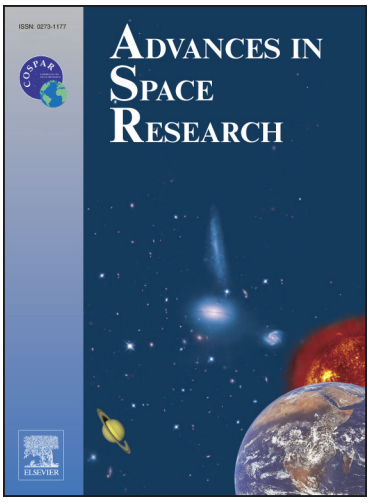

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SARin mode, and a Window Delay approach, for Coastal Altimetry

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Abstract

The CryoSat-2 (CS-2) mission is an altimetric mission designed to meet the measurement requirements for ice-sheet elevation and sea-ice 'freeboard'. In addition to Cryosphere applications, this mission is of great interest to the Hydrosphere and Oceanographic communities since it allows for quantitative assessment of expected enhanced altimetric capabilities in coastal monitoring, ocean floor topography, gravity field and inland water monitoring. The CS-2 main payload is a Synthetic aperture Interferometric Radar ALtimeter (SIRAL) operating in three different modes, including the SAR interferometric mode (SARin). In the work described in this paper, dedicated algorithms are developed for exploiting SARin mode for enhancing the sea level mapping at coastal regions. When operating in SARin mode the altimeter measurements allow for the derivation of the across-track Angle of Arrival (AoA), and so the reflection points at any range bin can be geolocated. In coastal altimetry, land contamination highly degrades the backscattered echo. This is sometimes, overcome with the SARM when tracks are perpendicular to the coast, since this mode provides an along-track resolution enhancement with respect to LRM mode due to the different footprints shapes (LRM is circular, while SARM is a stripe of the same wide across track but only around 300 m along track). However, across-track interferences still remain an issue in coastal altimetry and SARin mode can provide a solution for their mitigation. This paper proposes two different solutions for the improvement of SSH retrievals in coastal zones starting from L1b SARin products, developing post-L1b algorithms. The first solution is based in the use of the AoA. The second solution goes beyond SARin mode, and provides an algorithm for all operational modes, based in the historical window delay within a coastal track section. For both options, a sub-waveform approach is considered for the waveforms cleaning and retracking. In addition, a SAR L2 retracker inherited from the SAMOSA model is adapted to SARin. The results are analyzed and the potential improvements are assessed with respect to SARin data retracker by the CS-2 ground processor. A dedicated CS-2 SARin area (mask) covering the Cuban archipelago has been created for this investigation. A land-sea mask has been created from the Open Street Map high resolution catalogue for this study. A dataset has been produced including both ESA CS2 IPF Baseline B SSH and the SSH series coming from this study.

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