

Interactive comment on “Waveform analysis of airborne synthetic aperture radar altimeter over Arctic sea ice” by M. Zygmuntowska et al.

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We would like to thank Jari Haapala for the positive comment on our manuscript and his suggestions which helped to improve the quality of our paper.

The main suggestion he made, was to include some CryoSat waveforms or at least to discuss more details on the accuracy of the CryoSat SIRAL sensors. Similar corrections have been suggested by the referees, and we hope that the made changes on the manuscript are sufficient to meet the concern.

We added a paragraph in the discussion section describing the difference between ASIRAS and CryoSat waveforms in more detail.

The main difference between the ASIRAS data used in this study and CryoSat data

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is the resolution. While ASIRAS has a bin width of 9 cm and a footprint of tenths of meters, SIRAL onboard CryoSat has a bin width of ~ 45 cm and a resolution ranging from hundreds to thousands of meters. With this large footprint size it is more likely that a mixture of different sea ice types occurs within each footprint what makes a clear separation more difficult. The narrow bin width in the ASIRAS data allows for a detailed record of the returned power. For CryoSat the wide bin width allows only for a detection of large scale changes in surface structure and signal strength. This additionally limits the possibility to separate between surface types. To analyze the impact of the different resolutions as well as the influence of snow and roughness on the SIRAL waveform a detailed study is needed. This has to include measurements from radar and laser altimeters, snow radar and EM measurements as well large scale information about surface roughness from, e.g. ASCAT scatterometer data and snow retrievals from passive microwave measurements.

The references have been changed as suggested.

Interactive comment on The Cryosphere Discuss., 7, 1215, 2013.