

A dark blue world map with white outlines of continents, serving as a background for the title section.

Ex. 2: Mission planning with the EO-Compass

June 2019 | Martin Sudmanns & Dirk Tiede

Summary

In this exercise, you will learn how to use the EO-Compass for researching on Sentinel-2 images and describing inherent spatio-temporal dynamics of a study area. This information is valuable to improve your mission planning on all tasks related to Sentinel-2. The exercise includes a do-it-yourself practice where you learn to derive and describe data coverage characteristics for a larger region.

Content

- 1.) Introduction
- 2.) Module 1: Granule Maps
- 3.) Module 2: Granule Statistics
- 4.) Module 3: Satellite Forecast
- 5.) Do-it-yourself practice

1.) Introduction

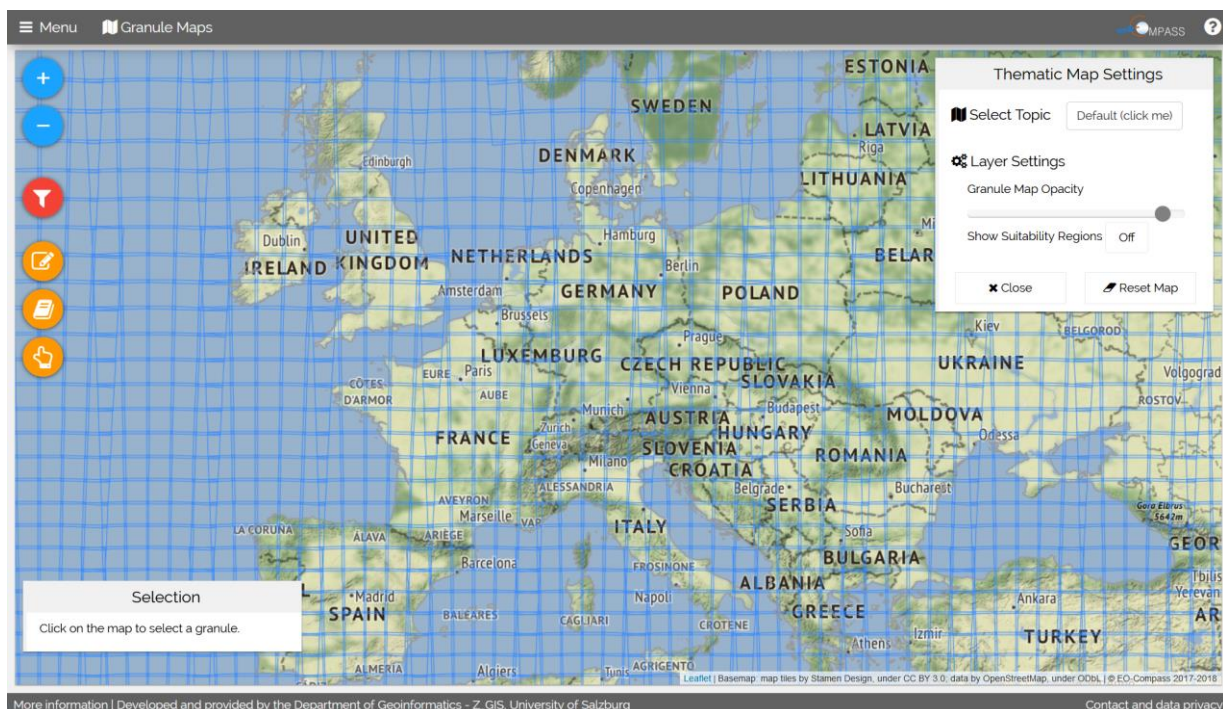
The EO-Compass uses a set of geovisualisation tools to visualise the spatio-temporal distribution of acquired Sentinel-2 images, selected metadata, as well as complementing information around the Sentinel-2 mission. The EO-Compass is provided and operated by the Interfaculty Department of Geoinformatics – Z_GIS. The access is free and there is no registration required. See here for further information:

<https://www.tandfonline.com/doi/full/10.1080/17538947.2019.1572799>.

- Open a browser and go to <http://eo-compass.zgis.at>.
- Click on “Launch application” to start the app.

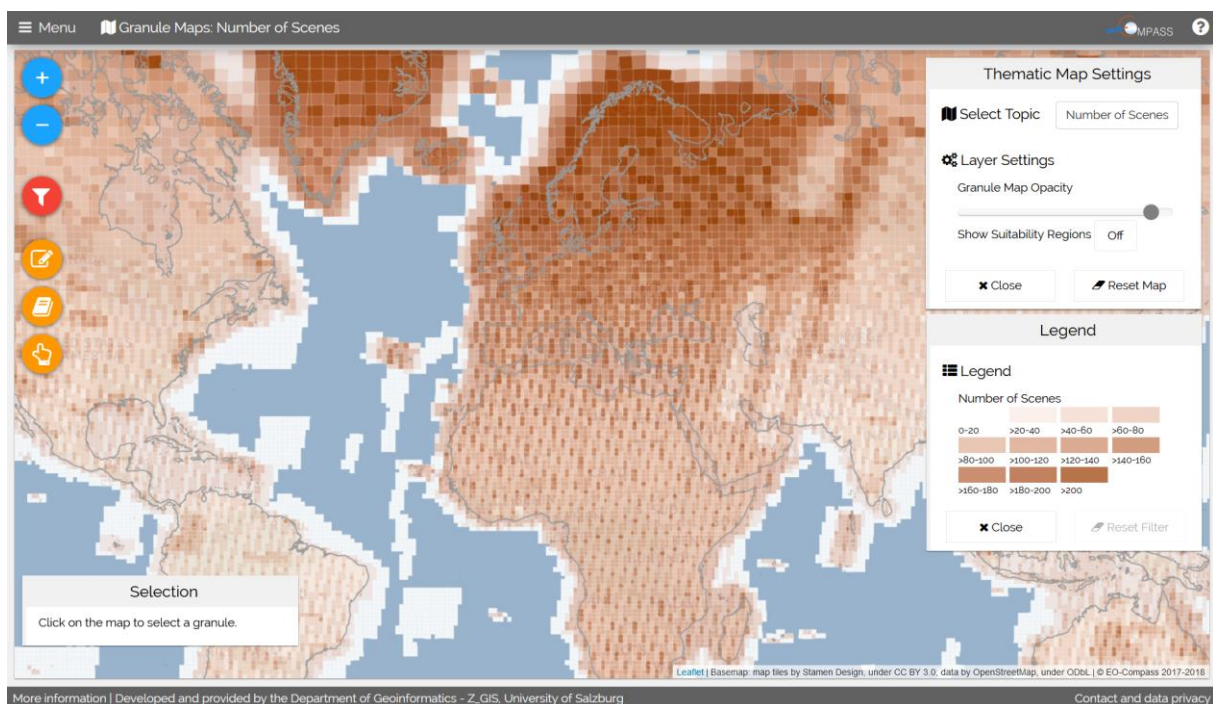
2.) Module 1: Granule Maps

The granule maps module allows exploration of Sentinel-2 scenes, enabling the investigation of spatial and temporal patterns on aggregated metadata statistics. A granule is the image footprint for Sentinel-2 images. The granules, also called tiles, are 100x100km² ortho-images in UTM/WGS84 projection. Tiles are approximately 600 MB in size. Tiles can be fully or partially covered by image data. Partially covered tiles correspond to those at the edge of the swath. The individual image footprints can be seen in the initial view of the app:



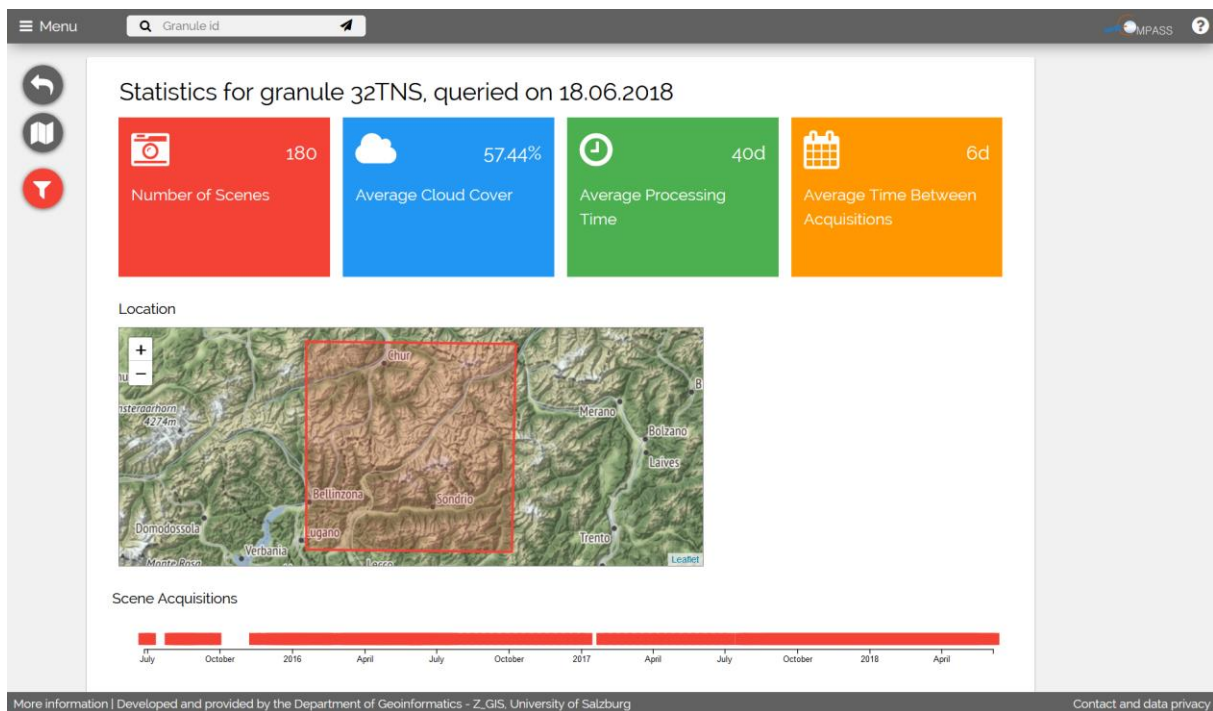
- Go to “Select Topic” and select a variable of your choice, e.g. the Number of Images.
- Pan and zoom through the map and explore the spatial patterns.
- Make yourself familiar with the Sentinel-2 acquisitions and their average cloud cover.
- Have a look at the image distribution. Are all regions on the Earth equally covered? What about water-covered areas?
- Compare the cloud cover with a climate classification system. For example, this one: [Köppen-Geiger](#). Do you see similarities between the climate zones and the acquisition characteristics?

In total, three variables are available in the “Select Topic” field: *Number of Scenes*, *Average Cloud Cover*, and *Percentage of Cloud-Free Images*. “Cloud-free” in this case means that the image has an average cloud cover of less than 10% (according to the cloud cover provided in the metadata).



3.) Module 2: Granule statistics

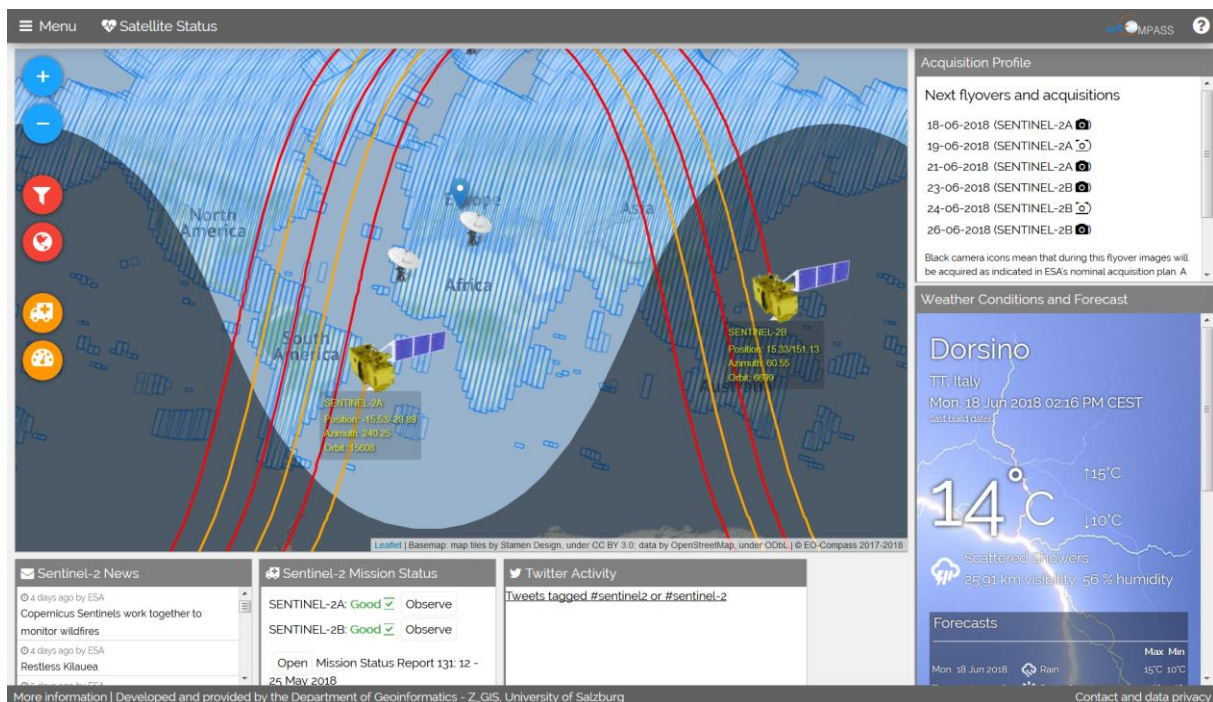
The granule statistics module focuses on temporal patterns and dynamics of Sentinel-2 scenes using granule-based statistics. Variables to explore include the number of scenes, average cloud cover, average duration between sensing and ingestion and average cloud cover per month.



- If you are in the *granule maps* module, click somewhere on the map, e.g., your hometown. On the bottom-left corner you see the identifier of the granule, which is a link to the granule statistics. Click on it.
- Make yourself familiar with the charts and visualisations. For example, consider the occasional gaps in the *Scene Acquisitions* timeline. Especially during the ramp-up phase of the satellite, images were not always acquired. Another reason for the gap the seasonality in the cloud cover.
- Go to tile 33XWH and look at the *Scene Acquisitions* timeline. There are larger gaps during winter time. Try to reason why this happens by considering the seasonality in the sun angle and illumination. (<http://eo-compass.zgis.at/#/granulestat/33XWH>)
- Re-visit the climate classification map (e.g., the Köppen-Geiger map) and select 3 more locations having different climate conditions around the world. Query their characteristics and compare their results.

4.) Module 3: Satellite Status

The satellite status module endeavours to communicate when and where the next image will be acquired by Sentinel-2. This is achieved by providing a cartographic representation of the current satellite positions of Sentinel-2A and -2B, a prediction of the next three orbits, and a visualisation of the current acquisition plan, which is published by ESA. Besides the spatio-temporal patterns of existing data, knowing the next acquisition and its estimated condition (e.g. based on predicted cloud cover) is important for many environmental and humanitarian applications, such as after a natural disaster.



- Go to *Menu* → *Satellite Status* to change the view.
- The background layer shows the acquisition plans as blue polygons. These areas will be covered by the Sentinel-2 satellites within the next days. Make yourself familiar with it by describing the geographic locations of the next observations and the satellite flyovers, e.g., when are they in the Earth shadow (ascending orbit) or in the illuminated part (descending orbit).
- Click on several locations on the map (maybe the same as in the previous task) and see the next acquisitions. Since the weather API is currently not available, use another weather forecast service on the Internet to get a weather forecast for that location. Can you estimate how good the acquisitions will be?

5.) Do-it-yourself practice

Consider the European region and try to distil important data coverage characteristics, e.g. what is the average number of images and cloud cover? Are there visually salient differences, e.g., in comparison of norther/southern or eastern/western parts?