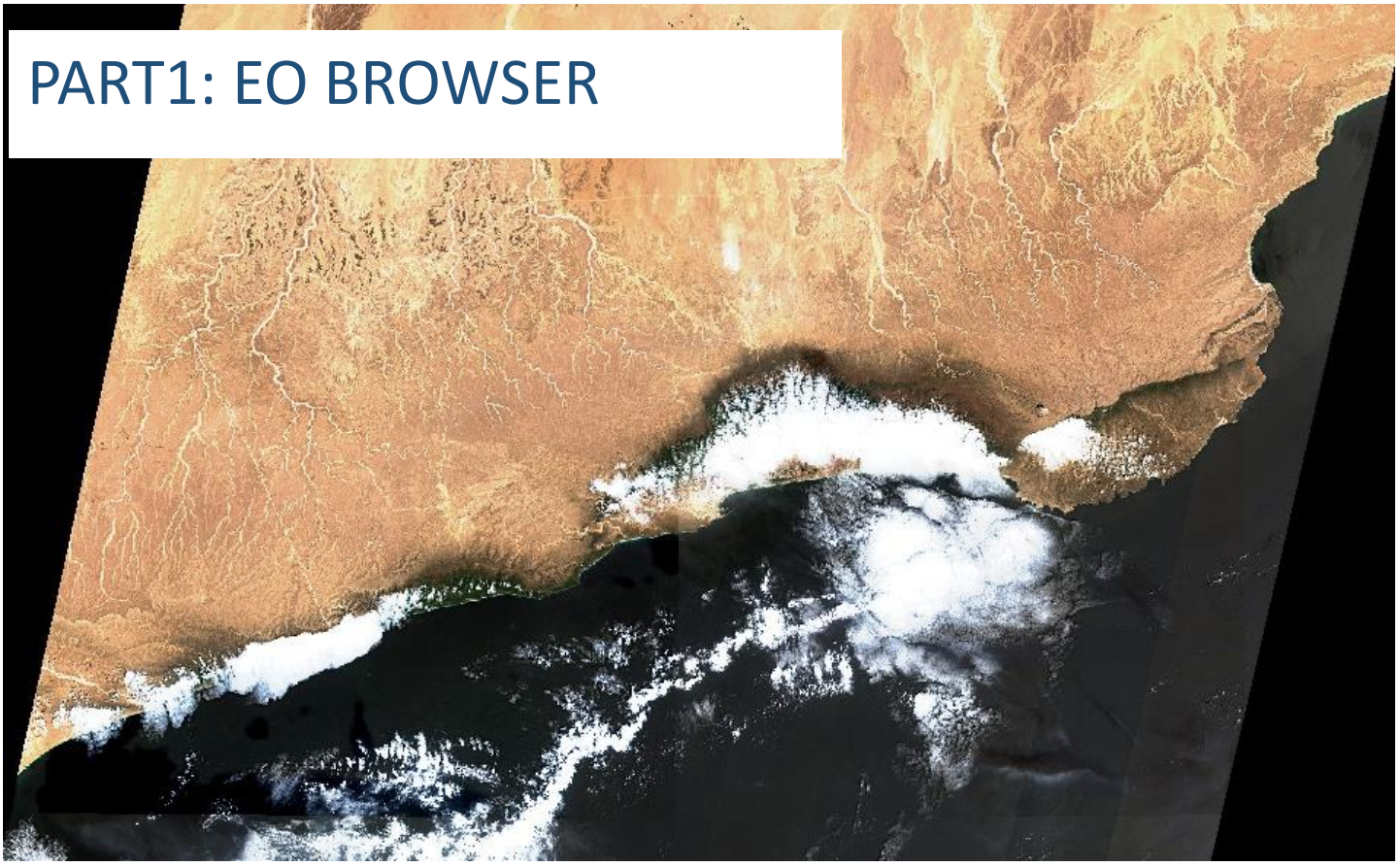
Data Handling and Visualization

Sentinel-1, Sentinel-2 & Sentinel-3



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EO Browser:

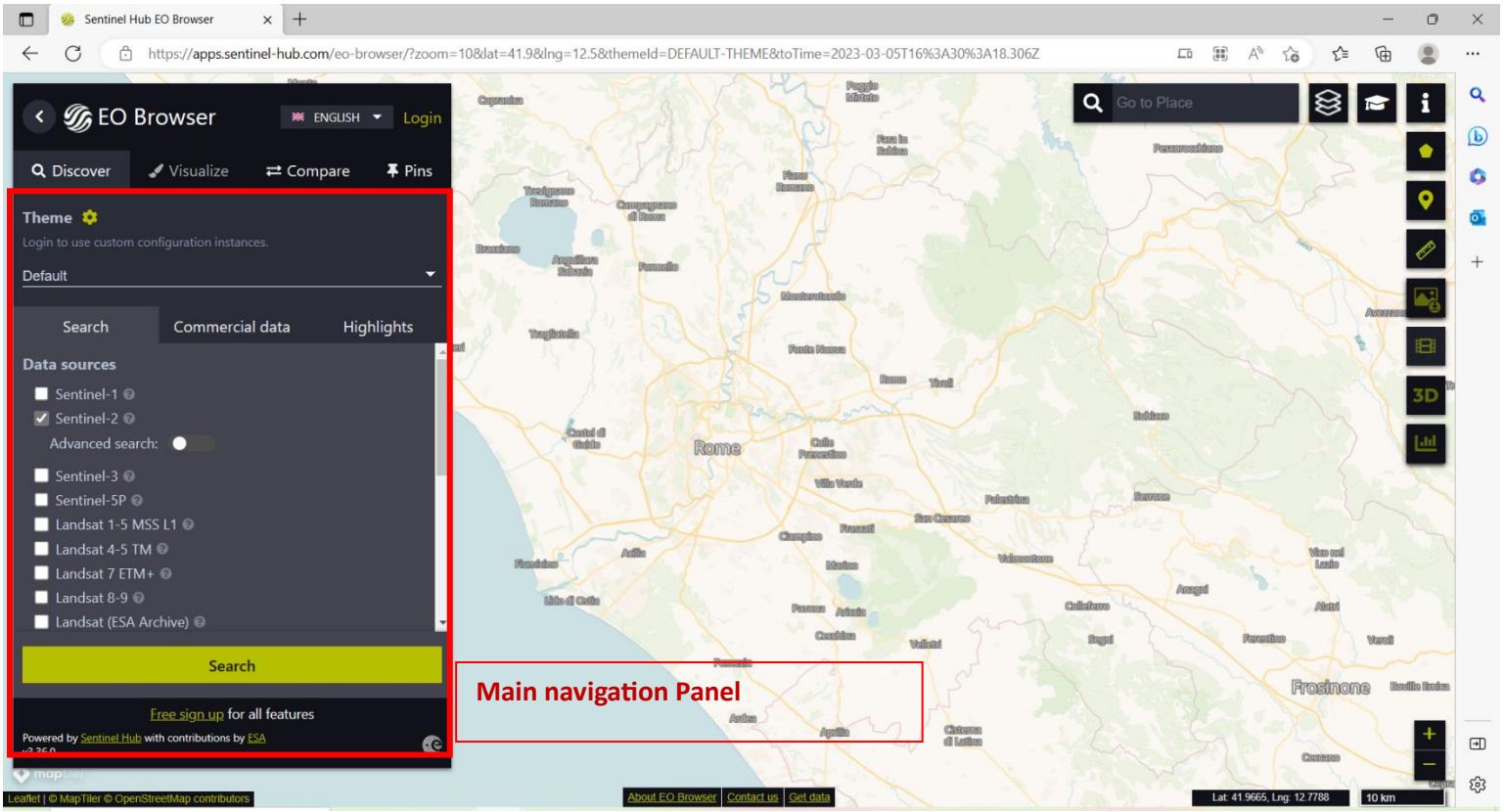
A web-platform for Earth Observation Data processing and visualising. It has a full archive of the Sentinel, Landsat (5,7 &8) satellites as well as other missions Envisat Meris, Proba-V and MODIS products.

- Free of Charge
- Requires Registration for Full access to all the tools (time laps Function)

Exploring EO Browser:

Step1: Go to EO Browser:

https://apps.sentinel-hub.com/eo-browser/



Step2: Creating an EO Browser account:

1. Click on **login** button, then **Sign Up** to create new account.
2. **Login** with your account

Step3: Search:

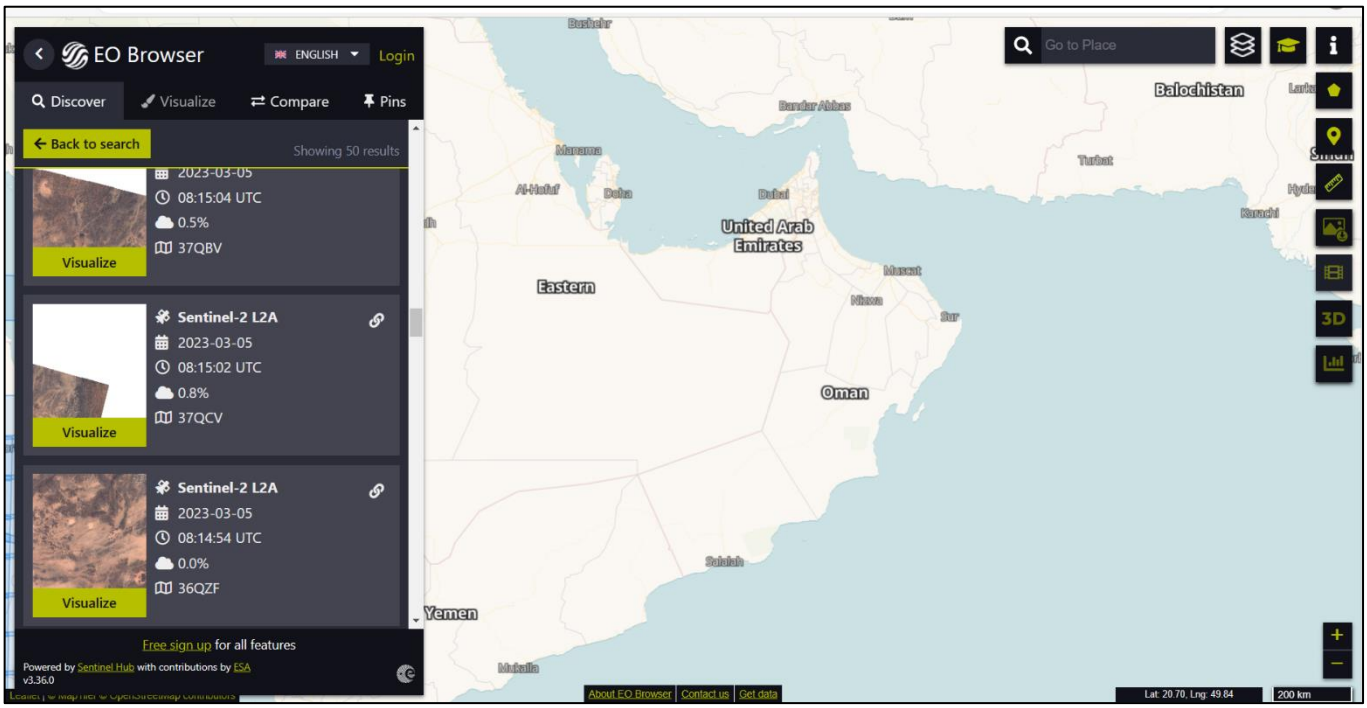
1. Navigate to your location of interest either by:

   a) Scrolling with the mouse over the map
   b) Using Search box
   c) Or click the icon  to upload (AOI), draw rectangle or polygon.

2. Select the: Theme, Satellite, Time range & Advanced Search (To Select Max Cloud Cover if applicable) from Main Navigation Panel.
3. To see the result, click on Search.

Step4: Results:

1. The list of results will display with images details:
   a) Sensing date – date when it was taken.
   b) Sensing time – time when it was taken
   c) Cloud Coverage – The cloud cover in % (not applicable for all Satellites)
   d) MGRS Location (Millitary Grid Reference System Location)



2. Visualise the image by Clicking on the **Visualize** button.

NOTE: It's not always easy to find the right image that you are looking for. So, you need to click **back to search** and change the search setting.

Step5: Visualise and Download the image:

1. Now you can select the visualisation type from the Products list (True Color, NDVI,etc.). (For more information about the products click on the icon )
2. Or you can Customize your product using **Custom**:
    a. **Composite** – Simple RGB composite image.
    b. **Index** - Create a simple band ratio or a normalized difference index.
    c. **Custom script** – Using java script code to define how the data is processed and returned.

3. Explore the image more:

   a. Zoom in and Zoom Out using the mouse or (+, -) buttons at the right bottom corner.

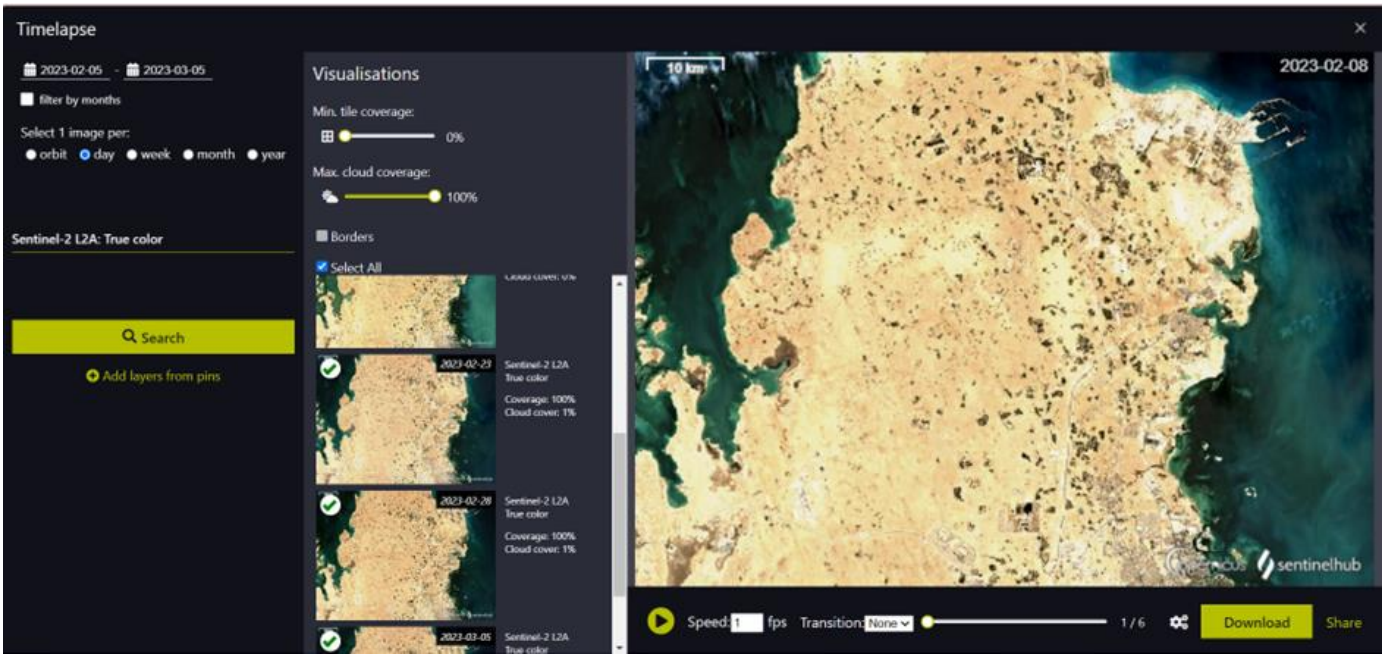
   b. Zoom to the Center of the tile by clicking the icon.

   c. For Advanced Visualisation (Gamma, Gain, etc) clicking on the icon.

   d. Use Measure Tool to measure the distance.

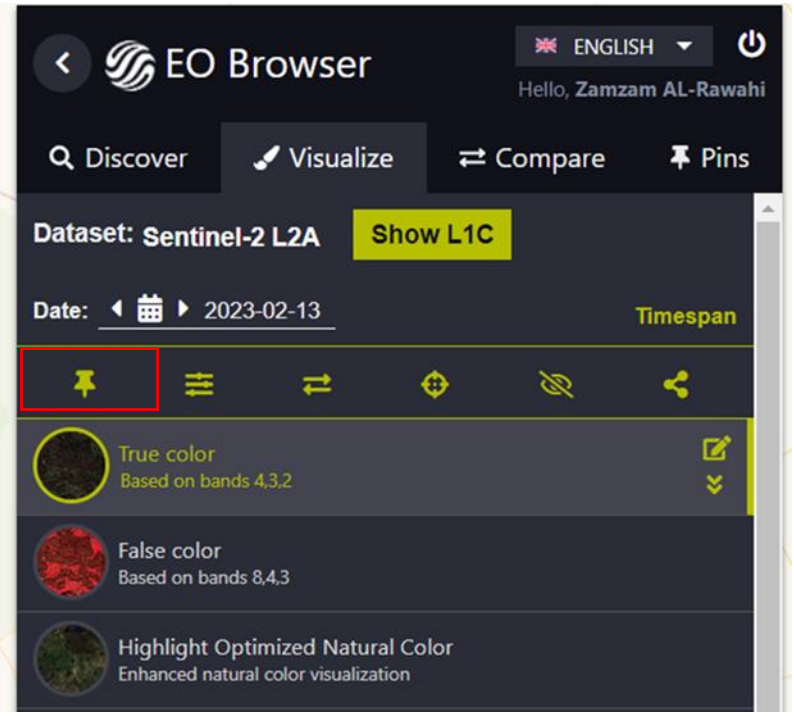
   e. Use Chart Tool to display statistical Analysis (NDVI)

   f. For Timelapse Animation clicking the icon. Choose the AOI, time span, frequency, speed, and transition.

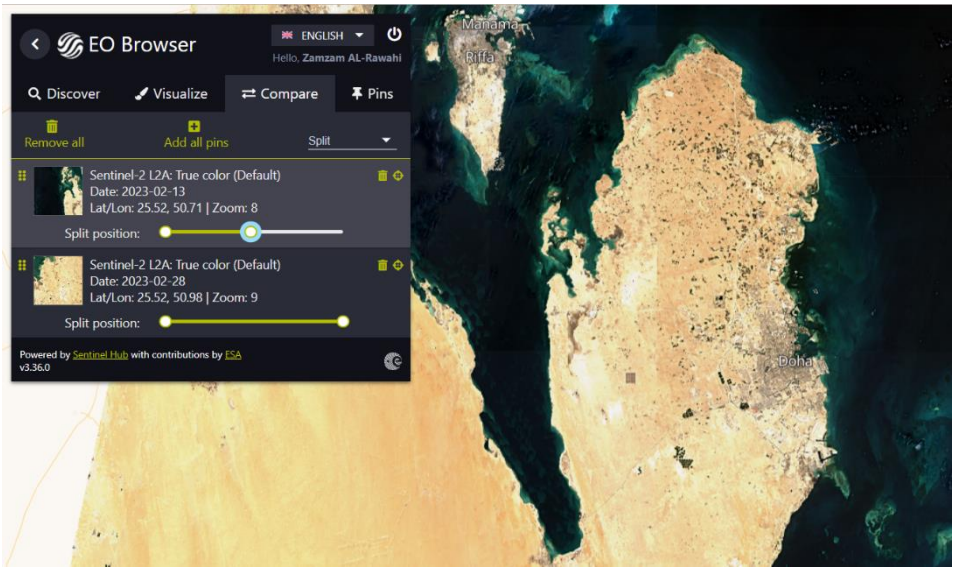


g. Pins and Image Comparison:

- To save the image for later use, clicking the pin icon (limited for registered users)



- To use compare function, choose at least two images from the **Pins Tab,** with the same location.
- Adding your pins to the compare pannel and compare them using split or opacity sliders.
- You can also create aquicke story from your pins of the same area using



Exercise with EO Browsers:

Exercise.1: Vegetation Seasonal Variation Dhofar mountains

1. **Choose parameters and Search:**
   - **Theme:** Vegetation
   - **Data Source:** Sentinel-2
   - **Advanced Setting:** Max. Cloud Cover = 40%
   - **Time Range: From:** 01/Jan/2022 To 31/Dec/2022
   - **Area of Interest:** Dhofar Mountains

2. **Visualize any image that cover the area of interest and with no cloud cover.**
3. **Explore the images more using the different tools.**
4. **Now use two images:**
   - **Before monsoon (Khareef) (Example: Jan)**
   - **After monsoon (Example in September)**

5. **Compare between the two images using the steps in the general description above.**
6. **Investigate the Vegetation area during Khareef 2022.**
7. **Create Time – Laps showing the Vegetation Seasonal Variation**

Hint: Use one image per Month.

8. **Download the Time-laps.**

1. **Calculate NVDI Time Series over the mountain area during Khareef**

- **Go back to search:**
  - **Theme:** Default
  - **Data Source:** Sentinel-2 L1C
  - **Advanced Setting:** Max. Cloud Cover = 0%
  - **Time Range: From:** 1/Jan /2020 To 30/Dec/2022
  - **Area of Interest:** Dhofar Mountains
- **Display any image, select NDVI layer.**
- **Click statical info of the AOI**
- **The graph will appear. Adjust the maximum cloud cover down to 4%**
- **Select one year,** Explain the Graph?
- **Select two year,** Explain the Graph?

Exercise.2: Wildfire Case Study 16 June 2021, AL Hamra.

2. **Choose parameters and Search:**
   - **Theme:** Wildfire
   - **Data Source:** Sentinel-2
   - **Advanced Setting:** Max. Cloud Cover = 0%
   - **Time Range: From:** 1/June/2021 To 20/June/2022
   - **Area of Interest:** Al Hamra Mountains

3. **Visualize image Date 19 June 2021, using True Color**
4. **Zoom in to Al-Hamra mountain.**
   - **Is there any burned area??**
5. **Go to custom and then drag bands:**
   - **Red: B8, Blue: B4, Green: B3**
   - **Which Composite RGB is this??**

6. **Go back, then go to (Show effect and advanced options)**
   - **Increase Gamma to 1.4.**
   - **Do you now find the burned area??**

7. **Draw an AOI (using polygon) around the burned area and read their extent.**

- **Burned Area = km2**

8. **Compare the image (19 June) with image before the case. (Using steps above).**

9. **Create short story and save it.**

10. **Display and Compare the NBR (normalized burned Ratio) images for (19 June and 9 June) (Try also to adjust Gamma)**
    - **Could you recognize the burned area easily?**

11. **Create a short story of NBR products before and after and save it.**

12. **Calculate NVDI Time Series over the burned Area and Unburned Area.**
    - **Go back to search:**
        - **Theme:** Default
        - **Data Source:** Sentinel-2 L1C
        - **Advanced Setting:** Max. Cloud Cover = 0%
        - **Time Range: From:** 1/April/2021 To 30/July/2022
        - **Area of Interest:** The burned Area
    - **Display any image, select NDVI layer.**
    - **Click statical info of the AOI (burned Area)**
    - **The graph will appear. Adjust the maximum cloud cover down to 4%**
    - **Select 6 months.**
    - **Capture the Graph.**

    - **Repeat the step 11 for nearest unburned Area.**
    - **Compare the NDVI of the burned and unburned area**