

Interactive comment on “Record mass loss from Greenland’s best-observed local glacier” by S. H. Mernild et al.

S. H. Mernild et al.

mernild@lanl.gov

Received and published: 31 March 2011

Anonymous Referee #3

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.

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

C224

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 the 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: A figure with topography, stake location, meteorological station location, and equilibrium line 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). During periods with a decreasing trend in precipitation (e.g., from 1900 until the 1930s and 1970 to the present) the temperature was increasing, and visa versa. Even though the climate is in anti-phase for MG region, the MG terminus has continuously retreated since the maximum extension of LIA. Text has been added to the manuscript about this.

For a wider use of the data it is not the total mass balance of this glacier that is interesting, 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 MG in size and elevation range. It would be interesting

C225

to carry out a detailed regional study of the climate sensitivity of these eight glaciers, but such a study is beyond the scope of this paper.

P 462, I 25: a misprint: should be Dyurgerov (not Dyugerow)

MERNILD: The spelling has been corrected.

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