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The Cryosphere Discussions

Interactive comment on "The relation between sea ice thickness and freeboard in the Arctic" *by* V. Alexandrov et al.

V. Alexandrov et al.

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I have three main comments. The first one is that based on the Sever data I think these results regarding relation between sea ice thickness and freeboard in the Arctic are relevant for FYI or Seasonal sea ice but not for MYI.

Answer: The simultaneous measurements of sea ice thickness, freeboard and snow thickness in Sever expeditions were conducted almost exclusively on the FY-ice and in the period March-May. Therefore the derived relations between ice thickness and freeboard are valid for FY-ice in late winter.

The relation between MY-ice thickness and freeboard was calculated using snow cli-

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matology data by [Warren et al., 1999], and the density of MY ice was calculated as the weighted average of its upper and lower layers.

My second remark concerns hydrostatic versus isostatic assumptions. Both assumptions

should not be confused. It should be clear that isostatic is more or less related to

snow pay load on top of sea ice in contrast with hydrostatic being more related to sea

ice density.

Answer: We need to be consistent and to use the terms, which are usually, used by scientific community in altimetry and sea ice physics. The authors of publications on this topic (R. Kwok, S. Laxon, K. Giles and others) use term hydrostatic equilibrium, so in our paper we also change "isostatic equilibrium" to "hydrostatic equilibrium".

The third important aspect concerns sea ice rheology that might affect freeboard versus

sea ice thickness. This might not have a dominant impact for FYI compared to MYI but

still need to be considered in this paper.

Answer: As we understood this remark, the referee means ridging or deformation of the sea ice. We agree that it might affect freeboard versus sea ice thickness, but we did not study this problem. In order to study it we need dedicated data, which separate level and deformed ice.

Interactive comment on The Cryosphere Discuss., 4, 641, 2010.