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

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Received and published: 31 March 2011

Updated review comments for Mittivakkat Glacier paper

M.Pelto

Title: Add Mittivakkat Glacier to the title.

MERNILD: Done.

464-8: Expand the discussion or include a table of the various terminus changes for the intervals noted in Figure 1.

MERNILD: A table (Table 1) has been added to the manuscript, and the values are discussed.

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464-20: Include a figure illustrating the balance gradient of the glacier. This is the single key figure that is helpful in analyzing mass balance, particularly with respect to a glacier's future response to climate change.

MERNILD: A plot of annual net balances with altitude for the Mittivakkat Glacier (1995–2010) has been added to the manuscript (Figure 4).

464-21: A satellite image with glacier contour lines and basic measurement profiles noted should be included since this is the first detailed mass balance report on this glacier.

MERNILD: A map illustrating the glacier with contour lines, the ELA, and the location of the stakes was added to the manuscript (Figure 1).

465-6,8,9: For clarity refer to mass balances losses with a negative sign before the value, as -0.34 m etc.

MERNILD: Since a 'loss' by definition is negative, it would be confusing to write 'a loss of -0.34 m'. Thus we have used minus signs when referring to negative mass balances, but we have omitted minus signs when referring specifically to mass losses.

465-11: What was terminus ablation in other high years such as 2005 and 2007, did 2010 substantially exceed all?

MERNILD: Terminus ablation values for 2005 and 2007 were added to the text. The 2010 value lies between the 2005 and 2007 values.

465-24: What was the winter balance in the typical accumulation zone above 600 m in 2010? At present we are given very little information on accumulation zone. Given the low AAR it is expected that ablation will be of greater focus.

MERNILD: In 2010 the AAR was zero, indicating that net ablation occurred everywhere on the glacier. We do not have data for the 2010 winter balance, because measurements were not carried out in May 2010. In some years fieldwork was done both in late

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May and in late August, but May data are not available in 2003, 2004, 2007, 2009, and 2010. Due to the missing values in the winter balance time series, we focused in this paper on the net balance.

465-25: When was the terminus exposed in 2010. Are there any other transient snow-line elevations noted during the course of the melt season. It would be interesting to know the length of exposure to melting of the various elevation bands.

MERNILD: A pers. comm. reference (Anders Anker Bjørk, see references for affiliation) has been added to the manuscript, stating that the glacier ice was exposed in late June 2010, two to three weeks earlier than average.

467-3: Is the annual ELA observed in the field or via satellite images?

MERNILD: The ELA is calculated based on measurements from the stake method. We have added text to make this clearer. The average ELA is also plotted on Figure 1, and the elevation for the annual ELA can be seen in Table 2.

467-15: Since 4 out of the last 10 years have led to the loss of essentially the entire accumulation zone, and other very low AAR suggest the lack of a persistent accumulation zone. Without an accumulation zone a glacier cannot survive Pelto (TC: 2010).

MERNILD: We agree. The low AAR values suggest that the glacier will not survive in the long term. Therefore, it will be interesting to observe mass balances (winter, summer, and net) for the Mittivakkat Glacier in the next decade to see if the trends of 1995-2010 continue.

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

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