



A new, high-resolution surface mass balance map of Antarctica (1989-2009) based on regional atmospheric climate modeling

Jan Lenaerts (1), Michiel van den Broeke (1), Willem Jan van de Berg (1), Erik van Meijgaard (2), and Peter Kuipers Munneke (1)

(1) Institute for Marine and Atmospheric Research, Utrecht University, Netherlands (j.lenaerts@uu.nl), (2) Dutch Royal Meteorological Institute, Netherlands

A new, high resolution (27 km) surface mass balance (SMB) map of the Antarctic ice sheet is presented, based on output of a regional atmospheric climate model that includes snowdrift physics and is forced by the most recent reanalysis data from the European Centre for Medium-Range Weather Forecasts (ECMWF), ERA-Interim (1989-2009). The SMB map confirms high accumulation zones in the western Antarctic Peninsula ($>1500 \text{ mm y}^{-1}$) and coastal West Antarctica ($>1000 \text{ mm y}^{-1}$), and shows low SMB values in large parts of the interior ice sheet ($<25 \text{ mm y}^{-1}$). The location and extent of ablation areas are modeled realistically. The modeled SMB is in good agreement with ± 750 in-situ SMB measurements ($R=0.88$), without a need for post-calibration. The average ice sheet-integrated SMB (including ice shelves) is estimated at $2506 \pm 147 \text{ Gt y}^{-1}$. Snowfall shows modest interannual variability ($\sigma=135 \text{ Gt y}^{-1}$), but a pronounced seasonal cycle ($\sigma=32 \text{ Gt mo}^{-1}$), with a winter maximum. The main ablation process is snowdrift sublimation, which also peaks in winter but with little interannual variability ($\sigma=10 \text{ Gt y}^{-1}$).