

# **Modeling the surface mass balance of the Antarctic ice sheet using RACMO2: recent progress and remaining uncertainties**

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We report results of recent and ongoing efforts to model the surface mass balance (SMB) of the Antarctic ice sheet, using evaluated output of the regional atmospheric climate model RACMO2. The model is forced at the lateral boundaries by ERA-Interim data, and has a horizontal resolution of 27 km. The new albedo scheme generates a realistic melt distribution, and we present the spatial and temporal melt rate distribution in Antarctica, and compare it to satellite-detected melt frequency. RACMO2 now also includes a routine to simulate blowing snow, and we show that blowing snow sublimation is the largest ablation component of the Antarctic SMB. Together with snowdrift erosion, it accounts in a realistic fashion for the distribution of blue ice areas in Antarctica. We show how blowing snow and SMB characteristics in Adélie Land and Victoria Land change when the model is run at very high (5.5 km) resolution. Using model output to drive a firn densification model, we show how accumulation variability impacts ice sheet surface elevation, and compare the calculated elevation trends to those derived from ICESat (2003-2008). We briefly show some ice2sea/IPPC AR5 related results, for which the model was forced by a climate scenario-driven GCM until the year 2200. Finally, we discuss the upgrade of RACMO2 to the latest ECMWF physics cycle, which results in a more advanced treatment of surface processes, atmospheric shortwave/longwave radiation transport and cloud physics. We present the first results of the upgraded model and discuss the improvements in the climate representation when output is compared to the current model.