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

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This paper analyses waveforms from airborne radar altimetric measurements over sea ice and examines the potential of their use for ice type classification. I am very glad that the paper takes advantage of extensive validation data obtained during European Space Agency CryoVex campaigns. Results are encouraging and provide further motivation to perform similar studies with CryoSat data, which use a similar synthetic aperture altimeter concept. The manuscript is well written and I suggest to publish it with minor revisions suggested below.

Title: Would Waveform Classification be a better term than Waveform analysis?

P 1218: L5: rapidLY L6: techniqueS L24-25: Better use real name CryoVEx, not CalVal

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P 1219: L11: north of Greenland AND CANADA

Chapter 2.2: Have you tried other waveform shape parameterizations as well? Were they unsuccessful?

P 1223, L 21: extenT

P1224, L 7: this is a little confusing here, mention that you mean MYI and FYI (?) as the two evaluated sea ice types

Eq. 3: confirm that you mean #class_class in denominator, not #known_class (as in Eq.2)?

Discussion:

Comparison with Drinkwater results: Maybe add an explanation that the Drinkwater results, obtained in the MIZ, probably were mostly from small floes smaller than the footprint size of the altimeter. This makes a big difference and footprint size should always be considered when comparing airborne and satellite data.

P1228, L. 11: describe more carefully: Freeboard is not the part, but the height of the ice (or) snow surface above the water level, depending on definition.

When discussing applicability of the results to CryoSat or other altimeters, it would be nice to include a discussion of the importance of the narrow bin width (9 cm) of ASIRAS for the good results. Probably this narrow bin width allows much better discrimination of the wave form parameters than with coarser bins like those from CryoSat?

Table 1: Add total length of sections over each ice type? Indicate if FYI was flat, or rough, or nilas?

Figure 3: I suggest to improve this figure by adding bins < 1% at both sides of the waveforms to show that LeW and TeW do not extent all the way to the beginning or end of the range window.

TCD
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Final remark: Although you have mentioned somewhere that indeed the classification into FYI is coarse and that there can be various different types of FYI, it would be nice to mention more explicitly that further studies of the impact of ice surface roughness and snow properties are warranted and should be done. Hopefully you will be able to perform a follow-up study using the existing extensive, coincident laser, EM, and snow data to study the effects of variations of these properties on altimeter waveforms?

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