

# Intro to Remote Sensing on VICTOR

This guide will cover two workflows on VICTOR that will begin to show what is possible with remote sensing access and analysis on the platform. The first notebook accesses data from NASA's OPERA project to map lava flows from past eruption events using vegetative disturbance information. In order to run the first notebook, you will need an EarthData account. The second workflow, developed by Dr. Claudia Corradino (INGV Catania), maps sulfur dioxide emissions from past eruptions.

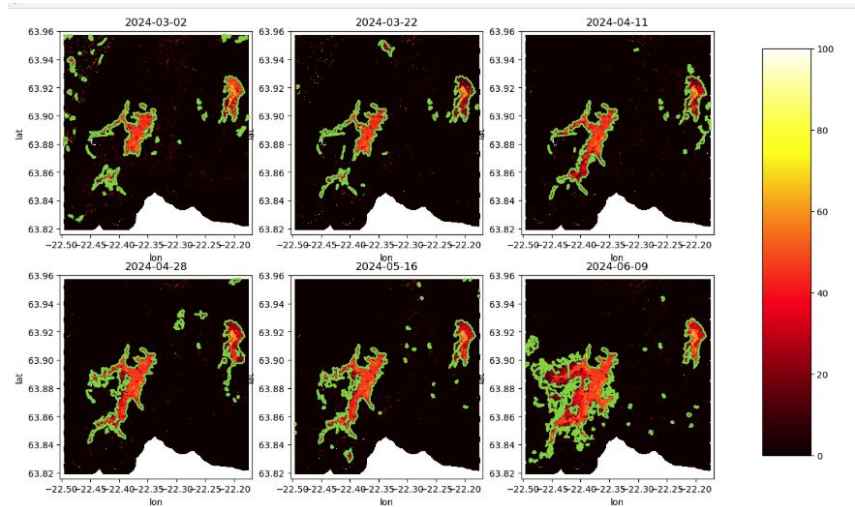
## Setup:

1. Before running either workflow, identify an eruption event that you would like to gather data from.
2. Log into VICTOR at `victor.2i2c.cloud`. We suggest using the third or fourth largest machine for these workflows.
3. Navigate to the remote sensing workflows folder: `/shared/Workflows/Remote Sensing/`

## VICTOR-OPERA Lava Flow Extraction:

1. Open the notebook titled, "`DIST_VICTOR.ipynb`". Make a copy of this notebook in your home directory, and copy the folder, titled "`src`" into that same directory.
2. Run the two import cells to gather all of the necessary packages to run the workflow. After running the second cell, you will be prompted to enter your EarthData credentials.

- Run the following cell to load an interactive map. Use the selection tools on the map to identify your area of interest. Once selected, run the next two cells to save the boundaries of your chosen region.
- Input the start and stop dates of the eruption event you are interested in.
- Specify thresholds for overlap and cloud cover as well as a project name. The cloud cover threshold indicates the minimum cloud cover percentage allowed for the data search, with the default being complete cloud coverage. The overlap threshold determines how specifically your chosen boundaries must align with available data swaths.
- Run cells to first double check the event dates and area coordinates, then search EarthData.
- Check granules to confirm that data exists for your chosen parameters. If an empty list is returned or an error is thrown at this step, you may need to widen your region of interest and/or time constraints.
- Run code to visually confirm that DIST tile boundaries overlap with your area of interest. Then, run the following cells to continue formatting the data until you reach the time-series visualization step.
- Run the final cells to produce a time-series of the lava flow.



## Mapping Volcanic Sulfur Dioxide Emissions with Sentinel-5 TROPOMI:

1. Open the notebook titled, “shared/Workflows/Remote Sensing/VICTOR\_Corradino\_etall.ipynb”. If copying this notebook into another directory, please also copy the JSON file named, “victor-397520-6e925130ead5.json” into the same directory.
2. Run the first two cells to import necessary packages and set up Google Earth Engine. VICTOR has an account that will be used in this example, however, credentials can be substituted for your own.
3. Input information about the event you’d like to analyze, including start day, end day, volcano name, latitude, longitude, and radius.
4. Run the next cell to define functions that will be used in this workflow.
5. Run the remaining code blocks to generate a map of sulfur dioxide emissions from your chosen event.

