



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

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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  $\pm 750$  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 ( $\sigma=10 \text{ Gt y}^{-1}$ ).