

# Sentinel-1 instruments status, product performance and evolutions

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The Copernicus Sentinel-1 (S-1) mission ensures the continuity of C-band SAR observations over Europe. The mission is characterized by large-scale and repetitive observations, systematic production and free and open data policy. Sentinel-1 data are routinely used by Copernicus and many operational services, as well as in the scientific and commercial domain.

On the 23<sup>rd</sup> of December 2021, an irrecoverable incident occurred to the Sentinel-1 B unit and on the 3<sup>rd</sup> of August 2022 the end of the mission has been announced.

The Sentinel-1 SAR Mission Performance Cluster Service (SAR-MPC) is an international consortium of SAR experts. It is in charge of the continuous monitoring of the S-1 instruments status, as well as the monitoring of the quality of the L1 and L2 products. This is done by analyzing the variation of key parameters over time using standard products and/or dedicated auxiliary ones.

The monitoring of both the SAR antenna health status and of the SAR instrument is carried out exploiting the dedicated auxiliary products and ensures that no degradation of SAR data quality is originated by instrument aging or element's failures.

The radiometric performance monitoring exploits both the DLR calibration site, hosting transponders and corner reflectors, and uniformly distributed targets, like rainforest, to assess the absolute and relative radiometric accuracy of S-1 products. The geolocation accuracy is monitored using dedicated acquisitions over additional calibration sites. The procedure includes the compensation of known instrument and environmental effects, e.g., propagation through troposphere and ionosphere.

In general, the performances are considered stable and within specifications. The performance of Ocean L2 product deriving from data acquired in WV mode has been improved thanks to the deployment of a new configuration for the WV2 beam on the 22<sup>nd</sup> June 2021.

Finally, important evolutions of the S1-IPF and S1 products have been introduced in recently:

- The possibility to detect and mitigate Radio Frequency Interferences (RFI), activated on the 23<sup>rd</sup> March 2022
- The introduction in the S1 product annotations of the burst cycle ID, a number that uniquely identifies a burst cycle within each repeat cycle, providing correspondence between the burst of a given sub swath and a geographic area on the 04<sup>th</sup> November 2021.
- A new S1-ETAD auxiliary product has been developed (and will be soon in production). It provides users with corrections to improve geometric accuracy of Sentinel-1 SLC images to centimetric levels.

This presentation will provide an overview of the current status of the Sentinel-1 instrument status and product performance, and the recent evolutions.