



→ RADAR VISION FOR COPERNICUS



Sentinel-1 Mission Status

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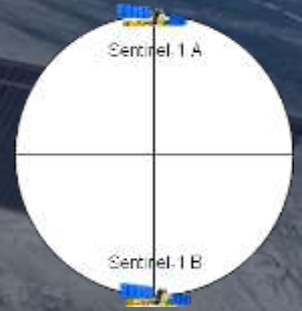


European Space Agency

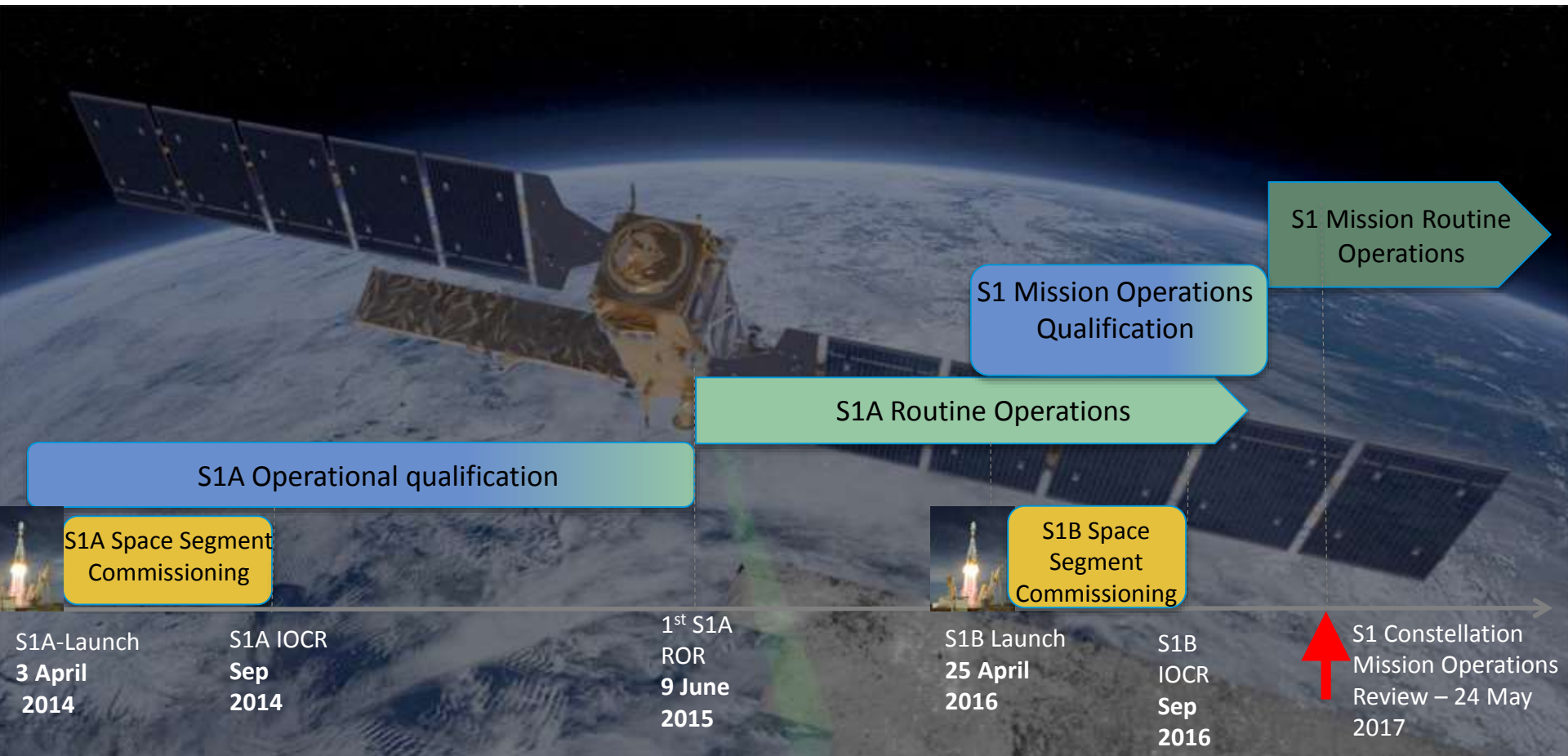
Sentinel-1: Copernicus radar imaging mission for ocean, land, emergency



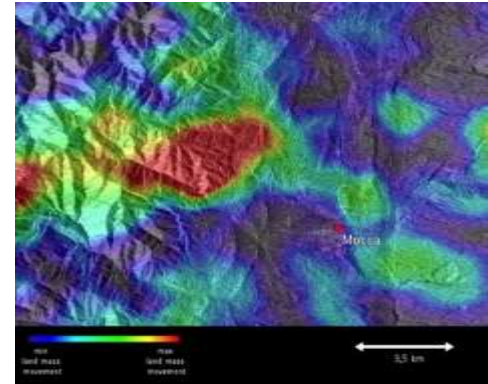
- Part of the Copernicus Programme led by the European Union
- Mission based on 2 identical satellites (S1A & S1B) and a highly performing ground segment
- Main satellites characteristics:
 - C-band Radar instrument
 - Instrument duty cycle of 25 min/orbit in HBR modes and 75 min/orbit in LBR (Wave)
 - Sun-synchronous orbit at 693 km altitude
 - Inclination: 98.18°
 - 7 years lifetime, consumables for 12 years
 - Mean LST: 18:00h at ascending node
 - 12-day repeat cycle at Equator (6 days with 2 satellites)
- Instrument operations based on a predefined observation scenario
- Systematic data processing with open & free data access
- Gradual increase of the mission operational capacity from the S1A launch up to the mission constellation routine operations



Sentinel-1 Mission Phases



- **Sentinel-1 nominal routine operations continue**
 - Sentinel-1B core products distributed to all users since end September 2016
 - Data routinely provided to Copernicus Services and users worldwide
 - On-going support to various activations from the Copernicus Emergency Management Service and International Charter Space and Major Disasters
 - Use of EDRS service being progressively increased as part of routine operations, for both Sentinel-1A and Sentinel-1B
- **Sentinel-1 constellation currently generates more than 10 TB of products daily** (against a formal specification of 3 TB)
 - Expected to be further increased with additional operational use of EDRS for Sentinel-1B and with the 4th core X-band station
- **Upcoming Milestones**
 - Start of EDRS Quasi Real Time activities



Sentinel-1 sees Mocoa landslide

Sentinel-1 observation scenario

Main thematic domains & components



Land cover:
agriculture, forestry,
hydrology, etc.

Maritime
surveillance

European coverage

Sea-ice, icebergs,
lake-ice

Emergency

Calibration/validation

Ground deformation:
Tectonic, volcanoes,
landslides, subsidence...
(InSAR applications)

Security

Global land mapping

Sea state

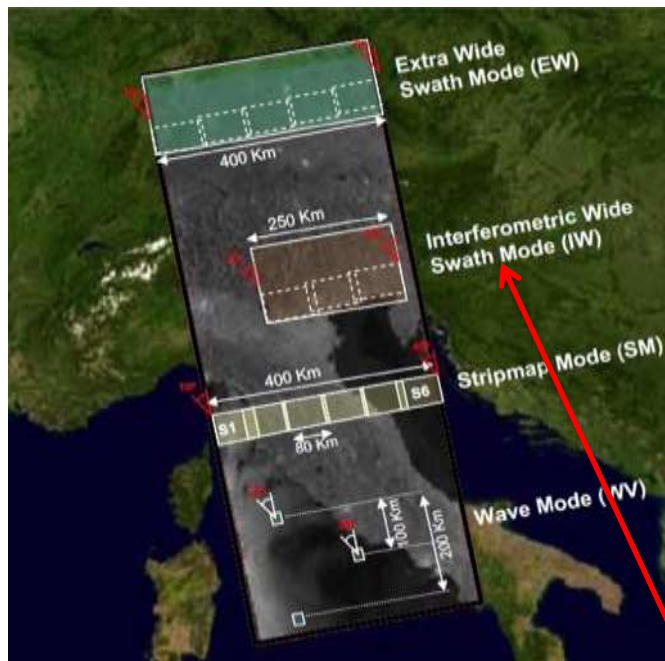
Ice sheets, glaciers,
permafrost, snow, etc

PR actions
(infrequent)



Sentinel-1 observation scenario

SAR Operational Modes



EW

IW

SM

WV

GRD Level 1 product resolution	Swath Width	Polarisation
50m (3 ENL)	> 400 km	HH+HV or VV+VH
20m (5 ENL)	> 250 km	HH+HV or VV+VH
9m (4 ENL)	> 80 km	HH+HV or VV+VH
50m (140 ENL)	20 x 20 km ² at 100 km spacing	HH or VV

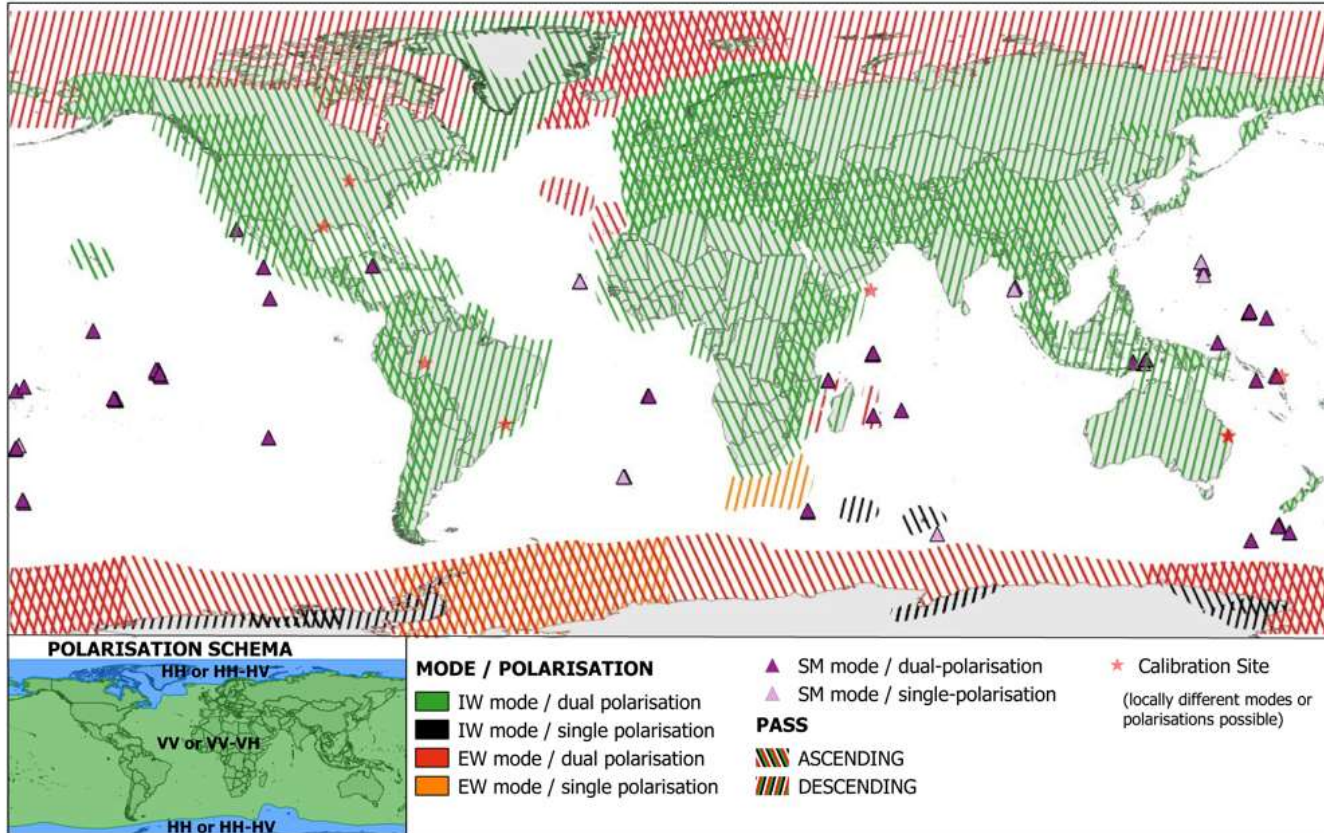
IW: main mode over land and coastal areas

Sentinel-1 observation scenario

Sentinel-1 Constellation Observation Scenario: Mode - Polarisation - Observation Geometry



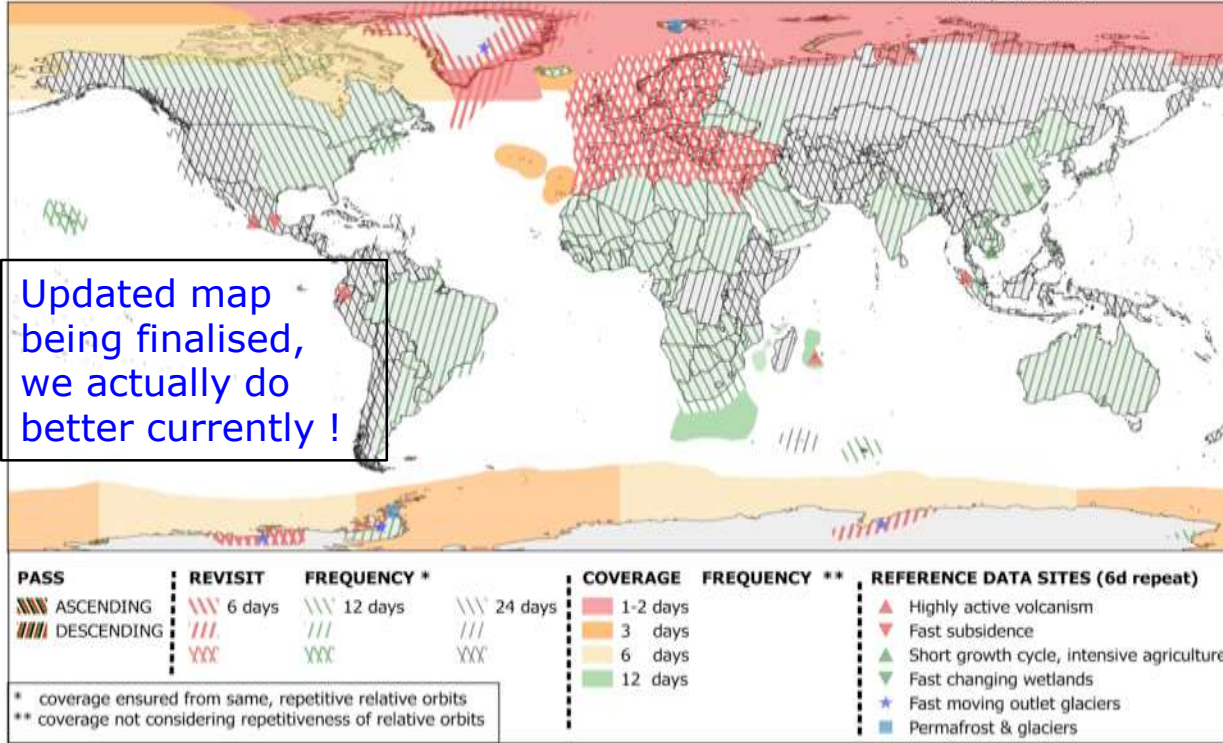
validity start: 05/2017



Sentinel-1 observation scenario



Sentinel-1 Constellation Observation Scenario: Revisit & Coverage Frequency

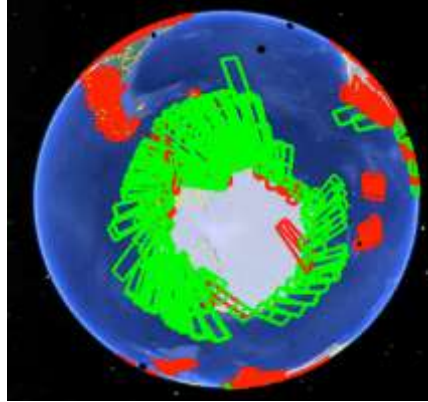
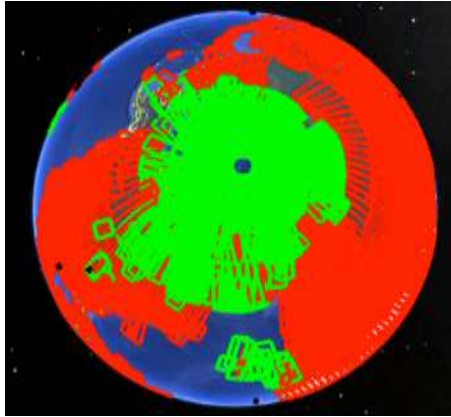


Gradual increase of global land coverage frequency performed over the past months.

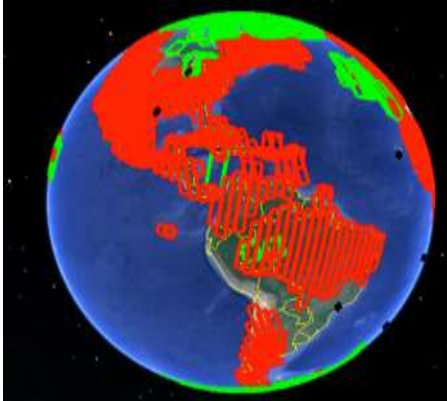
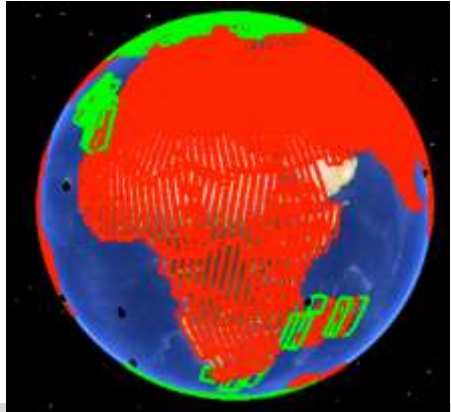
→ Today a **Full mapping of global land areas is ensured every 12 days at least, in IW dual-pol VV+VH,** with a combined use of S1A and S1B

(except for Antarctica and Greenland, subject to specific campaigns)

Sentinel-1 observation scenario



KML files providing detailed information on the planned acquisitions, regularly published on Sentinel Online



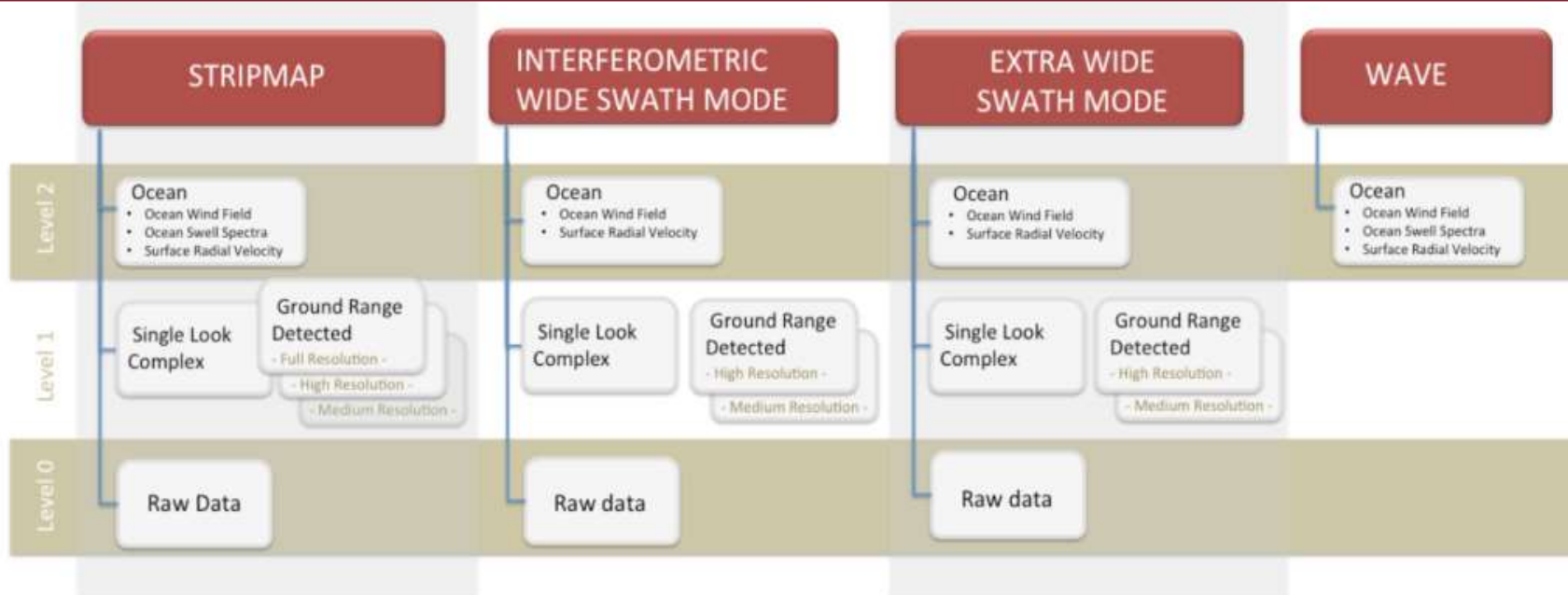
<https://sentinels.copernicus.eu/web/sentinel/mis-sions/sentinel-1/observation-scenario/acquisition-segments>

Sentinel-1 systematic production scenario



All Sentinels acquired data are systematically downlinked and processed to generate the core products within 24 hours from sensing:

- L0 products
- L1 GRD
- L1 SLC (initially over selected regional areas, since July 2015 over all land masses)



ES



Sentinel Open Hub: Free and Open Access to Sentinel data (previously called "Scientific" Hub)



<https://scihub.copernicus.eu/>

The screenshot shows the Copernicus Open Access Hub website. At the top, there is a blue header with the Copernicus logo, the text "Copernicus Open Access Hub", and the ESA and European Union logos. Below the header is a dark blue banner with the text "Welcome to the Copernicus Open Access Hub". Underneath, a white box contains the text: "The Copernicus Open Access Hub (previously known as Sentinel's Scientific Data Hub) provides complete, free and open access to Sentinel-1, Sentinel-2 and Sentinel-3 user products, starting from the In-Orbit Commissioning Review (IOCR)." Below this is a row of five white boxes, each with an icon and a dark blue button. The buttons are labeled: "Open Hub", "API Hub", "S-3 PreOpsHub", "User Guide", and "Roadmap". Below this row is another dark blue banner with the text "Access Points". Underneath, there are three lines of text: "Open Access Hub : access point for all Sentinel missions with access to the interactive graphical user interface.", "API Hub : access point for API users with no graphical interface. All API users regularly downloading the latest data are encouraged to use this access point for a better performance.", and "Sentinel-3 Pre-operational Hub : pre-operational access point for all users to Sentinel-3 data. Login credentials are s3guest:s3guest .". At the bottom of the page, there is a line of text: "For more details or request of help support please send an e-mail to eesupport@copernicus.esa.int".

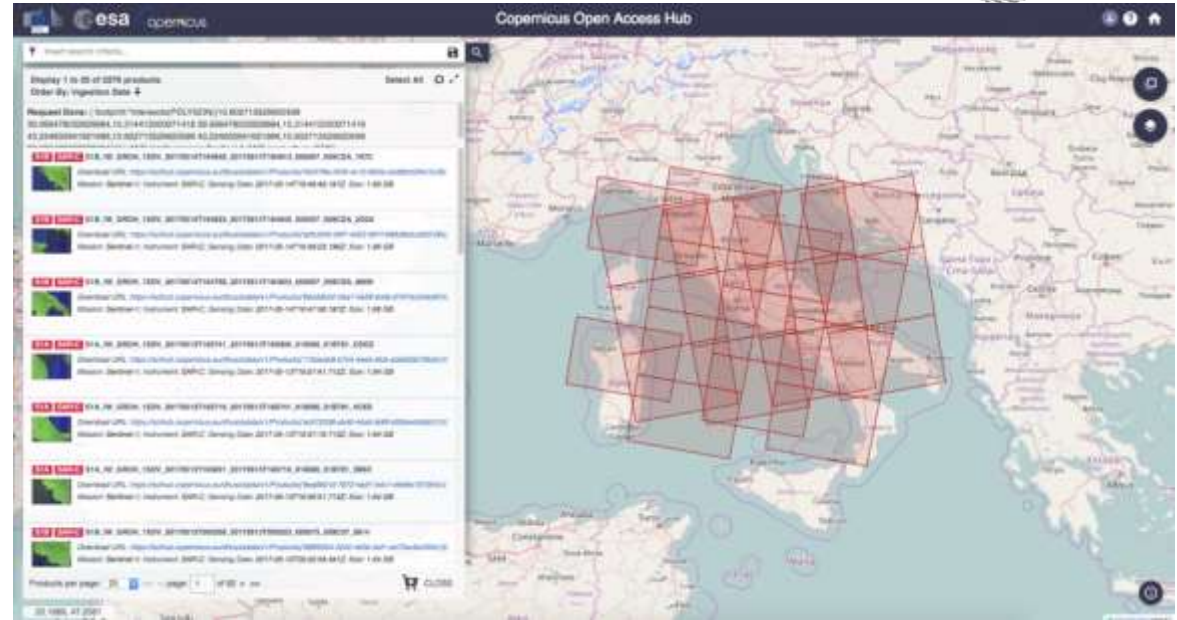
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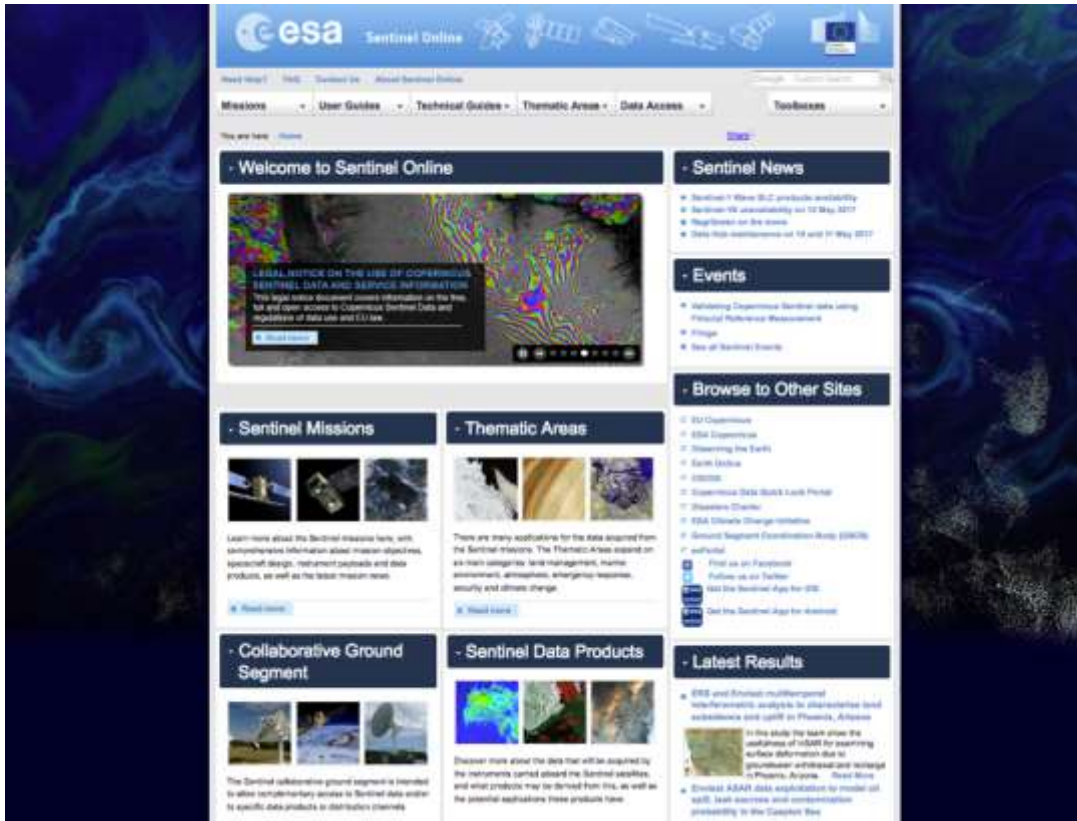


- Access through self-registration
- Automated download scripting capability and dedicated API-Hub
- Restriction on concurrent downloads



More than 80,000 users registered
Today, more than 1.3 Million Sentinel-1 products are available on-line for download, representing about 2 PB of data.

Sentinel Online web portal



<http://sentinels.copernicus.eu>

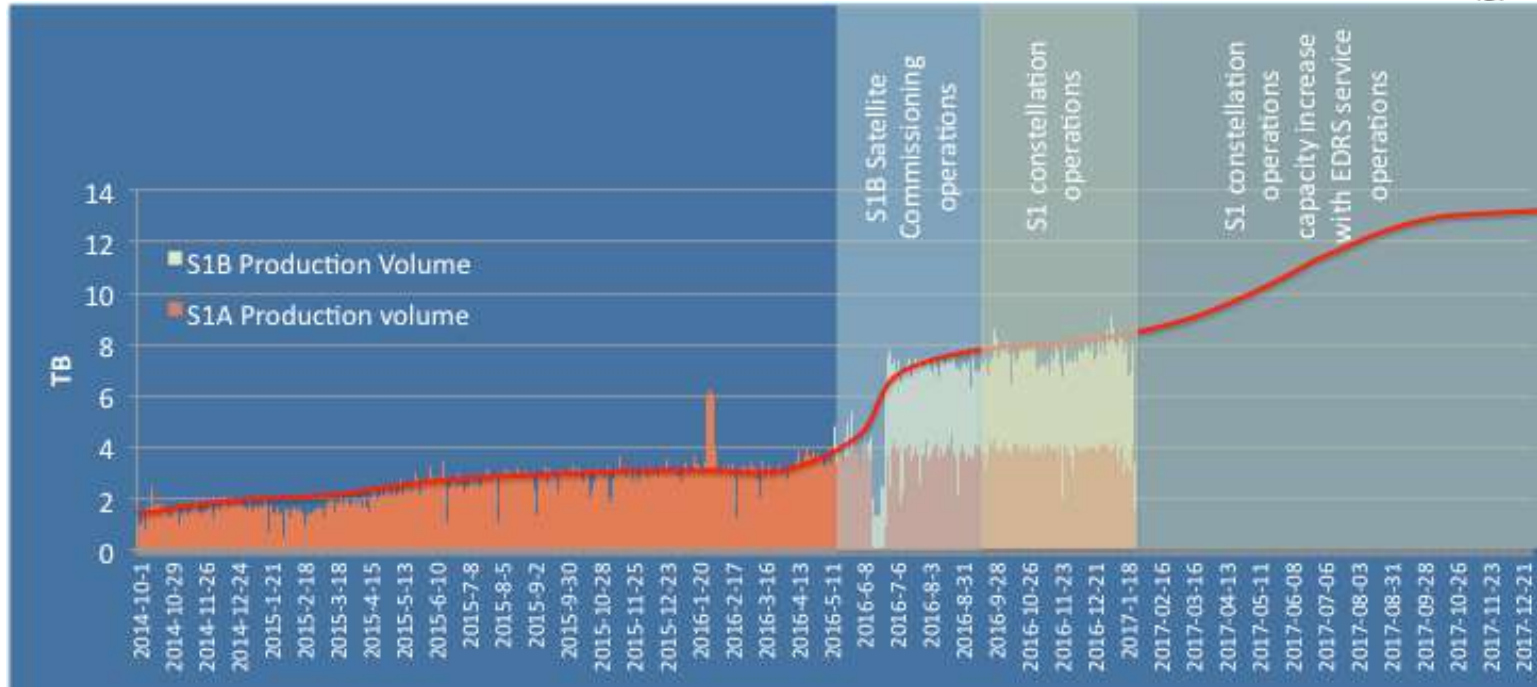
Sentinel-1 related documentation and technical notes available on this portal, as well as news and regular web stories

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Sentinel-1 mission capacity evolution – 2017



The Sentinel-1 mission total daily production will further increase in coming months, in particular due to the increase of operational use of EDRS for S1B

It is expected that the daily mission production will reach **~12 TB per day by end 2017**



Concluding remarks



- Sentinel-1 mission routine operations on-going, overall mission in a very good shape
 - Data routinely provided to Copernicus Services, and used by a wide spectrum of user communities for various thematic applications worldwide
 - The mission provides:
 - global and routine coverage, with a systematic production scenario
 - data access conditions
 - the long-term perspective
- ➔ to further bring SAR applications into the operational domain, at local, national, regional, continental and global scale



Copernicus Programme: copernicus.eu

Sentinel Online: sentinels.copernicus.eu

CSC Data Access: spacedata.copernicus.eu

 ESA Sentinel app: available for iOS and Android