Abstract for OSTST 2017 – Instrument Processing Measurement and Re-tracking

Abstract Title: Evaluating methods to improve the performance of Sentinel-3 SRAL SAR Altimetry in the Coastal and Open Ocean– The SCOOP Project.

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The Sentinel-3 satellite, launched by ESA in February 2016 as a part of the Copernicus programme, is the second satellite to operate a SAR mode altimeter.

SCOOP (SAR Altimetry Coastal & Open Ocean Performance) is a project funded under the ESA SEOM (Scientific Exploitation of Operational Missions) Programme Element, started in September 2015, to characterise the expected performance of Sentinel-3 SRAL SAR mode altimeter products, in the coastal zone and open-ocean, and then to develop and evaluate enhancements to the baseline processing scheme in terms of improvements to ocean measurements. There is also a work package to develop and evaluate an improved Wet Troposphere correction for Sentinel-3, based on the measurements from the on-board MWR, further enhanced mostly in the coastal and polar regions using third party data, and provide recommendations for use.
At the end of the project recommendations for further developments and implementations will be provided through a scientific roadmap.

The presentation includes:

- Results of an evaluation of the initial SCOOP Test Data Set (SAR mode and RDSAR) in the Open Ocean and Coastal Zone. This test data set is Cryosat-2 Baseline C data processed to be equivalent to Sentinel-3 baseline SAR and RDSAR product.

- Overview of planned modifications to the processing (in both Doppler Processing to L1B, and in re-tracking to L2), intended to improve on the performance of the baseline product, that will be implemented and evaluated in SCOOP. The modifications are expected to include:

- Doppler Processing: the independent evaluation of individual processing options such as:
  - the activation of **zero-padding in range** (suitable for peaky like waveforms with low SWH)
  - Inclusion of the **intra-burst Hamming window** to reduce the impact of the Doppler side-lobes (obtaining a cleaner stack with lower impact of these side-lobes in the noise region after geometry corrections, and leading to a better reproduction of the SAR ocean retracker point target response –PTR)
  - **Azimuth processing** using the **exact method**, useful for surfaces with high topographic variability
  - **Antenna pattern compensation** in the Doppler dimension and at stack level (using in a first approach the theoretical antenna model)
- L2 processing:
  - L2 processing to be aligned with the L1B processing so that the suitability of each individual Doppler processing baseline can be better understood in terms of geophysical parameters retrieval.

- Some early results from initial test implementations of these modifications.