CEOS Disaster Risk Management

CEOS WG Disasters

The Geohazards Lab

CEOS WG Disasters 10th meeting

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Geohazards Lab overview:

- Definition:

A platform with federated resources
to access, process
and publish satellite EO data
and derived products

- Goal:

Provide data access and a processing
and e-collaboration environment
to exploit EO data to assess geohazards and their impact

- ✓ Aims to **address priorities of the Sendai Framework for Disaster Risk Reduction 2015-2030** using satellite EO (focus: better understanding hazards & risks)
- ✓ Supports and complements the **CEOS WG Disasters activities** (on-going pilots, follow-on activities and the RO), **the GSNL** and **GEODARMA.**

The idea of the Geohazards Lab

CEOS WG Disasters

Seismic Demonstrator

Volcano Demonstrator

Landslide Pilot

Recovery Observatory

Submission of data requests

Data provision

DCT

- Upload data collections on GEP
- Integrate processing tools and services

Geohazards Lab

Geohazards Office

Access and visualize open data and dedicated data collections

Access online processing tools and services

Share results

GEO

GEO-DARMA

GSNL

Geohazards community users

- Upload data collections on GEP
- Integrate processing tools and services

- Integrate processing tools and services
- Access and links to federated resources
- Man-power support

Space agencies

Concrete objectives concerning DRR activities (1)

Not on an emergency basis

Exploit commonalities across geohazards themes (tectonics, volcanoes, landslides) and need for common processing tools and systematic monitoring chains:

I. **Support the GSNL initiative e.g. with on-line services** *(provide access to processing tools for GSNL users)*

II. **Support other CEOS Pilots that are still pursuing their activities and other follow-on activities**

III. **Support the Recovery Observatory (RO) activity by providing data delivery and access to tools and hosted processing about geohazards related issues relevant to the RO deployed**

IV. **Support GEO-DARMA by providing access to tools and hosted processing about geohazards in the priority areas (as described in the GEO-DARMA implementation plan) for risk assessment**

Concrete objectives concerning DRR activities (2)

On an emergency basis

V. **Pursue and support the generation and distribution of advanced science products based on terrain motion mapping** e.g. advanced tectonics mapping using Sentinel-1 for earthquake response (deformation maps, source models, etc.)

VI. **Pursue and support the generation and distribution of other advanced science products** e.g. for landslide monitoring, thermal signatures of volcanic eruptions, etc.

Contributions from CEOS agencies & the geohazards community

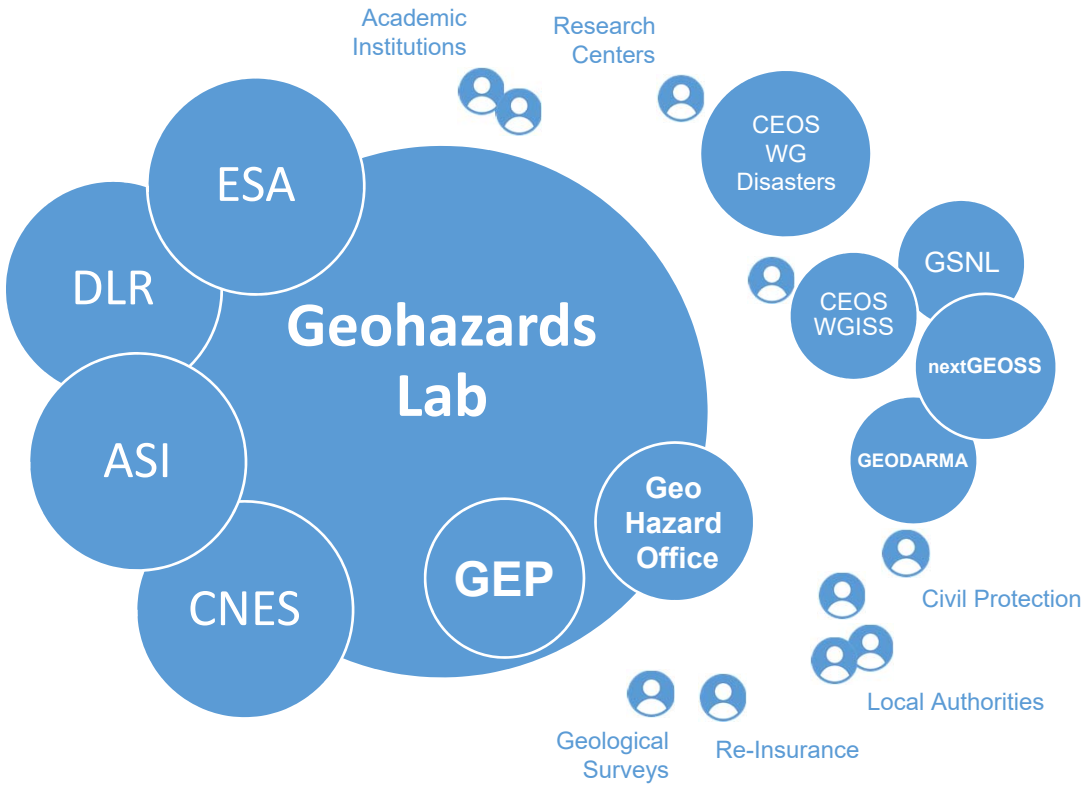
CEOS agencies: ESA, CNES, ASI, DLR

Geoscience centers with EO expertise that already have had an active role:

- **CNRS EOST** /France
- **CNRS IPGP** /France
- **COMET** /UK
- **ISTerre/Institut de Recherche pour le Développement (IRD)** /France
- **INGV** /Italy (via the responsible of the Geohazards Supersites and Natural Laboratories initiatives)
- **BRGM** /France provides in-kind contribution (labor) to the GeoHazards Office and takes the lead role
- **CNR-IREA** /Italy (via platform federation activities about InSAR data processing)
- **USGS** /USA participation in Geohazards Lab WG on scientific animation

GeoHazards Office

An activity of scientific animation within the Geohazards Lab



GeoHazards Office Goals:

- Full in line with the Geohazards Lab Implementation Plan
- Liaise with the geohazards community to promote their results when using the Geohazards Lab resources
- Develop collaboration with experts to harmonize and improve acceptance of platform based EO techniques
- Demonstrate and showcase hosted processing services for terrain motion mapping

GeoHazards Office
Examples of Ideas

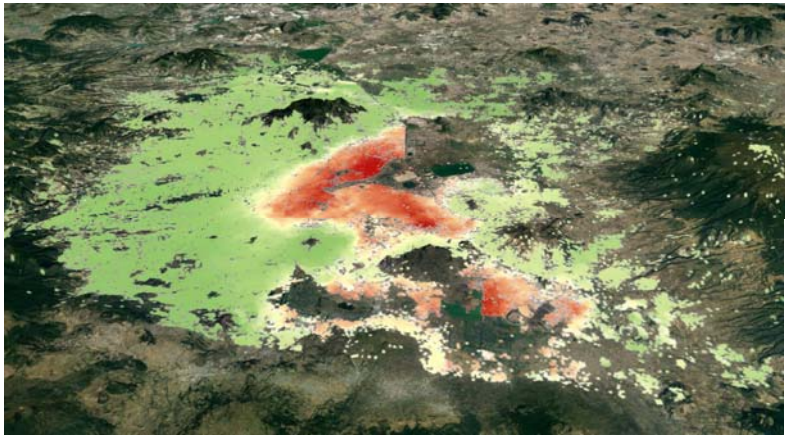
BRGM Internal EO Workshop
Definition and collection of geoscience users requirements, Foster exploitation of platform-based EO services, Build methodological approach for communication with relevant end users

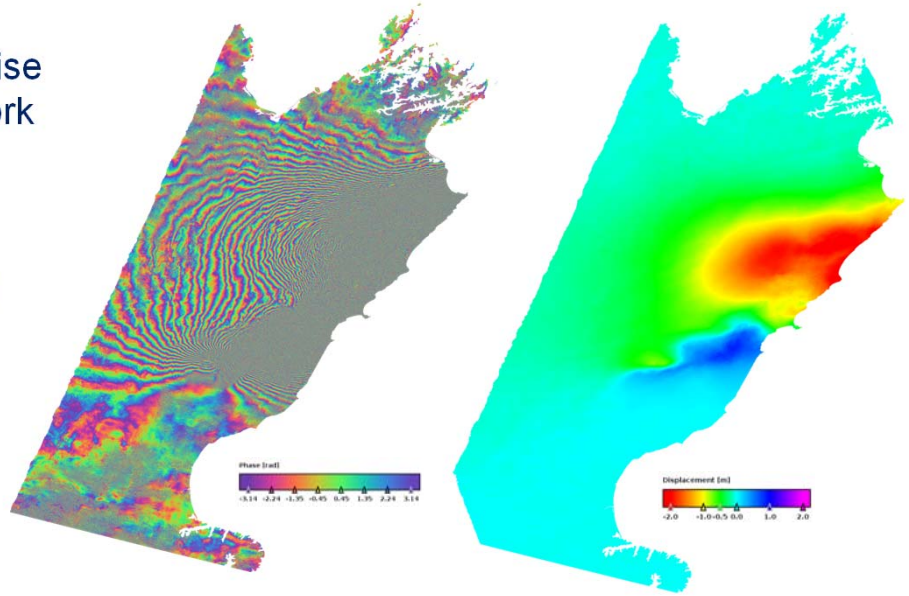
Demonstration Processing on GEP
Cloud processing on selected pilot sites, Scientific publications

CIEST initiative
Revival of the «Cellule D'intervention et d'Expertise Scientifique et Technique» collaborative framework between research institutes of forM@Ter group

Communication
Develop a webpage in line with the CEOS portal and explore options about a Twitter account to communicate the Geohazards Lab activities

Awareness & promotion
Wegener 2018 (GNSS community)





Contains modified Copernicus Sentinel data (2014-2017), processed by BRGM

WG on Scientific animation

A scientific advisory Working Group (WG) is being set up

Purpose: **Work on the definition and harmonization of EO products for geohazards monitoring** (terrain motion mapping, landslide monitoring etc.) to:

- ❑ maximize use of EO techniques and cloud processing by the EO expert community
- ❑ achieve acceptance of EO products by the non-EO scientific community and decision makers
- ❑ facilitate interpretation and improve understanding of EO products (and derived information) by end-users

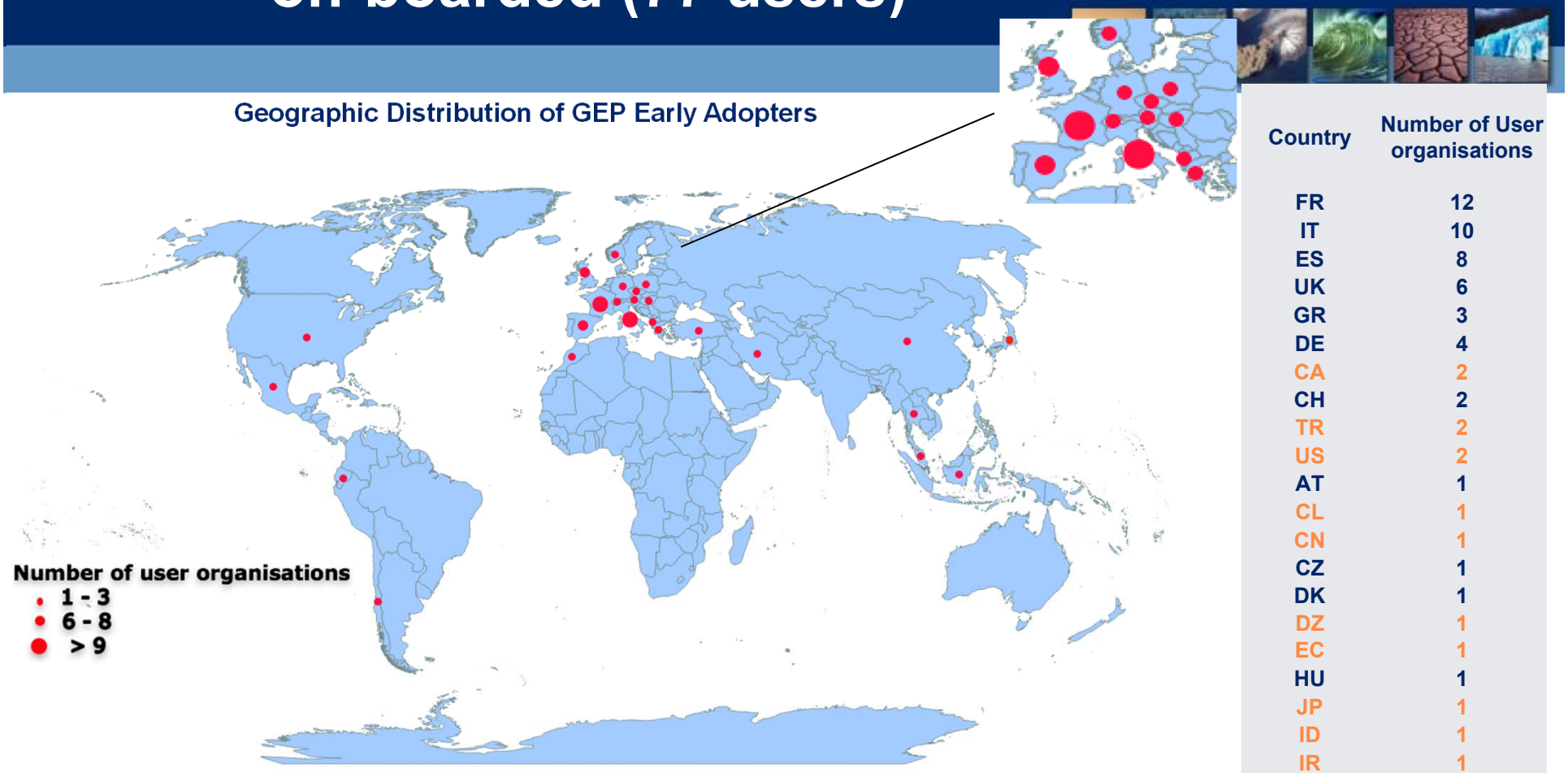
Contributions

Confirmed/interested: **ESA, CNES, BRGM, INGV, ASI, CNRS EOST, CNR IREA, USGS, NOA, NGU**

Invited: **BGS, IGME, PGI**

- ❑ **Preparatory meeting held** on 5 September 2018, Naples, Italy: Introduction to the concept and roadmap of activities
- ❑ **1st meeting of the WG** scheduled for 16 November 2018 at Frascati, Italy (during the Φ-Lab week)

September 2018: 69 user organisations on-boarded (77 users)



Country	Number of User organisations
FR	12
IT	10
ES	8
UK	6
GR	3
DE	4
CA	2
CH	2
TR	2
US	2
AT	1
CL	1
CN	1
CZ	1
DK	1
DZ	1
EC	1
HU	1
JP	1
ID	1
IR	1
MA	1
ML	1
MX	1
NG	1
NO	1
PL	1
TH	1
Total	63

- That is 21 users from the GEP Consortium and 56 users from the community via the **early adopters programme** in **28 countries**
- Mainly **European users,** but also **15 users from the rest of the world: Asia** (Turkey, Thailand, Indonesia, China, Malaysia, Japan & Iran), **Africa** (Morocco, Algeria, Nigeria), **Latin America** (Ecuador, Mexico and Chile) and **North America** (Canada, USA).

Reporting (1)

Q2-Q3 2018

I. Support the GSNL initiative

- ✓ INGV's SISTEM available (displacement maps using SAR interferometry and data from the GNSS technique). Discussions started with EPOS to **bring European GNSS data on GEP**. Other capabilities have been identified outside Europe (e.g. UNAVCO).
  - ✓ This task can not be complicated due to GNSS data license restrictions.

II. Support other CEOS Pilots that are still pursuing their activities and other demonstrator activities

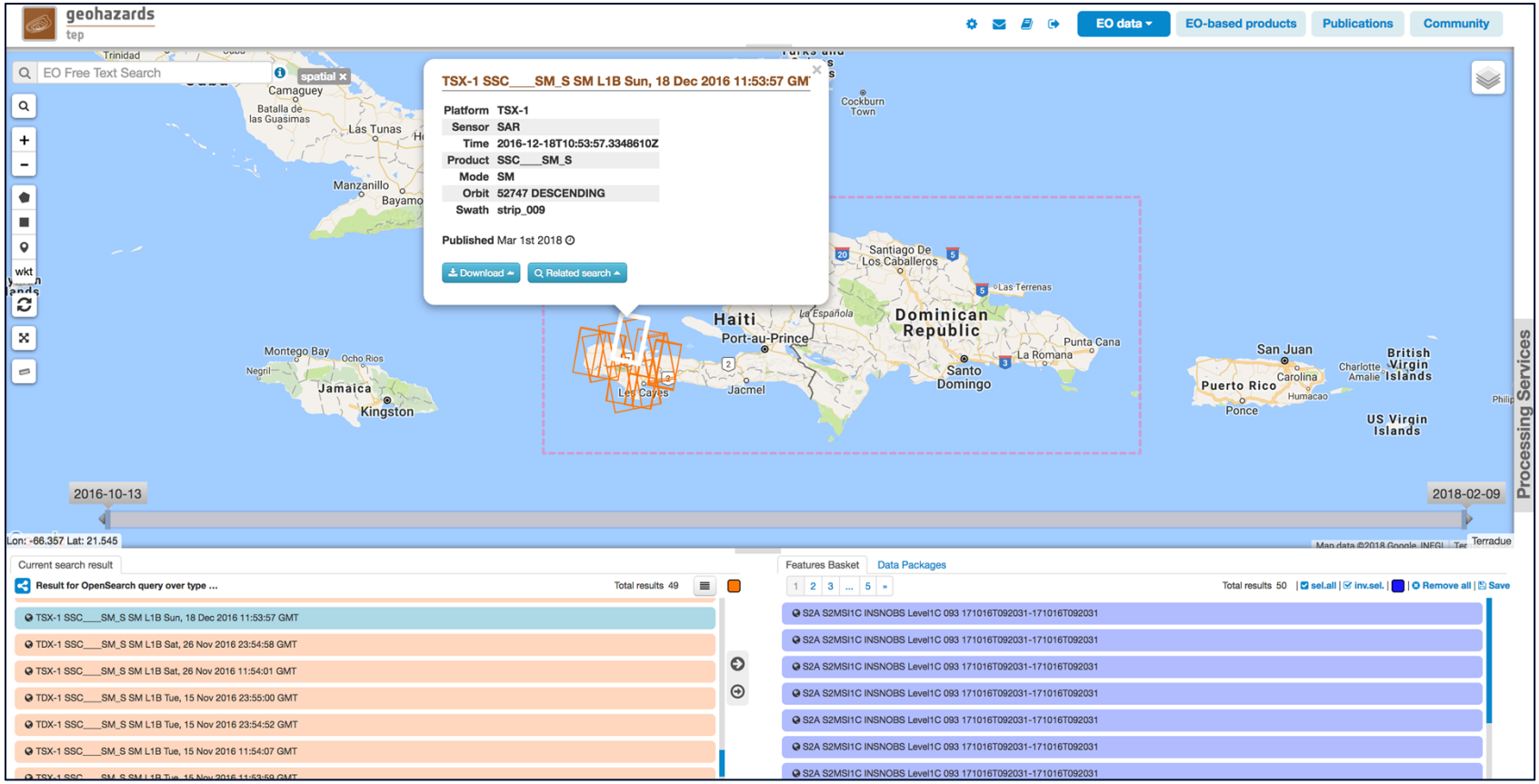
- ✓ **Agreement** with CNES to bring **Pleiades data on GEP for on-line processing**.

  Pleiades data
  - Each pilot/demonstrator to provide detailed list of Pleiades data received under CEOS/GSNL
  - A machine to machine mechanism to be set up between GEP and Airbus online system
  - A single user from ESA to sign the licence for the use of Pleiades data via GEP
  - Data to be made **available ONLY for online processing**
  - Access is restricted to authorized CEOS and GSNL users.
  - ESA to provide list of authorized users per activity per dataset

  Derived products
  - Distribution/transfer of DEM/DSM limited to authorized users within the EU or organizations having signed a cooperation agreement with CNES
  - Distribution of orthorectified images demands an authorization

Reporting (2)
Q2-Q3 2018

III. Support the Recovery Observatory (RO) activity



- ✓ TerraSAR-X data over Haiti available on GEP (scenes are continuously linked to GEP, upon reception by the RO)
- ✓ Cosmo-SkyMed data over Haiti available on GEP

Reporting (3)

Q2-Q3 2018

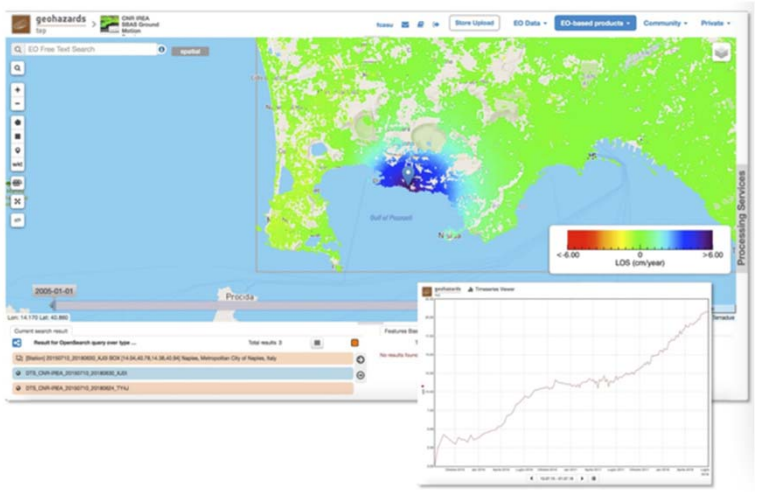
IV. Support GEO-DARMA by providing access to tools and hosted processing about geohazards in the priority areas for risk assessment

Not started yet.

V. Pursue and support the generation and distribution of advanced science products based on terrain motion mapping e.g. advanced tectonics mapping using Sentinel-1 for earthquake response (deformation maps, source models, etc.)

- ✓ **Integration of SNAP-StaMPS** on GEP **started** (BRGM, University of Leeds)
- ✓ **SBAS Sentinel-1 Surveillance service for ground deformation monitoring** (generates updated surface displacement time series via the P-SBAS-InSAR algorithm) **fully integrat**ed (CNR-IREA).

On-demand service to be integrated shortly.



Monitoring Campi Flegrei using the SBAS Sentinel-1 Surveillance service (CNR-IREA)

Reporting (4)

Q2-Q3 2018

VI. Pursue and support the generation and distribution of other advanced science products e.g. for landslide monitoring, thermal signatures of volcanic eruptions, etc.

- ✓ **Integration of Volcanic Plume Elevation Model (VPEM)** on GEP **to start shortly** (BRGM)
- ✓ **MPIC-OPT** (measuring horizontal displacement-series of optical satellite images) **fully integrated** on GEP by University of Strasburg/CNRS-EOST

Reporting (5)

Q2-Q3 2018

Promotion and Capacity Building

Presentations and posters

- ***Hosted Processing Tools of the Geohazard Lab Initiative in Support to Geohazard Risks in the Alps*** presented by BRGM and ESA during the EO4Alps Workshop, 27-29 June 2018, Innsbruck, Austria
- ***Introduction to EO for geological applications*** presented by BRGM during the Journée de Télédetection, 5 June 2018, Orleans, France
- **FastVel products generated on GEP** presented by BRGM during the Journée de Télédetection, 5 June 2018, Orleans, France

Papers

- **Abstract accepted: "*Generating InSAR products with COSMO-SkyMed and TerraSAR-X imagery in the Geohazards Exploitation Platform (GEP) to support the CEOS Recovery Observatory in Haiti",*** Φ-week, 12-16 November 2018, Frascati, Italy

Training

- **Upcoming training session: *Hands-on InSAR (ESA software and on-line tools),*** 21-25 September 2018, Corinth, Greece

Web articles and social media

- New GEP services from CNRS-EOST – MPIC-OPT & DSM-OPT https://discuss.terradue.com/t/new-gep-services-from-cnrs-eost-mpic-opt-dsm-opt/358
- New GEP service from CNR-IREA – SBAS Sentinel-1 Surveillance service for ground deformation monitoring https://discuss.terradue.com/t/new-gep-service-from-cnr-irea-sbas-sentinel-1-surveillance-service-for-ground-deformation-monitoring/365

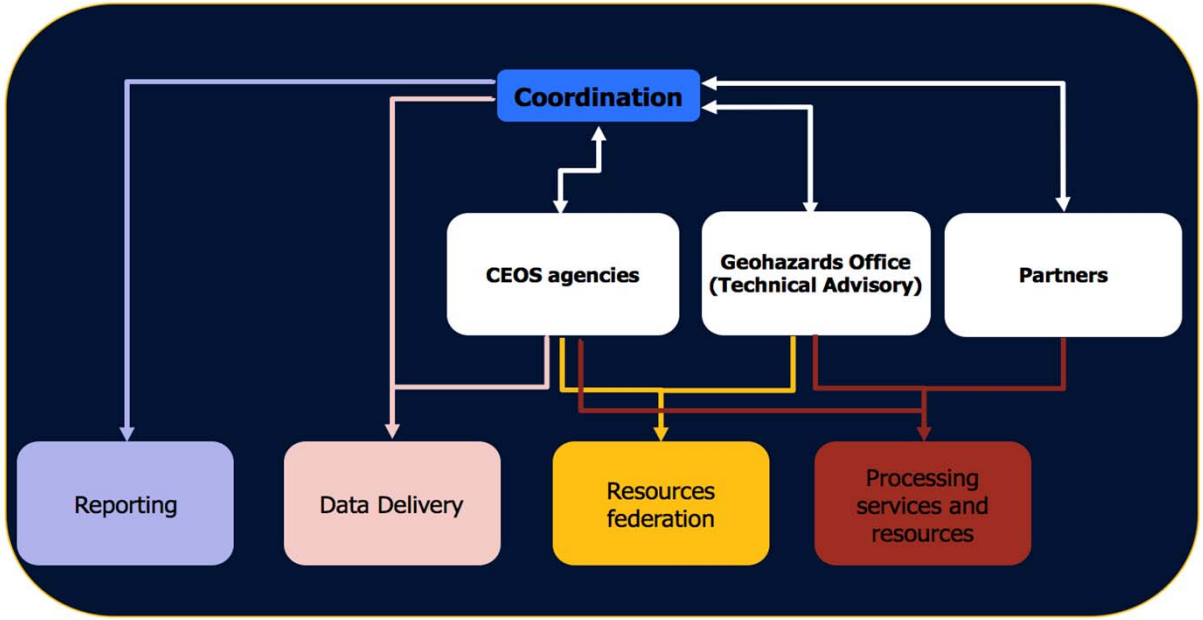
Status and milestones for 2018

Milestones of Year 1 of the Implementation Phase	Status Q1 2018	Status Q3 2018
Expand integration of services and tools to better meet community needs	Started	On-going
Document procedures to access and use processing chains	Not started	Not started
Define protocol with CEOS agencies that contribute to the Geohazards Lab. As a baseline ESA will provide access to the GEP	Not started	Started
Enhance procedure to make data available in a timely fashion	Not started	Not started
Develop a Website/Webpage	Not started	Started
Start promoting hosted processing and raising awareness (capacity building, training courses, workshops)	Started	On-going
Analyse geohazards community requirements	Not started	Started

Governance approach

The Geohazards Lab shall be organized according to CEOS WG Disasters rules:

- Coordination: ESA (Philippe Bally, Dorella Papadopoulou)
- Technical Advisory/Support: GeoHazards Office (Michael Foumelis, BRGM)
- Reporting: ESA (Philippe Bally, Dorella Papadopoulou
- Data delivery: Data delivery procedures in collaboration with the Geohazards Lab coordinators; the Geohazards Lab does not intend to request EO data (apart from open & free sources).
- Processing chains & processing resources from different infrastructures contributing in the Geohazards Lab will be provided on a voluntary basis by CEOS space agencies and partners.
- Platform resources federation: governance to be defined among the CEOS agencies willing to contribute to the Geohazards Lab.



Conclusion

- **Kick off** in Q1 2018.
- **Implementation Phase** started in Q3 2018
- **Contributions gathered**: 4 CEOS spaces agencies and 9 partners
- Further **contributions are welcome** if other CEOS space agencies and partners are interested (NASA, CSA, JAXA)
- Concrete discussion started with CNES, DLR and ASI about **accessing or processing the EO missions** they provide on GEP
  - **Agreement achieved for Pleiades data on GEP for online processing**
- **Roadmap of scientific animation activities** proposed by BRGM and ESA during WG preparatory meeting
- **Tools and services**: integration on-going
- **Promotion, awareness raising and capacity building**: on-going
- Website and webpage (on http://ceos.org/) under preparation

Thank you

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