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Investigation of the added value of a varying coherence threshold for CryoSat-2 swath processing

Natalia Havelund, Louise S. Sørensen, and Sebastian B. Simonsen

DTU Space, DTU, Kgs Lyngby, Denmark (naand@space.dtu.dk)

In a changing climate it is important to continuously monitor the Greenland Ice Sheet (GrIS) in relation to global sea level rise (Gardner et al., 2013). The margin of the GrIS is the most sensitive to climate changes and responds quickly.

Here, we study how to improve the sensing capabilities of the marginal areas by applying the novel swath processing technique of interferometric SAR radar data, which is only available from the SIRAL altimeter onboard the Cryosat-2 satellite. In contrast to traditional Point-of-closest-approach (POCA) processing of radar altimeter data, the swath processing delivers a band of data far from nadir and beyond the POCA point. Despite the swath processing, in comparison with POCA, delivers millions of extra data points (Foresta et al., 2018) the new estimates come with a lower signal-to-noise ratio and the method can be optimized further. Here, we investigate the added value of, under suitable surface conditions, to lower the coherence limit to derive the optimal number of observation points and still keep an acceptable signal-to-noise ratio. This will allow us to get the most out of each Cryosat-2 waveform. The validation is further aided by the inter-comparison to airborne data collected during the ESA CryoVEx campaigns.