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A consistent picture of recent Greenland mass loss

M. R. van den Broeke (1), J. Ettema (1), W. J. van de Berg (1), E. van Meijgaard (2), B. Wouters (3), and J. Bamber (4)

(1) Utrecht University, Institute for Marine and Atmospheric Research, Netherlands (m.r.vandenbroeke@uu.nl), (2) Royal Netherlands Meteorological Institute, Netherlands, (3) Delft University, Institute of Earth Observation and Space Systems, Netherlands, (4) University of Bristol, Bristol Glaciology Centre, School of Geographical Sciences, UK

In this presentation we show agreement between Greenland mass loss rates from two entirely independent methods: satellite gravimetry from GRACE (2003-2008) and mass budget calculations using ice discharge data from satellite interferometry combined with surface mass balance from regional climate modelling. The methods agree on the rate, seasonal cycle and spatial distribution of recent Greenland mass loss, and provide leads to its causes. Since 1990, runoff increased strongly by 3% per year. However, precipitation increased simultaneously, masking mass changes and maintaining surface balance for more than a decade. Since 2002, sustained above-normal runoff and increased ice discharge in combination with precipitation returning to normal has culminated in a cumulative 1990-2008 mass loss of 1600 Gt. The mass loss is dominated by enhanced runoff in relatively dry and cold regions of the ice sheet (north, east and southwest), while enhanced ice discharge becomes as important or even dominates mass loss in the wetter parts (northwest and southeast).