

# ***Interactive comment on “Greenland annual accumulation along the EGIG line, 1959–2004, from ASIRAS airborne radar and detailed neutron-probe density measurements” by T. B. Overly et al.***

## **Anonymous Referee #3**

Received and published: 10 February 2016

This paper presents annual accumulation rates along Greenland’s EGIG line derived from the ASIRAS radar altimeter between 1995 and 2004, and reports accumulation rates for the same area measured in-situ for the 1985–2004 period, and modeled accumulation rates for the 1959 – 2004 period. It is not straightforward what is the objective of the paper other than present accumulation rates already reported. Also, there are sections where the methodology explanation is not completely clear, and the author needs to address certain issues. For instance, the radar analysis using the ASIRAS data set is basically a repeat of de la Peña et al. (2010) method to estimate accumula-

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tion rates; the paper follows the same methodology and use the same data. The use of a different (and more numerous) set of density profiles (already published in Morris and Wingham, 2011) cannot be the only reason to present these data since the results and conclusions are basically the same, and the author has to better explain why. As has been addressed, there has to be an explanation of the dating of the radar isochrones and the dating of the neutron probe profiles. The radar isochrones do not form in the summer; in the dry-snow zone, the reflections are caused autumn hoar, which is formed after the summer and do not occur at the same time each year. In general, the paper lacks important references, and while some of the results are worthy of publishing (especially the comparisons), the document needs a revision. I would suggest focusing on the differences between observed and modeled accumulation rates, and expand the discussion on the differences in accumulation rates derived from ASIRAS using Herron and Langway and neutron probe densities.

In addition to the commentary from other reviewers, I have the following specific comments:

p. 6792 In 21: Remove ‘conservatively’; maybe include the estimated sea level rise range based on all scenarios.

p. 6792 In 22: Use ‘Assumptions’ instead of ‘Simplifications’.

p. 6793 In 5-10: This needs to be rephrased. The first sentence implies that ‘Depth and age’ of a given radar isochrone yield accumulation by itself – density needs to be accounted for (which is done, but this is not clear).

p. 6794 In. 18-19. Is not clear what you mean by ‘katabatic winds compact the upper snow layer’. Katabatic winds will create a ‘crust’ at the surface, and redistribute the snow, but it does not create compaction. Without a reference, I would discard this.

p. 6794 In. 22-24. Include reference Mosley-Thompson et al., (2001).

p. 6795 Include reference Helm et al., (2007).

p. 6799 ln. 11-12. While I tend to agree, the author mentioned before that east of T21 is considered the 'dry-snow zone' where temperatures never dropped below freezing. This statement contradicts that, and if ice was indeed found in some sections, the accuracy of the estimated accumulation rates would suffer, since there is no way to calculate ice content from the radar by itself.

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Interactive comment on The Cryosphere Discuss., 9, 6791, 2015.

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9, C3009–C3011, 2016

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