

# Sentinel-3 Surface Topography Mission

# New Sea Ice thematic products



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# Overview of Sentinel-3 Surface Topography Mission (STM)

### <u>Sentinel-3 is an Earth observation satellite series developed by ESA as</u> part of the Copernicus Programme

- The current constellation includes Sentinel-3A and Sentinel-3B, launched respectively on February 2016 and April 2018. Sentinel-3C and Sentinel-3D will follow (respectively planned for ~2025 and 2027).
- Sentinel-3 carries SRAL, the first radar altimeter operating exclusively ulletin SAR mode over all surfaces, to provide topography measurements of Earth surfaces at high resolution (~300m in along-track).

Microwave



#### Main objective over sea ice

Measure and monitor the sea ice thickness using the freeboard methodology as illustrated below.



## Sentinel-3 LAND MPC, and new Sea Ice thematic products

- The Sentinel-3 LAND Mission Performance Cluster (MPC) is tasked by ESA to monitor the health of the Copernicus Sentinel-3 SRAL and MWR sensors, and ensure a high data quality of LAND level-2 thematic products, one being dedicated to Sea Ice.
- The new Sea Ice thematic products are now generated with the Hamming and Zero-Padding processing. Zero-padding provides a finer sampling of the SAR altimetry waveforms.
- Information about the new Sentinel-3 LAND Thematic products is available in Sentinel OnLine: https://sentinels.copernicus.eu

### Preliminary assessments of Sea Ice thematic products

- A Sea Ice thematic Test Data Set has been produced for cycles 53 and 54 of Sentinel-3A covering from Dec. 19<sup>th</sup> 2019, to Feb 11<sup>th</sup> 2020.
- A Sea Ice thematic Pilot Dataset for S3A and S3B is now produced in parallel to the operational LAND products (PDGS) since July 2022. First results over austral sea ice are shown bellow:

Done





#### Systematic cycle validation. Examples:



Less NaN values, thanks to new auxiliary data for Sea Ice Concentration (OSISAF, OSI-430b) (0.42% instead of 3% for PDGS)

NaN

0.070

0.208

C2

Less radar freeboard outliers with new Sea Ice thematic product (new standard deviation of 19cm instead of 67cm)



### Conclusion & Perspectives

- Great improvements thanks to Zero-Padding and Hamming
- ✓ Quality very similar to CryoSat-2 Ice PDGS
- ✓ Systematic cycle validation with reports
- Updated thematic parameter : Sea Ice Concentration (sea\_ice\_concentration\_20\_ku from OSI-430b)
- ✓ Pilot data from July 2022 available in Copernicus Data Hub for collecting user feedbacks.
- Update of the Mean Sea Surface (DTU21 or CNES/CLS 2022).
- Evaluation of Sea Ice Type from S3 already available in the S3 Next Thematic product, derived from MWR and SRAL data.
  - Upcoming parameters: Snow Depth and later Sea Ice Thickness. > Full S3A and S3B Mission Reprocessing will start soon. S3 Thematic products will become operationnal in Q2 2023.

 $\rightarrow$  All feedbacks and ideas are welcome !