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The Cryosphere Discussions

Interactive comment on "Diagnosing the extreme surface melt event over southwestern Greenland in 2007" *by* M. Tedesco et al.

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In Fig. 2j the maximum surface energy flux is centered around 71 N, north of the maximum melt index region. Is there any explanation for the difference in the energy input patterns and the melt pattern?

This is an issue that certainly merits investigation. Looking at Figure 2g, it appears that the shift relative to the maximum surface melt anomaly is largely due to the pattern of the modeled anomalous sensible heat flux. A useful first step will be to compare the outputs of MAR with available surface-based measurements. We also take this opportunity to point out that the legends for panels f through j of Figure 2 should have stated that these are anomalies. A revised figure with the correct legends will be supplied in the revised version of the paper, once the end of the first review will allow to change the submission.

In Fig. 3 the correlation between the daily melt index, Fig. 3a, and the 500-1000 hPa thickness, Fig. 3c, appears to be very good, what is this correlation? A table illustrating the correlation for various years would be useful in helping to delineate what was different in 2007.

Given that the 1000-500 hPa thickness is a measure of tropospheric temperature, a relatively high correlation between the daily thickness and melt index time series (0.79 over the period 1 June-31 August 2008) is not surprising. All years in the records show high correlations, ranging between 0.74 to 0.84. This will be noted in the text. What was unusual in 2007 was the persistently positive anomalies in 1000-500 hPa thickness and the melt index.

In Fig. 4 the sharp albedo declines around 7/11 and 8/12 are noteworthy. However, the mechanisms noted are each long term processes and it is not clear to me how these explanations can account for the rapid short term change in the albedo on the aforementioned dates. Is there any data to reference on the reduced winter snowpack? The final two sentences are key. ...Mote (2007) while the seasonal melt departure index is significantly correlated with summer temperatures at coastal stations around Greenland, 2007 showed more melt than expected based on these records. The MAR simulation lends credence to his suggestion for a role of reduced albedo...I agree but the credence could be made more quantitative in this paper through use of appropriate statistical comparisons and a more detailed look at the rapid albedo response. In particular albedo in Fig. 4b can be directly related to Fi.e 3a-c.

Regarding the apparent sharp declines in albedo centered around 7/11 and 8/12, we find with considerable embarrassment that the albedo timeseries and anomaly plot (Fig4b) is simply wrong. In the corrected version of Figure 4, it is apparent that the sharp declines in albedo are actually periods with fairly high albedo, which, in turn, are associated with snowfall events in MAR. Such events are described by Fettweis et al. (2005). We have amended the text, cited this paper and have replaced the old version of Figure 4 with a corrected one. The low snowfall in 2007 simulated by MAR

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finds further support in the recent study of Hannah et al. [2008, in press]. We have amended the text and references to bring the reader's attention to this paper.

4) A minor detail but important for ease of viewing, is the font for the scale on the axes of each figure is insufficient for accurate reading.

We changed the font size in the colorbars.

As the paper is under review, we are not able to change the submission until reviews will come in. In the meantime, a revised temporary version of the paper can be found at http://kryos.110mb.com/Tedesco_et_al_2008_v1.2.pdf.

Interactive comment on The Cryosphere Discuss., 2, 383, 2008.