Review of "Self-affine subglacial roughness: consequences for radar scattering and basal thaw discrimination in northern Greenland" (Jordan et al.,)

The paper applies statistical techniques widely used in planetary radar sounding measurements to radar soundings of a terrestrial ice sheet for the first time. The authors demonstrate that a series of parameters (roughness, abruptness etc.) are different depending upon whether the data are from thawed or frozen bed conditions.

General comments

The paper is very well-written and technically excellent. The analysis is clearly important and has been very carefully and throughly undertaken. Some readers could perceive the manuscript as having a slight shortfall in glaciological content. However, I am of the opinion that the analysis and findings of the manuscript are of sufficient significance to make the content appropriate for publication in TC. For example, importantly, and of direct relevance to glaciology, the manuscript demonstrates limitations associated with the approach of Oswald and Gogineni (2008,2012) for determining areas of thawed and frozen bed. However, I do recommend that the authors do consider approaches to make the manuscript more accessible to a general glaciological audience. A slightly more glaciological-facing paper should acquire a broader readership in the community. I have two suggestions for how to achieve this, neither of which should be too onerous:

1. Incorporate into the paper a figure with radargrams that provide examples of the different characteristics. Including the actual radargrams for the four examples of the Hurst exponent in figure 1 could achieve this. Figure 4 might also benefit from radargrams illustrating bed echo waveforms with different abruptness.
2. What about a focused case study of a particular glacier (or two) in NW Greenland to exemplify the authors' key points? There are few references throughout the paper to actual locations or sites in Greenland, even in the discussion (e.g. Camp Century, NorthGRIP), and a few more references to geographical locations may make this paper a little less 'abstract' and more broadly accessible.

Specific comments

Intro – a very well-written intro, that sets the scene very effectively and concisely.

Section 3.2 – authors assume that all the level 2 data are consistent, but will have been picked by several different people. What confidence do the authors ascribe to the level 2 picks? Are there uncertainties associated with this data product that can be quantified?

Line 25 – are Seroussi and Schroeder references really the most appropriate here? I am sure that wet bed tends to = fast flow was determined by others long before 2013.

Lines 130- 131 – Sentence needs rewording.

Line 173 – some might suggest that reviewers could legitimately be referred to as 'asses', but the word I think you are looking for here is 'assess'.

Line 265 -"waveform corresponds to"?

Line 305 – "model a decrease"?

Line 400 – smoothing? A google search suggests “smoothening” is predominantly something to do with the management of hair.

Line 528 – “(Gorman and Siegert 1999)”

Line 529 – “…depth at which a lake is electrically ‘shallow’ or ‘deep’…..”?

Line 836 – “roughness”

Figure 6 – The colour scale in some parts of this figure (b and c) does not necessarily visualise the data as effectively as it might.

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