Geophysical Research Abstracts
Vol. 18, EGU2016-5969-1, 2016
EGU General Assembly 2016

Pseudo LRM waveforms from CryoSat SARin acquisition

Michele Scagliola (1), Marco Fornari (2), Jerome Bouffard (3), Tommaso Parrinello (3), and Pierre Féménias (3)
(1) Aresys s.r.l., Milano, Italy (michele.scagliola@aresys.it), (2) ESA-ESTEC, Noordwijk, The Netherlands, (3) ESA-ESRIN, Frascati, Italy

CryoSat was launched on the 8th April 2010 and is the first European ice mission dedicated to the monitoring of precise changes in the thickness of polar ice sheets and floating sea ice. The main payload of CryoSat is a Ku-band pulsewidth limited radar altimeter, called SIRAL (Synthetic interferometric radar altimeter). When commanded in SARIn (synthetic aperture radar interferometry) mode, through coherent along-track processing of the returns received from two antennas, the interferometric phase related to the first arrival of the echo is used to retrieve the angle of arrival of the scattering in the across-track direction.

When SIRAL operates in SAR or SARin mode, the obtained waveforms have an along-track resolution and a speckle reduction which is increased with respect to the pulse-limited waveforms. Anyway, in order to analyze the continuity of the geophysical retrieved parameters among different acquisition modes, techniques to transform SARin mode data to pseudo-LRM mode data are welcome. The transformation process is known as SAR reduction and it is worth recalling here that only approximate pseudo-LRM waveforms can be obtained in case of closed burst acquisitions, as SIRAL operates.

A SAR reduction processing scheme has been developed to obtain pseudo-LRM waveforms from CryoSat SARin acquisition. As a trade-off between the along-track length on Earth surface contributing to one SARin pseudo-LRM waveform and the noisiness of the waveform itself, it has been chosen a SAR reduction approach based on the averaging of all the SARin echoes received each 20Hz, resulting in one pseudo-LRM waveform for each SARin burst given the SARin burst repetition period.

SARin pseudo-LRM waveforms have been produced for CryoSat acquisition both on ice and sea surfaces, aiming at verifying the continuity of the retracked surface height over the ellipsoid between genuine LRM products and pseudo-LRM products. Moreover, the retracked height from the SARin pseudo-LRM has been verified noisier than that obtained from genuine LRM, as it was expected due to the fact that, while about 98 echoes at 1.97 kHz are averaged together in a CryoSat LRM waveform, only one burst of SARin data has been averaged together in a pseudo-LRM waveform.