

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 #2

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The authors used the data from an airborne radar altimetry (ASIRAS, the prototype of the SIRAL radar on board Cryosat-2 recently launched) over Greenland in order to estimate the average snow accumulation pattern and its temporal variability. The paper is well written, concise and show promising results. However, two problems should be addressed by the authors before a publication.

First, the paper seems to be a remake of the Hawley et al. (2006); It is the same data and the same objectives. The authors should better explain the differences between both studies and pointed out their own results. For instance, why the average accumulation is so different? What is the difference between both methodologies? I think the

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paper cannot be accepted without such a clear discussion.

Second, the derivation of annual accumulation rates from the observations should be better explained. Indeed, the speed of light in snow only depends of the permittivity or on the density and we understand well how derive the layers thickness. However the derivation of annual accumulation rates from the internal layers thickness needs several external observations such as snow density profile. The paper should have a discussion of the used snow profile and on the used densification law. Snow density is highly variable in time and space, so that few in situ measurements are not enough without justification. The authors only refer to papers of Hawley et al. (2006 and 2008), they must give more details about this.

Cryosat-2 is launched since few months and few profiles above Greenland are processed (some was shown during the Cryosat-2 session during the Living planet symposium of ESA at Bergen at the end of June). The authors can show such a profile and discuss about the capacity of Cryosat-2 to retrieve snow accumulation.

P 774 line 2. Penetration depth in Ku-band depends of a lot of parameters, snow temperature, dielectric loss due to scattering (then ice grain size) or absorption, dielectric loss due to internal stratification, roughness internal layers. . . not only of snow density. Additional layers observed with increasing elevation could probably be explained by decreasing temperature and loss.

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

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