



GEP InSAR software

Tools to process InSAR data in GEP

U-GEOHAZ TRAINING

Work package 5: Demonstration at different countries

WP Leader: IGME

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¹ IGME, Spain

Athens, Greece, 03/06/2019



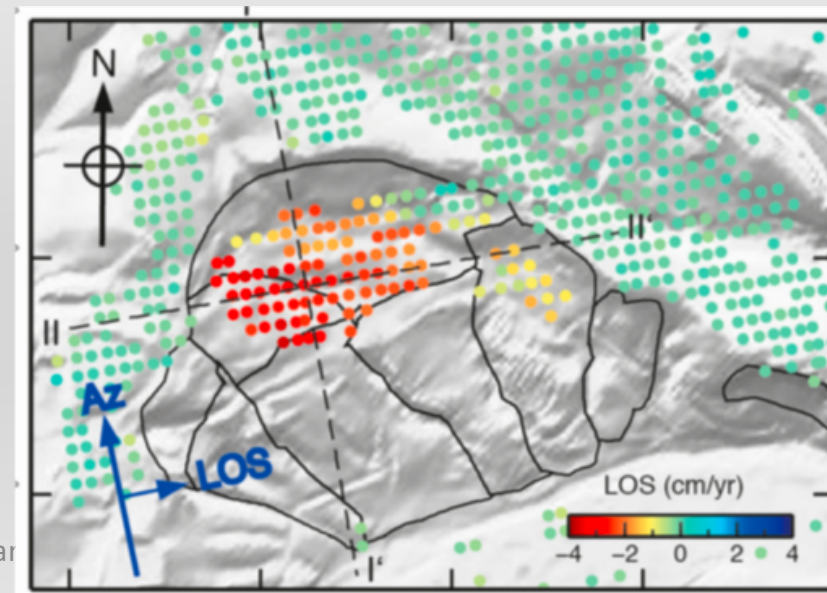
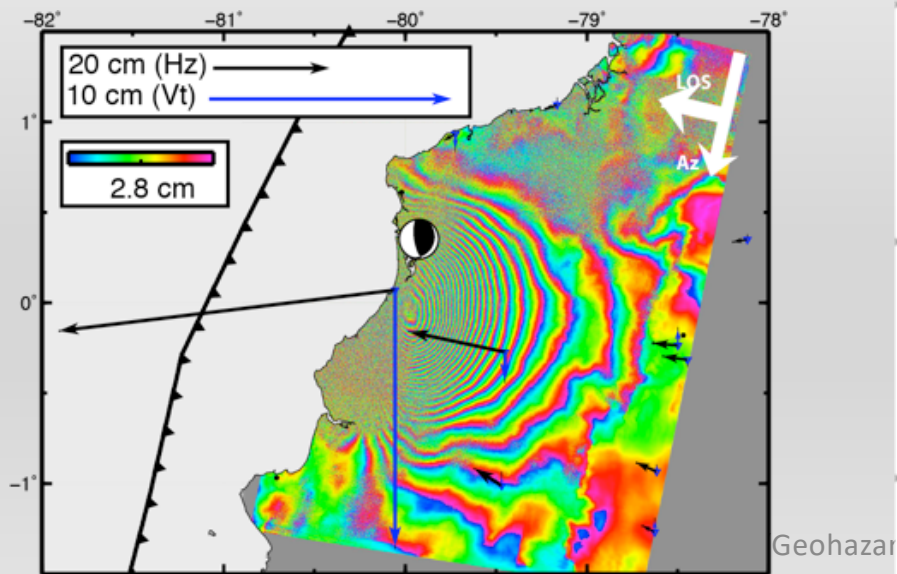
“This work has been funded by the European Commission, Directorate-General Humanitarian Aid and Civil Protection (ECHO), through the project U-Geohaz (UCPM-2017-PP-AG -783169).”



Introduction

- Training event objectives:
 - delivering the **U-Geohaz tools and methods**
 - **transferring** the basic knowledge **to the Geological Surveys** so they can develop the U-Geohaz products and to provide them to the Civil Protection Authorities
- Introduction to some tools of the Geohazards Exploitation Platform (GEP) to generate
 - differential interferograms
 - mean displacement velocity maps

} Identify, monitor active deformation associated to different Geohazards





Introduction

Terradue, ESA and TRE-Altamira agreed to grant temporal access to GEP to all the participants in the U-Geohaz training.



Terradue has created a Community and a Thematic App for the U-Geohaz training to:

- process our areas of interest
- share and discuss our results



Thematic Apps

Click to find out the existing thematic applications

[View apps](#)



Communities

The Geohazards platform gather activities from active groups of users

[View Communities](#)



Introduction

You will have access to several processing services of GEP until **XXXXXX**

Objective of the training:

- Learn how to use several processing services of GEP (Diapason, FASTVEL)
- Process your areas of interest after the training
- After the testing period: you can join **“The GEP Early Adopters Programme”** to continue using these tools





Outline

1. The Geohazards Exploitation Platform (GEP), an overview
2. Exploring the platform
3. DInSAR with GEP tools
 - 3.1. DInSAR examples
 - 3.2. Processing tools for DInSAR
 - 3.3. Diapason
 - > **Exercise 1**
 - > **Exercise 2**
4. A-DInSAR with GEP tools
 - 4.1. A-DInSAR examples
 - 4.2. Processing tools for A-DInSAR
 - 4.3. FASTVEL
 - > **Exercise 3**
 - > **Exercise 4**



1. The Geohazards Exploitation Platform (GEP): an overview

Thematic Exploitation Platforms (TEPs)

<https://tep.eo.esa.int/>

EARTH OBSERVATION (EO) EXPLOITATION PLATFORMS (EPs):
initiative started in 2014 by ESA
-> aims to create an ecosystem of interconnected Thematic Exploitation Platforms (TEPs), addressing:

- Coastal,
- Forestry,
- Hydrology,
- Geohazards,
- Polar,
- Urban
- Food Security

An EO exploitation platform is a collaborative, virtual work **environment providing access to EO data and the tools, processors, and Information and Communication Technology resources required to work with them, through one coherent interface.**

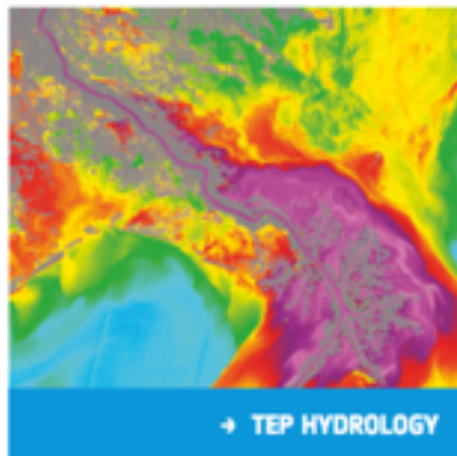
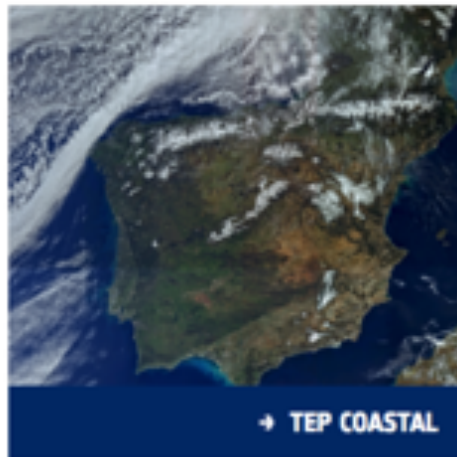


1. The Geohazards Exploitation Platform (GEP): an overview

<https://tep.eo.esa.int/>

- Coastal,
- Forestry,
- Hydrology,
- Geohazards,
- Polar,
- Urban themes
- Food Security

Thematic Exploitation Platform

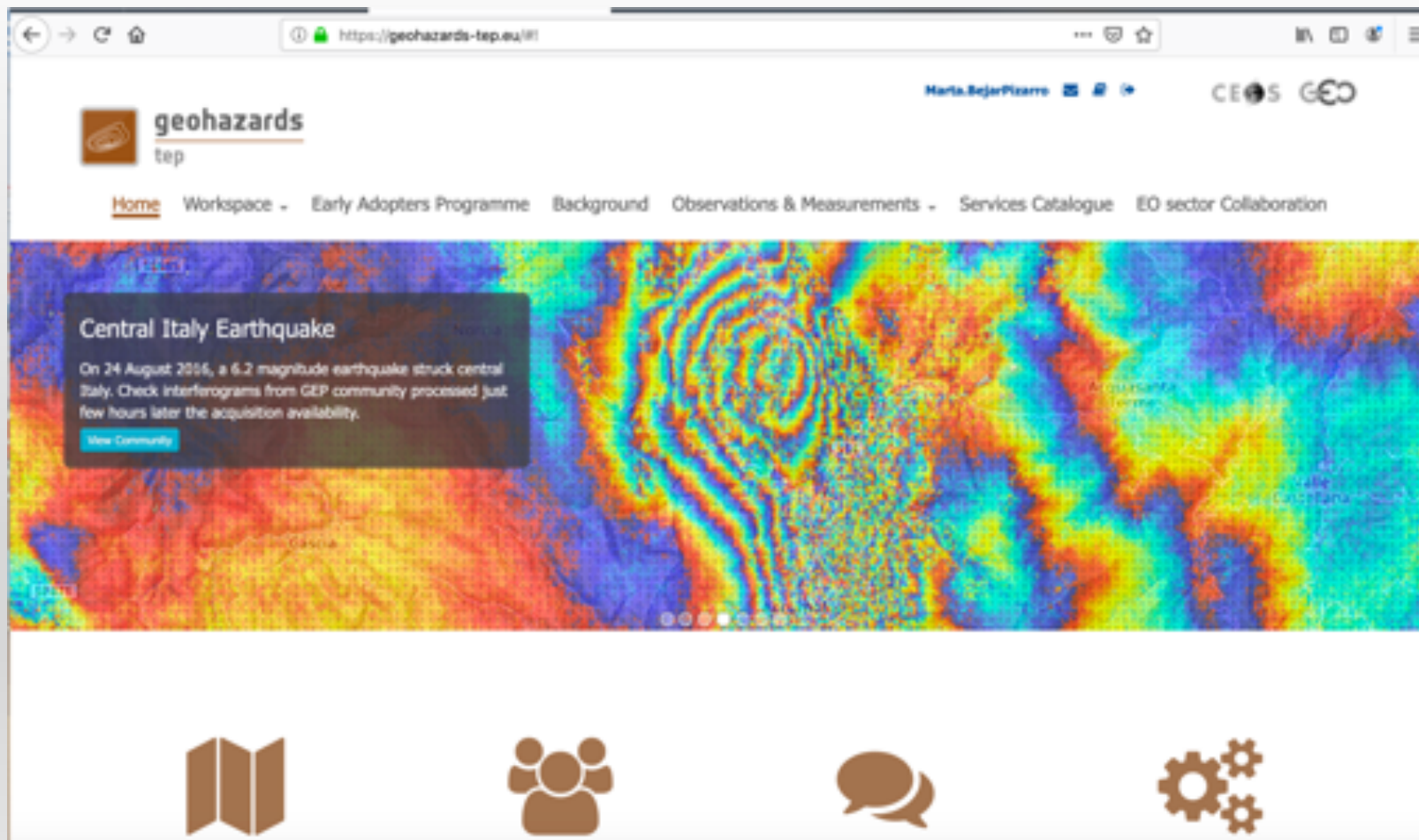




1. The Geohazards Exploitation Platform (GEP): an overview

The Geohazards Exploitation Platform aims to support the exploitation of satellite EO for geohazards (providing tools, data ..)

The development of the platform is **funded by the European Space Agency (ESA)**

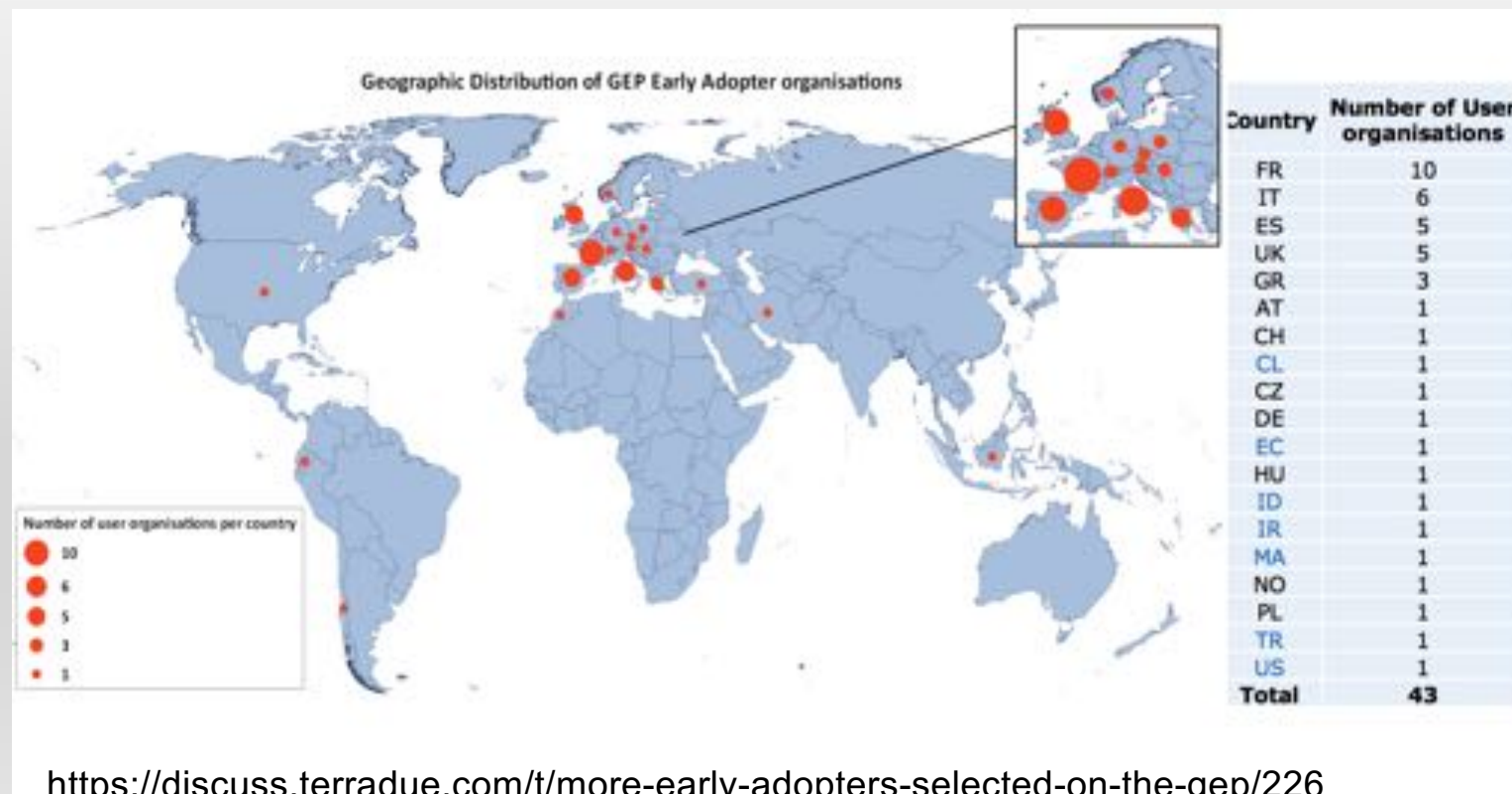




1. The Geohazards Exploitation Platform (GEP): an overview

To have access to the platform capabilities, users organisations can join **The GEP (Geohazard Thematic Exploitation Platform) Early Adopters programme**

Started in 2015 with 29 users, the GEP Early Adopters programme now includes 61 users and 54 different organisations from 19 countries.



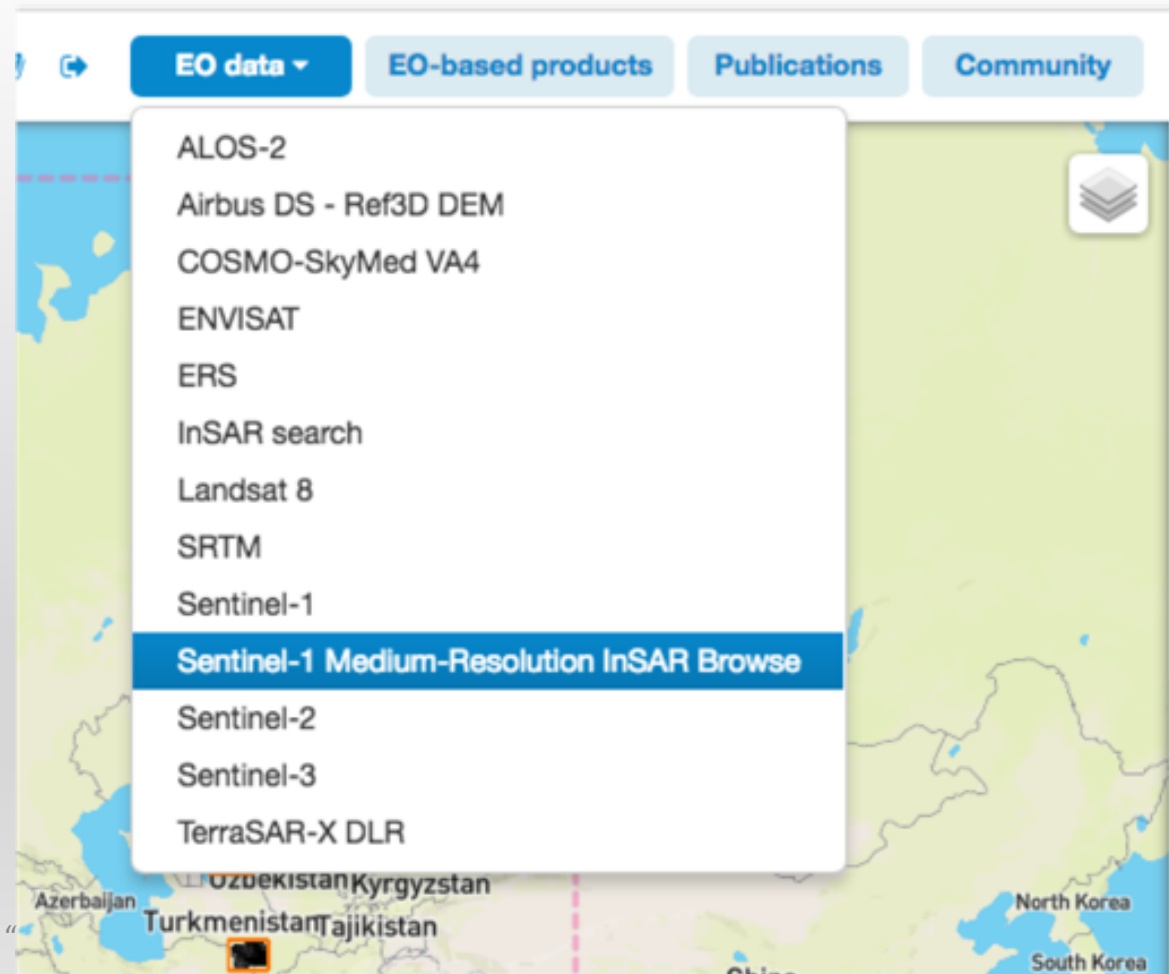


1. The Geohazards Exploitation Platform (GEP): an overview

GEP primary focus -> **mapping hazard prone land surfaces and monitoring terrain deformation**

Users have access to:

- large collections of **ENVISAT** ASAR and **ERS** SAR data
- **Sentinel-1** and **Sentinel-2** data
- other EO missions' data than from ESA such as from other space agencies and mission owners and operators





2. Exploring the platform

- > go to the GEP website (<https://geohazards-tep.eu/#!>)
- > sign in using your user account

The screenshot shows the homepage of the Geohazards Exploitation Platform (GEP). The top navigation bar includes the GEP logo, a 'Sign in' button (circled in red), and links for 'Register', 'Become an Early Adopter', and 'Contact'. Below the navigation bar is a main menu with links for 'Home', 'Workspace', 'Early Adopters Programme', 'Background', 'Observations & Measurements', 'Services Catalogue', and 'EO sector Collaboration'. The main content area features a large banner with a 3D topographic map and a text box announcing 'GEP v2 released with new services and features!'. Below the banner are four main sections: 'Thematic Apps', 'Communities', 'Forum', and 'Analytics', each with an icon and a 'View' button.



2. Exploring the platform

The screenshot displays the Geohazards platform interface. At the top right, the user profile 'Marta.BejarPizarro' is visible along with social media icons and logos for 'CEOS' and 'GEO'. The main navigation bar includes 'Home' (highlighted), 'Workspace', 'Early Adopters Programme', 'Background', 'Observations & Measurements', 'Services Catalogue', and 'EO sector Collaboration'. Below the navigation, four feature cards are presented:

- Thematic Apps**: Click to find out the existing thematic applications. A red arrow points to the 'View apps' button.
- Communities**: The Geohazards platform gather activities from active groups of users. Button: 'View Communities'.
- Forum**: Go to the Geohazards community forum. Button: 'View Forum'.
- Analytics**: Find out what is your usage of the platform. Button: 'View activities'.



2. Exploring the platform



U-Geohaz Training

by Terradue

This app provides access to services in the context of the U-Geohaz Training that will be held the 3 and 4 of June in Athens. The training event is aimed at delivering the U-Geohaz tools and methods and transferring the basic knowledge to the Geological Survey (GSs) in order to make them able to ...

May 6th 2019

Open App



2. Exploring the platform

The screenshot displays the geohazards platform interface. At the top, the logo 'geohazards' is visible, along with the user name 'Marta.BujarPlazova' and navigation buttons for 'Updated Data', 'EO Data', 'EO-based products', 'Community', and 'Private'. A search bar on the left contains the text 'Free Text Search'. The main area is a world map with a red data strip at the bottom, indicating a time range from 2014-10-04 to 2019-05-22. Below the map, there are two panels: 'Current search result' and 'Features Basket'. The 'Current search result' panel shows a list of search results for 'series linear' with 13611 total results. The 'Features Basket' panel shows a list of features with 80 total results.

geohazards
Marta.BujarPlazova
Updated Data EO Data EO-based products Community Private

Free Text Search

2014-10-04 2019-05-22

Processing Services

Current search result

Query results for series linear 1 2 3 ... 13611 Total results 13611

- S1B_SLC_WV_DP_L1_S2_Wed, 22 May 2019 07:22:18 GMT
- S1B_SLC_WV_DP_L1_S2_Wed, 22 May 2019 07:21:52 GMT
- S1B_SLC_WV_SP_L1_S2_Wed, 22 May 2019 07:08:12 GMT
- S1B_SLC_WV_SP_L1_S2_Wed, 22 May 2019 07:07:47 GMT
- S1B_SLC_WV_SP_L1_S2_Wed, 22 May 2019 07:07:22 GMT
- S1B_SLC_WV_SP_L1_S2_Wed, 22 May 2019 07:06:57 GMT
- S1B_SLC_WV_SP_L1_S2_Wed, 22 May 2019 07:06:32 GMT

Features Basket Data Packages

1 2 Total results 80

- S1A_SLC_WV_DP_L1_S2_Mon, 26 Dec 2018 17:46:35 GMT
- S1A_SLC_WV_DP_L1_S2_Sun, 25 Nov 2018 17:46:36 GMT
- S1A_SLC_WV_DP_L1_S2_Mon, 29 Oct 2018 18:46:45 GMT
- S1A_SLC_WV_DP_L1_S2_Sun, 08 Apr 2018 18:46:31 GMT
- S1A_SLC_WV_DP_L1_S2_Tue, 27 Mar 2018 18:46:31 GMT
- S1A_SLC_WV_DP_L1_S2_Thu, 15 Mar 2018 18:46:31 GMT
- S1A_SLC_WV_DP_L1_S2_Sat, 03 Mar 2018 18:46:31 GMT



2. Exploring the platform

Data collection (EO Data button)

The screenshot displays the geohazards platform interface. At the top, the logo 'geohazards' is visible, along with a search bar and navigation links for 'Updated Data', 'EO Data', 'EO-based products', 'Community', and 'Private'. A user profile 'Marta.BajarPizano' is shown. The main area features a world map with a search bar 'Free Text Search' and navigation controls. A dropdown menu is open over the map, showing 'GRD' and 'SLC' options, with 'Sentinel 1' and 'Sentinel 2' selected. A timeline at the bottom of the map shows dates from '2014-10-04' to '2019-05-22'. Below the map, there are two panels: 'Current search result' and 'Features Basket'. The 'Current search result' panel shows a list of search results for 'SLC' data, with a total of 96015 results. The 'Features Basket' panel shows a list of data packages, with a total of 80 results. The URL at the bottom is 'https://geohazards-geo.eu/geobrowser/?Geo-geohaz-training-wood'.



2. Exploring the platform

Processing services

The screenshot displays the Geohazards platform interface. At the top, the logo 'geohazards' is visible, along with user information 'Marta.BajarPizano' and navigation options like 'Updated Data', 'EO Data', 'EO-based products', 'Community', and 'Private'. A search bar is present on the left. The main area features a world map with a red overlay at the bottom. A dropdown menu is open over the map, showing 'GRD' and 'SLC' options, with 'Sentinel 1' and 'Sentinel 2' selected. A red arrow points from the text 'Processing services' to the 'Processing Services' label on the right side of the map. Below the map, there are two panels: 'Current search result' showing a list of search results for 'SLC' data, and 'Features Basket' showing a list of selected features. The URL at the bottom is 'https://geohazards-geo.eu/geobrowser/?Geo-geohaz-training-wood'.



2. Exploring the platform

Processing services

The screenshot displays the geohazards platform interface. At the top, the logo 'geohazards' is visible, along with a search bar containing 'IP-Geohaz Training' and a user profile for 'Marta BojarPizarro'. A navigation bar includes 'Upload Data', 'EO Data', 'EO-based products', 'Community', and 'Private'.

The main area is divided into two panels. The left panel shows a world map with a search bar 'Free Text Search' and a date range from '2014-10-04' to '2019-05-31'. Below the map, a search results list is shown with columns for 'Current search result', 'Features Basket', and 'Data Packages'. The results list contains several entries for 'S1A SLC IW_DP L1 101 F1, 31 May 2019' with timestamps.

The right panel, titled 'Processing Services', features a search bar 'Filter services' and a grid of service tiles. The tiles include:

- FAS** (FASTVEL)
- DIAPASON Sentinel-1** (DIAPASON INSAR Sentinel-1)
- DIAPASON Stripmap** (DIAPASON INSAR - StripM...)
- FASTVEL** (FASTVEL)
- SNAP InSAR** (SNAP Sentinel-1 W SLC L...)
- COIN** (COIN - Coherence and Int...)
- SNAC** (SNAC - SNAP S1 GRID A...)
- COMBI** (Band combination)
- RASTER** (Full Resolution Resampling)
- STEMP S-2** (STEMP-S2 Full)
- GMT3SAR Sentinel-1** (GMT3SAR INSAR - Sentin...)



2. Exploring the platform

Processing services: Diapason and FASTVEL

The screenshot displays the geohazards platform interface. On the left, a world map shows a red line representing a data series from 2014-10-04 to 2019-05-31. Below the map, a search bar contains the text "Free Text Search". The main content area is titled "Processing Services" and features a grid of service tiles. The tiles include:

- FAS (FASTVEL)
- DIAPASON Sentinel-1 (circled in red)
- DIAPASON Stripmap
- FASTVEL (circled in red)
- SNAP InSAR
- COIN
- SNAC
- COMBI
- RASTER
- STEMP S-2
- GMTSSAR Sentinel-1

At the bottom left, a list of search results is visible, showing various data packages with their respective dates and times.



2. Exploring the platform

To explore other processing services - > Documentation (book symbol)

The screenshot displays the geohazards platform interface. At the top, the logo 'geohazards' is visible, along with a search bar and navigation links. A red arrow points to a book icon in the top navigation bar, which is labeled 'Documentation (book symbol)'. The main area features a world map with a red timeline at the bottom, ranging from 2014-10-04 to 2019-05-31. Below the map, there is a search bar and a list of search results for the series 'linear'. The results list includes several entries with details such as 'S1B SLC WV_DP L1 13 Fri, 31 May 2019 14:23:48 GMT'. On the right side, there is a 'Processing Services' panel with a search bar and a grid of service icons. The services listed include FAS, DIAPASON Sentinel-1, DIAPASON Stripmap, FASTVEL, SNAP InSAR, COIN, SNAC, COMBI, RASTER, STEMP S-2, and GMTSSAR Sentinel-1.



2. Exploring the platform

To explore other processing services - > Documentation (book symbol)

- Processing tutorials

- **ADORE DORIS**
- **ALADIM-S2 and ALADIM-VHR: Preparation of input datasets**
- **ALADIM-S2: Automatic Landslide Detection and Inventory Mapping from multispectral S2 data**
- **COIN – Coherence and Intensity change for Sentinel-1**
- **COMBI - Band Combination**
- **DIAPASON InSAR - StripMap(SM)**
- **DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW)**
- **DSM-OPT: Digital surface models from optical stereo satellite images**
- **FASTVEL for displacement velocity map generation**
- **GMT5SAR InSAR - Stripmap**
- **GMT5SAR InSAR - Sentinel-1 TOPSAR**
- **G-POD GAMMA DInSAR Service**
- **G-POD GAMMA-L0 Service**
- **G-POD PF-ERS Service**
- **G-POD SBAS Stripmap Service**
- **MPIC-OPT: Multiple pairwise optical image correlation**
- **Optical Flood Tool Service**
- **P-SBAS Sentinel-1 processing on-demand by CNR-IREA**
- **PSI Post-Processing Service**
- **RASTER - Full Resolution Rasterization**
- **SAR Flood Tool Service**
- **SNAC - SNAP S-1 GRD Amplitude Change**
- **SNAP-InSAR – SNAP Sentinel-1 IW SLC Interferogram and Displacements**
- **SRTM Digital Elevation Model**
- **StaMPS Permanent Scatterer**
- **STEMP - Surface Temperature Map**
- **TIO - Optical time serie analysis**



2. Exploring the platform

Processing services: Jobs

Processing Services

Services **Jobs**

Filter jobs ↻ Show thematic jobs ▾

8 jobs found.

| | |
|---|----------|
| DIAPASON-Guada-descT8-int166-Gd0.6 | checking |
| 11 hours ago by Marta Béjar Pizarro | |
| DIAPASON_KaikouraEq_asc_t52_south_test1 | success |
| a day ago by Marta Béjar Pizarro | |
| DIAPASON_EcuadorEq_desc_t40_south_test1 | checking |
| 2 days ago by Marta Béjar Pizarro | |
| FASTVEL_Austria_desc_t95_S1A_test1 | failed |
| 2 days ago by Marta Béjar Pizarro | |
| FASTVEL_CZ_asc_t146_S1A_test1 | success |
| 2 days ago by Marta Béjar Pizarro | |
| FASTVEL_Arcos_asc_t147_S1A_test1 | checking |
| 2 days ago by Marta Béjar Pizarro | |
| FASTVEL_Klepa_desc_t7_S1A_test1 | checking |
| 4 days ago by Marta Béjar Pizarro | |
| FASTVEL_Klepa_asc_t175_S1A_test1 | checking |
| 8 days ago by Marta Béjar Pizarro | |



2. Exploring the platform

Processing services: Jobs

We can visualize the results labelled "success" (if they are our jobs or if they are public)

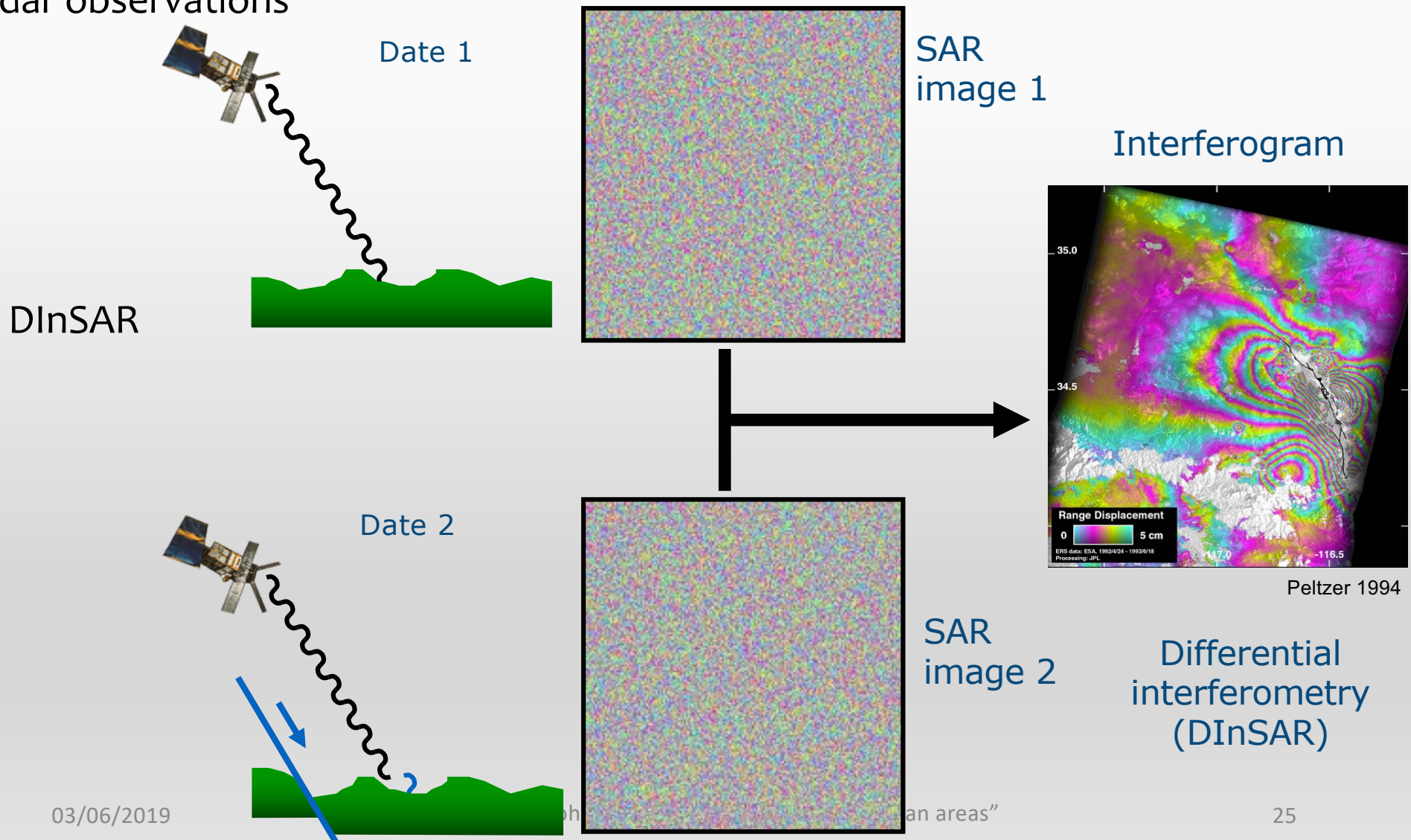
The screenshot displays the 'Processing Services' interface. At the top, there are tabs for 'Services' and 'Jobs', with 'Jobs' selected. Below the tabs is a search bar labeled 'Filter jobs' and a button 'Show thematic jobs'. The main content area shows '8 jobs found.' and a list of jobs with their status and user information.

| Job ID | Status | User |
|---|----------|-------------------------------------|
| DIAPASON-Guada-descT8-Int166-Gd0.6 | checking | 11 hours ago by Marta Béjar Pizarro |
| DIAPASON_KaikouraEq_asc_t52_south_test1 | success | a day ago by Marta Béjar Pizarro |
| DIAPASON_EcuadorEq_desc_t40_south_test1 | checking | 2 days ago by Marta Béjar Pizarro |
| FASTVEL_Austria_desc_t95_S1A_test1 | failed | 2 days ago by Marta Béjar Pizarro |
| FASTVEL_CZ_asc_t146_S1A_test1 | success | 2 days ago by Marta Béjar Pizarro |
| FASTVEL_Arcos_asc_t147_S1A_test1 | checking | 2 days ago by Marta Béjar Pizarro |
| FASTVEL_Klepa_desc_t7_S1A_test1 | checking | 4 days ago by Marta Béjar Pizarro |
| FASTVEL_Klepa_asc_t175_S1A_test1 | checking | 8 days ago by Marta Béjar Pizarro |



3. DInSAR with GEP tools

Differential interferometric SAR (DInSAR): measures phase differences between radar observations

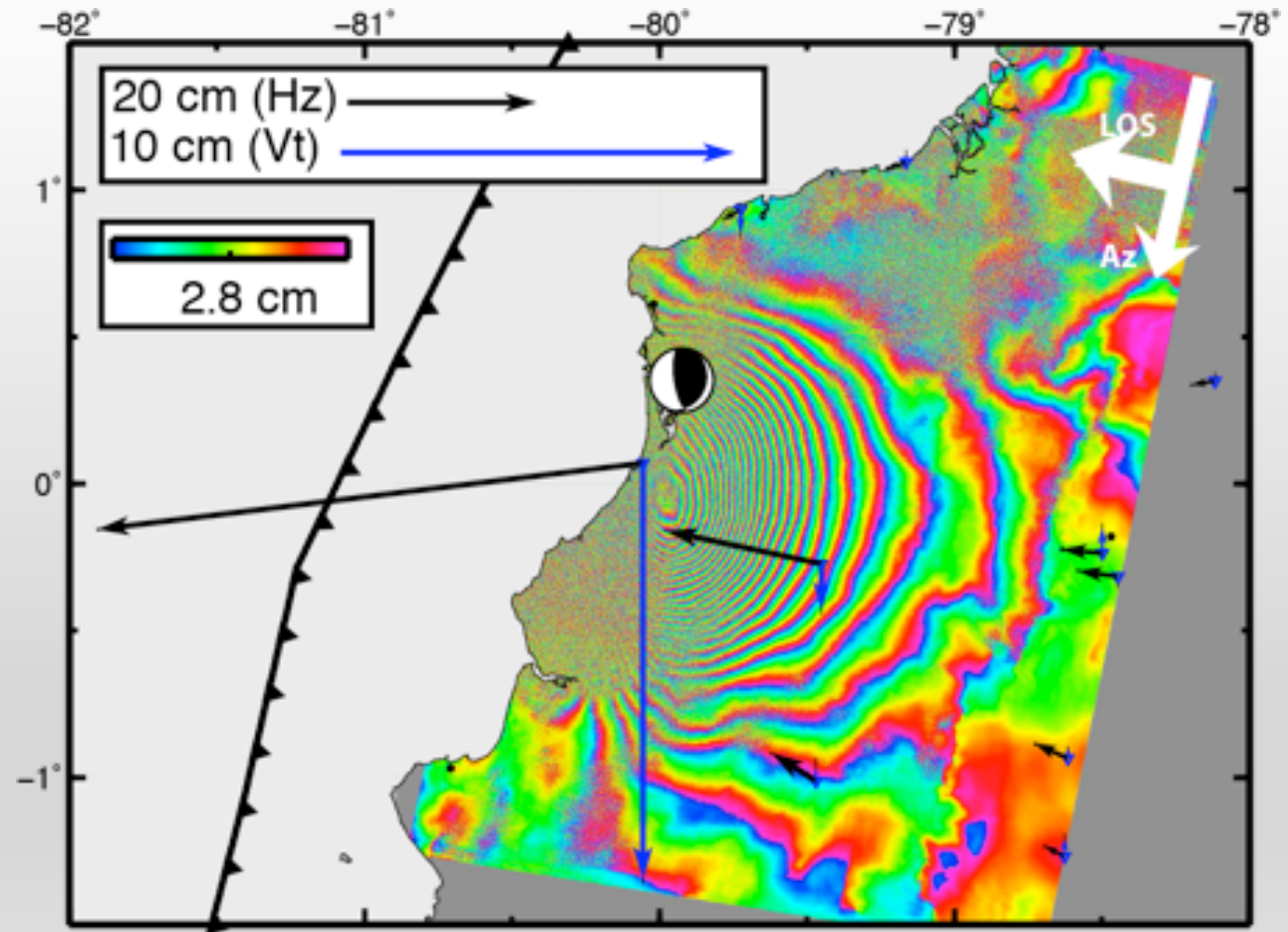




3. DInSAR with GEP tools

3.1. DInSAR Examples

Ecuador earthquake





3. DInSAR with GEP tools

Phase in the differential interferogram -> several contributions:

- Deformation
- Topography
- Orbits
- Atmosphere (stratified, turbulent)
- Noise

$$\Delta\phi = \phi_{def} + \phi_{topo} + \phi_{atm} + \phi_{orb} + \phi_{ruido}$$

To detect ground deformation: these contributions need to be reduced/removed

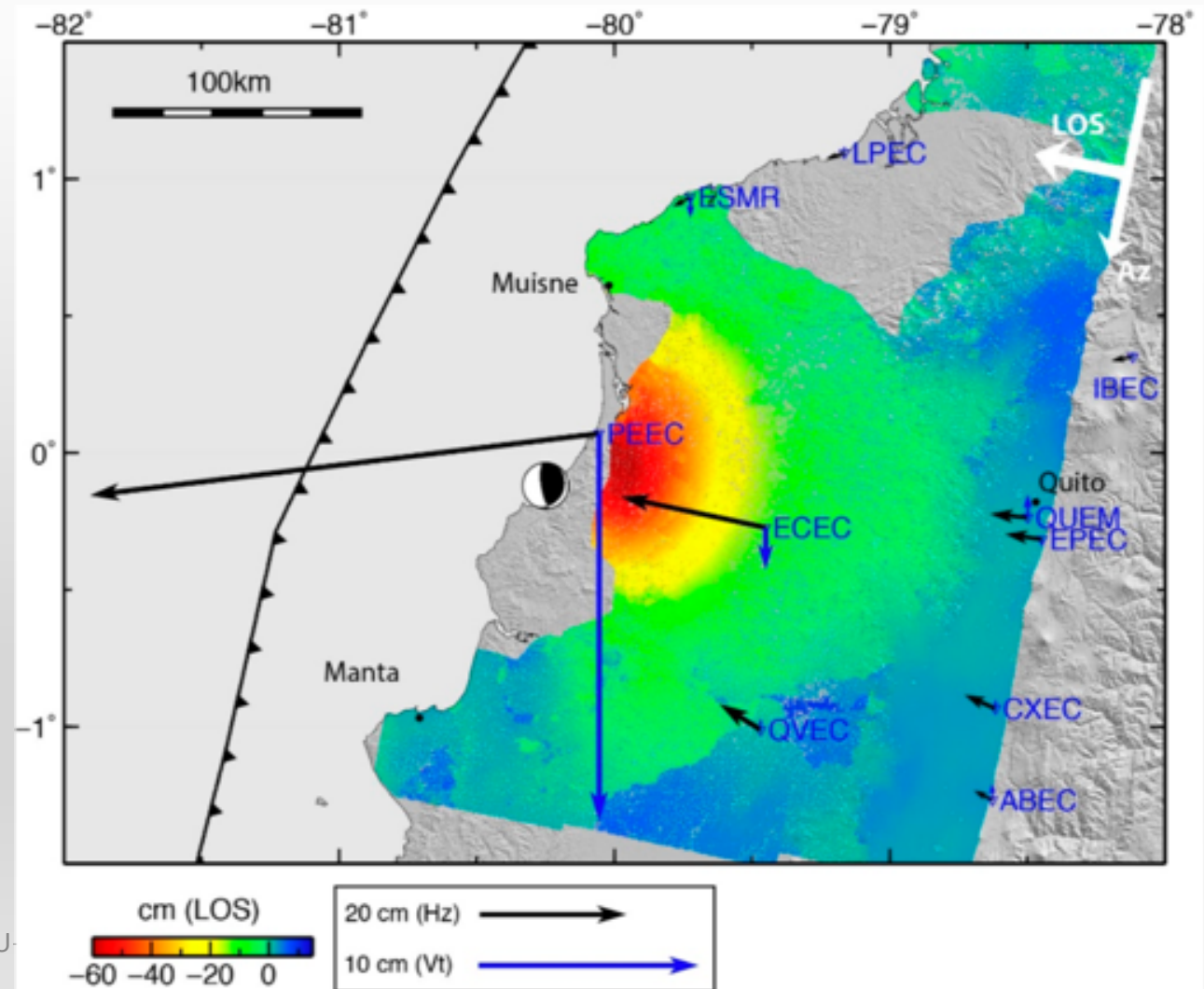
Under ideal conditions (if noise and other contributions are negligible) : phase values are equivalent to the ground displacement occurred between the two acquisition dates



3. DInSAR with GEP tools

3.1. DInSAR Examples

Ecuador earthquake

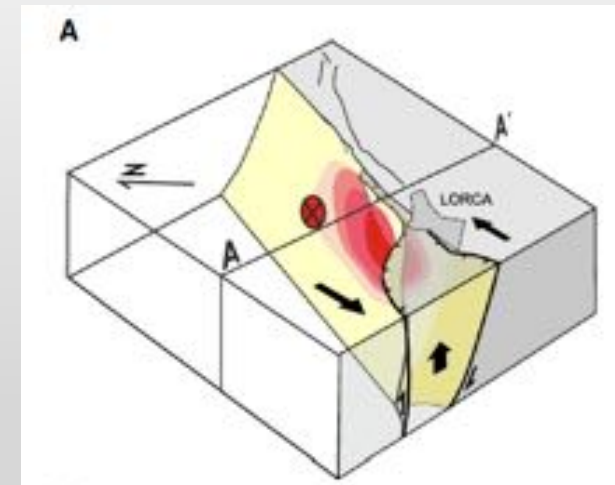
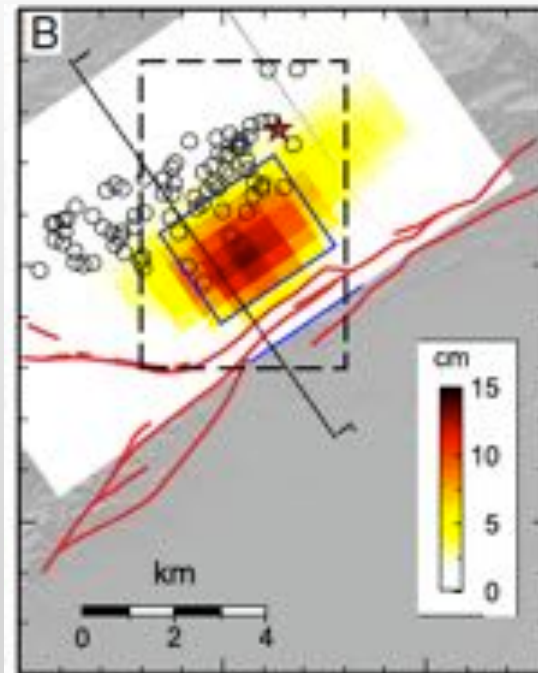
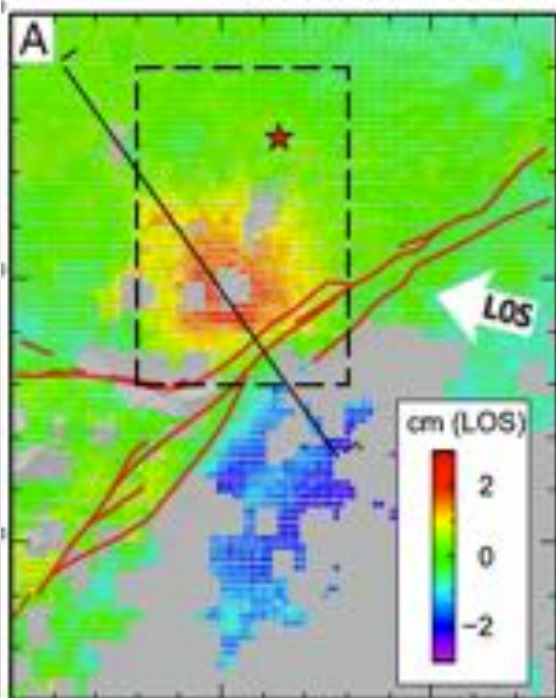




3. DInSAR with GEP tools

3.1. DInSAR Examples

Lorca earthquake

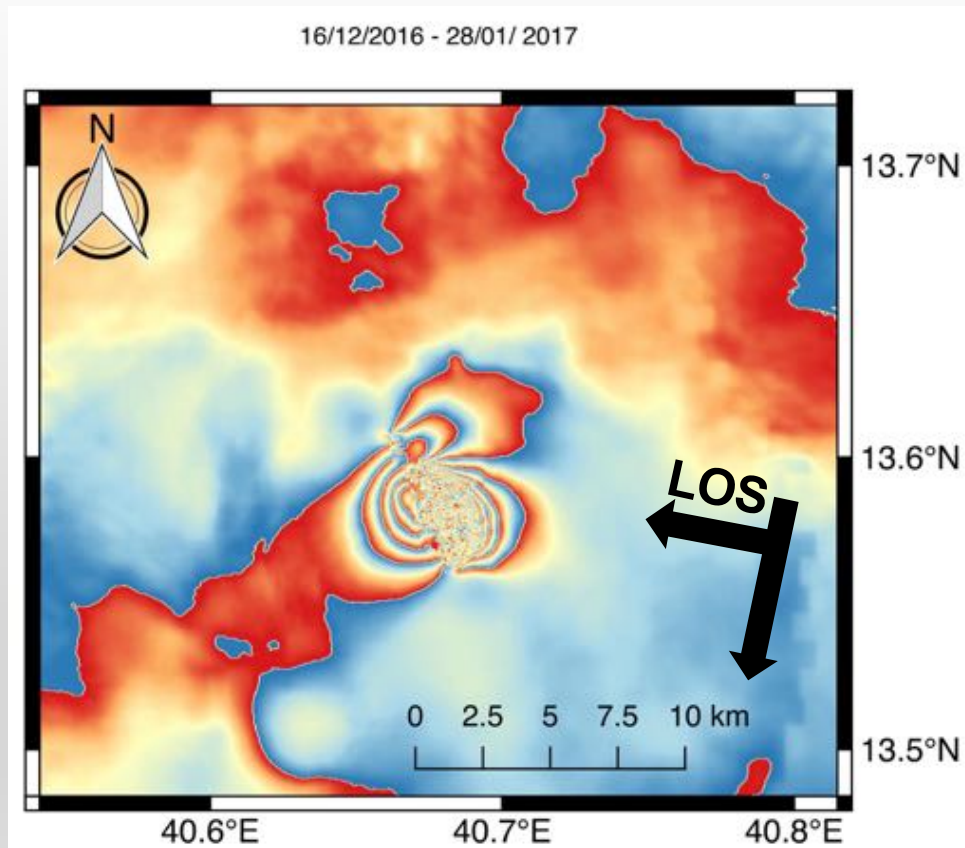




3. DInSAR with GEP tools

3.1. DInSAR Examples

Erta Ale volcano (Ethiopia)



Co-eruptive interferogram

- Ground deformation between 16 December 2016 and 28 January 2017.
- The interferogram is wrapped and each fringe (color cycle) represents a movement of the ground of 2.8 cm in the satellite line of sight. This interferogram illustrates the early stages of the Erta Ale eruption (Xu et al. 2017).



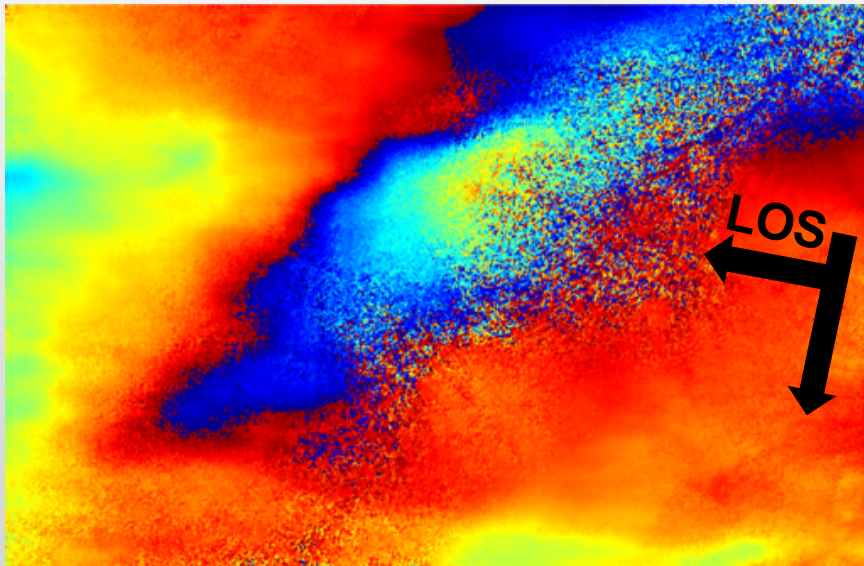
3. DInSAR with GEP tools

3.1. DInSAR Examples

Land Subsidence in the Alto-Guadalentin Aquifer

Wrapped interferogram

January 2016- May 2016





3. DInSAR with GEP tools

3.2. Processing tools for DInSAR

-> GMT5SAR InSAR -
Sentinel-1 TOPSAR



-> SNAP



-> Diapason



-> InSAR tool suite developed by the French Space Agency (CNES) and maintained by TRE Altamira.



3. DInSAR with GEP tools

3.3. DIAPASON

Diapason processing service

The screenshot shows a web interface titled "Processing Services" with tabs for "Services" and "Jobs". A search bar labeled "Filter services" is at the top. Below it, a grid of service tiles is displayed. A red arrow points from the text "Diapason processing service" to the "DIAPASON Sentinel-1" tile. The tiles include:

- FAS** (FASTVEL)
- DIAPASON Sentinel-1** (FASTVEL, TPE ALTAMIRA, CNES) with description: "DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) DIAPASON is an InSAR tool suite developed by the French Space Agency (CNES) and maintained by ALTAMIRA INFORMATION.This..."
- DIAPASON Stripmap** (TPE ALTAMIRA, CNES) with description: "DIAPASON InSAR - StripM..."
- FASTVEL** (TPE ALTAMIRA)
- COIN** (COIN - Coherence and Int...)
- SNAC** (SNAC - SNAP S1 GRD A...)
- COMBI** (Band combination)
- RASTER** (Full Resolution Rasterization)
- STEMP S-2** (STEMP-S2 Full)
- GMT5SAR Sentinel-1** (GMT5SAR InSAR - Sentin...)




3. DInSAR with GEP tools

3.3. DIAPASON

Diapason processing service

- InSAR tool developed by the French Space Agency (CNES) and maintained by ALTAMIRA INFORMATION.
- This service performs an InSAR workflow on **Sentinel-1 TOPSAR (IW,EW)** data
- Results: **interferograms**, **amplitude** and **coherence** maps.
- To run this service , specify **master and slave** Sentinel-1 SLC images.

Processing Services


 **DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW)**

id: b9a0ac30-d19b-4b4d-b7c3-0dff720ccd34


publisher: esa-gep-apps-deployer-creodias-ugeohaztraining

version: 1.1.4


DIAPASON is an InSAR tool suite developed by the French Space Agency (CNES) and maintained by ALTAMIRA INFORMATION. This service performs an InSAR workflow on Sentinel-1 TOPSAR (IW,EW) data, producing interferograms, amplitude and coherence maps. To run this service , specify master and slave Sentinel-1 SLC images.



Job title *

 DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW)


Sentinel-1 IW master *



Polarization *

W

Sentinel-1 IW Slave *



Area Of Interest

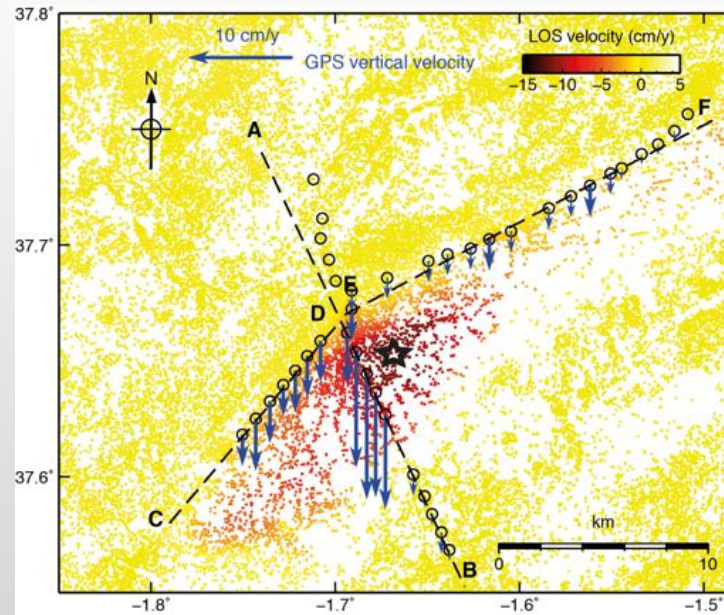


3. DInSAR with GEP tools

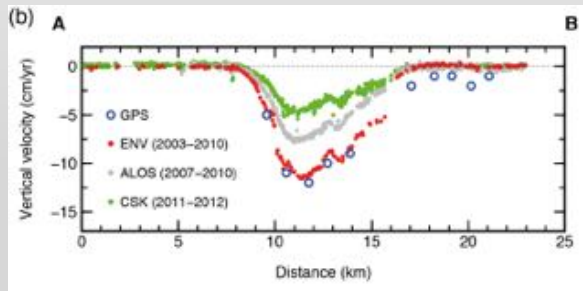
3.3. DIAPASON, Exercise 1



The Alto-Guadalentín aquifer (SE Spain)



- InSAR data (1992-2018)
- GPS, levelling, groundwater ts



- High def. rate (> 10 cm/yr)
- Aquifer overexploitation
- Very thick layer (> 100 m) of soft soil deposits

Boni et al. Engineering Geology (2015)

Béjar-Pizarro, et al. Remote Sensing (2016)

Ezquerro et al. Geofluids (2017)



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

| Parameters | |
|------------|---|
| Name | Value |
| master | https://catalog.terradue.com/sentinel1/series/insar/search?format=json&uid=S1A_IW_SLC__1SDV_20160117T061005_20160117T061033_009530_00DD7C_1E32 |
| pol | VV |
| slave | https://catalog.terradue.com/sentinel1/series/insar/search?format=json&uid=S1A_IW_SLC__1SDV_20160516T061010_20160516T061038_011280_01115E_4A9F |
| aoi | -1.802,37.539,-1.542,37.709 |
| psfiltx | 0.6 |
| unwrap | true |

[Resubmit Job](#)



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Select the data collection to be addressed (EO Data button)

The screenshot displays the geohazards web application interface. At the top, there is a navigation bar with the 'geohazards' logo, a search bar, and several menu items: 'Updated Data', 'EO Data', 'EO-based products', 'Community', and 'Private'. A red arrow points to the 'EO Data' button. Below the navigation bar is a map of Africa with a search bar and a date range selector. The date range is set from '2014-10-04' to '2019-05-22'. Below the map, there are two panels: 'Current search result' and 'Features Basket'. The 'Current search result' panel shows a list of search results for 'S1B SLC IW_DP L1 S2 Wvd, 22 May 2019-07:20:18 GMT'. The 'Features Basket' panel shows a list of search results for 'S1A SLC IW_DP L1 132 Mon, 26 Dec 2016 17:46:36 GMT'. The interface also includes a 'Processing Services' sidebar on the right.



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Select the area of interest

The screenshot shows the geohazards web application interface. At the top, there is a search bar and navigation links. The main area is a world map with a red rectangle drawn over the continent of Africa. A red arrow points from the text 'Select the area of interest' to this rectangle. Another red arrow points from the text 'Spatial filter (draw a rectangle)' to the map's left sidebar. Below the map is a date range selector showing '2014-10-04' to '2019-05-22'. At the bottom, there are two panels: 'Current search result' on the left and 'Features Basket' on the right. The 'Current search result' panel shows a list of search results for 'S1B SLC IW_DP L1 S2 Wed, 22 May 2019'. The 'Features Basket' panel shows a list of search results for 'S1A SLC IW_DP L1 132 Mon, 26 Dec 2016'. The URL at the bottom is 'https://geohazards-geo.eu/geobrowser/?Geo-geohaz-training-wood'.



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Select the area of interest (zoom in on southeast Spain)

The screenshot displays the geohazards web application interface. At the top, there is a navigation bar with the 'geohazards' logo, a search bar, and user information for 'Marta Bejar Pizarro'. Below the navigation bar is a search bar with the text 'Free Text Search'. The main area shows a satellite map of a mountainous region in southeast Spain, with a red dashed box indicating the area of interest. The map includes labels for 'Lecor', 'Pueblo Luján', and 'Mazarrón'. A timeline at the bottom of the map shows dates from 2014-10-04 to 2019-06-01. Below the map, there is a 'Current search result' section with a query for 'series linear' and a list of search results. The results are as follows:

| Query results for series linear | Total results: 625 |
|--|--------------------|
| S1B-SLC IW_DP L1 & F1, 31 May 2019 06:09:52 GMT | |
| S1B-SLC IW_DP L1 & F1, 30 May 2019 18:09:49 GMT | |
| S1B-SLC IW_DP L1 & F1, 30 May 2019 18:09:29 GMT | |
| S1B-SLC IW_DP L1 100 Sat, 25 May 2019 18:01:34 GMT | |
| S1B-SLC IW_DP L1 100 Sat, 25 May 2019 18:01:13 GMT | |
| S1B-SLC IW_DP L1 & F1, 19 May 2019 06:09:52 GMT | |
| S1B-SLC IW_DP L1 & F1, 18 May 2019 18:09:49 GMT | |



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Select the Time Interval -> time slider
(January 2016– June 2016)

The screenshot displays the 'geohazards' web application interface. At the top, there is a search bar and navigation tabs for 'EO Data', 'EO-based products', 'Community', and 'Private'. The main map area shows a satellite-style view of a mountainous region with several orange lines indicating a search area. A red arrow points to a time slider at the bottom of the map, which is set to a range from 2016-01-03 to 2016-06-06. Below the map, there is a 'Current search result' section with a list of search results. The results are displayed as orange bars with the following text:

- 51A SLC_WL_DP_L1_VV_VH 100 2016-06-03T18:00:00.3236910Z/2016-06-03T18:02:27.2884790Z
- 51A SLC_WL_DP_L1_VV_VH 100 2016-06-03T18:01:36.488490Z/2016-06-03T18:02:02.4814700Z
- 51A SLC_WL_DP_L1_B Sat, 28 May 2016 06:10:26 GMT
- 51A SLC_WL_DP_L1_B Sat, 28 May 2016 06:10:01 GMT
- 51A SLC_WL_DP_L1_Fri, 27 May 2016 18:09:53 GMT
- 51A SLC_WL_DP_L1_VV_VH 8 2016-05-18T06:10:10.247796Z/2016-05-18T06:10:38.1869180Z

On the right side of the interface, there is a 'Processing Services' panel with a 'No results found' message.



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Zoom out -> all the S1 images covering the AOI

The screenshot shows the geohazards web interface. At the top, there is a search bar and navigation options. The main map displays a satellite view of southern Spain with an orange AOI (Area of Interest) overlaid. A red timeline at the bottom of the map shows the acquisition dates of S1 satellite images, with labels for 2016-01-03 and 2016-06-06. Below the map, there is a 'Current search result' section with a list of search results for the series 'linear'. The results are displayed in orange boxes and include details such as the satellite (S1A), the product (SLC IW_DP L1 VV), the acquisition date, and the coordinates. The 'Features Basket' and 'Data Packages' sections are also visible, showing 'No results found'.

geohazards
U-Geohaz Training
Marta.BejarPizarro
Upload Data
EO Data
EO-based products
Community
Private

Free Text Search
Time spatial
2016-01-03 2016-06-06
Tanger
50 km
Tennadue

Current search result
Query results for series linear
Total results 31
Features Basket
Data Packages
Total results 0
No results found

- S1A SLC IW_DP L1 VV, 103 2016-06-02T18:02:35.3236916Z/2016-06-02T18:02:27.2884790Z
- S1A SLC IW_DP L1 VV, 103 2016-06-02T18:01:35.4884802Z/2016-06-02T18:02:02.4814700Z
- S1A SLC IW_DP L1 S Sat, 28 May 2016 06:10:26 GMT
- S1A SLC IW_DP L1 S Sat, 28 May 2016 06:10:21 GMT
- S1A SLC IW_DP L1 F Sat, 27 May 2016 18:09:50 GMT
- S1A SLC IW_DP L1 VV, 104 2016-05-16T06:10:10.2477960Z/2016-05-16T06:10:38.1989160Z



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Zoom out -> all the S1 images covering the AOI

The screenshot shows the Geohazards web application interface. At the top, there is a search bar and navigation options. The main map displays the Iberian Peninsula with an orange AOI (Area of Interest) outlined. A timeline at the bottom of the map shows S1 SAR image acquisition dates, with a red bar indicating the selected time range from 2016-01-03 to 2016-06-06. A text box overlaid on the map contains the following text:

To form an interferogram: we need to select images with the same "Orbit Direction" and the same track

Below the map, the 'Current search result' section shows a list of search results for the series 'linear'. The results are as follows:

| Search Result |
|--|
| S1A_SLC_IW_DP_L1_VV_1H_103_2016-06-02T18:02:35.3236916Z/2016-06-02T18:02:37.2884796Z |
| S1A_SLC_IW_DP_L1_VV_1H_103_2016-06-02T18:01:35.4884802Z/2016-06-02T18:02:32.4814700Z |
| S1A_SLC_IW_DP_L1_S_Sat_28_May_2016_06:10:26_GMT |
| S1A_SLC_IW_DP_L1_S_Sat_28_May_2016_06:10:21_GMT |
| S1A_SLC_IW_DP_L1_S_Sat_27_May_2016_18:09:50_GMT |
| S1A_SLC_IW_DP_L1_VV_1H_8_2016-05-16T06:10:12.2477962Z/2016-05-16T06:10:38.1869162Z |



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Search form

geohazards

U-Geohaz Training

Marta BojarPizarro

Upload Data

EO Data

EO-based products

Community

Private

Free Text Search

2016-01-03

2016-06-06

51A SLC IW_DP L1 VV 103 2016-06-02T18:02:35.3236916Z/2016-06-02T18:02:37.2884790Z

51A SLC IW_DP L1 VV 103 2016-06-02T18:01:35.4884802Z/2016-06-02T18:02:32.4814700Z

51A SLC IW_DP L1 S Sat, 28 May 2016 06:10:26 GMT

51A SLC IW_DP L1 S Sat, 28 May 2016 06:10:21 GMT

51A SLC IW_DP L1 S Sat, 28 May 2016 18:09:50 GMT

51A SLC IW_DP L1 VV 103 2016-05-16T06:10:10.2477960Z/2016-05-16T06:10:38.1869160Z

03/06/2019

U-Geohaz – “Geohazard impact assessment for urban areas”

45



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Search panel

- Search Terms: IW AND SLC
- product Type: SLC
- Dates (already selected)
- Show other parameters

Q Search Panel

searchTerms
IW and SLC

productType
SLC

start
2016-01-03

end
2016-06-06

Show Other Parameters





3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Show other parameters:

- orbit direction: **Descending**
- **Track: 8**
- **Search**

Q Search Panel  

Hide Other Parameters

orbitDirection

track

instrument

Q Search



3. DInSAR with GEP tools

We obtain all the images meeting those criteria in the result panel.

3.3. DIAPASON, Exercise 1

The screenshot shows the 'geohazards' web application interface. At the top, there is a search bar with the text 'Free Text Search' and several filter buttons: 'time', 'spatial', and 'earth observation'. Below the search bar is a map of southern Spain, with a red arrow pointing from the text box above to the map area. The map shows various cities and regions, including Córdoba, Sevilla, Granada, and Almería. A red bar at the bottom of the map indicates a time range from 2016-01-03 to 2016-06-06. Below the map, there is a 'Current search result' section with a 'Query results for series: Invar' and a 'Total results: 13' indicator. The results list contains several entries, each with a date and time stamp, such as 'S1A SLC IW_DP L1 S Sat, 28 May 2016 06:10:26 GMT'. A 'Features Basket' and 'Data Packages' section is also visible on the right side of the interface.

03/06/2019

U-Geohaz – “Geohazard impact assessment for urban areas”



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Select the 2 dates: 20160117-20160516

The screenshot shows the Geohazards web interface. At the top, there is a search bar with the text "Free Text Search" and a "U-Geohaz Training" dropdown. The main map area displays a satellite view of the Iberian Peninsula with a red bounding box around a specific region. Below the map, there is a "Current search result" panel with a list of search results. A red arrow points from the text "Choose the image pair to be processed from the 'Current search result' panel" to the search results list. Another red arrow points from the text "Add selected features to the basket" to the "Features Basket" panel on the right. The "Features Basket" panel shows two selected items with checkboxes and a "Remove all" button. The date range "2016-01-03" to "2016-06-06" is visible on the map's timeline.

Choose the image pair to be processed from the "Current search result" panel

Add selected features to the basket

03/06/2019 U-Geohaz – "Geohazard impact assessment for urban areas"



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1 Processing Services

The screenshot displays the geohazards web application interface. At the top, there is a navigation bar with the 'geohazards' logo, a search bar, and user information for 'María BejarPizarro'. Below the navigation bar is a search bar with the text 'Free Text Search' and a 'Search' button. The main area is a map of southern Spain, showing major cities like Sevilla, Córdoba, and Granada. A blue rectangular area is highlighted on the map, indicating a processing area. A red arrow points from the text 'Processing Services' in the title to this area. Below the map, there is a timeline showing dates from 2016-01-03 to 2016-06-06. At the bottom, there are two panels: 'Current search result' and 'Features Basket'. The 'Current search result' panel shows a list of search results for the series 'Incar', with a total of 13 results. The 'Features Basket' panel shows a list of data packages, with a total of 2 results.

geohazards top U-Geohaz Training María BejarPizarro Updated Data 0 Data EO-based products Community Private

Free Text Search Search

2016-01-03 2016-06-06

Current search result Query results for series Incar Total results: 13

- S1A SLC IW_DP L1 S Sw, 28 May 2016 06:10:01 GMT
- S1A SLC IW_DP L1 VL VH S 2016-05-16T06:10:10.2477950Z/2016-05-16T06:10:38.1869160Z
- S1A SLC IW_DP L1 S Sw, 22 Apr 2016 06:10:08 GMT
- S1A SLC IW_DP L1 VL VH S 2016-04-10T06:10:08.7813840Z/2016-04-10T06:10:33.7046290Z
- S1A SLC IW_DP L1 VL VH S 2016-03-29T06:10:05.3266190Z/2016-03-29T06:10:33.2694430Z
- S1A SLC IW_DP L1 VL VH S 2016-03-17T06:10:04.8564330Z/2016-03-17T06:10:32.8796650Z

Features Basket Data Packages Total results: 2

- S1A SLC IW_DP L1 VL VH S 2016-01-17T06:10:05.2811850Z/2016-01-17T06:10:33.2344250Z
- S1A SLC IW_DP L1 VL VH S 2016-05-16T06:10:10.2477950Z/2016-05-16T06:10:38.1869160Z

Processing Services



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Processing Services: Diapason
InSAR Sentinel-1, TOPSAR (IW,EW)

The screenshot displays the 'Processing Services' interface. At the top, there are tabs for 'Services' and 'Jobs'. Below them is a search bar labeled 'Filter services' with a refresh icon. The main area contains a grid of service tiles:

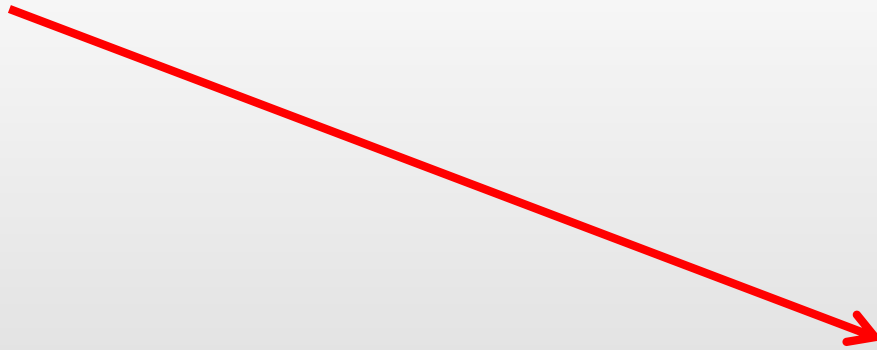
- FAS** (FASTVEL)
- DIAPASON Sentinel-1** (FASTVEL) - This tile is highlighted with a black background. It includes the text: 'DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW)' and 'DIAPASON is an InSAR tool suite developed by the French Space Agency (CNES) and maintained by ALTAMIRA INFORMATION. This...'
- DIAPASON Stripmap** (FASTVEL)
- COIN** (COIN - Coherence and Int...)
- SNAC** (SNAC - SNAP S1 GRD A...)
- COMBI** (Band combination)
- RASTER** (Full Resolution Rasterization)
- STEMP S-2** (STEMP-S2 Full)
- GMT5SAR Sentinel-1** (GMT5SAR InSAR - Sentin...)



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Job Title



Diapason-Guada-"Participant name"

Processing Services

DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW)

id: b9a0ac30-d19b-4b4d-b7c3-0dff720ccd34
publisher: esa-gep-apps-deployer-creodias-ugeoahaztraining
version: 1.1.4

DIAPASON is an InSAR tool suite developed by the French Space Agency (CNES) and maintained by ALTAMIRA INFORMATION. This service performs an InSAR workflow on Sentinel-1 TOPSAR (IW,EW) data, producing interferograms, amplitude and coherence maps. To run this service, specify master and slave Sentinel-1 SLC images.

Job title *

Sentinel-1 IW master *

Polarization *

Sentinel-1 IW Slave *



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

- Drag and Drop the image to be used as master into the “Sentinel-1 IW master” field (Master -> first date: 20160117)
- Then select the slave image into the “Sentinel-1 IW slave” field (slave: second date: 20160516)

Processing Services

 **DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW)**

id: b9a0ac30-d19b-4b4d-b7c3-0dff720ccd34
publisher: esa-gep-apps-deployer-creodias-u-geohaztraining
version: 1.1.4

DIAPASON is an InSAR tool suite developed by the French Space Agency (CNES) and maintained by ALTAMIRA INFORMATION. This service performs an InSAR workflow on Sentinel-1 TOPSAR (IW,EW) data, producing interferograms, amplitude and coherence maps. To run this service, specify master and slave Sentinel-1 SLC images.



Job title *

 DIAPASON-Guada-Marta

Sentinel-1 IW master *

 <https://catalog.terradue.com//sentinel1/series/insar/se>

Polarization *

W

Sentinel-1 IW Slave *

 <https://catalog.terradue.com//sentinel1/series/insar/se>



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Area of interest:

You can set this option to process an area smaller than the coverage of the two images (click on the button on the right of the “Area of interest”). This will set the current area selected on the map as area of interest for the processing.

If not selected, the area processed is the intersection between the two input images.

Area Of Interest

Goldstein phase filter exponential factor *

Phase Unwrapping *

* indicates required information

Select the result

OpenSearch Description to the Results
(application/opensearchdescription+xml)

Job OWS info (application/atom+xml)



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Goldstein filter factor

The value for the Goldstein filter exponential:
a floating point value
between 0 and 1. Higher
values will result in more
filtering of the output
interferogram phase.

Area Of Interest

 -1.802,37.539,-1.542,37.709

Goldstein phase filter exponential factor *

 0.6

Phase Unwrapping *

true

* indicates required information

Select the result

- OpenSearch Description to the Results
- (application/opensearchdescription+xml)
- Job OWS info (application/atom+xml)

 Run Job



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Phase

Unwrapping

To enable the phase unwrapping of the interferogram select “true” on the drop down list.

Area Of Interest

Goldstein phase filter exponential factor *

Phase Unwrapping *

* indicates required information

Select the result

OpenSearch Description to the Results
(application/opensearchdescription+xml)

Job OWS info (application/atom+xml)



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Run job

Click on “Run Job” button from the processor configuration panel and wait for the job to complete.

Area Of Interest

Goldstein phase filter exponential factor *

Phase Unwrapping *

* indicates required information

Select the result

OpenSearch Description to the Results (application/opensearchdescription+xml)

Job OWS info (application/atom+xml)



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Job info

Processing Services

DIAPASON Sentinel-1 **DIAPASON-Guada-Marta-ex1**

Job Info

| | |
|-------------------------------|--|
| Name | DIAPASON-Guada-Marta-ex1 |
| Id | a2c677ec-e95a-4247-a413-ed86cd490765 |
| Processing service | DIAPASON InSAR Sentinel-1 TOPSAR(W,EW) |
| Service version | 1.1.4 |
| Started at | Jun 1st 2019 09:11 |
| Created by | Marta Béjar Pizarro |
| Status/Result Location | |
| Status | checking... |
| Visibility | private |
| Share | |

18%

Parameters

| Name | Value |
|--------|---|
| master | https://catalog.terradue.com/sentinel1/series/insar/search?format=json&uid=S1A_IW_SLC_1SDV_20160117T061005_20160117T061033_009530_00DD7C_1E32 |
| pol | W |



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Check the results:
After successful
completion of the job

The screenshot shows a 'Processing Services' interface with a 'Jobs' tab selected. It displays a list of 8 jobs. The second job, 'DIAPASON-Guada-descT8-Int166-Gd0.b', is marked as 'success' with a green button. The other jobs are marked as 'retry to connect' with orange buttons and 'Host unreachable' status. A red arrow points from the text box to the 'success' button of the second job.

| Job Name | Status | Time Ago | By |
|---|------------------|---------------|---------------------|
| DIAPASON-Guada-Marta-ex1 | 25% | 2 minutes ago | Marta Béjar Pizarro |
| DIAPASON-Guada-descT8-Int166-Gd0.b | success | a day ago | Marta Béjar Pizarro |
| DIAPASON_KaikouraEq_asc_t52_south_test1 | retry to connect | 2 days ago | Marta Béjar Pizarro |
| DIAPASON_EcuadorEq_desc_t40_south_test1 | retry to connect | 2 days ago | Marta Béjar Pizarro |
| FASTVEL_Austria_desc_t95_S1A_test1 | retry to connect | 3 days ago | Marta Béjar Pizarro |
| FASTVEL_CZ_asc_t146_S1A_test1 | retry to connect | 3 days ago | Marta Béjar Pizarro |
| FASTVEL_Arcos_asc_t147_S1A_test1 | retry to connect | 3 days ago | Marta Béjar Pizarro |
| FASTVEL_Klepa_desc_t7_S1A_test1 | retry to connect | 5 days ago | Marta Béjar Pizarro |
| FASTVEL_Klepa_asc_t175_S1A_test1 | retry to connect | 9 days ago | Marta Béjar Pizarro |



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

View results on the map

Click on the Show results on map button after the job is completed.

The screenshot displays the Geohazards web interface. On the left, a map shows a satellite image of a mountainous region with a color-coded DInSAR result overlay. The overlay shows a central area of high deformation (red) surrounded by lower deformation (yellow and green). The map includes a search bar, navigation controls, and a timeline from 2000-03-12 to 2020-03-12. Below the map, a 'Discovery feed for local data' shows search results for DIAPASON InSAR Sentinel-1 TOPSAR(WVLR) products, including Interferometric Amplitude, Coherence, Phase, and Unwrapped Phase. A 'Features Basket' on the right contains two selected items. On the right side of the interface, a 'Success' notification states 'The job was completed successfully.' Below this, a 'Results' section shows 'Found layers in the result.' with a 'Show results' button. A red arrow points from the 'Show results' button in the notification area to the 'Show results' button in the 'Results' section.

| Name | Value |
|--------|---|
| master | https://catalog.terradue.com/bentinel1/series/nsar/search?format=json&uid=S1A_IW_SLC__1SDV_20180117T061005_20180117T061005_009530_0007C_1E32 |
| pol | VV |
| slave | https://catalog.terradue.com/bentinel1/series/nsar/search?format=json&uid=S1A_IW_SLC__1SDV_20180516T061010_20180516T061010_011280_01115E_4A3F |
| aoi | -1.802,37.538,-1.502,37.708 |
| polfix | 0.6 |
| unwrp | true |

Success
The job was completed successfully.

Results
Found layers in the result. [Show results](#)

XML Result

Technical Support



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

The screenshot shows the geohazards web interface. At the top, there is a search bar with the text "Free text search". Below the search bar, there is a map of a mountainous region with an inset interferometric map showing a color-coded area. The map includes labels for "Vélez Blanco", "Vélez Rubio", "Totana", and "Parque Natural Cabo de Gata y Puzos de Calera". The interface also features a "Discovery feed for local data" section with a list of data packages. The results panel shows the following items:

- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferometric Amplitude - 2016-01-17T06:10:20 2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferometric Coherence - 2016-01-17T06:10:20 2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferometric Phase - 2016-01-17T06:10:20 2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Unwrapped Phase - 2016-01-17T06:10:20 2016-05-16T06:10:23

The "Data Packages" section shows two items:

- S1A SLC IW_DP L1 VW_VH 8 2016-01-17T06:10:05.2811920Z/2016-01-06:10:33.2244250Z
- S1A SLC IW_DP L1 VW_VH 8 2016-05-16T06:10:10.2477950Z/2016-05-06:10:38.1869160Z

After successful completion of the job, the following elements will appear on the Results panel:

- The **interferometric amplitude**.
- The **interferometric coherence**.
- The **interferometric phase**.
- The **unwrapped phase** (in case the phase unwrapping processing was activated).



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

The interferometric amplitude

Can be interpreted in terms of the scattering properties of the Earth's surface. It is related to the energy of the backscattered signal

- High energy: urban areas, rocks
- Low energy: low reflectivity elements (rural areas, soft materials: wood ..)

The screenshot shows the 'geohazards' web application interface. At the top, there is a search bar with 'Free text search' and a 'U-Geohaz Training' dropdown. The main area displays a satellite image of a landscape with a dark, textured overlay representing interferometric amplitude. The image includes a scale bar (3 km) and coordinates (Lon: -1.529, Lat: 37.513). Below the image, there is a 'Current search result' section with a 'Discovery feed for local data' and 'Total results 5'. The search results list includes:

- DIAPASON InSAR Sentinel-1 TOPSAR(W,EW) - Interferometric Amplitude - 2016-01-17T06:10:20-2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(W,EW) - Interferometric Coherence - 2016-01-17T06:10:20-2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(W,EW) - Interferometric Phase - 2016-01-17T06:10:20-2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(W,EW) - Unwrapped Phase - 2016-01-17T06:10:20-2016-05-16T06:10:23
- logs.zip

On the right side, there is a 'Features Basket' and 'Data Packages' section with 'Total results 2'. The data packages listed are:

- S1A SLC IW_DP L1 VV, VH 8 2016-01-17T06:10:05.2811920Z/2016-01-17T06:10:33.2244250Z
- S1A SLC IW_DP L1 VV, VH 8 2016-05-16T06:10:10.2477950Z/2016-05-16T06:10:38.1869160Z



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

The interferometric amplitude

The interferometric amplitude in geotiff format -> the modulus of the complex product of the master SLC image and the coregistered slave SLC image.

03/06/2019

The screenshot shows the 'geohazards' web interface. At the top, there is a search bar and navigation buttons. The main map area displays a satellite image of a landscape with a dark, textured overlay representing the interferometric amplitude. A red box highlights a specific area on the map. A pop-up window titled 'DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferom' is open, showing the following metadata:

| Description | Interferometric Amplitude |
|--------------------|---|
| Orbit Direction | DESCENDING |
| Master SLC Product | S1A_IW_SLC__1SDV_20160117T061005_20160117 |
| Processing Date | May 31 2019 |

Below the map, there is a search results section with a list of items:

- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferometric Amplitude - 2016-01-17T06:10:20 2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferometric Coherence - 2016-01-17T06:10:20 2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferometric Phase - 2016-01-17T06:10:20 2016-05-16T06:10:23
- DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Unwrapped Phase - 2016-01-17T06:10:20 2016-05-16T06:10:23
- logs.zip



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

The interferometric coherence

Coherence:
stability of the
electromagnetic
signal over time

- Densely vegetated areas: low coherence
- Urban areas: high coherence

The screenshot shows the 'geohazards' web application interface. At the top, there is a search bar with 'tep' entered and a 'Free text search' button. The main display area shows a satellite image of a mountainous region with a red box highlighting a specific area. The image is dated '2000-03-12' and '2030-03-12'. The interface includes navigation tools on the left, a 'Features Basket' on the right, and a 'Data Packages' section at the bottom. The 'Data Packages' section shows two results: 'S1A SLC IW_DP L1 VV, VH 8 2016-01-17T06:10:05.2811920Z/2016-01-17T06:10:33.2244250Z' and 'S1A SLC IW_DP L1 VV, VH 8 2016-05-16T06:10:10.2477950Z/2016-05-16T06:10:38.1889160Z'. The interface also includes a 'Discovery feed for local data' section with a total of 5 results.



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

The
interferometric
coherence

DIAPASON InSAR Sentinel-1 TOPSAR(IW,EW) - Interferometric Coherence

Interferometric Coherence

| Description | Interferometric Coherence |
|--------------------|---|
| Orbit Direction | DESCENDING |
| Master SLC Product | S1A_IW_SLC__1SDV_20160117T061005_20160117 |
| Processing Date | May 31 2019 |

[Download](#) [Related search](#)

The interferometric coherence -> floating point geotiff image with values within [0.0 255.0]. Pixel values of 255.0 are equivalent to a coherence value of 1



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

The interferometric phase (wrapped interferogram)

1 fringe ~ 3 cm
(120d) -> ~ 9 cm/yr

The screenshot shows the 'geohazards' web application interface. At the top, there is a search bar with 'Free text search' and a user profile for 'Marta.BejarPizarro'. The main map area displays a satellite image of a mountainous region with a wrapped interferogram overlaid. The interferogram shows a central blue area surrounded by yellow, green, and red areas, indicating phase differences. The map includes various labels such as 'RM-C15', 'RM-C9', 'A-7', 'A-91', 'N-342a', 'Puer Lumbri', 'A-327', and 'Terradue'. The coordinates are 'Lon: -1.777 Lat: 37.524'. Below the map, there is a 'Current search result' section with a list of search results. The selected result is 'DIAPASON InSAR Sentinel-1 TOPSAR(W,EW) - Interferometric Phase - 2016-01-17T06:10:20 2016-05-16T06:10:23'. Other results include 'Interferometric Amplitude' and 'Unwrapped Phase'. A 'Features Basket' and 'Data Packages' section are also visible, showing two data packages with their respective IDs and dates.



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Phase in the differential interferogram -> several contributions:

- Deformation
- Topography
- Orbits
- Atmosphere (stratified, turbulent)
- Noise

$$\Delta\phi = \phi_{def} + \phi_{topo} + \phi_{atm} + \phi_{orb} + \phi_{ruido}$$

To detect ground deformation: these contributions need to be reduced/removed

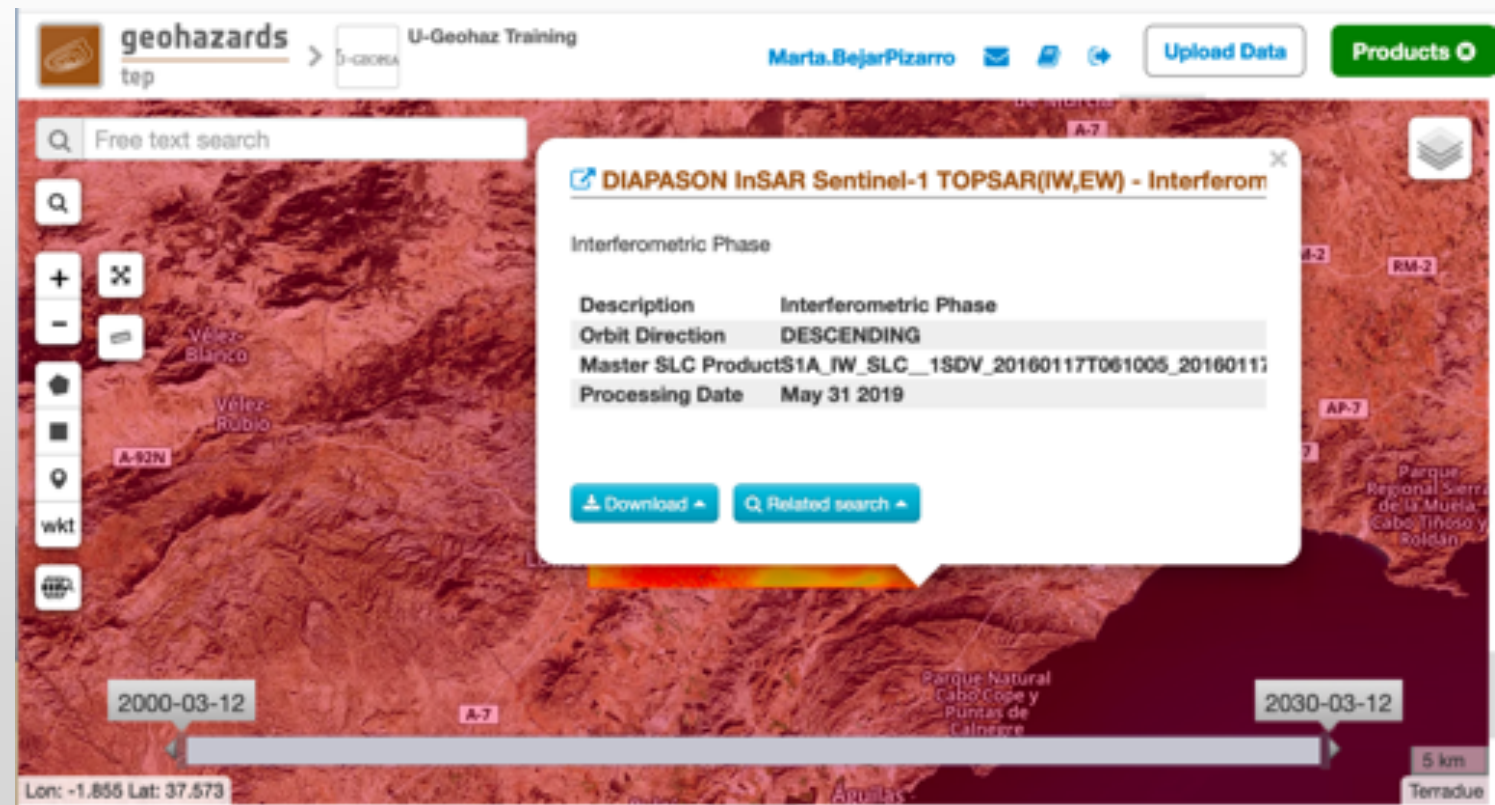
Under ideal conditions (if noise and other contributions are negligible) : phase values are equivalent to the ground displacement occurred between the two acquisition dates



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

The interferometric phase (wrapped interferogram)





3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 1

Unwrapped phase

Interferogram with fringes (wrapped): we add all the fringes to obtain the total deformation

The screenshot shows the 'geohazards' web application interface. At the top, there is a search bar with 'Free text search' and a user profile for 'Marta.BejarPizarro'. The main map area displays a satellite image of a mountainous region with a central inset showing a wrapped interferogram with colorful fringes. The map includes a date range from 2000-03-12 to 2030-03-12 and coordinates (Lon: -1.709, Lat: 37.517). Below the map, the 'Current search result' section shows 5 results, with the selected one being 'DIAPASON InSAR Sentinel-1 TOPSAR(W/EW) - Unwrapped Phase - 2016-01-17T06:10:20 2016-05-16T06:10:23'. The 'Features Basket' and 'Data Packages' sections show 2 results, including 'S1A SLC IW_DP L1 VV, VH 8 2016-01-17T06:10:05.2811920Z/2016-01-17T06:10:33.2244250Z'.



3. DInSAR with GEP tools

3.3. DIAPASON, Exercise 2

Select an area of interest and submit a job with Diapason

Suggestions

- Select a deformation event occurred in the period 2015-2019 (Sentinel-1 catalogue)
- AOI within the two scenes



3. DInSAR with GEP tools

3.3. DIAPASON

Explore Diapason results

-> DIAPASON-Guada-descT8-int166-Gdo.6
(subsidence)

-> DIAPASON TOPSAR - EcuadorEq_desc_t40_south
(Ecuador earthquake)

-> DIAPASON_KaikouraEq_asc_t52_south_test1
(New Zealand earthquake)