

Interactive
Comment

Interactive comment on “Changes in the firn structure of the Greenland Ice Sheet caused by recent warming” by S. de la Pe na et al.

S. de la Pe na et al.

santiagodpr@gmail.com

Received and published: 31 March 2015

We thank anonymous referee 3 for comments and recommendations. Please find the response to specific remarks below. All changes/corrections will be shown in the final draft.

By recommendation of two reviewers the paper title has changed to “Changes in the firn structure of the western Greenland Ice Sheet caused by recent warming”.

Specific comments reviewer #3:

1. (p. 543 In 4) The phrase ‘melt and percolation regimes’ refers to the processes, not the area affected. 2. (p. 543 In 4) Replaced “solid ice” with “ice content”. 3. (p. 543 In 5) Replaced “equilibrium line” with “superimposed ice zone”. 4. (p. 445 In 2) Replaced

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'height' with the word 'elevation'. 5. This has been corrected. The instrument used in Fettweis et al. (2011) is the passive Scanning Multichannel Microwave Radiometer (SMMR). This reference confirms that although biases exist in the RACMO data, melt rates in areas with no runoff are consistent with rates satellite observations. 6. The following reference has been added: Burgess, E. W., Forster, R. R., Box, J. E., Mosley-Thompson, E., Bromwich, D. H., Bales, R. C., and Smith, L. C.: A spatially calibrated model of annual accumulation rate on the Greenland ice sheet annual (1958–2007), *J. Geophys. Res.*, 115, F02004, doi:10.1029/2009JF001293.2009, 2010.. 7. (p. 548 In 3). Surface elevation change in this region is caused by a combination of dynamic thinning, firn compaction, and accumulation. Variability in annual snow accumulation (not only from models, but from winter snow accumulation measured in the field) was not large enough to cause the drastic elevation change noted in 2012-2013 (there are also firn compaction monitors in the sites, so it is also known that compaction variability is not causing the large displacement), and there is no evidence to suggest that dynamic thinning increased so much during 2012 to cause such a signal at these elevations. Thus, we conclude that at least most of the differences in elevation change in 2012-2013 compared to the previous years shown is caused by a change in the volume of the firn resulting from converting snow to ice. 8. Table 1: We have converted to decimal degrees to allow more space. 9. Figure 1 has been redrawn to show OIB flightpath. 10. Figure 7: outline of the ice sheet has been drawn.

Interactive comment on The Cryosphere Discuss., 9, 541, 2015.

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