Experiences from Early Adopters in EOSC
RELIANCE Open challenge for Sustainable Development

Hazard monitoring of remote volcanos at Ecuador using the Reliance Services

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https://webinar22.eoscfuture.eu/registration/

Reliance

Hazard monitoring of remote volcanos at Ecuador using the Reliance Services

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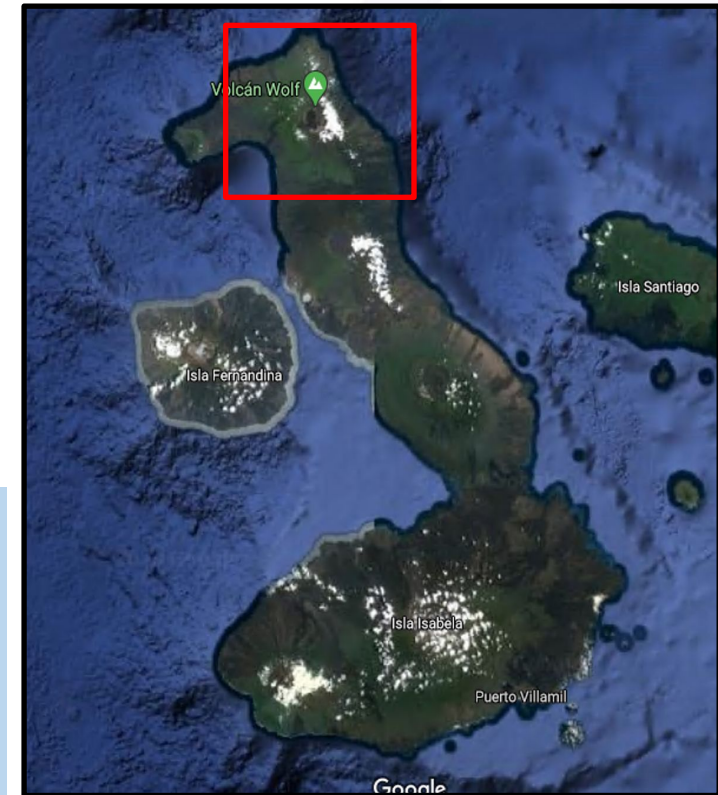
Main activities carried out with the RELIANCE Services

- We can work with our simulation of modelling deformation sources in any place of work (office, home, travel).

- We can use scripts, software, and other resources from national and international collaborators.

- The services are useful for routine monitoring of volcanoes and for rapid sharing of scientific products in case of emergency.

Reliance

Introduction

Galápagos Islands (Ecuador) have volcanoes with significant rates of deformation. We focused on the Wolf volcano in the Isabela Island. It is a very far away site, hence remote sensing measurements are very useful to detect crustal deformation. We investigated the pre and syn-eruptive phase following the 2022 eruptive activity, by analyzing Sentinel-1 data (TOPSAR acquisition mode).
The outcomes were then used as input to infer the volcanic source parameters, such as its position, shape and volume variation.
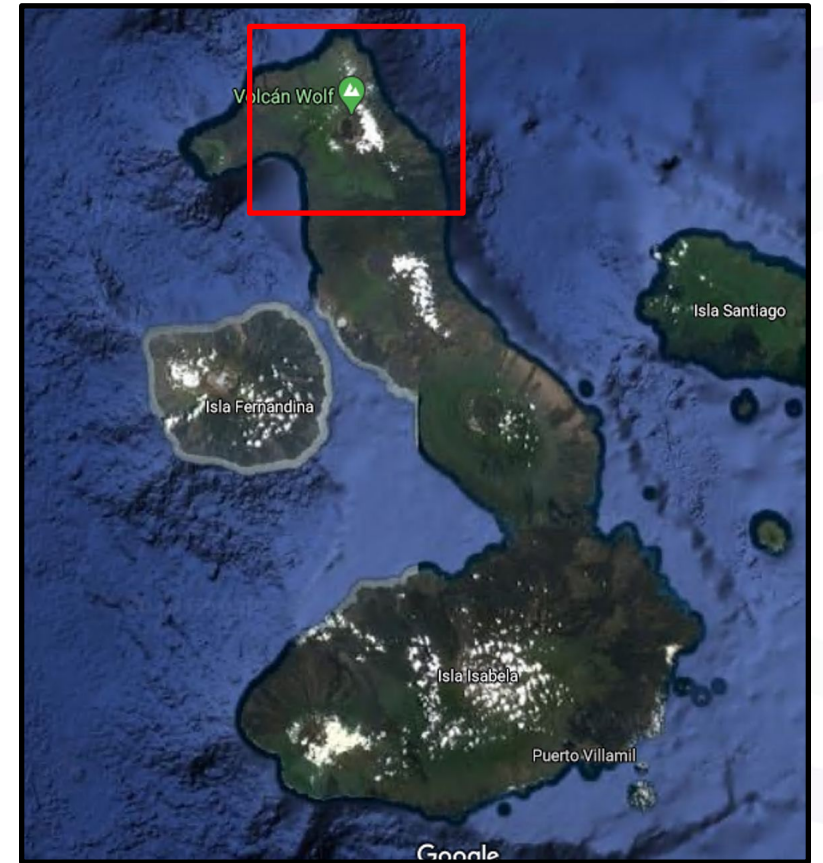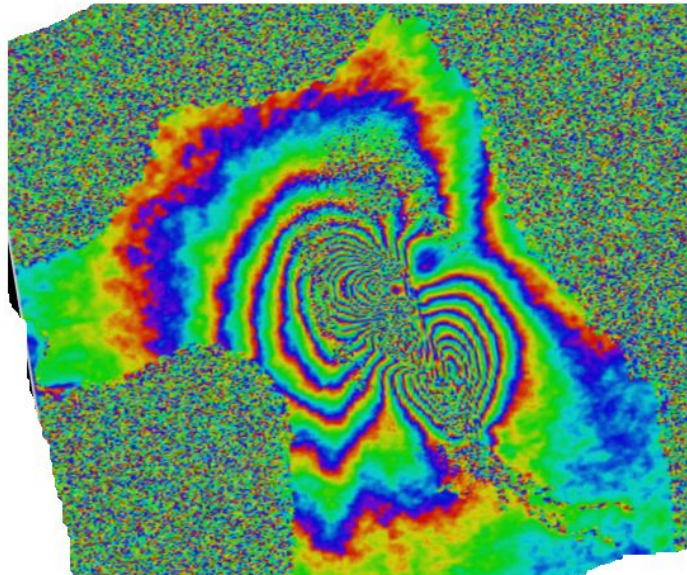
a) Map of Galapagos (Ecuador) and location of Wolf volcano.

Shared resources

We can use computational and storaging resources that are made available to the Geohazard Community:

```
import sys
import os
import pathlib
import pandas as pd
import cartopy.crs as ccrs
import matplotlib
import matplotlib.pyplot as plt
sys.path.append(os.path.join(os.environ['HOME'], "datahub/Reliance/Geohazard/VSM"))
import VSM
```

Volcanic and Seismic source Modelling

Reliance

Markdown ∨   Python 3 ○

WOLF VOLCANO (Galapagos, Ecuador)

InSAR analysis and modelling

VSM - Volcanic and Seismic source Modelling is a Python code to perform inversions of geodetic data.

Code https://github.com/EliTras/VSM
License E. Trasatti - INGV (elisa.trasatti@ingv.it), covered by GNU-GPL License https://github.com/EliTras/VSM/blob/main/license.lic

This Notebook contains details on the use of VSM to run data inversion, and post-processing

Filename

```python
[1]: import sys
!{sys.executable} -m pip install -r /home/jovyan/datahub/Reliance/Environments/ingv_reqs.txt
```

```
Collecting astropy
  Using cached astropy-5.1.1-cp38-cp38-manylinux_2_12_x86_64.manylinux2010_x86_64.whl (11.2
Collecting rioxarray
  Using cached rioxarray-0.13.1-py3-none-any.whl (53 kB)
Collecting corner
  Using cached corner-2.2.1-py3-none-any.whl (15 kB)
Collecting emcee
  Using cached emcee-3.1.3-py2.py3-none-any.whl (46 kB)
Collecting rohub
  Using cached rohub-1.1.0-py3-none-any.whl
```

Mode: Command   ⊗   Ln 1, Col 1   VSM_wolf_syn2-1.ipynb

We detect deflation in the pre-eruptive and syn-eruptive phase and the opening of the dike of feeding the eruption.

We model the satellite data with a notebook in the EGI.
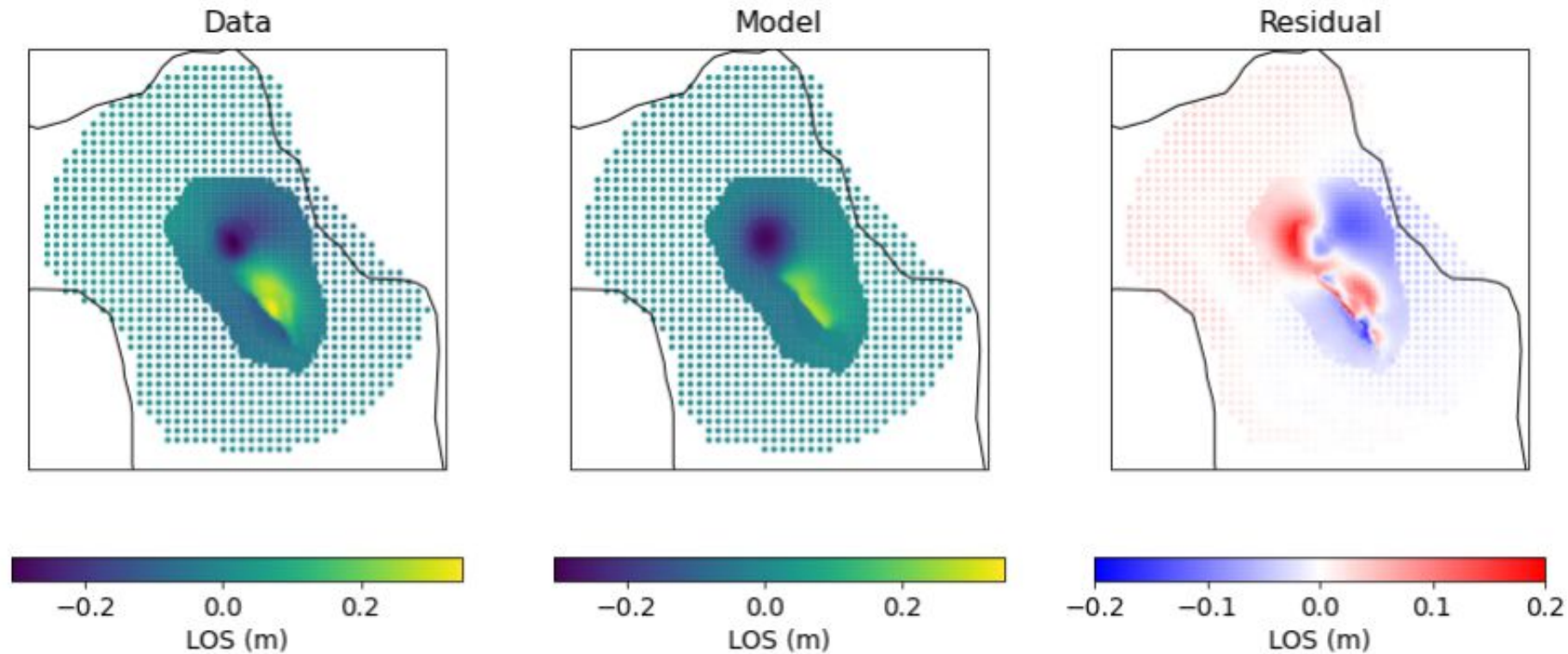
FINAL CONSIDERATIONS AND REMARKS

- Modelling of deformation sources in Ecuadorian volcanoes is possible using resources shared by colleagues.

- Real time modelling results can be produced with the cloud computational resources for monitoring volcano deformation.

Thank you for your attention!

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