InSAR on-demand services and data processing pipelines for deformation modelling

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Terradue is an Italian SME (ESA spin-off in 2006) Headquarters: Rome (IT)

- From day one providing **support to application builders in earth sciences**, to use satellite EO data as information source
- Early days Grid Computing. Nowadays, all Cloud Platform-as-a-Service (PaaS) & APIs for the **transfer in production of scalable software applications** (Cloud bursting)

- [https://www.terradue.com](https://www.terradue.com)

As part of the EC H2020 project EuroVOlC, Terradue provides the automation of existing approaches to fast modelling of individual data types, in particular the simultaneous and integrated strain tensor estimation from GNSS and InSAR data developed by INGV

Terradue also contributes to the networking activities of the project, especially collaboration and networking between VOs and VRIs, and with international initiatives
Overview

EUROVOLC is developing case studies over European Volcanoes in Iceland, Italy, Spanish Canary islands and Portuguese Azores island.

For the case of Etna, data access and processing automation levels, for simultaneous and integrated strain tensor estimation from GNSS and satellite-based InSAR, are applied to the modelling of deformation and seismicity data.
Collaborative work environment

A Cloud platform environment is configured to this end for the EUROVOLC community.

A community gathers its members around common thematic areas, in this case volcanoes.

The EUROVOLC community includes several “Thematic Apps” per European country volcanoes.

For instance, the Italian Volcanoes Thematic App is focussed on the Etna, Vesuvius, Campi Flegrei and Stromboli volcanoes.
Thematic App services

Each “Thematic App” is implemented as a Geobrowser. It provides the access point to several services dedicated to the exploitation of Earth Observation (EO) data.

The Thematic App services include data discovery, access, processing and exploitation/visualization.
Data Discovery

The data discovery service provides the EUROVOLC community with custom and tailored catalogue access for several EO missions.

At this stage, the platform provides access to Sentinel-1, Sentinel-2, Sentinel-3, Envisat ASAR, Landsat-8 and ASTER.

The EO data discovered can be downloaded if needed.
Italian Volcanoes Thematic App

Placemarks for direct search & filter

Related list of reference sites
Italian Volcanoes Thematic App

Selected Sentinel-1 product metadata

Selected Sentinel-1 quicklook

Contextual list of search results per EO data collection

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On-demand Data Processing

The access to **on-demand data processing services** exploiting such EO missions is available from the Thematic Apps.

This includes several services according to the nature of the EO data used.

**For Sentinel-1**, users can access InSAR processing services for interferometry (e.g. DIAPASON and SNAP) and for coherence and backscatter generation.

**For Sentinel-2, Sentinel-3, Landsat-8** and **ASTER**, users can access the INGV Hot Spot detection services.
User access to Data Processing services

- Data product visualisation on the map
- Data processing job management and result summary
- Contextual data products list & selectors
- User data management area
- Data sharing functions

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User access to Data Processing services

- Products search
- Processing job progress monitoring
Data Processing Pipeline

**Project activities is scope**: the simultaneous and integrated strain tensor estimation from GNSS and InSAR data.

**Data preparation automated**: the access to Envisat ASAR IMS data is feeding an InSAR data processing pipeline, which generates and delivers **interferogram stacks**, then used as inputs to INGV’s strain tensor estimation tool.
Data Processing Pipeline

Data processing pipeline spec:
- **Data Source**: Envisat ASAR L1 IMS
- **Processor**: DIAPASON
- **Method**: all master/slave pairs over Etna for 2008 and 2009
Value adding services

Programmatically access the Platform APIs and data resources from a Jupyter Notebook workspace.

e.g. to post-process on-demand processing datasets, or time series of a data processing pipeline results

The Ellip Notebooks service allows to combine distributed data and services into a single, sharable application.
Want to join?

Contact us support@terradue.com

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