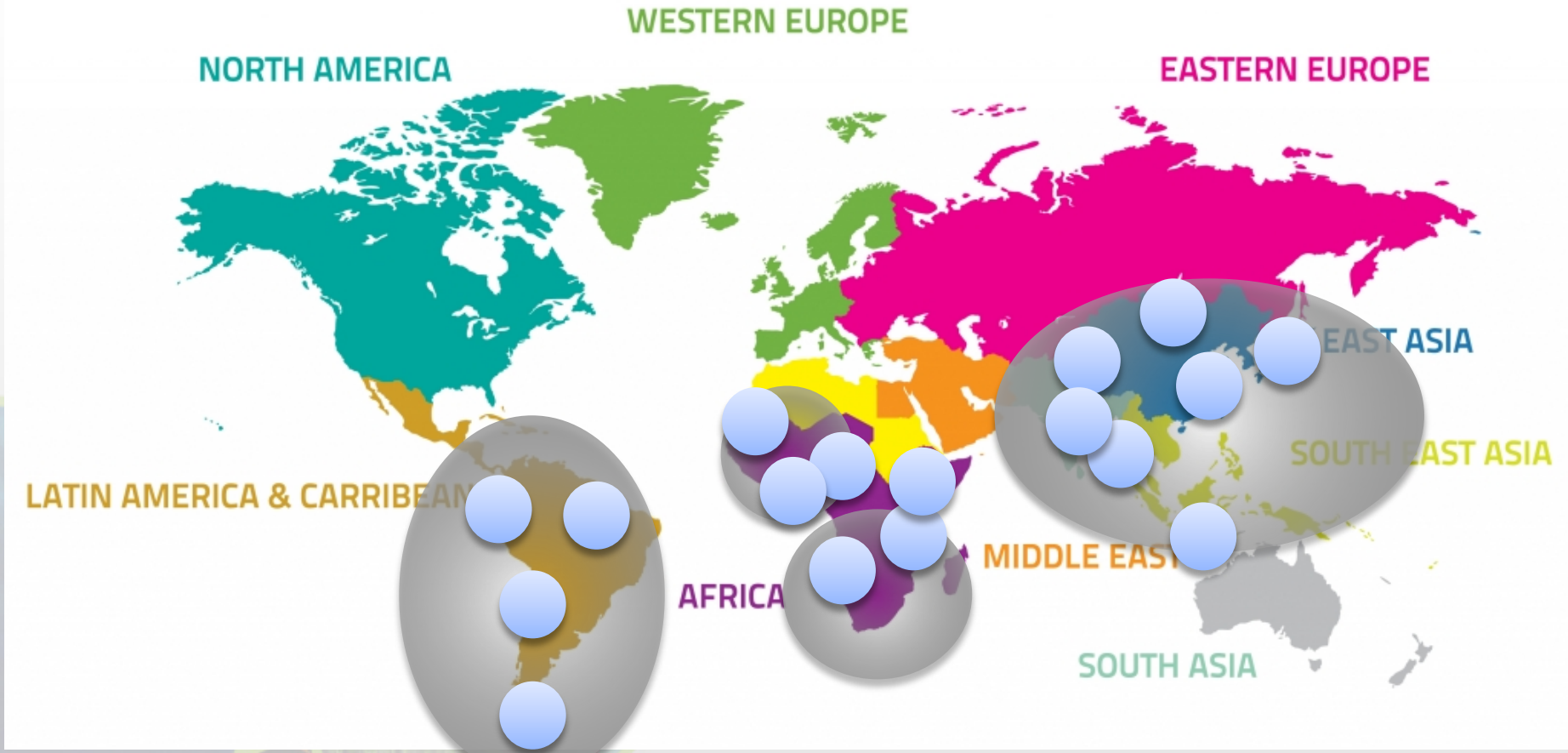
Identification of users needs and DRR priorities per region



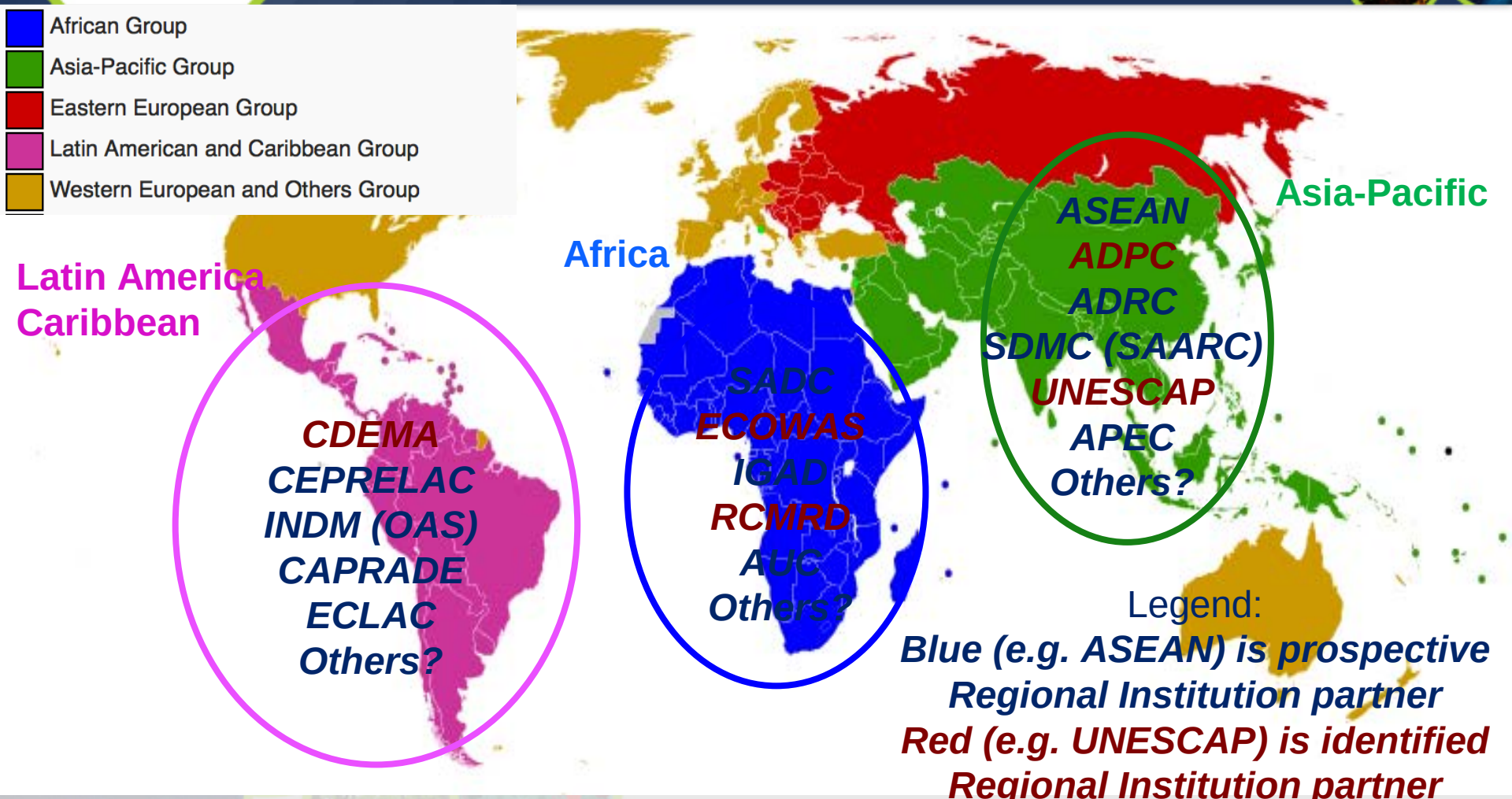
For each region:
Types of hazards,
DRR Issues to be solved,
Initial countries

GEO-DARMA Approach (2)
(project dots only an illustration)

Prototype projects – progressive extension to neighbouring countries



GEO-DARMA Partnership Approach



Legend:

Blue (e.g. ASEAN) is prospective Regional Institution partner

Red (e.g. UNESCAP) is identified Regional Institution partner

Regional programmes of global partners (e.g. World Bank, GFDRR, UNDP, UNEP, UNESCO, UNISDR) to be considered across all regions)

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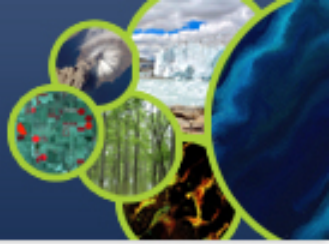
KO Workshop March 14th

First planning meeting held in Rome March 14th (18 people) with CEOS WG Disasters, extended to a few interested parties, to discuss next steps and :

- **Understand Sendai Framework priorities as they apply to EO**
- **Examine Sendai Framework monitoring indicators and relevance for EO**
- **Examine regional organizations of interest**
- **Take stock of relevant regional DRR programs in three regions**
- **Begin planning for 1st SC meeting and Concept workshop in Cancun**

Role and Schedule for Steering Committee



- **Steering Committee (SC) composed of high-level advisors to guide and steer GEO-DARMA initiative;**
- **SC to meet once a year face-to-face and once or twice by telcon; 1st meeting in Cancun May 2017; second meeting planned for October 2017 (telcon)**
- **SC membership is voluntary does not imply or require funding commitment from members to GEO-DARMA;**
- **SC provides advice to management team and Technical Committee, which is made up of representatives of all projects partners (some organizations sit on both SC and Technical Committee – e.g. UNESCAP, ADPC, ECOWAS, CDEMA).**
- **Terms of reference draft completed and will be reviewed at 2nd SC meeting**

Concept Workshop & 1st SC meeting
25 May, Cancun

- **Introduced Steering Committee Members to GEO-DARMA Concept and forge collective approach on way forward**
- **Reviewed role and schedule for SC**
- **Reviewed high-level GEO-DARMA approach and refined schedule and timeline as function of objectives**
- **Discussed Sendai Framework priorities and SDGs, and how EO contributes to their indicators**
- **Initiated discussion on regional priorities**

Current Status and Next Steps

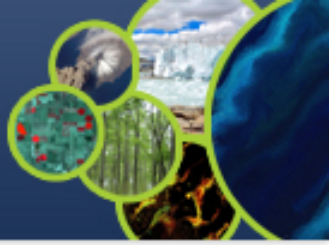
- **Regional Assessment Template Completed**
- **Regional Organizations to develop short report on their vision for regional priorities**
- **Review of regional assessments in October by SC**
- **Conclusion of Concept phase and initiation of 1st projects for prototyping phase**

GEO-DARMA Steering Committee

- **Tiziana Bonapace,** Director ICT and DRR, UNESCAP
- **Francis Ghesquiere**, Head, GFDRR
- **Ronald Jackson,** Executive Director, Caribbean Disaster and Emergency Management Agency (CDEMA)
- **Michael Szoenyi,** Group Head of Flood Resilience, Zurich Insurance Group
- **Mohammed Ibrahim,** Principal Programme Officer, ECOWAS Commission
- **Faisal Djalal, Chairperson,** Asia-Pacific Alliance for Disaster Management
- **Hans Guttman,** Executive Director, Asian Disaster Preparedness Center (ADPC)
- **John Bosco Kayla Kiema,** Director Technical Services, Regional Centre for Mapping of Resources for Development (RCMRD)
- **Godfrey Bahigwa,** Director, Rural Economy and Agriculture, African Union Commission (Invited)
- **Rohan Richards,** Co-chair, UN-GGIM WG-Disasters
- **Mayra Valle Torres,** CEPREDENAC, Coordinator, Training and Education (Invited)
- **Ivan Petiteville,** GEO-DARMA PoC, CEOS / ESA

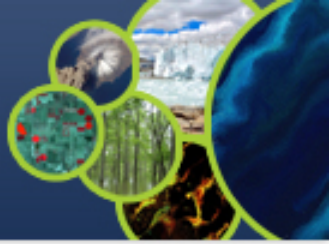
One or two more members from Latin America to join

Suggestions from 1st regional mission – Southeast Asia



- Identify specific SGD and Sendai indicators and demonstrate how EO can be used operationally to track progress – suggested area Central Asia or ASEAN countries
- Identify existing projects (e.g. SERVIR Mekong) that could benefit from integration of much broader suite of satellite EO resources and demonstrate added benefit
- Select a small (four to five) group of coastal mega cities in SE Asia that show rapid growth (e.g. Manila, Jakarta, Bangkok…) and use EO as a tool to monitor key parameters of risk and resilience in a multi-hazard perspective over a five year period
- Consider balance of smaller, easier to achieve projects (in Pacific island context for example) and broader more ambitious projects (in transboundary flooding in a major river

Sendai Indicators - Global Targets



A: Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared with 2005-2015.

B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared with 2005-2015.

C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.

D: Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030

E: Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.

F: Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.

G: Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

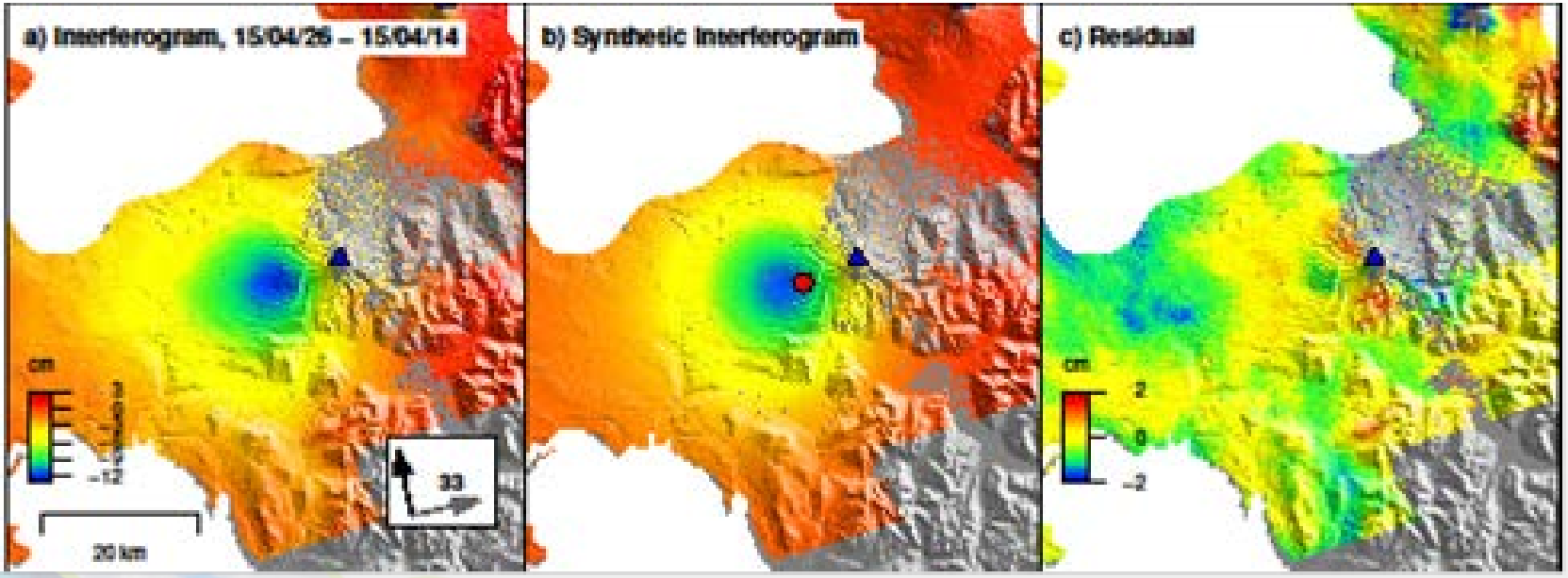
Samples of CEOS Pilot Successes Relevant to GEO-DARMA

Volcano Pilot, Calbuco, Chile

- **After 43 years of quiescence, Calbuco began erupting on 22 April 2015, with very little warning.**
- **Large amount of ash, significant impact on air traffic on Chile and Argentina. Ash tracked and was communicated to VAAC Buenos Aires**
- **Several 1000s people were evacuated from villages closest to Calbuco .**
- **Other interferograms constrain the deformation to have started no more than 1.5 days before the eruption, and to have lasted no more than 1 day.**

Partner agencies: SERNAGEOMIN (Chile); **Buenos Aires Volcano Ash Advisory Center** (Argentina); **University of Bristol** (UK); **Cornell University** (USA); **NOAA** (USA)

Volcano Pilot, Calbuco, Chile



Observed (left), modeled (center), and residual (right) deformation at Calbuco from a Sentinel-1a interferogram spanning April 14–26, 2015. Deformation can be approximated by a source at ~9 km depth beneath the volcano's west flank.

Observatorio Volcanológico de Los Andes del Sur (OVDAS) used this source model to validate their tilt meter records

Volcano Pilot, Chiles – Cerro Negro de Mayasquer

Chiles- Cerro Negro are volcanoes on the Ecuador-Colombian border, with no historical activity

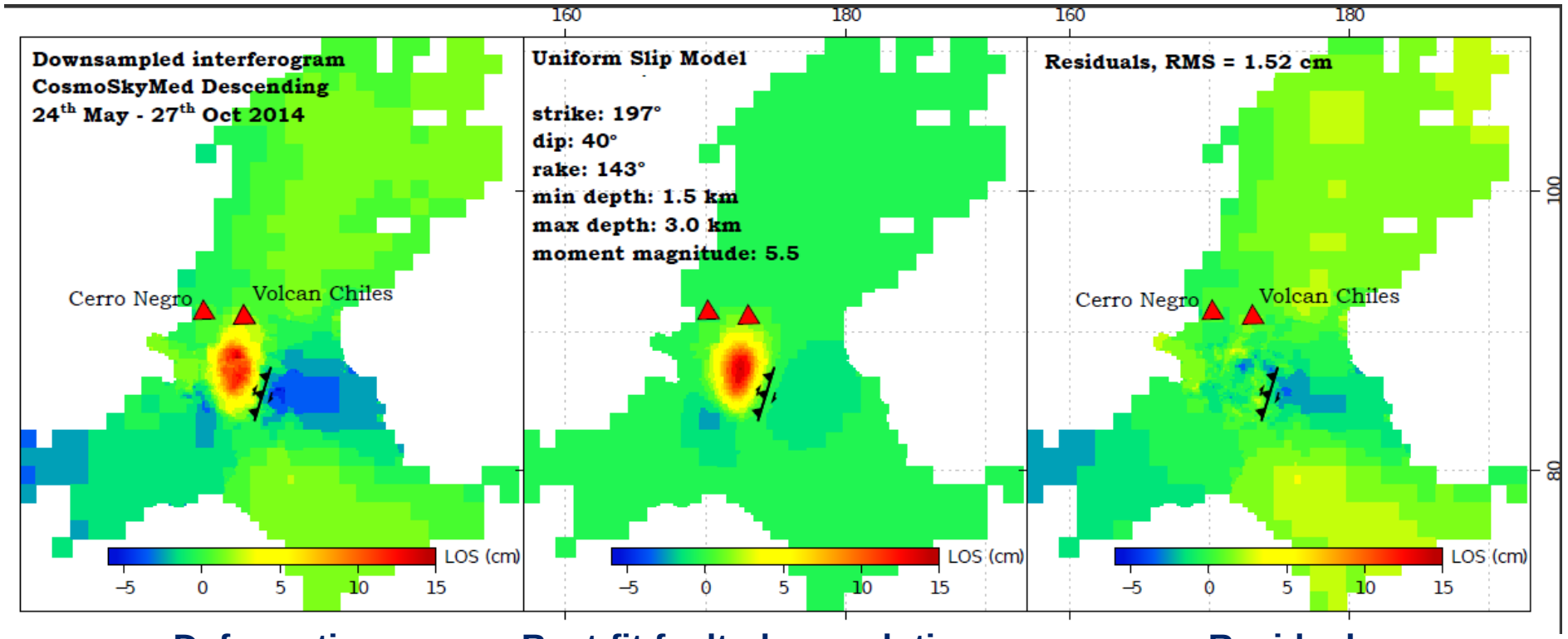
photos: Instituto Geofisico, Ecuador

Since September 2014, thousands of small earthquakes every day – but no changes at the surface.

As there have been **no historical eruptions, ground based monitoring is limited**:

-> **satellite data are critical**

Volcano Pilot, Chiles – Cerro Negro de Mayasquer



Deformation **Best-fit fault plane solution** **Residuals**

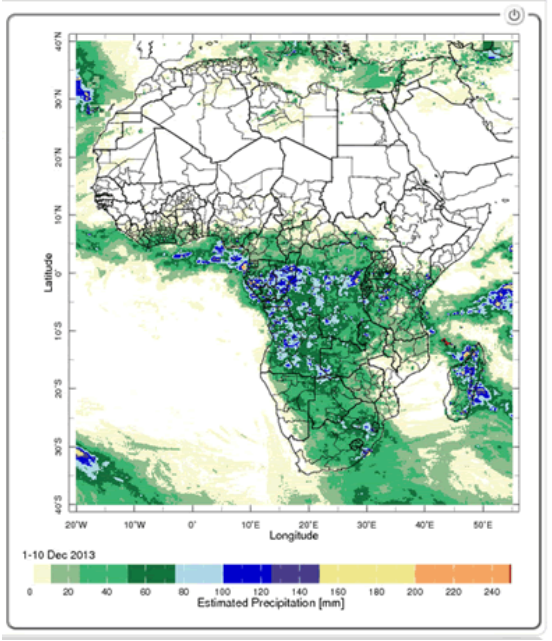
The deformation detected using InSAR has so far been primarily associated with a larger (M5.6w) earthquake on the 22nd October 2014. This earthquake result in maximum displacements of 15 cm towards the satellite in a region SW of Chiles volcano.

- The majority of deformation can be explained by oblique slip on a fault at depths ~1.5-3 km.

Civil Defense in Colombia ordered the evacuation of 12,000 people.

Management of Mosquito-borne Diseases

Malaria and meningococcal meningitis epidemics: recurring problems in Africa



Estimated Precipitation
From SERVIR, NASA's Earth Science
PI: Pietro Ceccato, Columbia UniversityTeam

Risk for malaria transmission increases:

- Average temperature between 18°C and 32°C
- Average precipitation is greater than 80mm
- Average relative humidity is greater than 60%

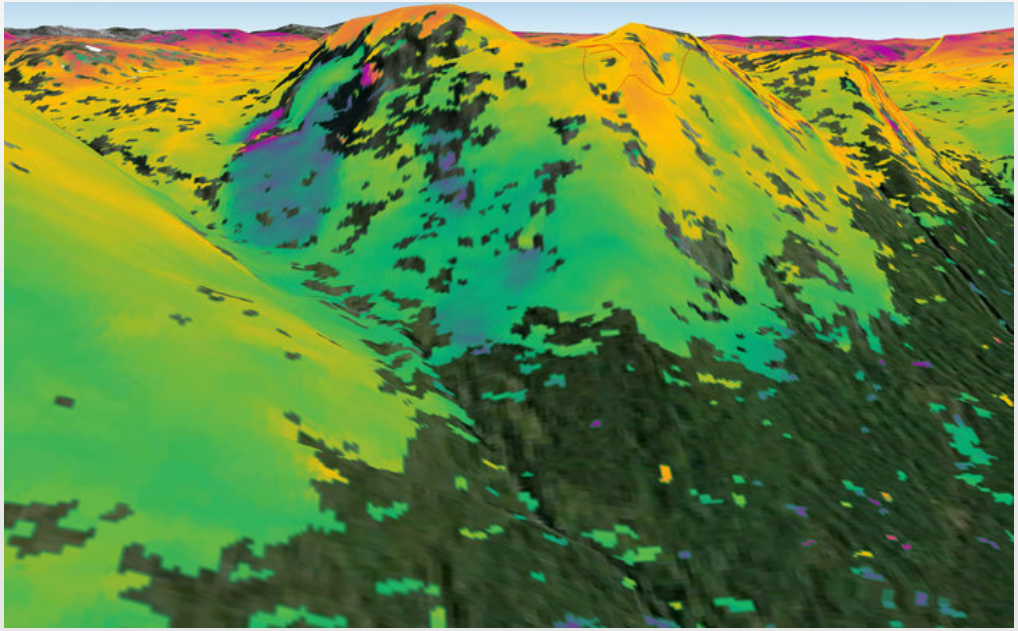
Combined use of satellite observations and performing models can provide accurate predictions to local populations

Landslide Risk Monitoring

‘Interferometric’ image showing surface deformation of a landslide in the municipality of Kåfjord in Troms county, Norway.

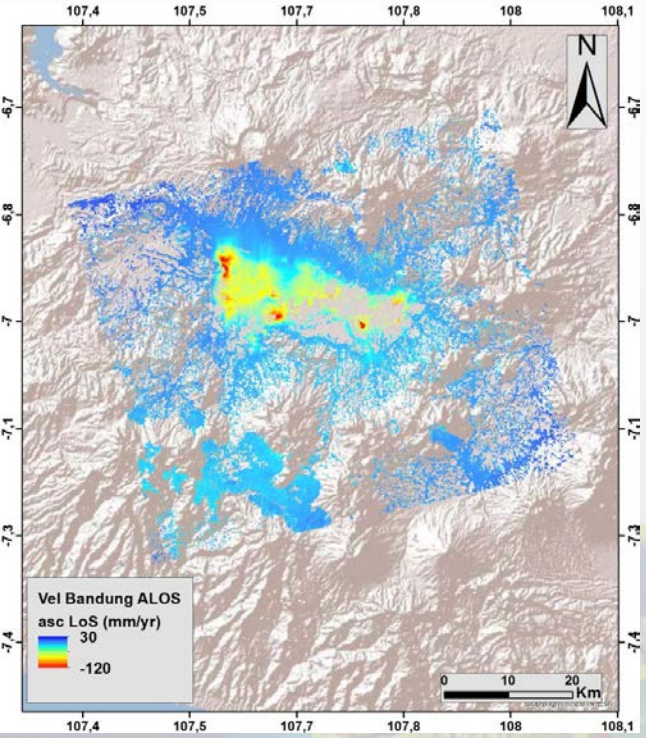
- Sentinel-1A radar scans from 23 Sep. and 30 Aug. 2014

In 24 days, the ground moved about 1 cm.

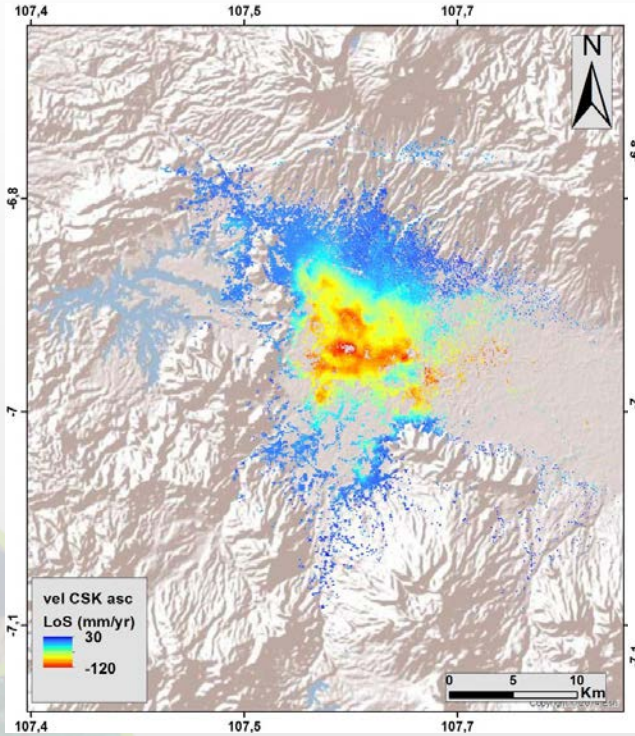


Flood Modelling and subsidence in South-East Asia

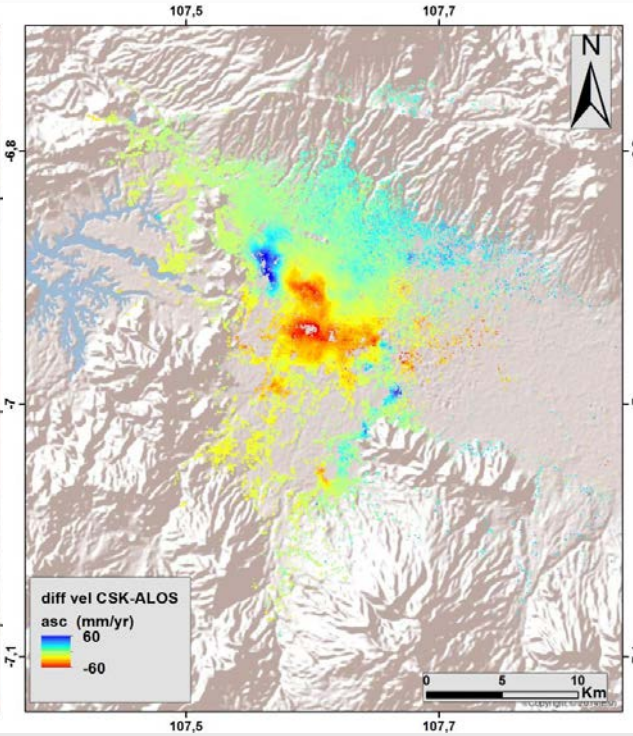
ALOS ascending (2007-2011)



CSK ascending (2013-2015)

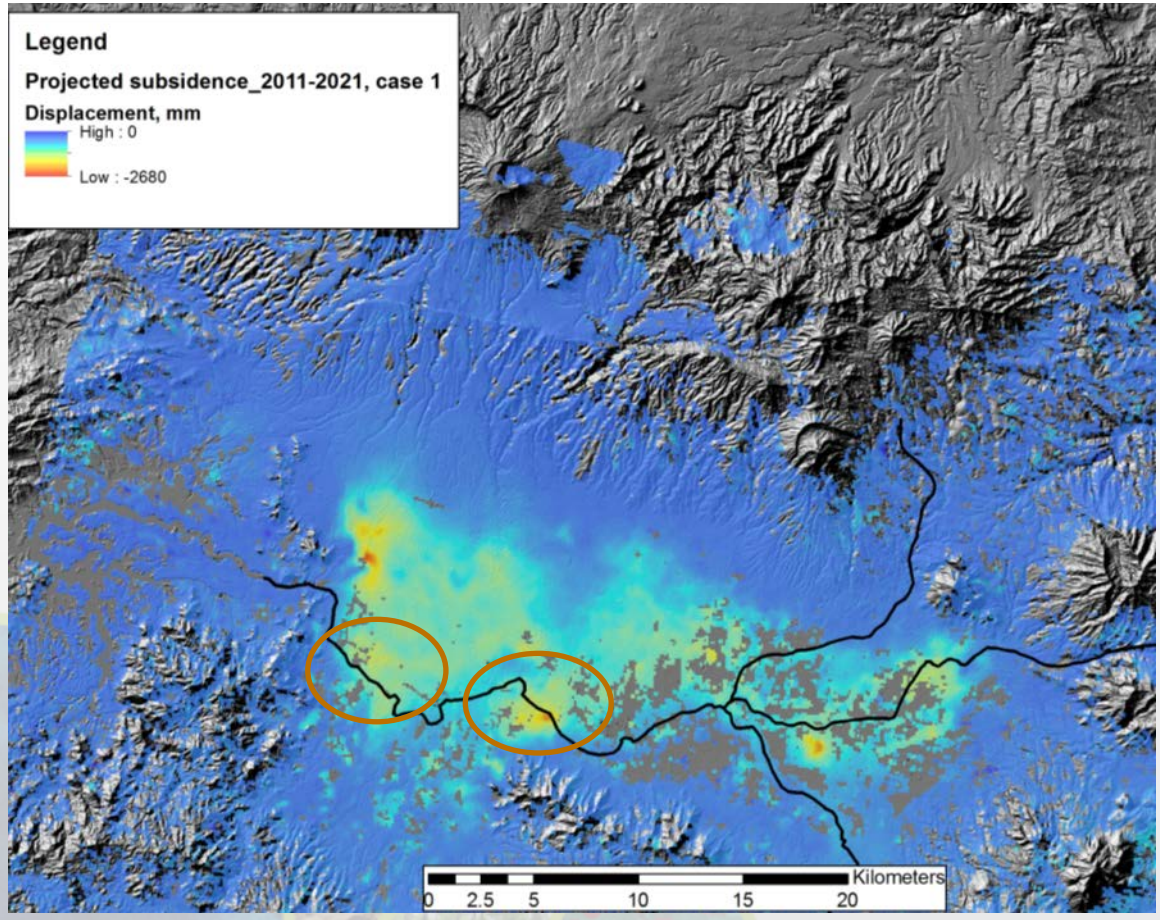


Difference (CSK-ALOS)



(red = increased rate of subsidence)

Flood Modelling - Subsidence Projection



Projected total subsidence by 2021 of up to 2.2 m along main drainage areas.

© INGV

Other Activities:

Consultations on new pilot products with **UN, World Bank**, and **ICRC**

Asian Disaster Preparedness Center (ADPC, Bangkok Thailand) to setup instance of flood modeling and monitoring processing and distribution software installed under cooperation with SERVIR and USAID Oct-Nov 2015

Thank You!

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