



Evaluating the pitch bias of CryoSat exploiting stacks of single look echoes

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CryoSat was launched on the 8th April 2010 and it is the first European ice mission dedicated to monitoring precise changes in the thickness of polar ice sheets and floating sea ice over a 3-year period. CryoSat carries an innovative radar altimeter called the Synthetic Aperture Interferometric Altimeter (SIRAL), that transmits pulses at a high pulse repetition frequency thus making the received echoes phase coherent and suitable for azimuth processing. The attitude information of the spacecraft is provided by star trackers, that have an internal accuracy of few arc-seconds.

By analysis of the CryoSat products, two different studies [1, 2] verified the existence of a bias between the pitch reported by the star trackers and the actual pitch of CryoSat during its flight. However those studies, that use two different methods to evaluate the actual pitch, provided different values for the pitch bias.

This poster is aimed at describing a further method to estimate the pitch with which the satellite is actually flying by analysis of the stacks of the single look echoes that are accumulated for a given location of sea surface during the Level1 processing. In fact, over ocean the power of the single look echoes for a given point is shaped by the along-track antenna pattern. As a consequence, estimating the angular direction of pointing of the antenna from the stack, an estimate of the pitch can be obtained. Finally, the bias evaluated starting from the pitch measured with the proposed method is compared with the pitch bias measured in [1, 2].

[1] Galin, N. and Wingham, D., Estimating Pitch Angle of CryoSat-2 using the Power Distribution of the Synthetic Aperture, presented at SAR Altimetry Expert Group Meeting, Southampton UK, June 25-27, 2013.

[2] Smith, W.H.F. and Scharroo, R., Retracking range, SWH, sigma-naught, and attitude in CryoSat conventional ocean data. In proceedings of Ocean Surface Topography Science Team Meeting. San Diego, October 19-21, 2011.