

Interactive comment on “Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming is highly dangerous” by J. Hansen et al.

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This is in response to the following remark made by Mr Istvan regarding the potential for Greenland ice sheet melt water to contribute to SLR:

"The ice would have to melt, and most of it is nowhere near oceans."

There is a great deal of data showing significant ice mass loss from Greenland:

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"Using satellite radar interferometry observations of Greenland, we detected widespread glacier acceleration below 66° north between 1996 and 2000, which rapidly expanded to 70° north in 2005. Accelerated ice discharge in the west and particularly in the east doubled the ice sheet mass deficit in the last decade from 90 to 220 cubic kilometers per year. As more glaciers accelerate farther north, the contribution of Greenland to sea-level rise will continue to increase." (Rignot, 2007)

" We estimate a mean annual GrIS mass loss of $243 \pm 18 \text{ Gt a}^{-1}$, equivalent to 0.68 mm a⁻¹ sea level rise (SLR) for 2003–2009." (Beata M. Csatho, et al; 2014)

Furthermore, melt water is finding its way to the base of the ice sheet, releasing the frozen bond between rock and ice that has likely existed for millennia, promoting further movement.

" Moulin discharges mapped inside 52% of the source ice watershed for Isortoq, a major proglacial river, totaled 41–98% of observed proglacial discharge, highlighting the importance of supraglacial river drainage to true outflow from the ice edge. " This work describes a drainage system found in SW Greenland. (Laurence C. Smith, et al; 2014).

As far as additional access to the ocean is concerned, the NW quadrant of the Greenland ice sheet is superimposed on a dendritically drainage system that feeds into a " canyon (that) has the characteristics of a winding river channel and is at least 460 miles (750 kilometers) long, making it longer than the Grand Canyon. In some places, it is as deep as 2,600 feet (800 meters), on scale with segments of the Grand Canyon. "

http://science.nasa.gov/science-news/science-at-nasa/2013/29aug_megacanyon/

The mouth of the canyon is also the site of the Peterman Glacier terminus. The Peterman shelf is the one that Jason Box predicted would calve, an assessment that was largely disregarded by the scientific community at that time. It did, in fact break off in

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2010, the year following his prediction.

http://www.nbcnews.com/id/44353322/ns/us_news-environment/t/second-giant-ice-island-set-break-greenland-glacier/#.Vbe30XhkDWE

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