



**University of
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Copernicus Browser Tutorial

Exercises for independent practice

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<https://browser.dataspace.copernicus.eu>



**Space
eXchange**
Switzerland

What functions are available in the Copernicus Browser?

- View satellite images (new and historical)
- Choice of multiple satellite sensors and surface models
- Custom configuration settings and filtering by application/topic
- Filtering by time period (incl. filter by % cloud cover)
- Application of various preset visualizations
- Set your own visualizations (composition of spectral bands)
- Calculate distances and areas (scale tool)
- Create or load shapes (polygons) (Polygon & Geometry tool) e.g. to analyze time series of an index for this area or to calculate the area
- View spectral profiles (Spectral Explorer tool)
- Create time series movies in mp4 and GIF format
- Download satellite images (for further processing in other programs incl. GeoTiff/georeferenced (but these are not the original satellite data))

1. General

The screenshot shows the Copernicus Browser interface. On the left sidebar, there are sections for 'DATE: SINGLE' (showing 2024-09-07), 'CONFIGURATIONS: Default', and 'DATA COLLECTIONS: Sentinel-2'. The main area displays a satellite map of Europe. Several callouts point to specific features: 'Create account and log in' points to the 'EN' and 'Login' buttons; 'Language settings' points to the 'EN' dropdown; 'Please zoom in or search for a location of interest' points to the map; 'Search function' points to the 'Go to Place' search bar; and 'Toolbox' points to the vertical toolbar on the right side of the map.

2. General configuration

The two screenshots show the configuration panel of the Copernicus Browser. The left screenshot highlights the 'Themes' area, which includes options like 'Monitoring Earth from ...', 'Agriculture', 'Atmosphere and Air Po...', 'Change Detection thro...', 'Floods and Droughts', 'Geology', 'Ocean and Water Bodies', 'Snow and Glaciers', and 'Urban'. The right screenshot highlights the '(Satellite) data set' section, which lists various data collections including 'Sentinel-2', 'Sentinel-1', 'Sentinel-1 Mosaics', 'Sentinel-2 Mosaics', 'Sentinel-3', 'Sentinel-5P', 'Copernicus DEM', 'Copernicus Snow & Ice', and 'Copernicus Vegetation'. Both screenshots show a zoomed-in satellite map of a rural area.

3. Time range filters

1. Filter for cloud cover

2. Slider for maximum cloud coverage

3. Available data is filtered for maximum cloud coverage

Filter data for time range

Show all image products as list

The interface shows the Copernicus Browser with a search bar and a 'VISUALIZE' button. The left panel shows the 'DATE: SINGLE' filter with a calendar and a cloud cover slider. The right panel shows the 'DATE: TIME RANGE' filter with date and time pickers, a cloud cover slider, and a 'Find products within selected time range' button. The bottom panel shows the 'LAYERS' section with various visualization options like True color, False color, NDVI, etc.

4. Different visualisations

False color

NDVI

Moisture index

Details (unfoldable)

Add layer to compare, pin or timelapse tool

Visualisations

The interface shows the Copernicus Browser with a search bar and a 'VISUALIZE' button. The left panel shows the 'LAYERS' section with various visualization options like True color, False color, NDVI, etc. The middle and right panels show the resulting visualizations: False color, NDVI, and Moisture index. The bottom panel shows the 'LAYERS' section with various visualization options like True color, False color, NDVI, etc.

4.1 Compare tool

Dynamic slider

4.2 Pin manager

To save individual images

5. Toolbox explained

Polygon tool: delimitation of an area

Geometry tool: draw a line

Spectral explorer: mark an area of interest

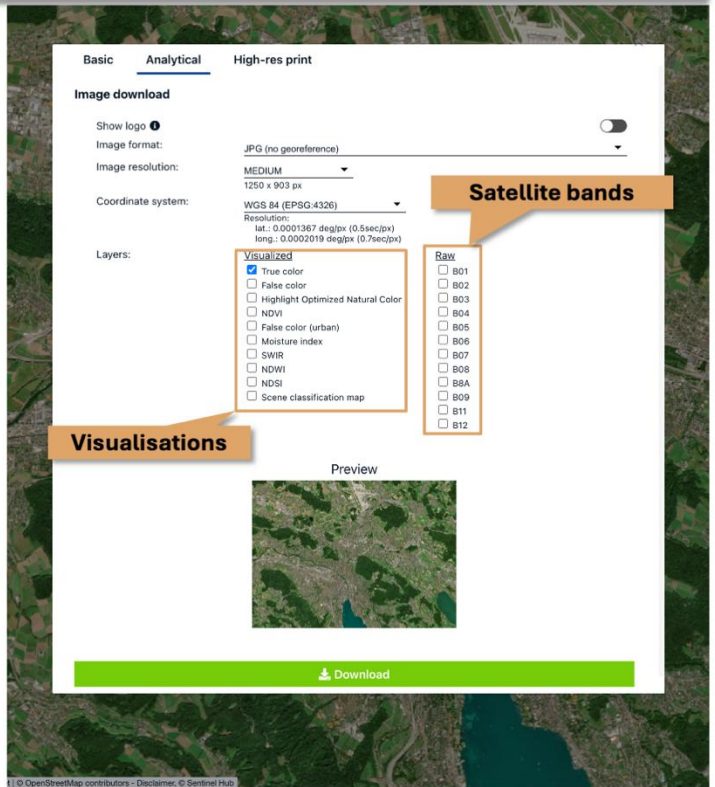
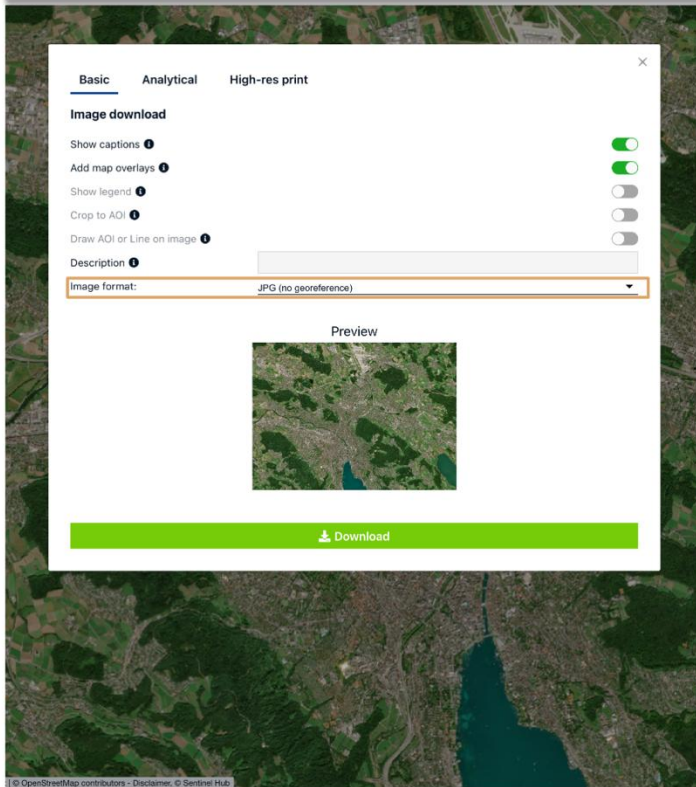
Measure tool: distance & area calculation

Download image

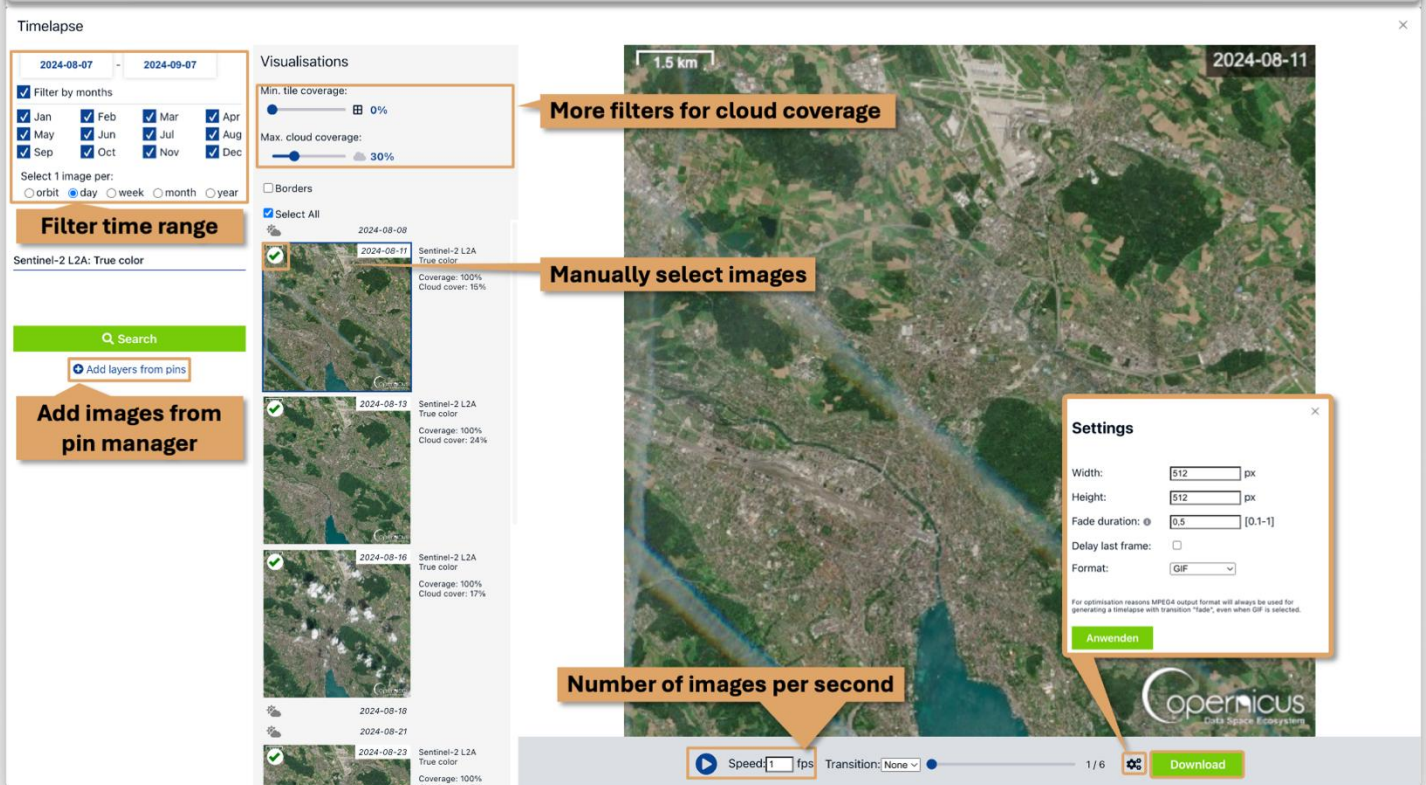
Create timelapse animation

Visualise terrain in 3D

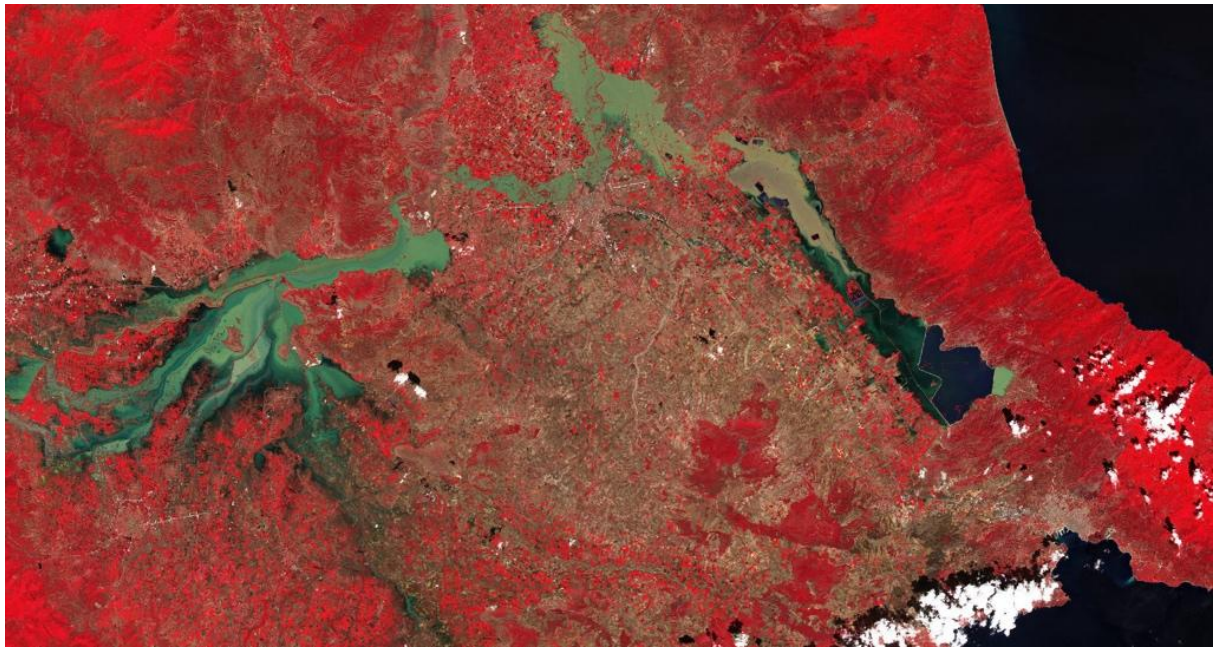
5.1 Download image (Toolbox 🗺️)



5.2 Create timelapse animation (Toolbox 🎬)



Floods and wildfires



Larissa and Volos, Greece

Theme: Vegetation and forestry

Data sources: Sentinel-2

Time range: 02.07.2023 – 30.10.2023

Visualisation: False Color

Tasks

- Depict the scene using the information given above.
- Create a time-lapse of the scene using the details. In the time-lapse editor, select "1 image per day".
- Increase the "Min. tile coverage" to fill the whole AOI with Sentinel-2 image (the area is in between tile borders)

Questions

1. When is the first burn area visible?
2. When are the flooded areas visible?
3. How large is the burn area on 31.08.2023 (use the measure tool)?
4. How large is the eastern flooded area on 10.09.2023 (use the measure tool)?

Volcanic activity



Fagradalsfjall, Iceland (east of Grindavik)

Theme: Volcanoes

Data sources: Sentinel-2

Time range: 08.02.2021-Sept 2023

Visualisation: True Color + IR Highlights

Tasks

- Depict the scene using the information given above.
- Create a time-lapse of the scene using the details:
Filter out the months October-January in the time-lapse editor. Select "1 image per week" and move the maximum cloud cover to approx. 20-30%. Now manually deselect all other images that are not relevant or show no volcanic activity.

Questions

Compare the True Color visualization with the True Color + IR Highlights visualization on 09.05.2021 (via the comparison tool).

1. What and where are the differences?
2. Measure the length of the lava flow. Which geometry property of the actual length should be taken into account?

Agriculture in arid regions



Smurr, Arizona

Theme: Agriculture

Data sources: Sentinel-2

Time range: 2025

Visualisation: open

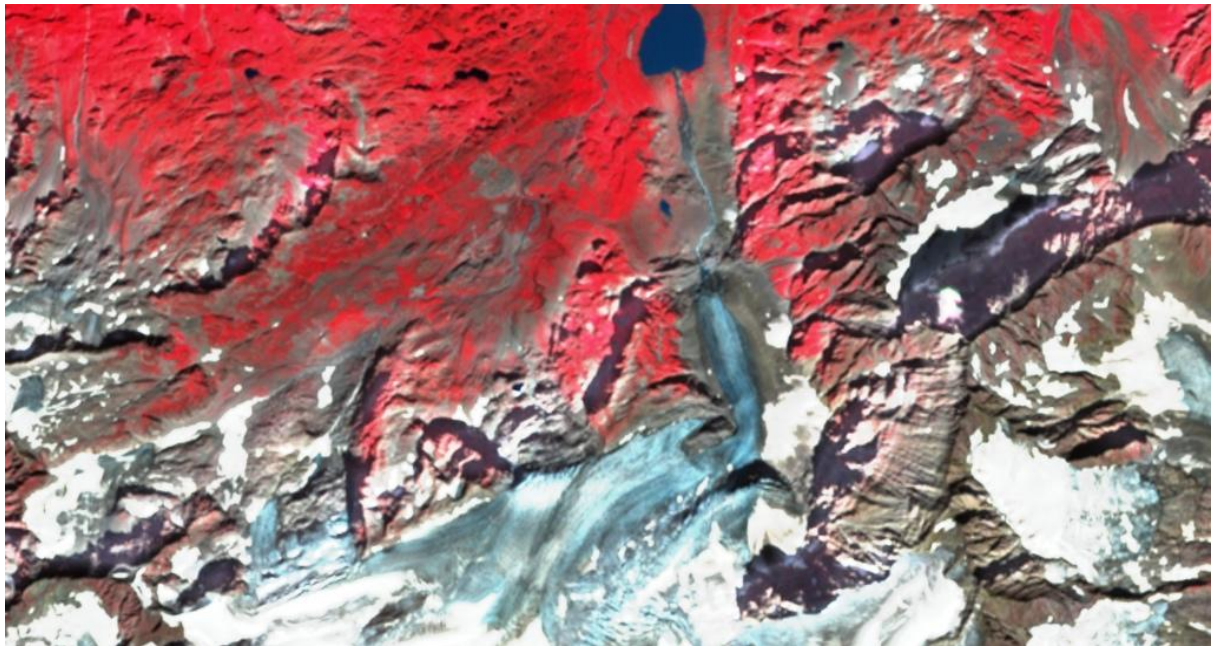
Tasks

- Depict the scene using the information given above.
- Compare the different visualizations with each other. To do this, click through the different visualizations and unfold the details.

Questions

1. Which visualization is suitable for determining the water content in vegetation?
2. What is the difference between NDVI and SAVI? Which visualization is better suited for the scene?
3. How can you explore the crop rotation and harvesting of the fields?

Glaciers and cryosphere



Steingletscher, Switzerland

Theme: Snow and Glaciers

Data sources: Sentinel-2

Time range: 2016-2025

Visualisation: False Color

Tasks

- Depict the scene using the information given above.
- Create a time-lapse over 12 months:
For example, 2019, select "1 image per week" and move the maximum cloud coverage to approx. 20%.
- Create a time-lapse over the whole available data period:
Select "1 image per month" and move the maximum cloud coverage to approx. 20%. Only select the months you think are suited for glacier observation. Manually deselect images that are not useful.
- In Winter 2019/2020 something changed at the glacier tongue. Add one image before and one after to the comparison tool and compare them.

Questions

1. Time-lapse: Which season is best suited for qualitative glacier observation with Sentinel-2? Why?
2. Comparison tool: What changes can be observed at the glacier tongue? Do you know the reason for this?
3. How did the distance between the glacier tongue and the lake change between 2017 and 2025?

Recommended solutions

Floods and wildfires

1. 27.07.23
2. 10.09.23
3. Approx. 107 km²
4. Approx. 120 km²

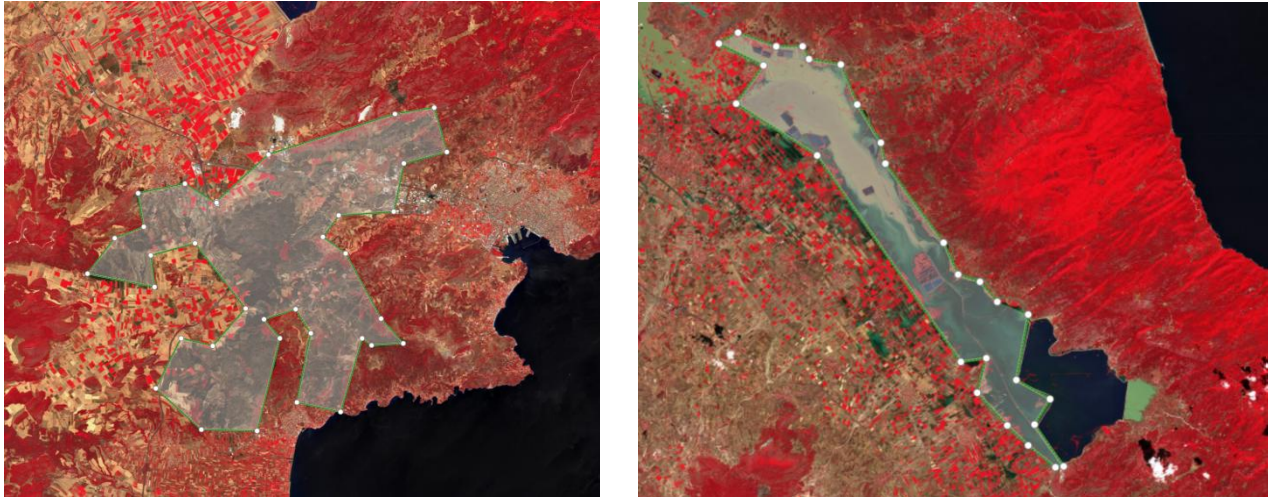


Figure 1: Approximate burn area (3. left) and flooded eastern area (4. right)

Volcanic activity

1. Volcanic outflow is emphasized by the IR highlight. IR highlights indicate heated areas, which can show active lava flows more clearly than true color images alone.
2. approx. 1.73km, 2.5km with lava outflow field. Please note the viewing angle geometry: We (the satellite) are looking at the volcano from above, so we cannot include height in our length calculation. An approximation is possible using Pythagoras' triangle.

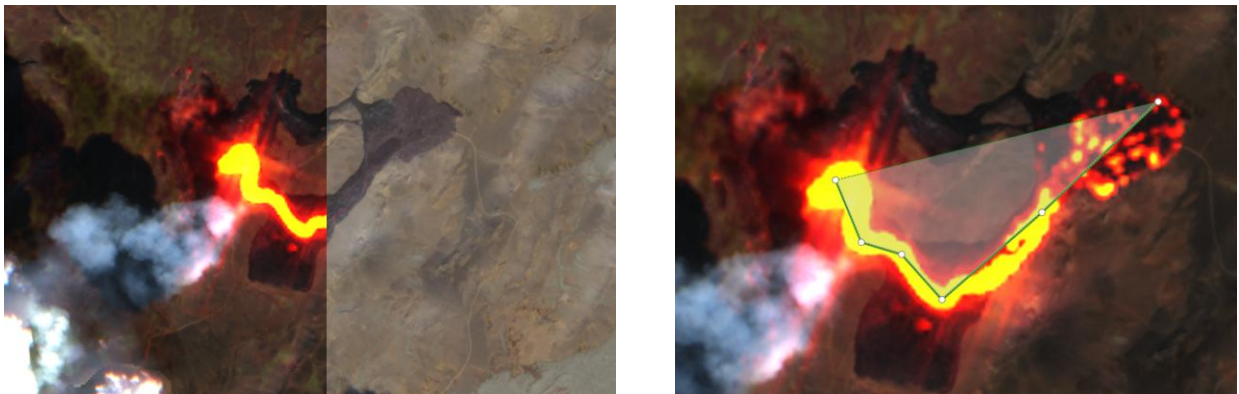


Figure 2: Comparison of the two visualizations True color and + IR Highlights (1. left) and the approximate length of the lava outflow area (2. right).

Agriculture in arid regions

1. Moisture Index (NDMI) and Moisture Stress
2. SAVI is suitable for dry regions with sparse vegetation, as seen in this scene.
3. Select one field as the region of interest (Create area of interest tool) and display the statistical info. By filtering clouds (e.g., 30%) and changing the time frame, you can explore the harvests of the field. The low SAVI values in summer usually indicate a harvest of the field. It is different for each field in different years.



Figure 3: Left to right: NDMI, Moisture stress index and SAVI

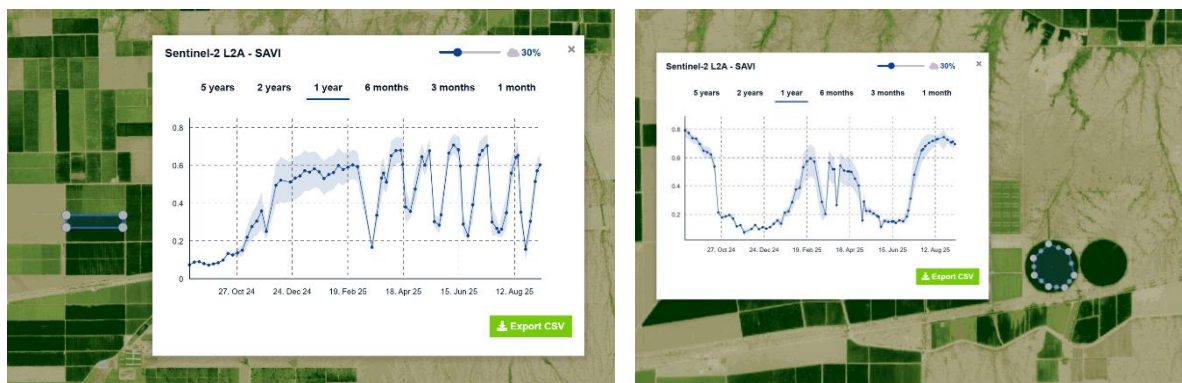


Figure 4: SAVI time series of two different fields over the last year to derive the times of harvest.

Glacier (Stein Glacier)

1. (Late) summer, when snow has largely melted and ice and vegetation are exposed, and the minimum glacier length of the year has been reached. This is when the exact boundaries of the glacier are most visible, and its mass balance can be calculated most accurately.
2. The color changes, i.e., the glacier tongue is shown in a different color. On 17.11.2019, 21.2.2020, and 25.4.2020, three major rock and ice avalanches fell onto the rock glacier, which now covers formerly open areas of ice. Rock and debris reflect in a different wavelength range, which is why the color representation changes.
3. Distance 2017: approx. 1.05 km; distance 2025: approx. 1.15km, so the distance changed about 100 m!

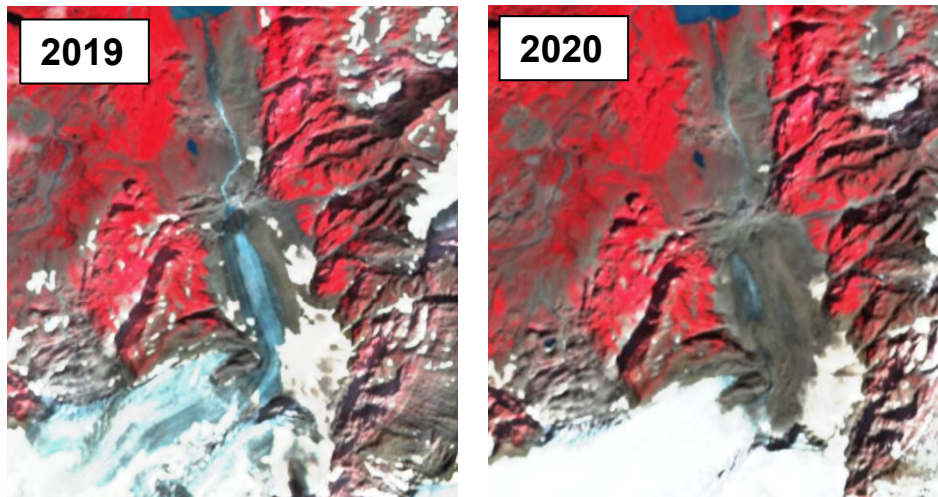


Figure 5: Comparison before/after rockfall events on the glacier tongue.

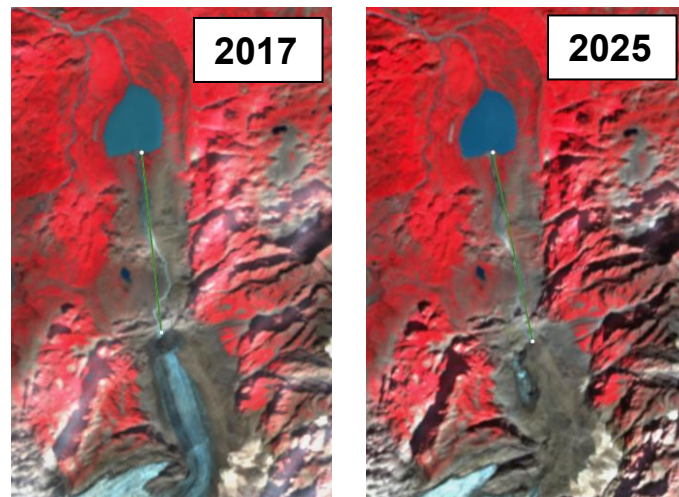


Figure 6: Distance between the glacier tongue and the lake in 2017 and 2025.