

Interactive
Comment

Interactive comment on “Glacier dynamics over the last quarter of a century at Helheim, Kangerdlugssuaq and 14 other major Greenland outlet glaciers” by S. L. Bevan et al.

M. Pelto

mauri.pelto@nichols.edu

Received and published: 4 June 2012

Bevan et al (2012) provide a longer time series of velocity and frontal changes on key GIS outlet glaciers than previously available. This is valuable in quantifying the widespread stability of the 1985-1995 period. This is in contrast to the period of increased outlet glacier velocity and terminus change from 1995-2010 where this paper provides a valuable record of the outlet glacier temporal and spatial variability of velocity. To better illustrate the dynamic changes the authors need to better quantify for the reader the changes in velocity from the period of dynamic stability to the more recent period of dynamic variability. The important role of water depth is emphasized in the

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



introduction in terms of ability to bring warmer ocean water in contact with the glacier. However, the water depth is not identified at the calving front for those glaciers where it is known.

1646-22: There should be a Table that accompanies Figure 1 that indicates for each glacier terminus changes, mean velocity for the period of stability, and the period of acceleration and the degree of variability. Additionally it is crucial because of the dynamic importance to where possible simply identify the water depth or ice thickness at the glacier front. For example Stearn et al (2005) indicate ice thickness at the front of the Daugaard Jensen Glacier as approximately 500 meters.

1647-12: What was the stable velocity of Helheim Glacier? What is the mean acceleration for the periods after 1995/96? For each glacier it important to denote the mean stable period velocity and the mean post acceleration speed. Further this should be denoted in percentage for comparison from glacier to glacier and allows comparison with the larger data set for a shorter period from Moon et al (2012)

1651-9: It should be emphasized that Petermann and Nioghalvfjærdsbrae are the only two glaciers that do not have a maximum velocity near the terminus, and of course this is related to the large distance from the grounding line to the terminus.

1651-15: Daugaard Jensen (DJ) should not be lumped in with Petermann and Nioghalvfjærdsbrae simply because terminus response is the same. The lack of a large floating tongue, and the evident velocity maximum at the terminus indicates that dynamically it is more like the other outlet glaciers. Why the changes are less than the other fast flowing outlet glaciers is the interesting question. Walsh et al, (2012) observe that the change in terminus position of nearby Fredriksborg and Christian IV are similar to DJ. Neither Fredriksborg or Christian IV accelerated from 2000-2010. This should be noted to emphasize that DJ is not exceptional for its region. In Walsh et al (2012) DJ is shown to have increased in velocity, whereas here the acceleration is not observed, why the difference?

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

Moon, T., Jooughin, I., Smith, B. and Howat, I.: 21st-Century Evolution of Greenland Outlet Glacier Velocities. *Science* 4 May 2012: 576-578, DOI:10.1126/science.1219985,2012.

Stearns, L. A., Hamilton, G. S., and Reeh, N.: Multi-decadal record of ice dynamics on Dau gaard Jensen Gletscher, East Greenland, from satellite imagery and terrestrial measurements, *Ann. Glaciol.*, 42, 53–58, doi:10.3189/172756405781812565, 2005. 1651

Walsh, K. M., Howat, I. M., Ahn, Y., and Enderlin, E. M.: Changes in the marine-terminating glaciers of central east Greenland, 2000–2010, *The Cryosphere*, 6, 211–220, doi:10.5194/tc-6-211-2012, 2012. 1646, 1654

[Interactive comment on The Cryosphere Discuss.](#), 6, 1637, 2012.

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

