Geophysical Research Abstracts, Vol. 7, 10435, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10435

Mass budget of the Greenland Ice Sheet in 2000 from Radarsat-1 interferometry

E. Rignot

Jet Propulsion Laboratory, Ms 300-321, 4800 Oak Grove Drive, Pasadena CA 91109-8099 (eric.rignot@jpl.nasa.gov)

The mass balance of the Greenland ice sheet has been estimated using airborne and satellite elevation data to indicate that the interior regions are in balance with accumulation while thinning dominates along the coast and is concentrated along the channels occupied by outlet glaciers. Overall, thinning dominates and the Greenland ice sheet is losing mass to the ocean. Only a small fraction of glaciers have been surveyed, however, and the altimetry results have been extrapolated to the rest of Greenland using a melt model. Subsequent studies showed that dynamic effects are an important contribution to the overall mass loss, if not dominant, suggesting that current estimates of total mass loss are underestimates. Here, we calculate the mass budget from the difference between ice discharge at the margins with snow accumulation in the interior on a large number of glaciers. Ice velocity is measured using Radarsat-1 InSAR data acquired in 2000 using a speckle tracking technique. Ice thickness is from radio echo sounding by the NASA/University of Kansas radar. Snow accumulation is from PARCA. We previously applied this approach to northern and eastern Greenland glaciers using ERS-1 data from 1996. We present new estimates for the whole ice sheet. Glaciers not covered by radio echo sounding are extrapoled using various techniques. The results show that altimetry underestimates mass losses. Several glaciers accelerated markedly in recent years, with significant impact on total mass loss. Accelerated flow in turn enhances ice sheet retreat. Much yet remains to be learned, however, on the mechanisms controlling accelerated flow.