

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

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Updated review comments to Mittivakkat Glacier paper.

M. Pelto

M. Pelto, thanks for the comments related to our paper in Discussion for TC.

Title: Add Mittivakkat Glacier to the title. MERNILD: Is 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) is added to the manuscript, and the values are discussed.

464-20: Include a figure illustrating the balance gradient of the glacier. This is the
C128

single key figure that is helpful in analyzing mass balance, particularly with respect to a glacier’s future response to climate change.

MERNILD: Figures illustrating annual net balances with altitude for the Mittivakkat Glacier (1995-2010) is added to the manuscript.

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 are as well added to the manuscript.

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 a negative thing, it will be a pleonasm saying: ‘a loss of -0.34 m’. Therefore, we will not include a negative sign in front of the values, as asked for by the reviewer.

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 are added to the text.

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 ELA was located above the glacier some where. We simply don’t have any data for the 2010 winter balance, because we didn’t went to the glacier in end-of-May 2010. In some years fieldwork is done both in end-of-may, and end-of-August, but in 2010 we only went to Mittivakkat in August to do annual net balance. In 2003, 2004, 2007, 2009, and 2010 we didn’t go

there to do end-of-winter balance. Due to the missing values in the winter balance time series, we were in this paper only concentrated/focused 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. com. reference (Anders Anker Bjørk, see references for affiliation) has been added to the manuscript, saying that the MG the glacier ice was exposed already in late June 2010, which is two to four 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 a line to the manuscript, to make it 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 Peltó (TC: 2010).

MERNILD: I agree. The low AAR, and AAR values equal to zero, will probably in the long run do, that the glacier not will survive. Therefore, it will be interesting to observe mass balances (winter, summer, and net) for the Mittivakkat Glacier in the future – in the next decade –, to see if the trend illustrated for the period 1995-2010 will continue.

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