

## Monitoring of the Greenland ice sheet

DIRK VAN AS, A.P. AHLSTRØM, S.B. ANDERSEN, M.L. ANDERSEN, J.E. BOX, C.  
CHARALAMPIDIS, M. CITTERIO, W. COLGAN, R.S. FAUSTO, B. HASHOLT, H.  
MACHGUTH, A.B. MIKKELSEN

*Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark*

The Programme for Monitoring of the Greenland Ice Sheet was initiated in 2007 and sets out to monitor various aspects of the mass balance of the entire ice sheet. The chief component in PROMICE is the automatic weather station network, which targets the ablation area, a region which is difficult to reach and hard on instrumentation. Station transects provide the means to calculate the regional surface mass balance components. Yet combining PROMICE and GC-Net weather station data with MODIS surface albedo allows for a Greenland-wide observation-based estimate of surface melt. PROMICE weather station observations are also used to calibrate regional climate model output, improving surface mass balance calculations. To obtain the total mass balance from the ice sheet, the dynamic mass loss from ice berg calving is determined from airborne ice thickness measurements and satellite-based surface velocities.

Various related activities target mass balance processes in more detail. Firn coring campaigns discovered the existence of thick ice layers in firn in southwest Greenland, favoring runoff over percolation. Thermistor string measurements confirm that after big melt years refreezing does not occur below thick ice layers, but slush forms at the surface. The resulting surface darkening enhances melt through the melt-albedo feedback. We determine/validate the quantity of meltwater running off regionally by river discharge measurements.