

Interactive comment on “Partitioning of melt energy and meltwater fluxes in the ablation zone of the west Greenland ice sheet” by M. Van den Broeke et al.

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This paper provides a detailed method for determining the magnitude of the respective energy balance terms and the consequent melting that occurs. The method is based on considerable field data, which suggests its robustness. By identifying the differing energy balances and melting sequence at the various locations in the ablation zone, this method provides an opportunity for upscaling. I look forward to seeing the partitioning of the ablation zone itself in terms of areal extent to combine with the ablation relationships identified here through melt partitioning. I would like to see more discussion of the surface roughness issue as it is quite important to the sensible heat flux

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(SHF). Are there any quantifiable observations of surface flux? Has there been any changes in surface roughness at S5 or S6 from 2003-2007? If so this could be an important potential change in the melt energy for such a region. I have noted considerable surface roughness increases after several years of persistently high ablation in various sections of the ablation zone of temperate alpine glaciers. It would be advantageous to see the temporal differences in surface energy balance terms resulting from unusual ablation conditions of 2007 compared to 2003-2006.

Specific comments: 712-25: It is noted that the narrow ablation zone has been the location of the largest changes in ice flow. Must be careful with this as the greatest ice flow changes are in the ablation zone of marine terminating outlet glaciers, not simply in all areas of the ablation zone.

714-10: What about the surface conditions at S6. In fact I would like to see Table 2 include a measurement if one exists for surface roughness at the three locations.

718- 15-20: Need a Figure for this observation of M, or of the observed versus modelled Ts.

720-8-10: I like the use of the 10 day average melt rates. I have found ablation difficult to quantify accurately from weather records at the daily level. Is this part of the reason for this time period?

721-20: Any measures over long period of changing surface roughness that would affect SHF at either S5 or S6?

721-: Return to the advantage of this method to the degree day model of Braithwaite.

Figure 1: A more zoomed view of the three measurement sites.

Figure 4: The melt models greatest relative errors are for melt rates below 10 kg/day makes sense but explain.

Figure 5: Why is S6 melt so much lower than S5 in 2004?

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Figure 6: I doubt hourly rates are either important or reliably determined, not that this changes the results of this figure.

Figure 7: Add a figure showing the difference for 2007 surface energy balance versus the longer term results, for at least one site, this could be 7(c).

Interactive comment on The Cryosphere Discuss., 2, 711, 2008.

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