

Copernicus Space Segment for Agriculture

Sentinel-1, -2 & -3

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European Space Agency

Sentinels – New Era of Observations

EU-ESA Copernicus Space Programme



Long-term Continuity & Access to Earth Observation data



(*)



Sentinel 1 – SAR imaging

All weather, day/night application e.g. **crop type, floods, water bodies**

2014 & 2016



Sentinel 2 – Multi-spectral imaging

Land applications: urban, forest, **crop status & type**
Continuity of Landsat, SPOT

2015 & 2017



Sentinel 3 – Ocean & global land monitoring

Wide-swath ocean color, **global vegetation, evapotranspiration**, land/sea surface temperature, altimetry

2016 & 2017



OPERATIONAL

Copernicus Sentinel-1

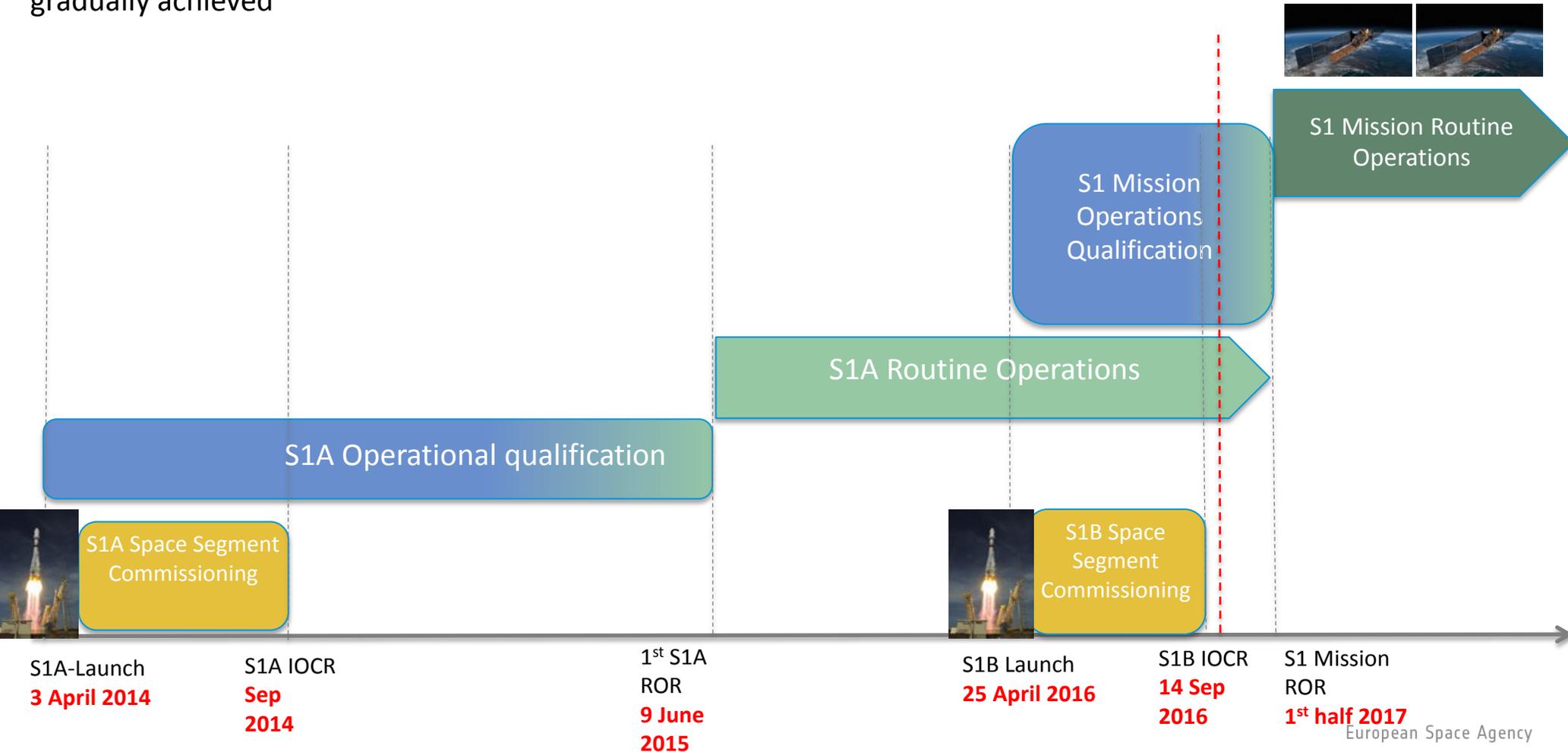


- Launch: **S1a: 3rd April 2014, S1b: 25th April 2016, ...**
- Constellation of two satellites
- C-Band Synthetic Aperture Radar, weekly coverage (2 satellites)
- Nominal lifetime in orbit of 7 years (max. 12 yrs)

Sentinel-1 Mission Operations Phases



Sentinel-1 full mission exploitation capacity based on the routine operations of the 2-satellite constellation → gradually achieved



Sentinel-1: mission status



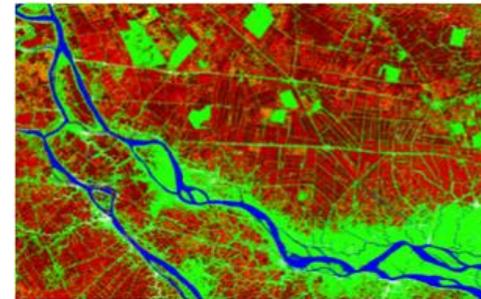
➤ **Sentinel-1A nominal routine operations continue**

- Data routinely provided to relevant operational Copernicus services, with very good feedback received
- Support to various activations from the Copernicus Emergency Service and from the International Charter Space and Major Disasters
- Many promising results based on S1A data obtained in various application fields from institutional, scientific, commercial players
- Upcoming start of routine downloads via European Data Relay System (EDRS)



➤ **Sentinel-1B start of routine operations**

- First SAR data acquired and successfully processed less than 3 days after launch
- Commissioning activities completed with successful In-Orbit Commissioning Phase Review (IOCR) on 14 Sep 2016
- Start of Sentinel-1B operations on **26 Sep 2016 with opening of S1B data** on the various data hubs

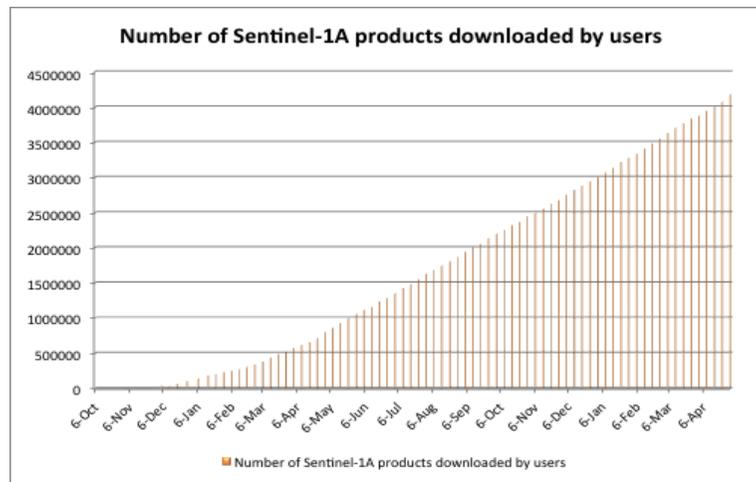


Sentinels User and Product Statistics Overview

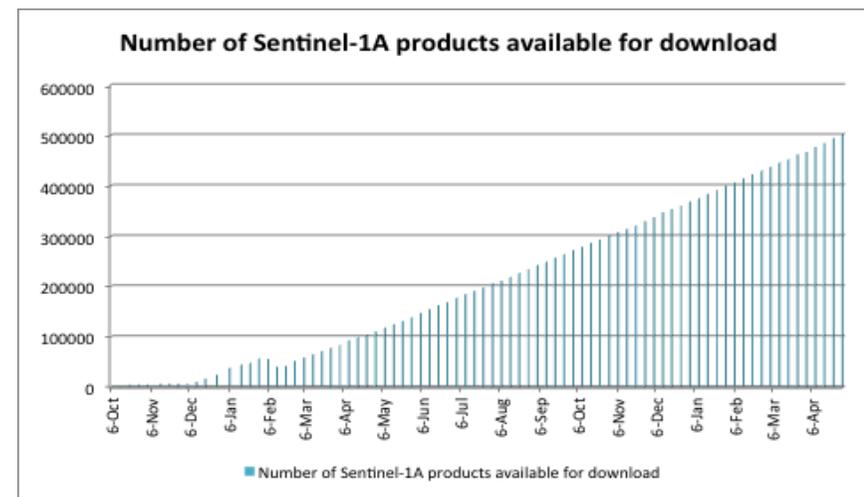
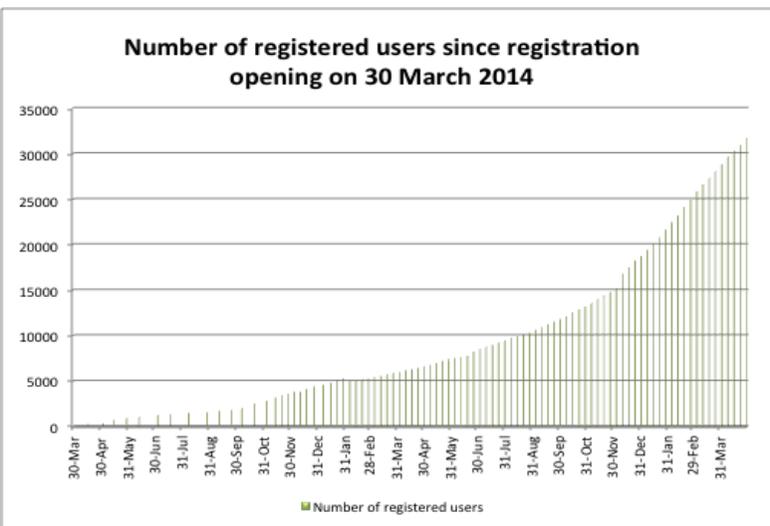


Sentinel data access online at sentinels.copernicus.eu

More than 47,000 users registered on the scientific/open access data hub



5.5 million products downloaded, representing about 6 Petabytes



More than 720,000 Sentinel-1 core products available for download

European Space Agency

Sentinel-1 Constellation Observation Scenario

- High level strategy for the inclusion of Sentinel-1B -



+



- The use of Sentinel-1B similarly to Sentinel-1A will basically allow to increase the observations frequency by a factor 2 overall
- **Increase of global land mapping frequency**, for land cover applications in particular, that require short revisit time... e.g. **Agriculture**
 - ➔ First target is to provide a **full mapping of global land areas every 12 days** with a combined use of S1A and S1B
 - Note: some global tectonic areas may remain observed in single pol, the full coverage in dual-pol is foreseen once in full operations capacity, first half 2017
- **European coverage increase by a factor 2**, ie 6-day cycle in both ascending and descending, in IW VV+VH

S1A - 25 September 2016
S1B - 1 October 2016
S1A - 7 October 2016

The Mekong Delta
observed by Sentinel-1
A & B
last week



S1A - 25 September 2016

S1B - 1 October 2016

S1A - 7 October 2016

Black: Fallow flooded fields

Red: Rice harvested between 25/9 and 1/10

Green: Rice harvested between 1/10 and 7/10

Blue: Rice not yet harvested by 7/10

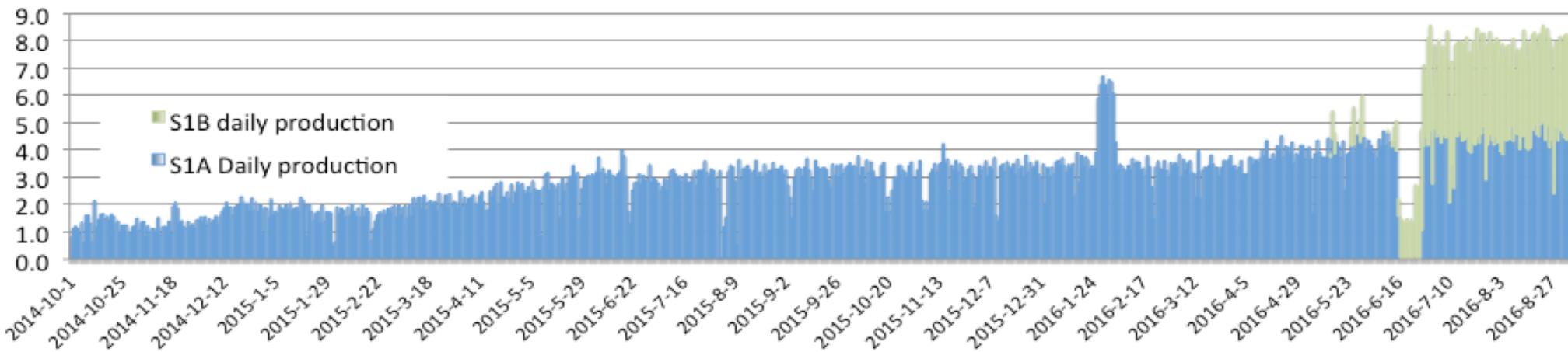


S1 Constellation Production operations status



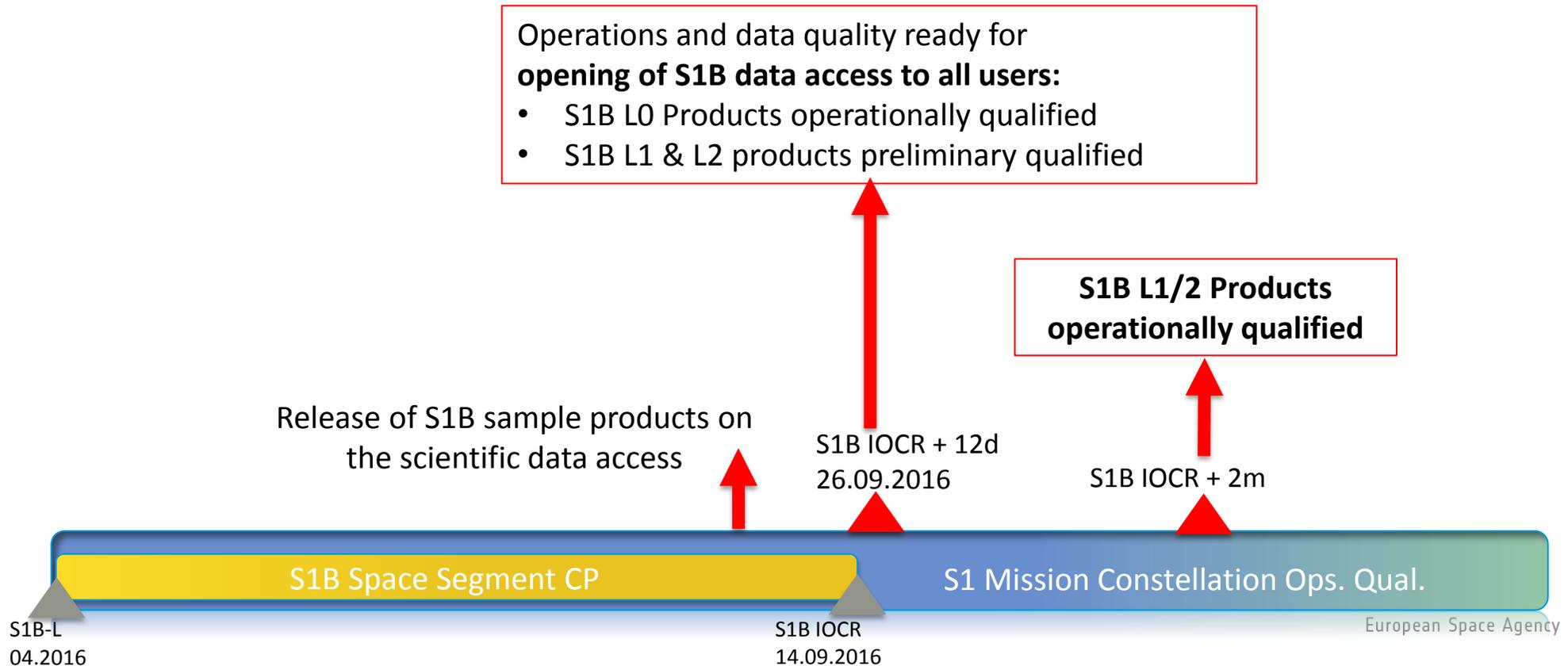
Total S1B operations level at S1B-IOCR is similar to the S1A routine operations level

S1A&S1B Constellation
Total Daily production volume per mode [TB]



- Sentinel-1 constellation operations **generate daily about 8 TB of data** since July 2016
- Sentinel-1B production volume in August 2016 represents already about 40% of the total to S1 mission production

Operations are ready to **start delivery of Sentinel-1B products to users**, using same interfaces as for Sentinel-1A.

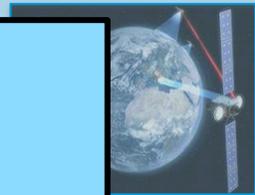


Sentinel-1 Mission Reaching Full Operations Capacity



SENTINEL-1B

- Launched 25 Apr 2016
- + 100%
observation capacity



SENTI
✓ Lau
✓ Full



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Evolution of the user requirements

- from the Copernicus services
- National requirements from Copernicus Participating States
- Other requirements (incl. science)

... need to be considered in the allocation of Sentinel-1
resources

SEGMENT:

- ✓ 3 X-band stations

Copernicus Sentinel-2



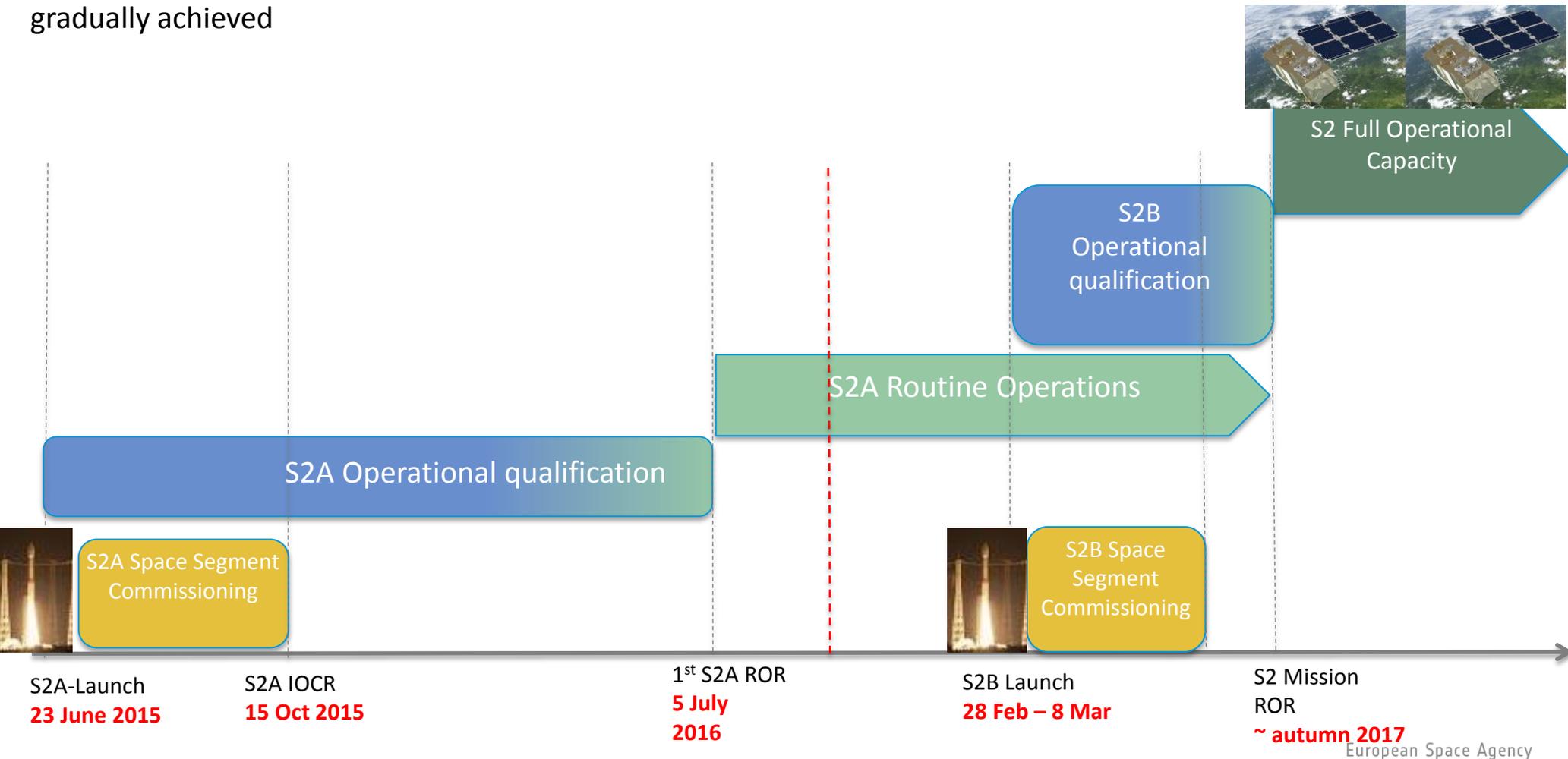
- Launch: **S2a: June 23rd 2015**, Q1 2017
- 13 bands (VIS, NIR & SWIR)
- 290 km swath at 10, 20 and 60 m
- Systematic acq. of all land and coasts
- 5 days repeat cycle with 2 satellites
- 7 years design lifetime (max. 12 yrs)



S2 Operational Qualification phase leading to the Routine Operations



Sentinel-2 full mission exploitation capacity based on the routine operations of the 2-satellite constellation → gradually achieved

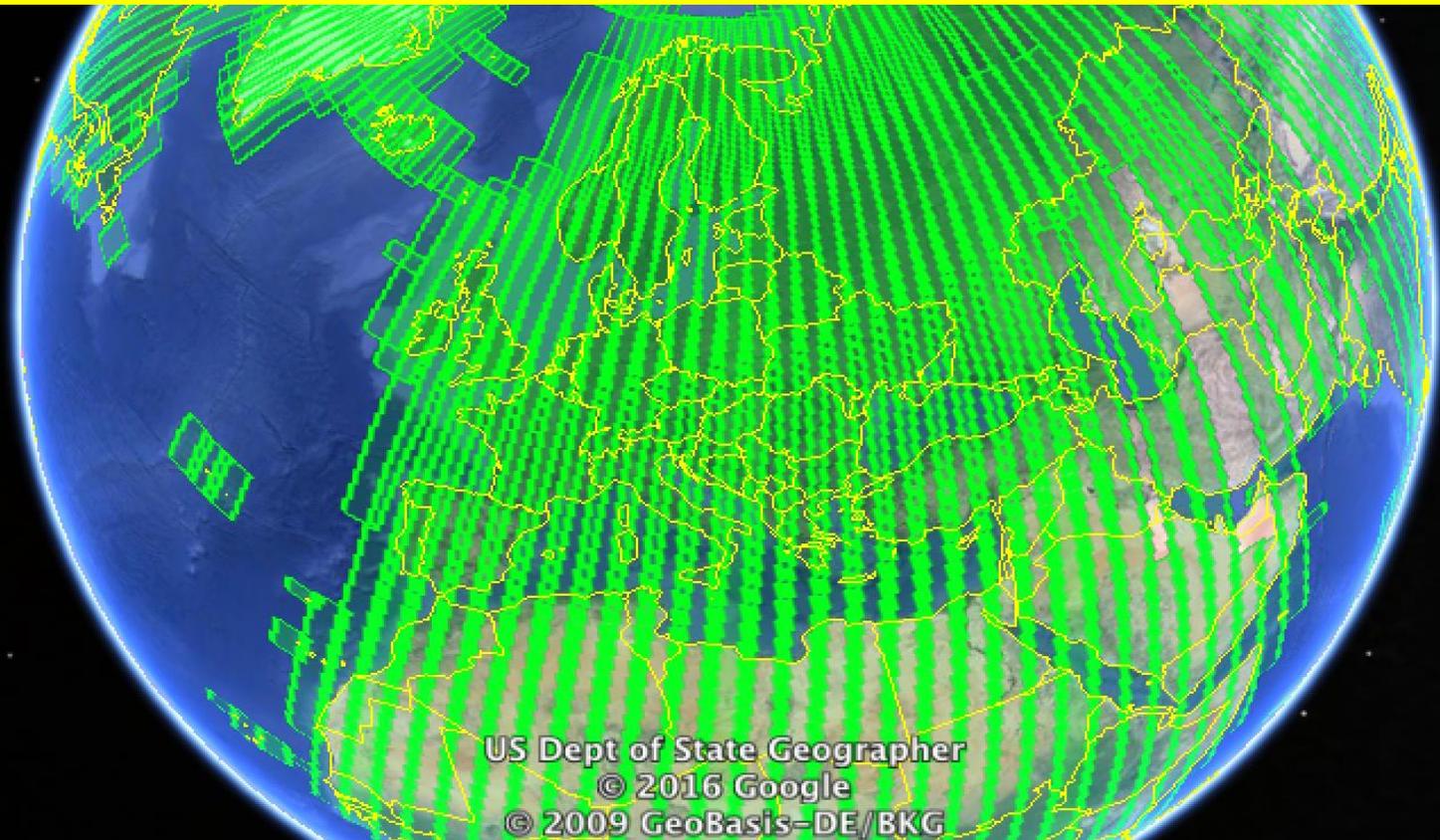


Sentinel-2 acquisition plan

Currently 10 days revisit in Europe, Africa and Greenland

Rest of the World in 20 days (=14.2min/orbit)

→ Continue to increase data acquisition: 10 days revisit of all land masses to be reached
Q1/2017, using EDRS service / 4th X-band station



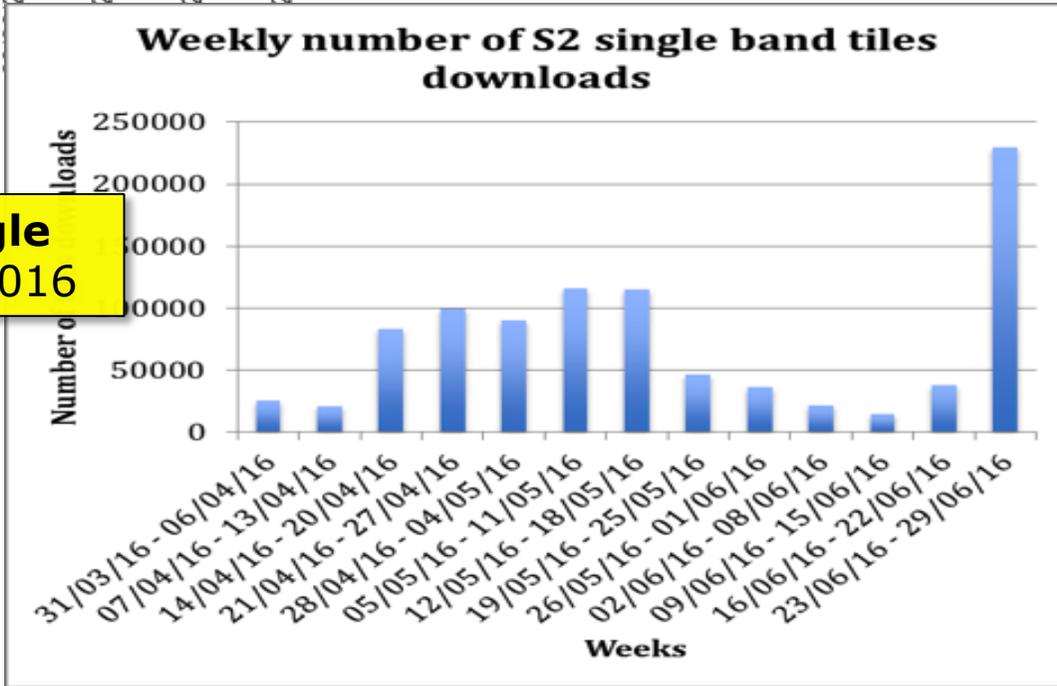
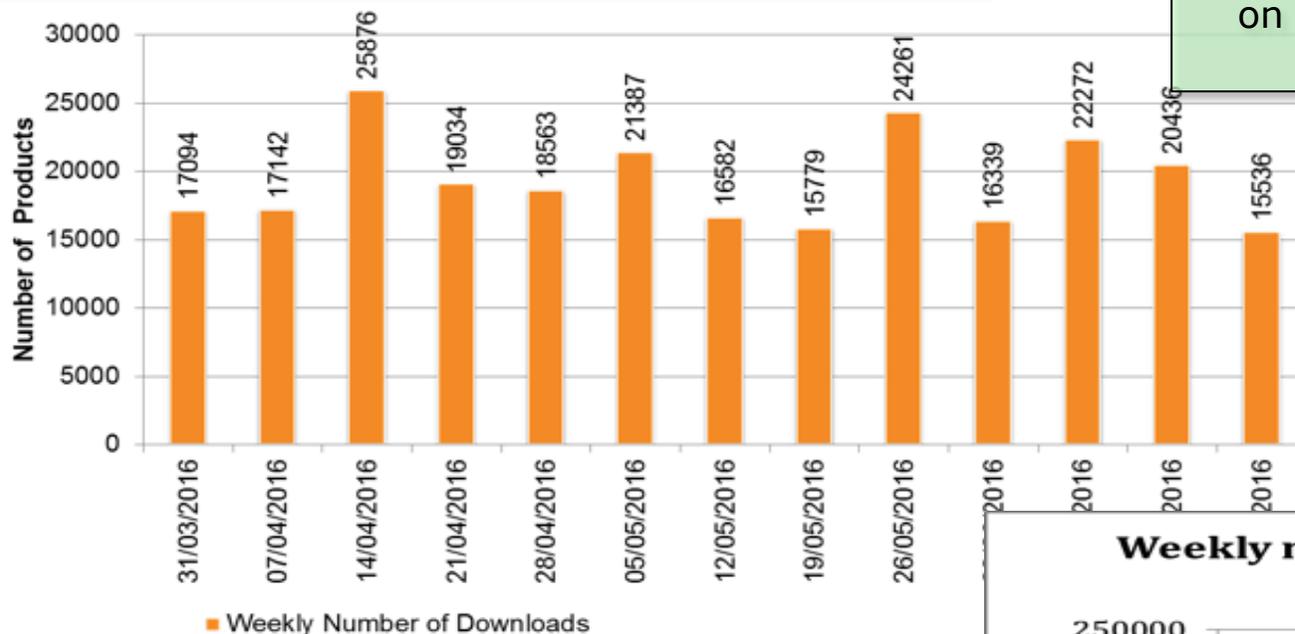
Sentinel-2 acquisition plan published online ahead of every repeat cycle at
<https://sentinels.copernicus.eu/web/sentinel/missions/sentinel-2/acquisition-plans>

Sentinel-2: products distribution statistics



Approx. 250,000 products were downloaded during Q2-2016

Exploitation ratio - 1:9
on average each product published has been downloaded times

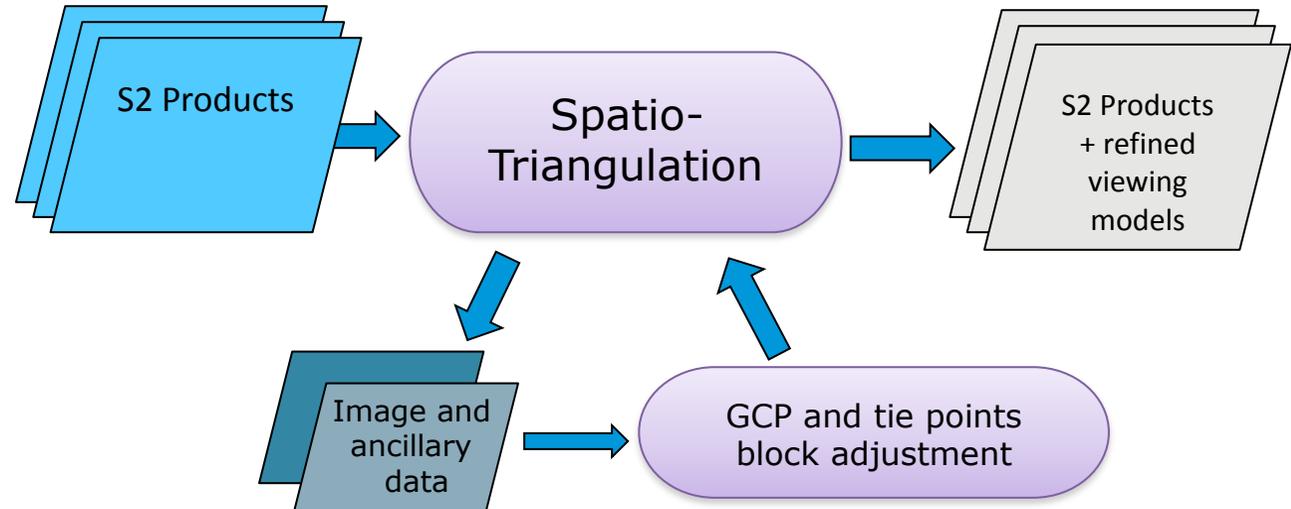
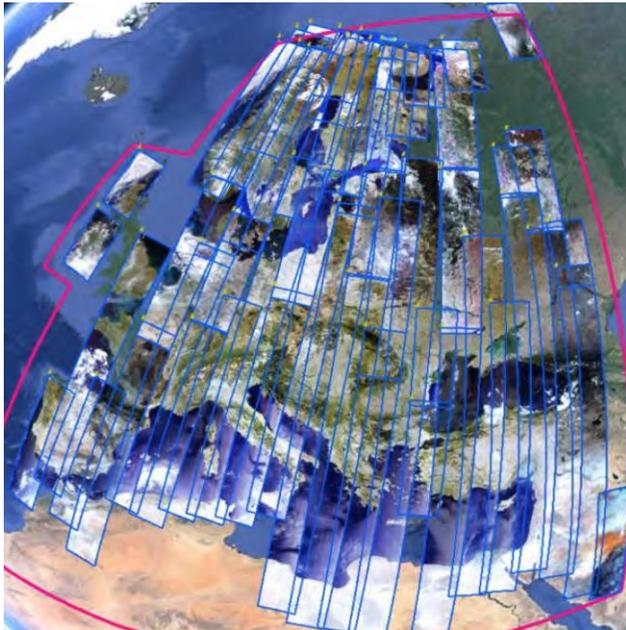


In addition, an estimated 1 million single band tiles were disseminated during Q2-2016

Note: currently S2 products comprise several Tiles and all Bands. Users can however download single bands and single tiles via the API libraries provided by ESA.

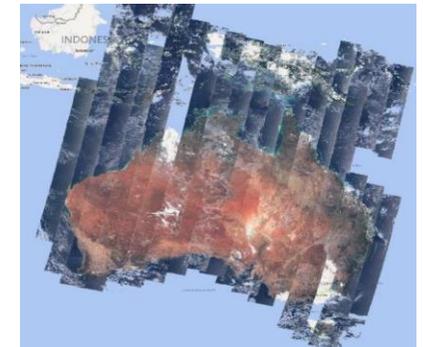
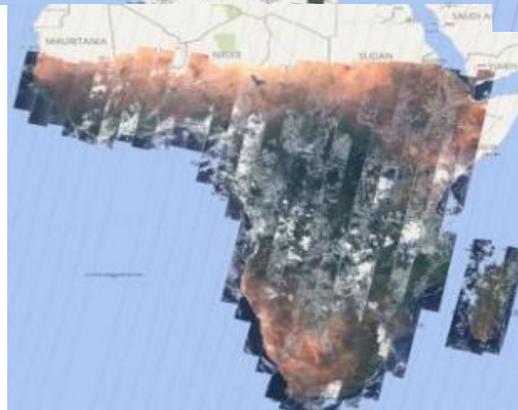
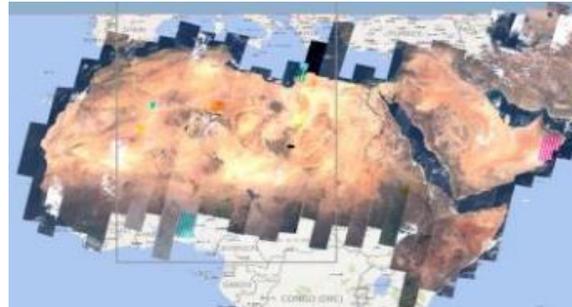
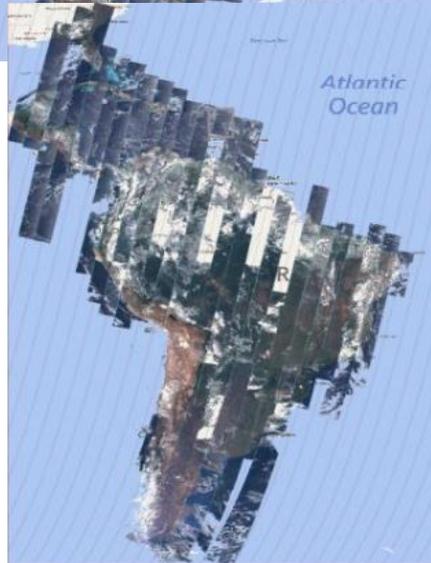
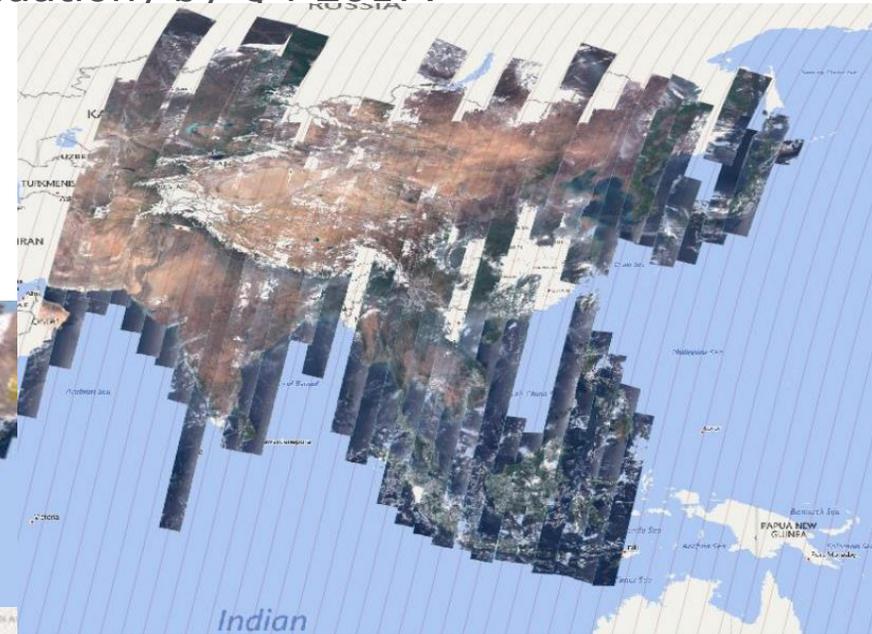
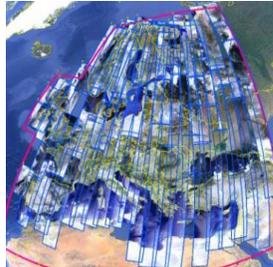
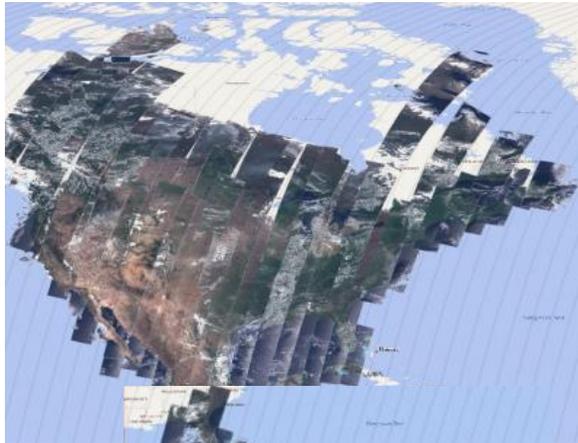
GRI (Global Reference Image)

- **Objective:** To obtain a full repeat cycle dataset of well-localized mono-spectral Level-1B images (band 4) which will be used as reference images in the processing, allowing to: improve geolocation, ensure coherence between orbits and ensure multi-temporal registration.
- **Methodology:** Massive spatio-triangulation on large blocks.



GRI Construction Status

- ✓ European GRI will be completed (including validation) by Q4 2016.
- ✓ Worldwide GRI will be completed (including validation) by Q4 2017.



Processing Baselines and Anomalies

✓ <https://sentinels.copernicus.eu/web/sentinel/missions/sentinel-2/data-quality-report>

Anomaly ID	Title	02.00	02.01		02.02	02.03	02.04
		Deployed 23/11/2015	Deployed 27/01/2016	Deployed 31/03/2016	Deployed 03/05/2016	Deployed 09/06/2016	Deployed 15/06/2016
3	Incorrect tile numbering	yes					
4	Instrument Measurement Time MTD	yes	yes	yes	yes	yes	yes
5	Minimum Reflectance "0"	yes	yes				

Next evolution step ~end October:

- addition of **True Colour Images** (TCI) = RGB histogram equalized in JPEG2000
- shorter **filename**
- Sample data released **5th of October**
- **See PSD V14**

<https://sentinels.copernicus.eu/documents/247904/685211/Sentinel-2-Products-Specification-Document-Draft>

S2 Data Quality Overview



Requirement	Description	Measured performance
Absolute geolocation (without ground control points)	The geo-location uncertainty shall be better than 20 m at 2σ confidence level (without Ground Control Points).	< 10 m at $2s$
Multi-spectral Registration	The inter-channel spatial co-registration of any two spectral bands shall be better than 0.30 of the coarser achieved spatial sampling distance of these two bands at 3σ confidence level.	< 0.26 pixel at $3s$
Absolute radiometric uncertainty	The absolute radiometric uncertainty shall be better than 5 % (goal 3%).	B1 to B9: < $5\% \pm 2\%$
SNR	The Signal-to-Noise Ratio (SNR) shall be higher than specified values	All bands compliant with > 20% margin

Call for S2 Validation Team



1st sentinel-2 validation team meeting

European Space Agency

List of events

- Home
- Objectives
- Deadlines
- Registration
- Abstract Submission
- Venue
- Contact
- Organizing Committee
- Hotel

1st Sentinel-2 Validation Team Meeting

28-29 November 2016
ESRIN, Frascati, Rome (Italy)



Registration and abstract submission opening	22 September 2016
Registration and abstract submission closing	06 November 2016
Notification of acceptance and preliminary programme	18 November 2016
Release of the final programme at the meeting	

The Copernicus Sentinel-2A satellite was launched in June 2015. A second satellite, Sentinel-2B, will be launched early 2017 completing the deployment of the Sentinel-2 constellation. Calibration and validation activities are carried out operationally by ESA's Mission Performance Centre (MPC).

These activities can be complemented with the expertise from independent teams such as the experts involved in relevant Cal/Val international groups, or by individual principal investigators, users, laboratories, and institutions.

These experts are invited to be part of the so-called Sentinel-2 Validation Team (S2VT). The work performed by the S2VT will complement on a best-effort and with no supply of funds basis, the baseline validation activities.

Copernicus Sentinel-3

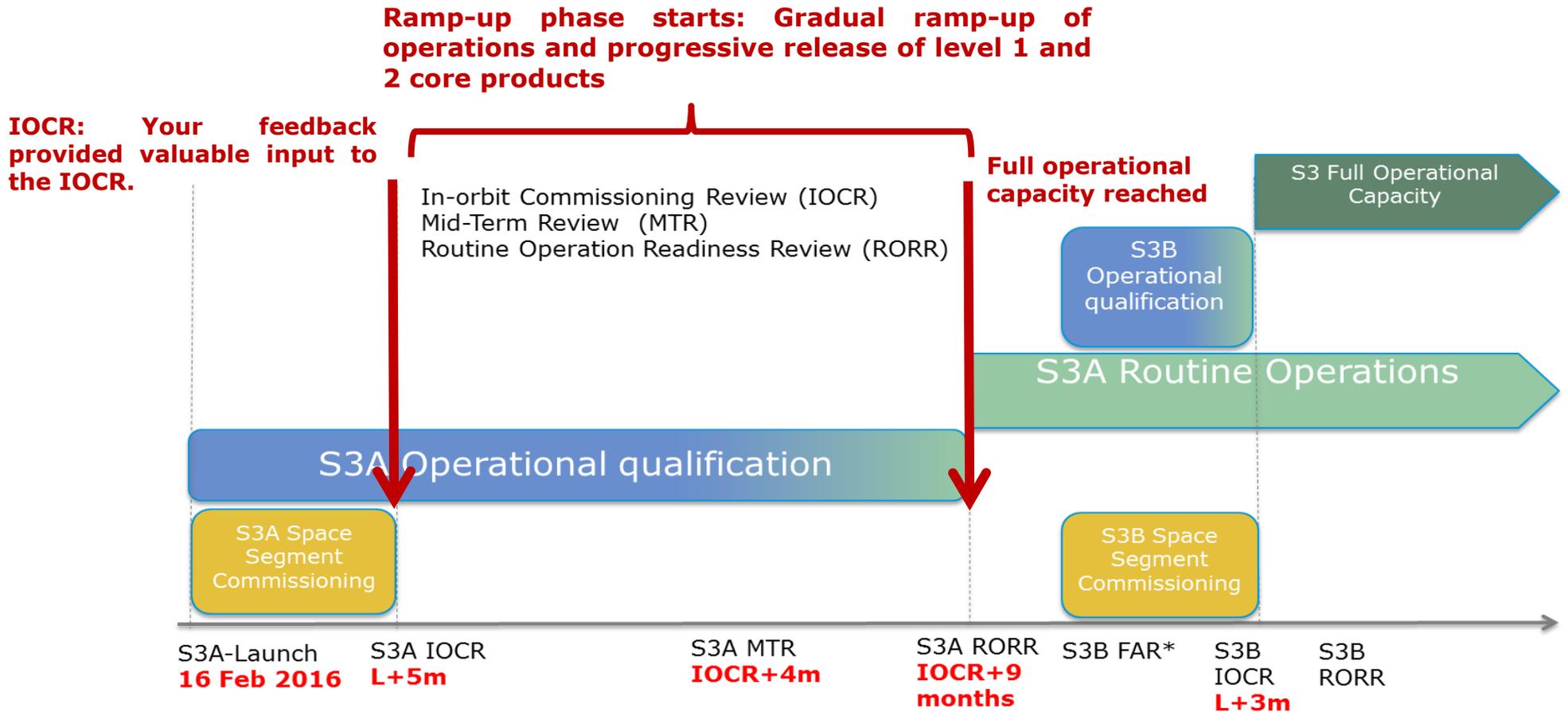


- **Ocean and Land Colour Instrument (OLCI)**
 - 21 channels, 300 m resolution, 1270 km swath
- **Sea and Land Surface Temperature Radiometer (SLSTR)**
 - 9 channel, 500m – 1km resolution, 1675 km swath
- **Sea & Ice Topography Payload**
(SRAL, MWR, GNSS, DORIS, LRR)



- Revisit at equator = 2 days (or daily with 2 satellites)
- 7 year lifetime (max. 12 yrs)
- **S3A launched on 18 February 2016, S3B in Q3 2017**

Sentinel-3 Mission Operations Phases

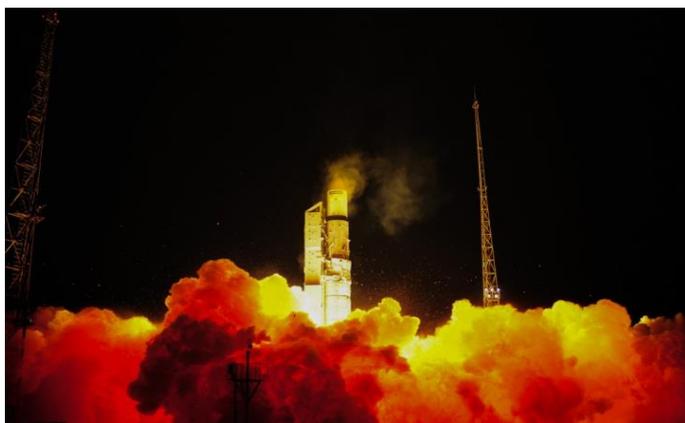


**S3B launch 2017*

What happened since launch



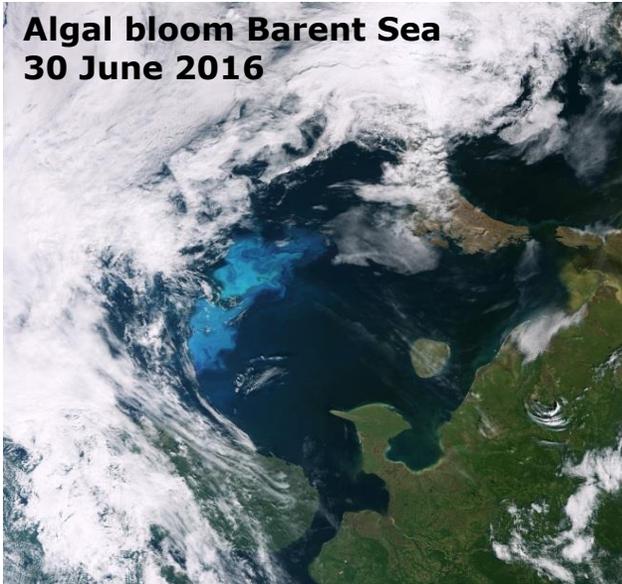
Sentinel-3A successfully launched from Plesetsk Cosmodrome (Russia) on 16 February 2016



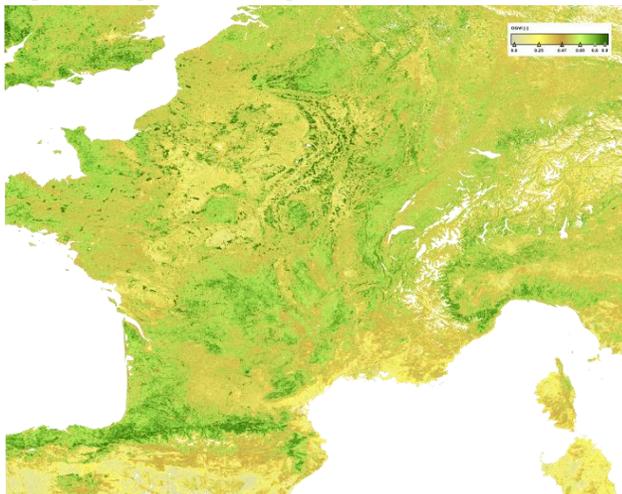
Spacecraft & all instruments in nominal operational mode and functioning well.

16 Feb	Successful Launch
18 Feb	LEOP phase concluded successfully <ul style="list-style-type: none">✓ Perfect orbit injection from the launcher✓ Rapid and smooth Solar Array deployment✓ Only one minor anomaly encountered (Star Tracker depointing due to incorrect quaternion data), rapidly identified and corrected
26 Feb	Platform In-Orbit Verification completed
4 March	Payload In-Orbit Verification completed <ul style="list-style-type: none">✓ All instrument ON and operating (except SLSTR in decontamination mode, as planned)✓ Level-0 products being generated
7 March	Cal/Val Phase of S3 commences
April/May	Mid-Term-Reviews for OLCI, SLSTR and SRAL
mid- May	Release of sample products to all users for familiarisation
28-30 June	Expert users meeting – first feedback from S3 validation teams
11/12-July	In-Orbit Commissioning Review (IOCR)– successful completion of commissioning phase, start of ramp-up phase (initial operational)
13 July	ESA internal handover from development to operations team; Handover of flight operations from ESA to EUMETSAT
30 September	Handover of Marine PDGS from ESA to EUMETSAT
October 2016	Release of Level 1 data TBC
Ramp-up phase IOCR+9months	Release of Level 2 data

Algal bloom Barent Sea
30 June 2016



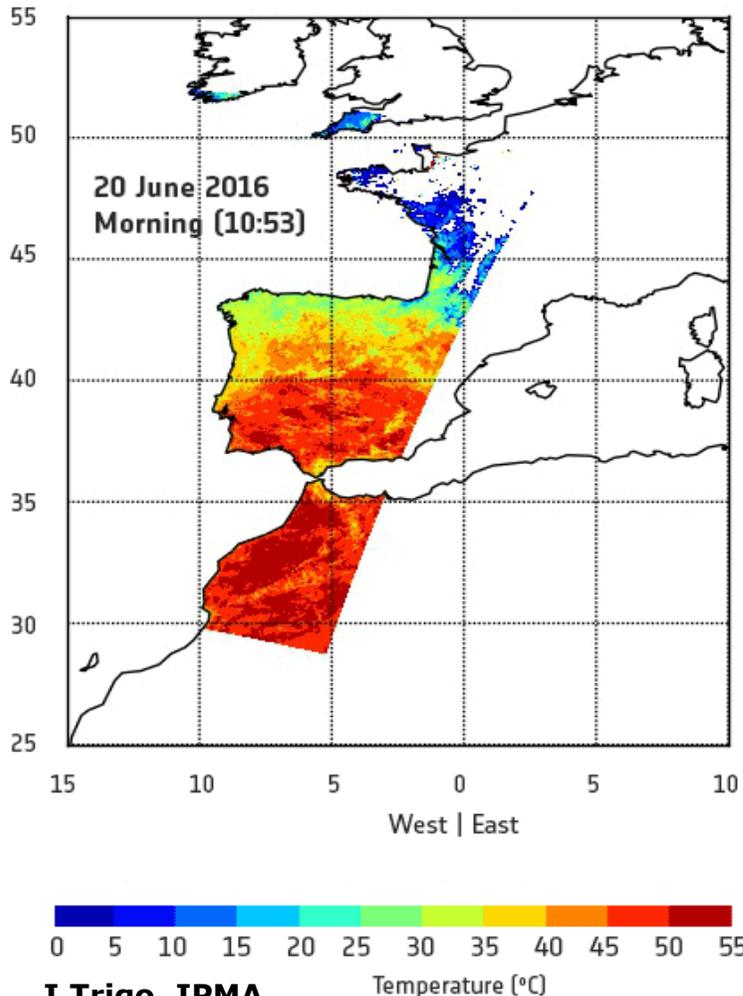
OLCI Global Vegetation Index
(OGVI), 19 July 2016



Ocean and Land Colour Instrument (OLCI)

- ❑ high absolute (relative) accuracy of 2 (0.5) % in reflectance
- ❑ OLCI working nominally since 29 Feb 2016.
- ❑ Sample Level 1 & Level 2 products available since May/June.
- ❑ **Level 1 performance:**
 - ❑ Radiometry: on-board radiometric calibration functional; SNR is compliant; calibration gains show time variability; vicarious calibration shows consistent results, however a $\sim +3\%$ bias.
 - ❑ Spectrally: fully compliant ($<0.15\text{nm}$); small temporal trends since beginning of the mission
 - ❑ Geometry: pointing issues fixed, current sub-pixel accuracies;
- ❑ **Level 2 validation started.**
 - ❑ Cloud flag needs improvement
 - ❑ L2 products unavailable for inland waters
 - ❑ improvement in the atmospheric correction
 - ❑ Improving standard product flags
- ❑ **Release of Level 1 planned for October TBC.**
- ❑ **Release of Level 2 planned for end 2016.**

Land Surface Temperature from Sentinel-3



I.Trigo, IPMA

Sea & Land Surface Temperature Radiometer (SLSTR) designed for high radiometric accuracy <2% (BOL)/<5% (EOL); < 0.2K (0.1K goal),

- ❑ SLSTR first switched on 2 March.
- ❑ Current anomaly causing slight increase in SLSTR instrument detector temperature (~1K)
- ❑ Sample Level 1 and Level 2 data products are available since May/June.

❑ Level 1 performance, open points from IOCR:

- ❑ Corrections to Basic Cloud Screening – solved
- ❑ SWIR calibration for S5/6 – not yet fully solved
- ❑ Geometric calibration corrections in Nadir and Oblique (nadir ok, oblique still off several pixels)
- ❑ Saturation flags not yet correctly set
- ❑ VIS-SWIR co-registration – solution discussed

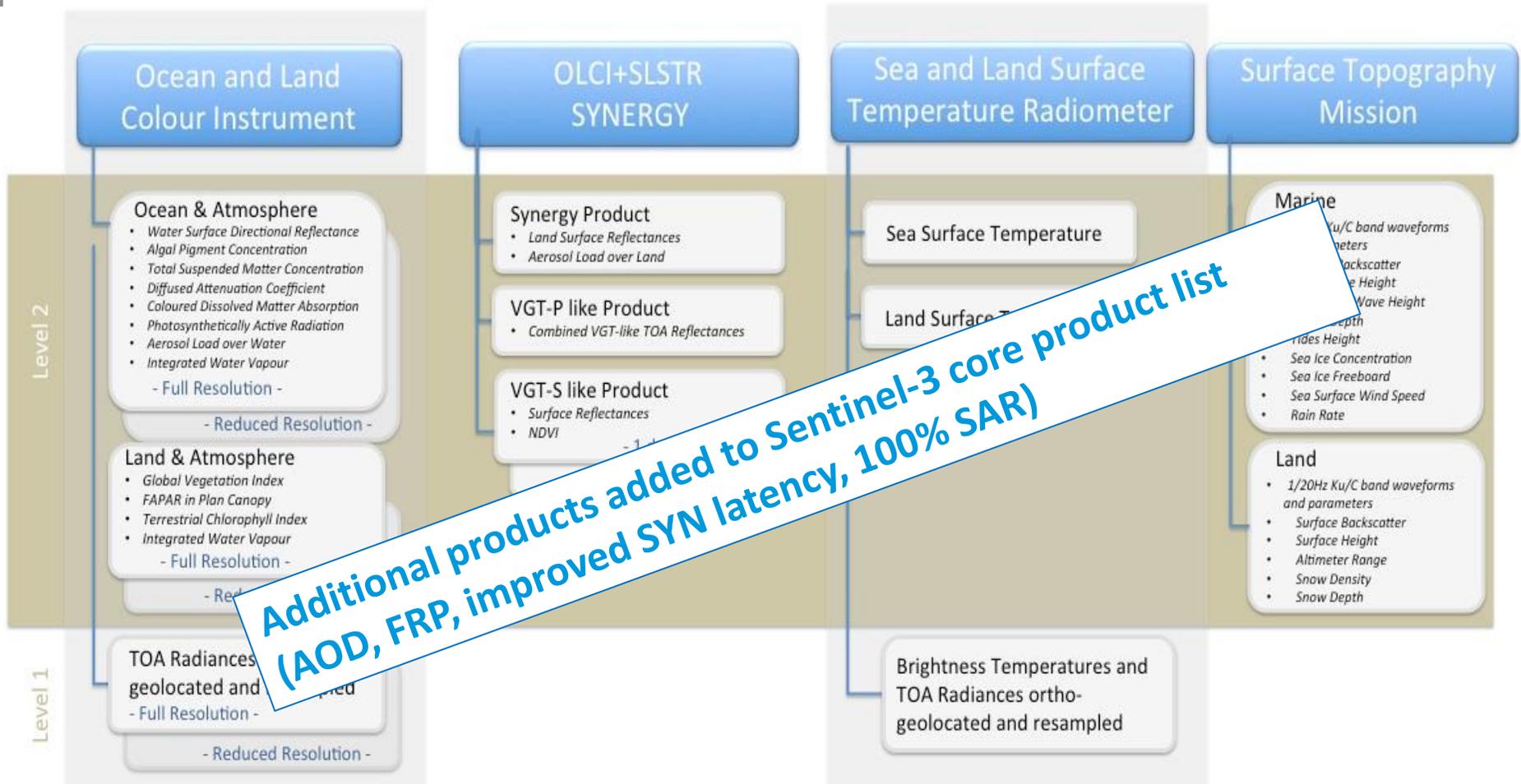
❑ Level 2 performance

- ❑ Level 2 validation started
- ❑ Depending on Level 1 quality
- ❑ Need for fine tuning LST & SST coefficients

❑ **Release of Level 1 planned for October TBC.**

❑ **Release of Level 2 planned for end 2016.**

SENTINEL-3 CORE DATA PRODUCTS



<https://sentinel.esa.int/web/sentinel/missions/sentinel-1/mission-status>



sentinel-1

→ RADAR VISION FOR COPERNICUS

Mission Status Report 1

Reference Period: 3 April - 7 April 2014

Mission Status

- Sentinel-1A was successfully launched from Kourou on 3 April 2014, 21:02 UTC
- The Launch and Early Orbit Phase (LEOP) was successfully performed according to the planned timeline and declared closed on 6 April at 16:00 UTC
- The Commissioning Phase has started

Satellite

The LEOP covered the main following key activities:

- Deployments of the solar panels (including rotation) and of the Synthetic Aperture Radar (SAR) antenna
- Achievement of Satellite Nominal Mode and AOCS Nominal Pointing Mode
- Switch ON and initial checks of the spacecraft sub-systems
- First operations of the X-Band Transmitter and the SAR instrument (3 min of Wave mode)

In addition, a collision avoidance manoeuvre was performed on 5 April

Ground Segment

- The Flight Operations Segment performed nominal during the complete 3 days of LEOP
- First X-band data acquisition took place at the Matera ground station on 6 April, early morning
- First SAR instrument data acquisition was performed on 6 April. The related measurement was successfully processed at UK-PAC
- The FOS and the PDGS were declared ready to support the commissioning phase

Outlook

- Start of platform and payload commissioning activities
- First SAR acquisitions driven by the operational PDGS mission planning system are planned to start on 9 April, as part of the initial verification and calibration activities
- Start of orbit manoeuvre sequence to acquire the target reference orbit.

Report prepared by the ESA Sentinel-1 Team - 



sentinel-1

→ RADAR VISION FOR COPERNICUS

Mission Status Report 126

Reference Period: 27 September 2016 – 3 October 2016

Mission status

- The Sentinel-1A and Sentinel-1B routine operations are on-going
- Sentinel-1B routine operations have started on 26 September, with data accessible from the same hubs as data from Sentinel-1A. See at: <https://sentinels.copernicus.eu/web/sentinel/news/article/sentinel-1b-products-available-from-26-september-2016>
- The observation scenario supports the systematic coverage of a first set of Copernicus Services areas of interest, of European land and coastal waters, of global tectonic/volcanic areas, as well as of other specific areas worldwide for various applications. The observation plan also includes a regular mapping of all land areas worldwide, which is largely increased with Sentinel-1B coming into operations. Starting on 26 September 2016, the Sentinel-1 observation plan is implemented with the combined use of Sentinel-1A and Sentinel-1B
- The detailed observation plan in the form of instrument acquisition segments, for both Sentinel-1A and Sentinel-1B is published at: <https://sentinels.copernicus.eu/web/sentinel/missions/sentinel-1/observation-scenario/acquisition-segments>. See additional information at: <https://sentinel.copernicus.eu/web/sentinel/news/article/sentinel-1b-planed-acquisition-segments-publication-and-change-to-file-name-convention>
- Specific planning has been prepared with both Sentinel-1A and Sentinel-1B to support the activation EMSR-0184 from the Copernicus Emergency Rapid Mapping Service for major floods in Australia. Relevant products already generated were also made available quickly and used by the service. Sentinel-1B images have been used to generate flood delineation maps, see an example at: http://emergency.copernicus.eu/mapping/system/files/components/EMSR184_01GOOLOOGONGJEM_ALONG_DELINEATION_OVERVIEW-MONIT02_v1_100dpi.jpg
- The operational use of Sentinel-1 data by the Copernicus Marine Environment Monitoring Service for sea-ice and iceberg monitoring activities is on-going
- The European Maritime Safety Agency (EMSA) operationally uses Sentinel-1 imagery in quasi-real time in the CleanSeaNet services; operations with EMSA service providers local stations are on-going
- The EDRS-A - Sentinel-1A user commissioning is on-going, with a target start of service currently foreseen in November 2016
- Both Sentinel-1A and -1B spacecraft are in a stable state, operating in Nominal Mission Mode (NMM). The Flight Operations Segment (FOS) ensuring the monitoring, control and commanding of the satellites is operating nominally. Orbit control manoeuvres are performed once a week
- Collision avoidance manoeuvres were performed on Sentinel-1A on 28 September to reduce the risk of collision with a debris
- X-Band data acquisitions are routinely performed over Matera, Svalbard and Maspalomas X-band core stations. The acquired data are circulated within the Payload Data Ground Segment (PDGS), systematically processed to Level-0 and Level-1 products and archived
- Wave Mode data are regularly acquired over open oceans, systematically processed to Level-2 OCN products and made available. Sentinel-1 IW and EW Level-2 OCN products over regional ocean areas are available on the Data Hubs. The operational qualification of Level-2 OCN products is on-going (geophysical validation of the Radial Surface Velocity component)
- Operations are performed regularly at the Processing and Archiving Centres (DLR-PAC and UK-PAC). All other PDGS operational services (i.e. Mission Performance, Precise Orbit Determination, Wide Area Network) are operating nominally
- By 29 September 2016, a total of 47,843 users have self-registered on the Sentinels Scientific Data Hub; 5,495,435 product download have been made by users, corresponding to 6.2 PB of data. At the time of publishing this report, more than 719,000 Sentinel-1A products are available on-line for download, representing about 955 TB of data. Statistics of last 24 hours are available in real time at the Data Hub home page: <https://scihub.copernicus.eu>

Outlook

- Continuation of Sentinel-1 constellation routine operations
- Continuation of EDRS-A - Sentinel-1A user commissioning

Report prepared by the ESA Sentinel-1 Team

Backup



Sentinel-1 Constellation Observation Scenario

- High level strategy for the inclusion of Sentinel-1B – (Cont'd)



- Increase of revisiting frequency for operational monitoring services, in particular CMEMS and maritime surveillance services
 - CMEMS requirement is to get a daily coverage, increase of coverage frequency in western Arctic and around Antarctica
 - Sentinel-1B observations are made in complement to S1A observations, in an optimised way
 - very relevant to sea-ice CCI
- European coverage increase by a factor 2, ie 6-day cycle in both ascending and descending, in IW VV+VH
 - relevant to Land Cover CCI
- Interferometry every 6 days for critical areas and applications, for instance:
 - for fast moving glaciers (Greenland margins and “supersites” in Antarctica) allowing to get more coherence between two acquisitions
 - areas subject to large subsidence
 - etc



Sentinel-1 Constellation Observation Scenario

- High level strategy for the inclusion of Sentinel-1B – (Cont'd)



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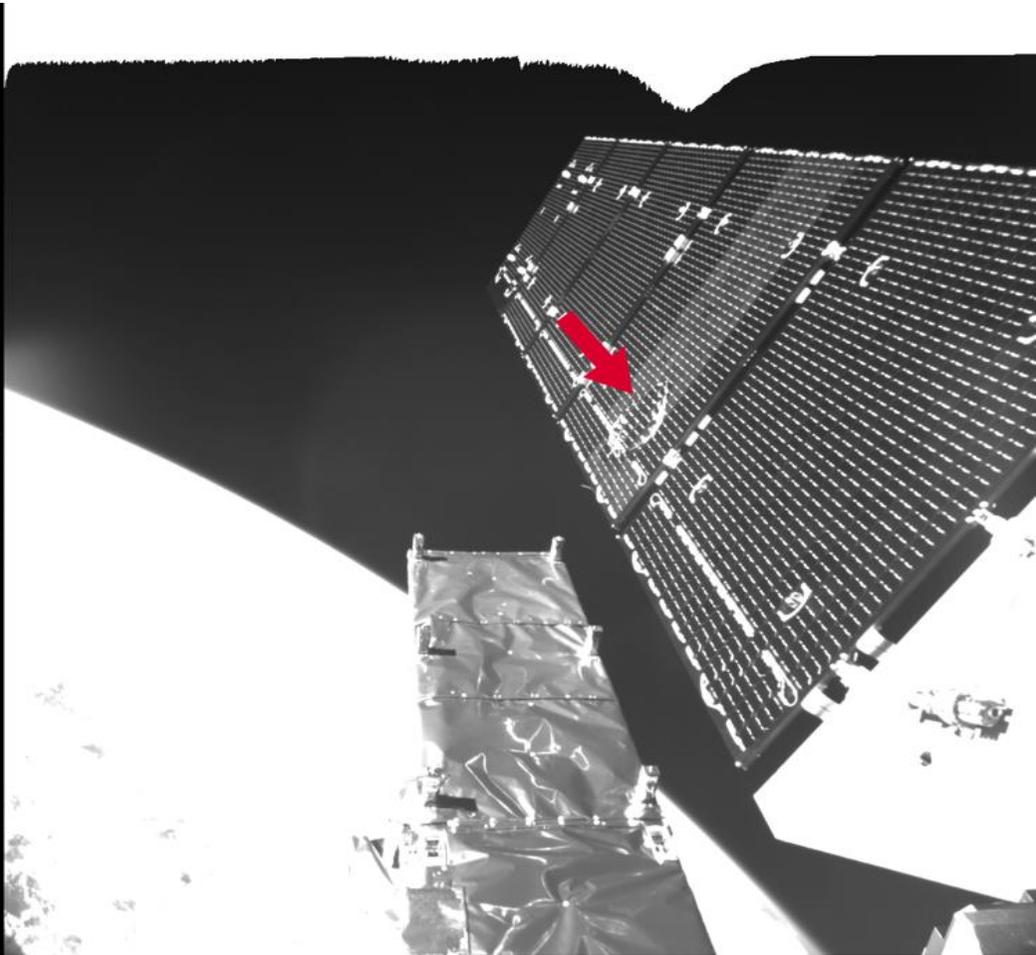
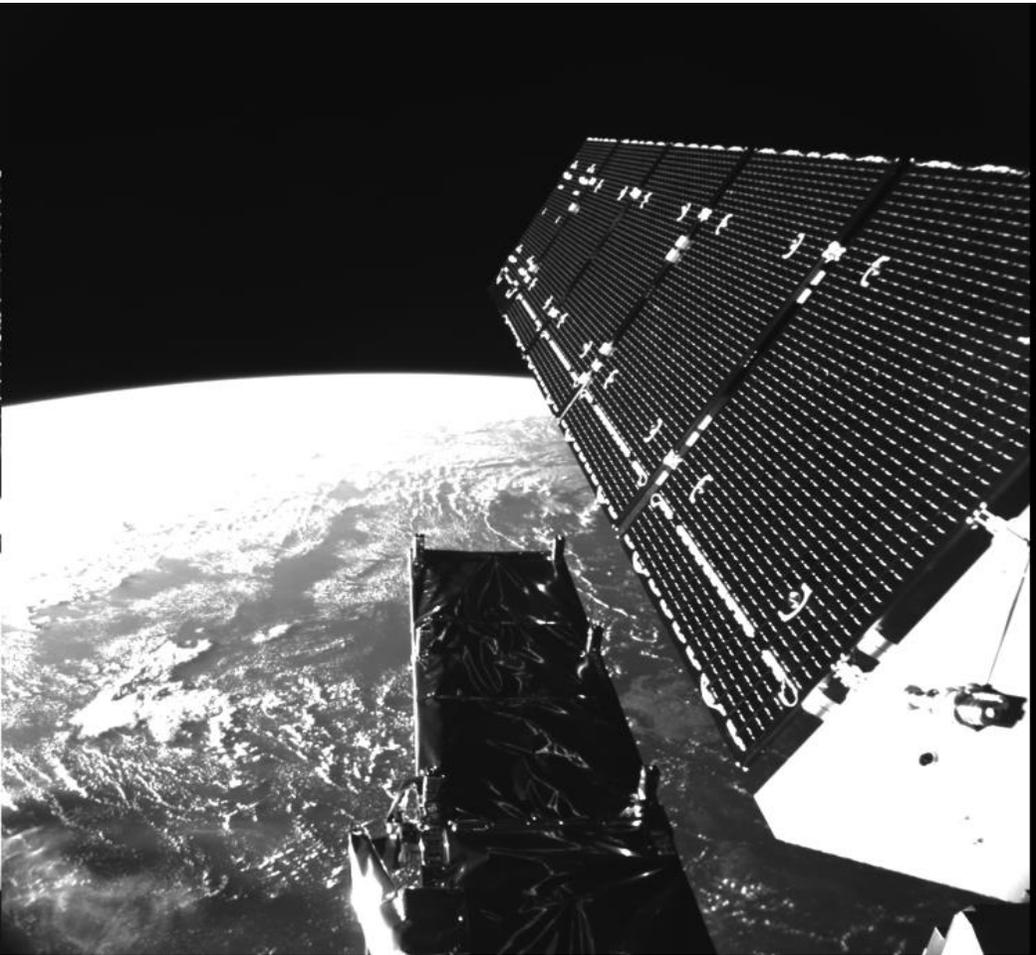
- Implement “complementarity” of observations between S1A and S1B, to some extent (e.g. use S1A for one set of remote volcanoes worldwide, use S1B for another set, distinct areas for maritime surveillance activities)
- Increase of global land mapping frequency, for land cover applications in particular, that require short revisit time...

➔ First target is to provide a full mapping of global land areas every 12 days (except Antarctica and Greenland which are subject to specific campaigns), with a combined use of S1A and S1B

Note: some global tectonic areas may remain observed in single pol, the full coverage in dual-pol is foreseen once in full operations capacity, first half 2017

➔ very relevant to Land Cover CCI

Sentinel-1A hit by space particle

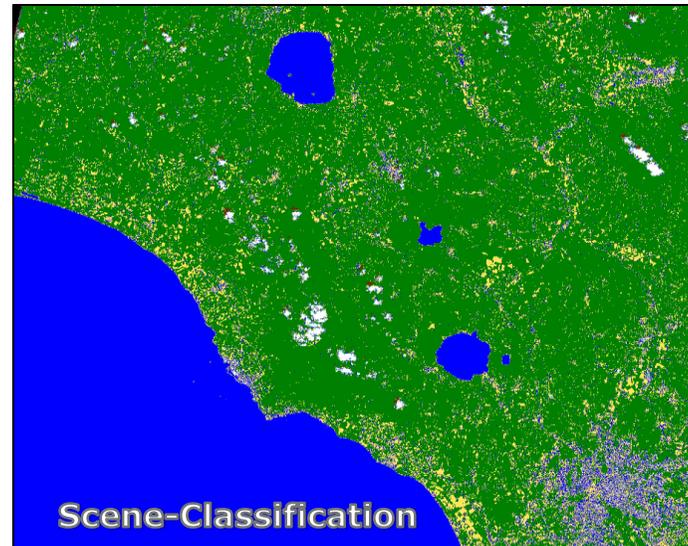


Sentinel-1A solar panel was hit by a space particle on 23 August 2016, resulting in a 5% reduction of the power generated by the solar array. This power reduction does not have any impact on the mission operations.

L2A Pilot Pre-Operational Production



- Pilot production of L2A over Europe to be released in the next 1-2 weeks
- The Sen2Cor processor has been integrated in the ESA-RSS environment (Research and Support System).
- It will daily generate up to 250GB of L2A products data (~600 Tiles/Day).
- L2A output products will be made available, through <http://scihub.esa.int>
- Products granularity of resulting L2A will be the same of L1C available on SciHub.



Label	Classification
0	NO_DATA
1	SATURATED_OR_DEFECTIVE
2	DARK_AREA_PIXELS
3	CLOUD_SHADOWS
4	VEGETATION
5	BARE_SOILS
6	WATER
7	CLOUD_LOW_PROBABILITY
8	CLOUD_MEDIUM_PROBABILITY
9	CLOUD_HIGH_PROBABILITY
10	THIN_CIRRUS
11	SNOW

Released sample data products so far



Data available from

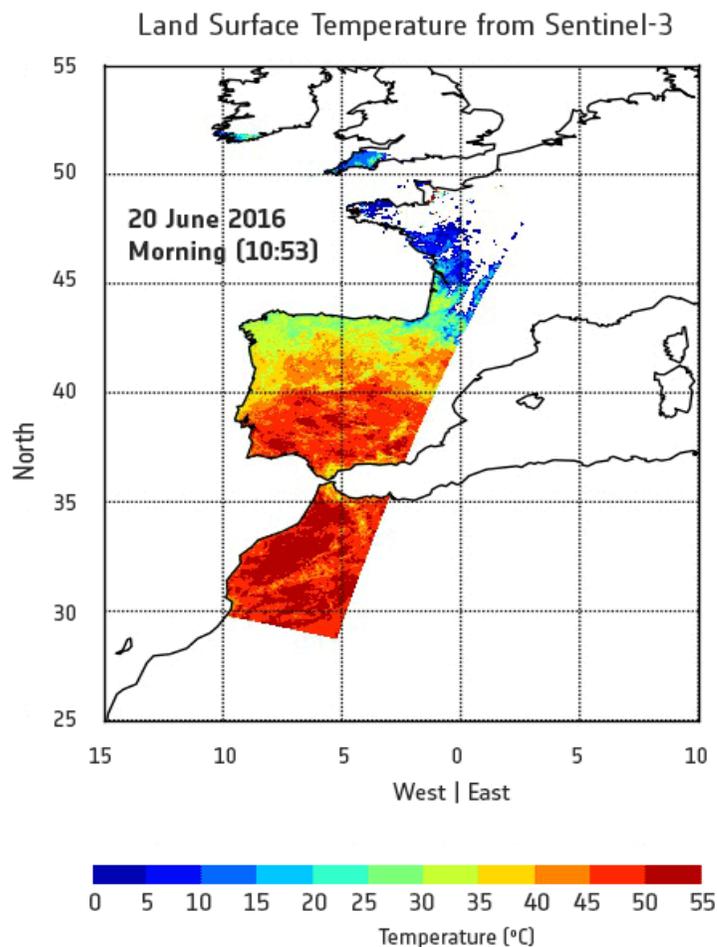
- ❑ *ESA's Sentinel Data Hub for expert users (*)*
- ❑ *EUMETSAT's ODA, Data Centre, EUMETCast (*)*

Data product (*)	Released on	Available data
OLCI L1 (FR)	11 May	9 May - today
OLCI L2 over land (ESA)	20 June	20 June - today
OLCI L2 over ocean (EUMETSAT)	22 June	22 June - today
SLSTR L1	13 June	8 June - today
SLSTR L2 - LST (ESA)	20 June	9 June - today
SLSTR L2 - SST (EUMETSAT)	21 June	21 June - today
SRAL L1B (**)	15 June	6 April - 6 May (SAR), 9-12 April (LRM); 18 June- today
SRAL L2 over land (ESA)	15 June	6 April - 6 May (SAR), 9-12 April (LRM) 18 June- today
SRAL L2 over ocean (EUMETSAT)	15 June	6 April - 6 May (SAR), 9-12 April (LRM) 12 July - today

SYN, AOD, FRP products to be released in ramp-up phase

* In addition: some sample products on General Sentinel Data Hub and EUMETSAT webpage for familiarisation for data users

SLSTR: STATUS (II)



❑ Level 1 performance, open points from IOCR:

- ❑ Corrections to Basic Cloud Screening - solved, part of official data release in Oct
- ❑ SWIR calibration for S5/6 - not yet fully solved, may be postponed to a later release
- ❑ Geometric calibration corrections in Nadir and Oblique (nadir ok, oblique view still off by several pixels, possibly solved before end of Sept 2016)
- ❑ Saturation flags not yet correctly set - may be postponed to a later release
- ❑ VIS-SWIR co-registration - solution discussed, part of official release in Oct

❑ Level 2 performance

- ❑ Level 2 validation started
- ❑ Depending on Level 1 quality
- ❑ Need for fine tuning LST and SST coefficients identified

❑ Release of Level 1 planned for October TBC.

❑ Release of Level 2 planned for end 2016.

ESA data access: Current Operation Baseline



Scientific Data Hub

Self Registration



> 33,000 Users



No Rolling Policy Applied



Sentinel-1A NTC
Sentinel-2A L1C

03-Oct-2014



16-Nov-2015



Max 2 Concurrent Downloads

Collaborative Data Hub



11 Collaborative Users
4 Data Hub Relay Users



Node 1: 30 days
Node 2: 9 days



Sentinel-1A NRT & NTC
Sentinel-2A L1C



Node 1: Max 10 downloads
Node 2: No limits

International Access Hub



4 Users



30 Days



Sentinel-1A NTC
Sentinel-2A L1C¹



No limits

Copernicus Services Data Hub

copernicus
space component data access



108 Users



No Rolling Policy Applied



Sentinel-1A NRT¹ & NTC
Sentinel-2A L1C

01-Dec-2015



Max 10 concurrent downloads

L1C¹ coming soon

NRT¹ via dedicated ftp

ESA has signed technical operating arrangements e.g. with NOAA, NASA, USGS ...

Data access stats from the open and free data hub



<https://scihub.copernicus.eu>

**> 500,000
products
available**

**> 30,000
Registered
users**

**➤ 4 Million
products
downloaded**

**> 4,7 PByte
Data volume
downloaded**

Statistics at April 7, 2016

Copernicus Sentinel data (2015)