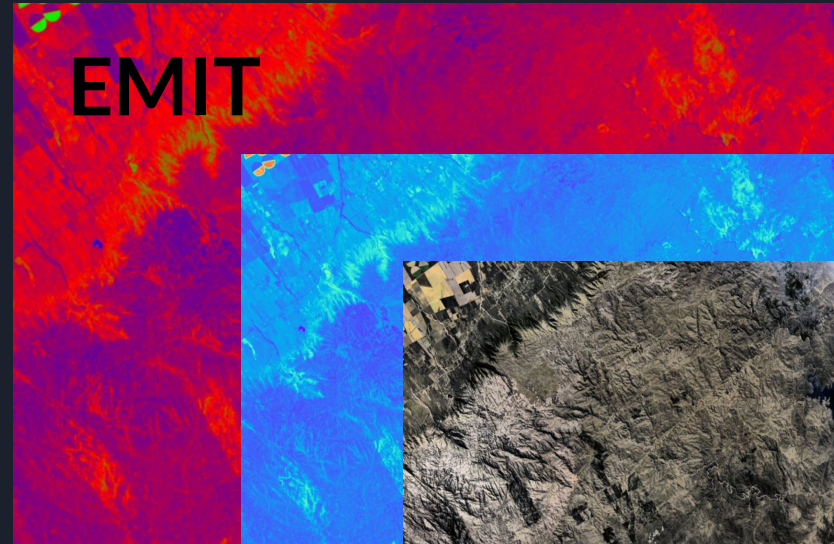


Team: ARSTRIUM

Challenge: Be a space Geologist

Members: Alexander Rubattino

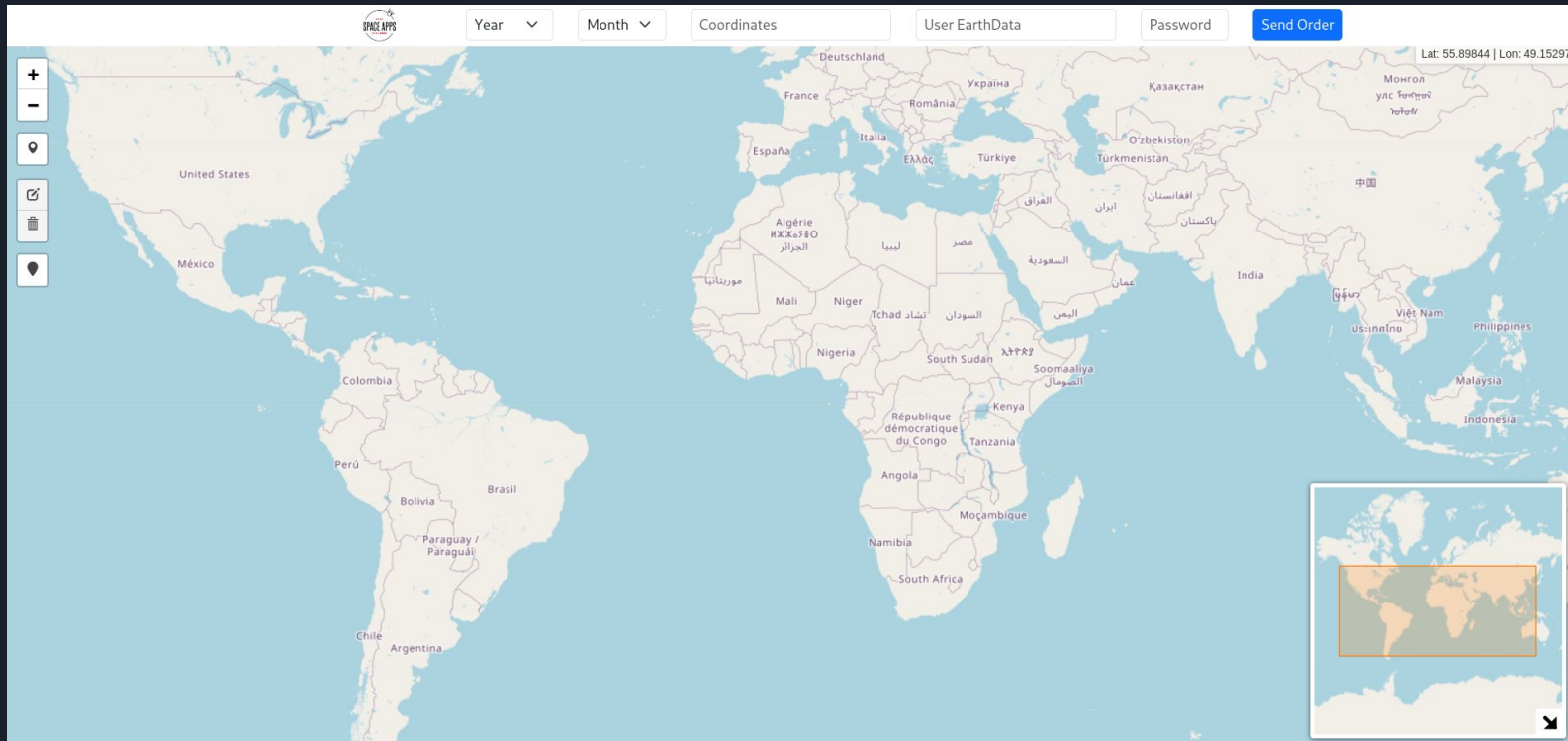




Project summary:

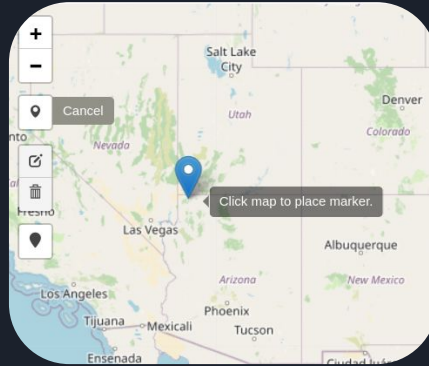
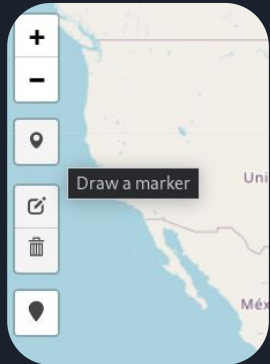
The project is a web application for geologists. It is a quick and simple application where the user selects the point of interest and loads the coordinates along with the date, username and NASA earthdata password. Send the request to the backend service program and the algorithm is in charge of searching for the EMIT optical images automatically, downloads them and processes them, delivering in a few minutes a PDF report with the processing indexes and images of the NASA product "EMIT L2B Estimated Mineral Identification and Band Depth and Uncertainty 60 m V001" and the IDs corresponding to each mask. It is a tool that is designed to be simple, automatic, and provide easy access to professionals who do not have knowledge of programming and using GIS software. At the same time, it is designed so that it can collect the greatest amount of data from NASA.

Run in terminal: `“python3 app.py”`
In browser: `http://127.0.0.1:8050`

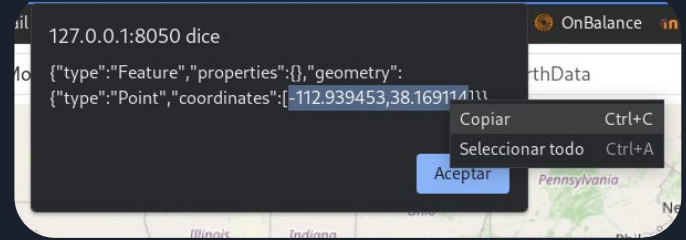


Mode of use:

1. Select the marking tool.



2. Click with the mouse on the area of interest on the map.



3. Click on the marked one to display the coordinates.



4. Copy the coordinates

5. Paste the coordinates in the box, select the year and month of interest. Enter your earthdata username and password. Then click "Send Order" and the order would be sent to the backend. You can view the terminal to see the progress.

A screenshot of a web form titled 'SPACE APPS'. The form has several input fields: 'Year' (dropdown menu showing '2023'), 'Month' (dropdown menu showing 'June'), 'Coordinates' (text input field containing '-112.939453,38.169114'), 'User EarthData' (text input field containing 'arubattino'), 'Password' (text input field with masked characters '.....'), and a 'Send Order' button. Below the form is a map showing the location of the coordinates.



Processing:

The algorithm will search for the reflectance EMIT products of the desired area along with the L2B EMIT products of minerals. Then it does the data processing and creates a PDF report with the data information and 6 + RGB images.

- NDVI index for vegetation.
- Iron oxide index.
- Hematite index.
- Argillic and Sericitic Alteration Index.
- Hydroxyls and alunite.

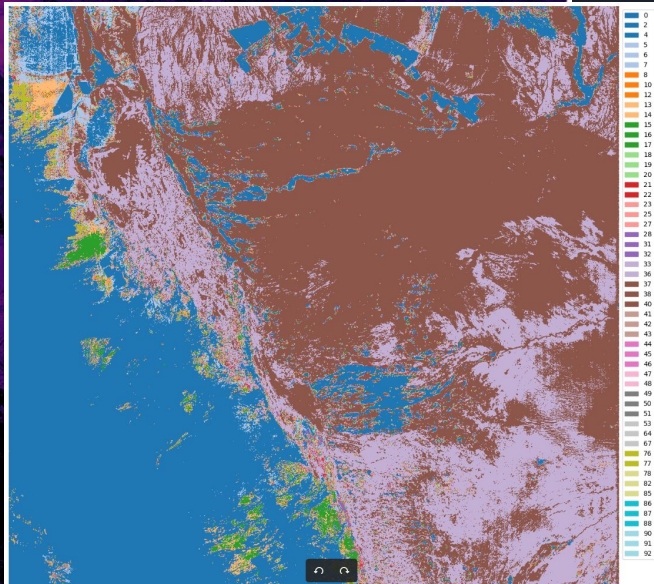
It then processes NASA's L2B data to generate 4 images that correspond to each band in the image. In them you can see the different minerals detected by the product and on the side their corresponding ID and color so that the professional can identify them.

Sometimes due to cloud cover or availability, there are no images available on the date the user requested, so the algorithm will look for the most recent image it finds in order to deliver data to the geologist.

Finished...

In folder: /data

EMIT L2B Mineral Images and Mask



Report PDF with the processes



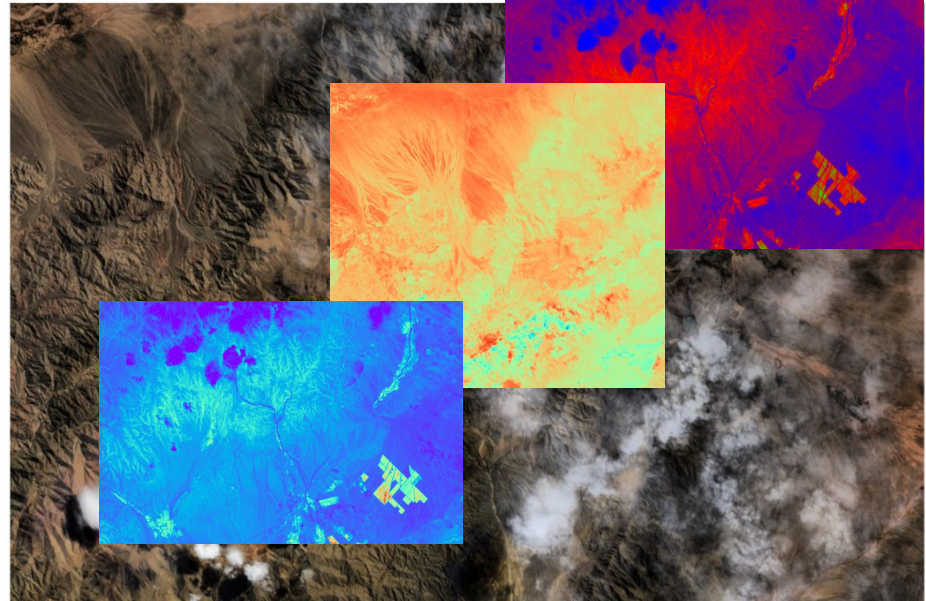
NASA SpaceApp Geology 2023


Image Name: EMIT_L2A_RFL_001_20230902T154620_2324510_011.pdf

Image Date Set: 2023-09-01

Lat | Lon: -67.469788 | -29.142566

Zone: Ruta del Vino, Los Sarmientos, Dep





It is a tool that is designed to be easy, automatic and able to download and process the greatest amount of data. Although it works with EMIT images because it is hyperspectral with its 285 bands and its great availability, other data such as radar (SAR) from Sentinel-1 were investigated to detect changes on the Earth's surface. It was decided to include radar data in the future.

We can integrate other analyzes of NASA products and expand the tool for other researchers, providing them with topics other than geology.

The large amount and diversity of data can make geospatial data a very powerful and consuming tool. It is expected that the information will reach more people, faster and in an easier way for early stages of the research.

Thank you!