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The Cryosphere Discussions

Interactive comment on "Spatially extensive estimates in annual accumulation in the dry zone of the Greenland Ice Sheet inferred from radar altimetry" *by* S. de la Peña et al.

Anonymous Referee #1

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This short paper presents radar altimetry-based accumulation rates along a 200 km transect in the dry snow zone of the GrIS with the aim for applying the same technique with the coming Cryosat-2 data.

It is well written and the accumulation retrieval methodology used here is interesting for Cryosat-2 although it is similar to Hawley et al. (GRL, 2006). The abstract is a good summary of the paper. The approximations made in the methodology are well described and justified. However, before publication, some additional information about the used snow density profiles should be given and the interest of this paper compared to Hawley et al. (2006) should be more clear.

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Interactive Discussion
Discussion Paper

Hawley et al. (2006) (HA06 hereafter) seems to use the same data on the same transect with the same aim of estimating the accumulation. What are the differences with HA06 ? Why were HA06 able to estimate the accumulation since 1995 while the accumulation is limited here to 1998-2003 ? The HA06 analyse starts at 2650 m. Why do the authors not use the ASIRAS data between 2650 m - 2750m along the EGIG transect like HA06?

In addition, I m not sure if the paragraph about the modelled results is relevant in this paper because the comparison is limited here to only 8 pixels over 6 years. If the authors want to keep this section, I suggest to add here the non-calibrated model outputs to see the interest of the Bales et al. (2009) based calibration and to show how the Bales et al. (2009) data set compares with the remote measurements made here. If the authors can justify the interest of their paper compared to HA06, I suggest to accept this paper for publication in TC as "Brief Communication" with the suggested additions listed hereafter.

1. pg 770, line 9: The authors forgot to mention the impact of snow drift in the factors that cause elevation changes.

2. pg 770, line 20: What is the snow density used here ? Is it a constant value over 1998-2003 ? A table showing measurements made at Summit and at 2650m is required here.

3. pg 775, line 6: A comparison year by year with real measurements (in a table) should be more interesting here to see if the interannual variability from the ASIRAS-based accumulation is reliable.

4. pg 775, line 9: The reference to Table 2 is missing.

5. pg 775, line 10: The comparison with measurements at 2750m shows that the methodology used here overestimates the accumulation rates of 4cm. This ex-

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plains likely why their estimates are 5cm higher than the previously recorded observations. The main uncertainty in this methodology is the snow density. What should be the snow density value needed at 2750m for having a full agreement with measurements ? Are the snow density measurements reliable ?

6. pg 775, line 17: What is the value of the constant snow density used here?
7. pg 776, line 23: A reference is needed here
8. pg 777, line 3: The absolute value of the simulated SMB of the dry snow zone should be given here and not only the error.

Interactive comment on The Cryosphere Discuss., 4, 767, 2010.