



Characterising and improving the performance of the Sentinel-3 SRAL altimeter: A Report from SCOOP, SHAPE & SPICE Projects

Marco Restano (1), Américo Ambrósio (2), David Cotton and the SCOOP Team (3), Pierre Fabry and the SHAPE Team (4), Malcolm McMillan and the SPICE Team (5), and Jérôme Benveniste (6)

(1) SERCO c/o ESA/ESRIN, (Italy), (2) DEIMOS c/o ESA/ESRIN, (Italy), (3) Satellite Oceanographic Consultants (United Kingdom), (4) ALONG-TRACK (France), (5) Centre for Polar Observation and Modelling, University of Leeds, Leeds (United Kingdom), (6) European Space Agency, Earth Observation Science, Applications and Future Technologies, Frascati, Italy (Jerome.Benveniste@esa.int)

Under the ESA Scientific Exploitation of Operational Missions (SEOM) Programme, 3 Projects are currently underway to accurately characterise and improve the performance of the Sentinel-3 SRAL SAR mode altimeter. They are: 1) SCOOP (SAR Altimetry Coastal & Open Ocean Performance Exploitation and Roadmap Study) for Coastal and Open Ocean; 2) SHAPE (Sentinel-3 Hydrologic Altimetry PrototypE) for Inland Water; 3) SPICE (Sentinel-3 Performance improvement for ICE sheets) for Ice Sheets. As projects started before the launch of Sentinel-3 (a full SAR mission), calibrated Cryosat-2 data have been used as input to a processor replicating the Sentinel-3 baseline processing.

For the SCOOP project, a first test dataset has been released to end users including data from 10 regions of interest. The successful SAMOSA retracker, adopted in the previous CP4O Project (CryoSat Plus for Oceans), has been readapted to re-track Sentinel-3 waveforms. An improved version of SAMOSA will be released at the end of the project.

The SHAPE project is working towards the design and assessment of alternative/innovative techniques not implemented in the Sentinel-3 ground segment (performing no Inland Water dedicated processing). Both rivers and lakes will be studied. Amazon, Brahmaputra and Danube have been selected as rivers, whereas Titicaca and Vanern have been chosen as lakes. The study will include the assimilation of output products into hydrological models for all regions of interest. A final dataset will be provided to end users.

The SPICE project is addressing four high level objectives: 1) Assess and improve the Delay-Doppler altimeter processing for ice sheets. 2) Assess and develop SAR waveform retracker for ice sheets. 3) Evaluate the performance of SAR altimetry relative to conventional pulse limited altimetry. 4) Assess the impact on SAR altimeter measurements of radar wave interaction with the snowpack. Dataset used for validation include ICESat and IceBridge products. Vostok, Dome C and the Spirit Sector (all located in Antarctica) have been selected, along with the Russell Glacier in Greenland, as regions of interest.

In the frame of both SCOOP and SHAPE projects, improved wet troposphere corrections will be estimated for all regions of interest.