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The Cryosphere Discussions

Interactive comment on "Record mass loss from Greenland's best-observed local glacier" *by* S. H. Mernild et al.

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Review comments to Mittivakkat Glacier paper.

Anonymous Referee #3

We thank the anonymous referee for the comments related to our paper in Discussion for TC.

The main message from this paper is the long time series of 15 years of mass balance measurements showing the steady trend towards more negative mass balance (Fig.3). That could have been addressed in the title of the paper more like: "Increasing mass loss from Mittivakkat glacier in Greenland". The current title does not focus on the main content, which is the long time series, and not the last year record high loss.

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Interactive Discussion

Discussion Paper

MERNILD: The title has been changed.

I missed figures about the stake locations and elevation contours but I see now that such a figure will be added. I also really missed the added information in the long time series of the summer mass balance and the winter mass balance. Such data would have added much information to the discussion about the net mass changes. However, since this data is not available, at least for many of they years, it helps to have the time series of temperature and precipitation as given in Figure 3b. The long-time series of air-temperature anomalies is given in fig. 4, but why not also give, if available, the longtime series of precipitation? We see (a bit surprising) from Fig. 3 a decreasing trend in precipitation since 1996. Is this consistent with long time series and also a regional trend?

MERNILD: Figures with topography, stage location, meteorological station location, and ELA has been added to the manuscript. The general trend for the MG since 1995 has been toward higher summer temperatures, less winter precipitation, and a more negative glacier mass balance. The trends in climate for the MG region are consistent with the long-term climate trends since 1900 for Tasiilaq, where the temperature anomaly is almost in anti-phase with the precipitation anomaly (Mernild et al. 2011 or attached figure from Mernild et al. 2011). During periods with a decreasing trend in precipitation (e.g., from 1900 until the 1930s and 1970 to the present), the temperature trend was increasing, and visa versa. Even though the climate is in anti-phase for the MG region, the MG terminus has continuously retreated since the maximum extension of LIA, since 1900. Text has been added to the manuscript about this, and a figure showing the Tasiilaq temperature and precipitation anomaly has been uploaded here as back ground material.

Mernild and others 2011. Climate-driven fluctuations in freshwater to Sermilik Fjord, East Greenland, during the last 4000 years. In press The Holocene.

For a wider use of the data it is not the total mass balance of this glacier that is interest-

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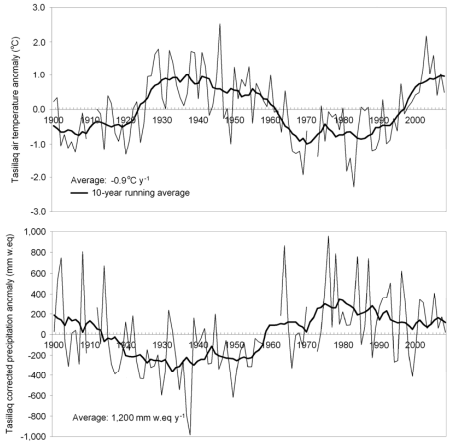
ing, but rather the mass balance gradient, the trend in the data and the mass change in each elevation band. That information can probably be used for larger regional estimates of mass changes. The overall mass balance for this glacier will of course be a direct result of the hypsometry and thus the discussion about the AAR and future possible volume changes is valid only for Mittivakkat Glacier.

MERNILD: Observations of eight other glaciers in the Mittivakkat region, including Sermilik Fjord and Ammassalik Island, show terminus retreats comparable to that of MG. These glaciers are similar to the Mittivakkat Glacier in size and elevation range. Therefore, a new detailed regional study investigating the sensibility of the glacier response in the Mittivakkat Glacier region due to changes in climate could be interesting, based on observations from these eight glaciers and Mittivakkat Glacier. A study like this is however outside the purpose of this study.

P 462, l 25: a misprint: should be Dyurgerov (not Dyugerow) MERNILD: This is changed throughout the manuscript.

Interactive comment on The Cryosphere Discuss., 5, 461, 2011.



Time series of atmospheric values from Tasiilaq meteorological station for 1900–2008: MAAT anomaly and 10-years running average; and annual corrected precipitation anomaly and 10-years running average (this figure is from Mernild et al. 2011, The Holocene).

Fig. 1. Time series of atmospheric values from Tasiilaq meteorological station for 1900–2008: MAAT anomaly and 10-years running average; and annual corrected precipitation anomaly and 10-years running average

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