The Cryosphere Discuss., 5, C1630–C1632, 2011
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The Cryosphere Discussions

Interactive comment on "Sensitivity of a distributed temperature-radiation index melt model based on a four melt season AWS record from Hurd Peninsula glaciers, Livingston Island, Antarctica" *by* U. Y. Jonsell et al.

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Received and published: 22 December 2011

Jonsell et al (2011) provide a detailed surface energy balance for two glaciers on the Hurd Peninsula of Livingston Island, Antarctica. This paper can be a valuable addition to our developing understanding of surface energy balance and mass balance in the region building on the similar study nearby on King George Island that lacked surface mass balance data (Braun and Hock, 2004). As a result there needs to be a greater attention to the mass balance work and also to the observations of the surface energy balance of Braun and Hock (2004). There are two key aspects that I suggest further

attention to would enhance the value of this paper. 1) There is no mention of the accumulation area ratio, balance gradient or duration of exposed bare ice at any specific locations. Important aspects in tying the surface energy balance to mass balance. 2) In such settings where the temperature range is limited, it is typically advection of warm moist air events that dominate the ablation record, such events need a greater focus.

Specific Comments: 3226-4: Refer top Braun and Hock (2004) who note a range of 3.3 to -5.5 C on nearby King George.

3230-14 or 3226-1: The dominant periods of ablation on nearby King George Ice Cap were noted as occurring during the advection of warm moist air with winds from the north as a low passed north of the region. This is noted by the authors here and at 3226-1, but needs added discussion. In Figure 8 are the three spikes in ablation due to such events?

3231-25: Melting is initiated when Ts>-0.5 C when A is positive, correct? Use the Kuipers-Munneke et a al. (2011) in support of this.

3233-6: It is worth noting the range in annual ablation as noted by the sonic ranger of 1.5-2.5 m depending on the year and or the ablation stakes. There is no mention of the balance or ablation gradient, inclusion is essential.

3234-17: What is the ratio of stakes in ice to snow in the various years.

3237-20: Need to document the AAR for the glacier in the various years. WGMS lists an AAR0 for Hurd and Johnson of 51 and 58 respectively. What is the duration of the exposure of bare ice typically?

3238-15: Braun and Hock (2004) note the low lapse rates as well during the primary melt events.

References:

Braun, M. and Hock, R.: Spatially distributed surface energy balance and ablation

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Interactive comment on The Cryosphere Discuss., 5, 3221, 2011.