

Introducing "TIO"

Optical imagery time series analysis on the Geohazards Exploitation Platform

Matthieu Volat¹ Pascal Lacroix² Noélie Bontemps³
Marie-Pierre Doin⁴

¹CEA/Leti ²IRD/ISTerre ³Univ Grenoble-Alpes/ISTerre ⁴CNRS/ISTerre

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Overview

- ESA initiative, part of the Thematic Exploitation Platforms
- Aims:
 - Facilitate use and processing of large dataset
 - Open to science and non-science users
 - Provide an environment for services development

geohazards
top

CEOS Geohazards Pilots
CEOS creates thematic disaster risk management pilots on floods, seismic hazards and volcanoes, and oversees a Recovery Observatory.
[Go to Sky](#)

Cloud Dashboard

Geo Browser

Activities

Why go on GEP?

User

- Access to ESA catalog¹
- Ready-to-use tools
- Publish scientific results²



Developer

- Share your tools
- Provide a tested platform
- Do presentations about GEP



¹but not to download it

²but only from those tools

tío

masculine noun

1 (relative)

a uncle: *Mi tío se vistió de Papá Noel para la fiesta navideña.*

2 (colloquial) (form of address) (Spain)

a dude (US): *Oye, Paco, hay un tío en la puerta que dice ser tu hermano.*

b mate (UK): *Oye, tío. No le hables así a mi esposa.*

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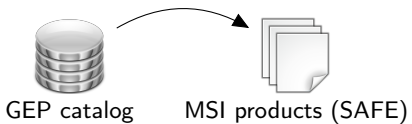
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Aims

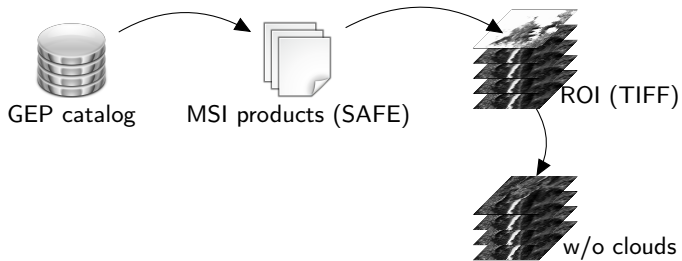
- A processing service on GEP
- Compute displacement maps over datasets
- Perform the timeserie analysis from [Bontemps et al., 2017]
- Focus on Sentinel-2 dataset, but can accomodate other sensors



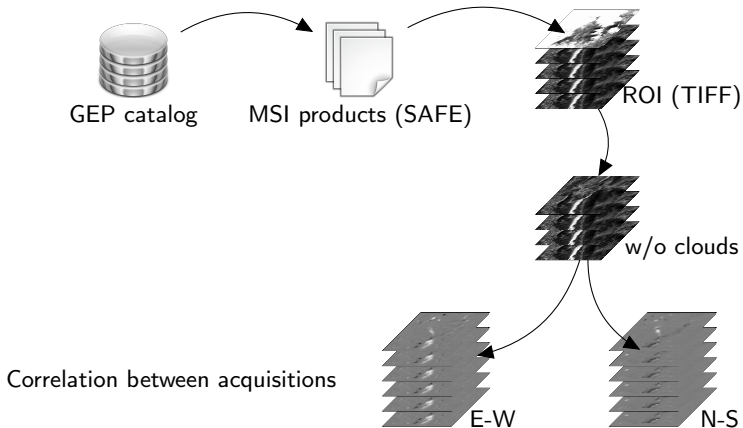
TIO processing



TIO processing



TIO processing



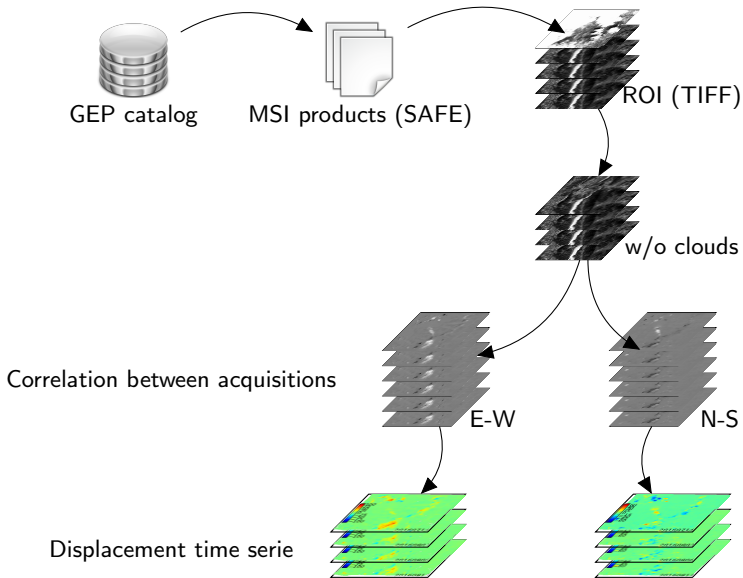


Image correlator

- Developed at IGN
- Displacement maps from georeferenced products



NSBAS

- Process InSAR data from raw to timeserie analysis [Doin et al., 2011]
- Timeserie analysis adapted to optical data [Bontemps et al., 2017]

Validation: Sihuas area, Peru

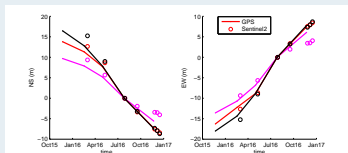


Figure: GPS and TIO measurements (EW and NS)

Interface overview: important parameters

The screenshot displays the Geohazards TEP web interface. At the top, the browser address bar shows the URL: <https://geohazards-tep.eo.esa.int/geobrowser/#!context=Sentinel-2>. The page header includes the Geohazards TEP logo and navigation links: "volat", "EO data", "EO-based products", "Publications", and "Community".

The main content area features a map of the Grenoble region. The search bar contains the query: `*S2A S2MSI1C INSNBS*`. The map shows various locations, including Saint-Marcellin, Grenoble, and Saint-Jean-de-Vaux. A date range of 2016-05-26 to 2016-10-03 is displayed at the bottom of the map. The coordinates are Lon: 5.863 and Lat: 44.805.

Below the map, the "Current search result" section shows three search results for the query `*S2A S2MSI1C INSNBS*`. The results are:

- S2A S2MSI1C INSNBS Level1C 108 161002710022-1610027103017
- S2A S2MSI1C INSNBS Level1C 008 160915T104022-160915T104731
- S2A S2MSI1C INSNBS Level1C 008 160906T104022-160906T104246

The "Features Basket" and "Data Packages" sections are currently empty, showing "No results found."

On the right side of the interface, a "Job title" section is visible, containing the text "TIO // Harmalière 2". Below this, there are several input fields for search parameters:

- References to catalogue entries *
- Region of interest *: 5.662,44.91,5.706,44.947
- Cloud level threshold *: 1200
- Max number of pairs per date *: 4
- Remove median value *: no
- Smoothing coefficient *: 0.003
- RMS disclosure threshold *: 1.2

Interface overview: important parameters

The screenshot shows the Geohazards TEP web interface. The main map displays a satellite view of the Grenoble region with a red rectangular Region of Interest (ROI) box. The search bar contains the query "*S2A S2MSI1C INSNBS*". The right-hand panel is titled "Job title" and contains several configuration fields:

- References to catalogue entries *
- Region of Interest *: 5.662,44.91,5.706,44.947
- Cloud level threshold *: 1200
- Max number of pairs per date *: 4
- Remove median value *: no
- Smoothing coefficient *: 0.003
- RMS disclosure threshold *: 1.2

Three callout boxes provide instructions:

1. Drag & drop imagery
2. Get ROI box
3. Scroll to click the "run" button

Interface overview: result, quicklook

Retrieving the results

- Final output are 3 multi-layered TIFFs: NS/EW/RMS
- Post-processing is left to minimum
- The data is yours now:
 - Download it, further process it, create figures
 - Create a service based on TIO

Perspectives

- Production machine
- Large scale analysis
- More sensor support (w/ better resolution)



Ressouces

- Tutorial: <http://terradue.github.io/doc-tep-geohazards/tutorials/tio.html>
- Service source code:
<https://github.com/geohazards-tep/dcs-isterre-tio>

Contact

Pascal Lacroix, ISTERre: pascal.lacroix@univ-grenoble-alpes.fr

Thanks for your interest

-  Bontemps, N., Lacroix, P., and Doin, M.-P. (2017).
Inversion of deformation fields time-series from optical images, and application to the long term kinematics of slow-moving landslides in peru.
Remote Sensing of Environment.
-  Doin, M.-P., Guillaso, S., Jolivet, R., Lasserre, C., Lodge, F., Ducret, G., and Grandin, R. (2011).
Presentation of the small baseline nsbas processing chain on a case example: The etna deformation monitoring from 2003 to 2010 using envisat data.
In Proceedings of the European Space Agency Symposium "Fringe". Frascati, Italy.