



Product documentation: Sentinel-2 True Colour Mosaics of Switzerland and the surroundings

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Introduction

Since 23 June 2015, the Earth observation satellite "Sentinel-2A" orbits our planet at an altitude of 786 km. Together with the identically built "Sentinel-2B" satellite, launched in 2016, they continuously deliver images of the Earth's surface. These systems are part of the EU "Copernicus" programme and operated by the European Space Agency (ESA). The sensors measure the radiation, originating from the sun and reflected by the Earth, in the visible and infrared spectral domain. The data takes are acquired with a spatial resolution of 10 meters per pixel in the visible and near infrared domain and 20 meters per pixel in the short-wave infrared domain respectively. Along the Sentinel-2 satellites flightpath, the sensors record continuous image strips of almost 300 km in width. The maximum "revisit time", i.e. the time interval between two image acquisitions of the same area, is 5 days. In medium and high latitudes, the interval improves to 2 - 3 days. The raw measurements (image strips) are transmitted to earth and afterwards processed into digital image products. Detailed information about the sensor can be found at:

https://www.d-copernicus.de/fileadmin/Content/pdf/s2-monograph_sp-1322_2_mar2012.pdf



The Sentinel-2 satellite imagery allows an almost continuous monitoring of changes to the earth surface system with a spatial resolution of 10m to 20m, corresponding to the Sentinel-2 imagery pixel size. Important applications of the satellite imagery are, amongst others, monitoring issues in agriculture and

forestry, the detection of land use/land cover changes, the mapping of vegetation with respect to chlorophyll concentration, water content or leaf area index, the observation of coastal and inland waters as well as the mapping of natural disasters and risk factors.

The National Point of Contact for Satellite Images in Switzerland (www.npoc.ch) has created freely available and usable satellite image mosaics of Switzerland and the surroundings for the years 2017, 2018 and 2019 to promote the use of Sentinel-2 data.

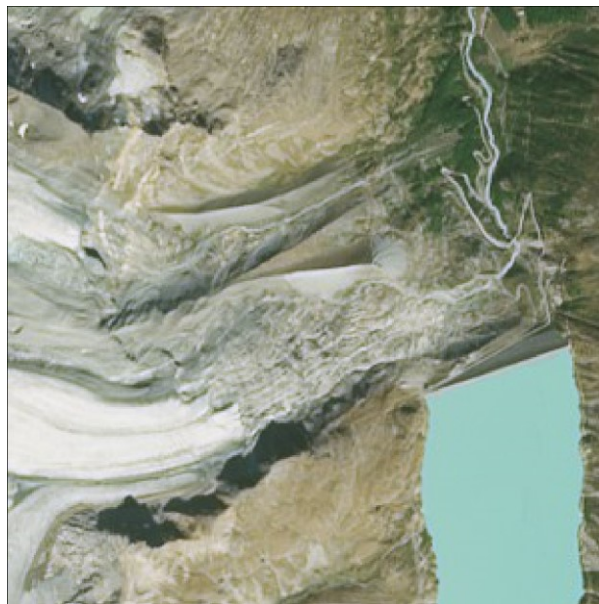
Description of the Sentinel-2 Mosaics of Switzerland and the surroundings

- The satellite image mosaics with Switzerland in the centre have an extent of **605 km * 425 km**. The exact perimeter in Swiss national coordinates (LV95) is as follows:
XMIN = 2'384'000 YMIN = 990'000
XMAX = 2'989'000 YMAX = 1'415'000
- The **data distribution format** is the Tagged Image File Format (.tif), along with a world file (.tfw).
- The projection system used for the satellite image mosaics is the **LV95 coordinate system** ("Schweizer Landesvermessung 1995") Georeferencing information is stored in the corresponding TIF world files (*.tfw).
- The **ground sampling distance GSD** (geometric resolution) of the data is 10 meters.
- The absolute **geometric precision** of the data is 1-2 GSD in X and Y direction.
- The satellite image mosaics are available as three-band **true colour** (RGB) mosaics. This look with almost natural colors is well suited for any illustrations.
- Each of the three band (RGB) of the mosaics is stored with a **radiometric resolution** of 8 bit and can be read by almost all common image processing and GIS applications.
- **Tiling:** For a simplified data management, the satellite mosaics data are split into four separate tif/tfw subsets (NW/NE/SE/SW). The size per subset is approximately 1.9 GB.

Samples



Mont Vully, Switzerland, 2018



Glacier of Allalin and the water reservoir of Mattmark, Switzerland, 2018



Munich, Germany (before the Oktoberfest), 2018

Venice, Italy, 2018

Product specification

1. for the 2018 mosaic

Summary: The 2018 mosaic was produced by manual mosaicking of single scenes. Each region of the mosaic originates from one specific image acquisition with an associated acquisition date. The mosaic exhibits good contrasts but a significant share of shadowed regions.

The Sentinel-2 satellite imagery for this mosaic originates from the Copernicus data archive:

<https://scihub.copernicus.eu/dhus/#/home>

The Sentinel-2 imagery is provided for free and to all interested parties via this portal.

The NPOC processed the raw imagery to the final “Sentinel-2 Mosaic 2018 of Switzerland and the surroundings” along the following steps:

Selection: A selection of convenient Sentinel-2 satellite imagery strips were made in the Copernicus archive. The strips had to meet several quality requirements to ensure the production of a homogeneous; almost cloud free mosaic within a short acquisition period. The acquisition period for the data of this Sentinel-2 mosaic was between August and October.

Reprojection: The data provider already normalised geometrically (orthorectified) the raw satellite imagery and provided them in the data archive in UTM projection (UTM Zone 32). All bands of the image strips, selected for the satellite mosaic, were reprojected by the NPOC into the map projection LV95 of the Swiss National Survey. The visual bands RED, GREEN and BLUE were kept for further processing.

Mosaicking: Along the mosaicking process, appropriate regions of the pre-processed image strips were selected, clipped and rejoined to achieve an almost cloud-free and consistent mosaic over the entire perimeter.

Compression: The original Sentinel-2 satellite imagery data is acquired with a radiometric depth of 12bit (4096 greyscales) per band. In a final step, the imagery was radiometrically compressed to result in with a satellite image mosaic product of 8bit (256 greyscales) per band.

2. for the 2017, 2019 & 2020 mosaics

Summary: The 2017, 2019 & 2020 mosaics were produced using an automated pixel-wise approach. For each pixel of the mosaic, an algorithm determines the “best” pixel from all available image acquisitions from a specific period. The mosaic therefore does not show any contiguous regions that share the same satellite image acquisition date. The product exhibits less shadowed regions and exposes less general contrast.

The NPOC processed Sentinel 1LC data for the 2017, 2019 and 2020 mosaics of Switzerland and the surroundings along the following steps:

Selection, Mosaicking and Compression: These processing steps were performed in Google Earth Engine based on Sentinel L1C products. The acquisition periods for the data of these Sentinel-2 mosaics were between August and October, respectively.

Reprojection: After export from the Google Earth Engine, the mosaics were reprojected into the map projection LV95 of the Swiss National Survey.

Applications

The mosaics as a whole or parts of it may be used free of charge by anyone for non-commercial purposes.

The mosaics are suitable for a variety of applications such as:

- illustration and documentation purposes
- thematic investigations like small-scale forest or settlement mapping
- landscape representation for planning and simulation
- data layer in Geographical Information Systems (GIS)

Citation:

Please reference the mosaic data as follows:

"Contains modified Copernicus Sentinel data [YYYY] swisstopo, NPOC"

About us:

The NPOC (National Point of Contact) for satellite data is the single point of contact for the Swiss Federal administration, the cantonal administrations, municipal authorities and private individuals for Remote Sensing data from primarily satellite platforms as well as for advice, applications and projects based on satellite data.

The NPOC promotes the use of Earth observation measurements by sharing our knowledge about technologies and methods with potential users.

Contact:

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