Improved Oceanographic Measurements with Cryosat SAR Altimetry: Application to the Coastal Zone and Arctic

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The ESA CryoSat mission is the first space mission to carry a radar altimeter that offers "SAR" (or Delay Doppler) and interferometric SAR (SARin) mode operation. These modes provide the capability to make high resolution and high precision altimeter measurements in the coastal zone.. Although much has been achieved in recent years through the COASTALT community, there is a limit to the capabilities of pulse limited altimetry which often leaves an un-measured "white strip" right at the coastline.
We present the outcomes of a study which analysed the performance of CryoSat altimeter and developed and tested processing schemes to optimise performance in this challenging region.
This work included:
A thorough analysis of the performance of SAR altimeter data in the coastal zone. One of the key benefits offered by SAR altimetry is the ability to make measurements at high resolution (~250m) right up to the coastline.
Developing a processing scheme with CryoSat SARin mode data to retrieve valid oceanographic measurements in complex coastal areas.
Developing and evaluating improvements to the SAMOSA altimeter re-tracker that is implemented in the Sentinel-3 processing chain. This should support improved performance in terms of accuracy and efficiency in retrieving oceanographic geophysical parameters from altimeter data.
A further activity developed a state of the art tidal atlas for the Arctic Ocean with CryoSat altimeter data. Through its high inclination orbit, the CryoSat mission provides the most complete altimeter data set ever used in this region, and so should enable the production of a highly accurate Arctic tidal model. This is turn will improve the quality of CryoSat Sea Surface Height measurements and all derived products (e.g. mean sea surface, mean dynamic topography).
These studies also provide an important foundation for exploiting data from the Sentinel-3 and Sentinel-6 / Jason CS missions, which will be flying altimeters operating in "SAR" mode.
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