



## **Elevation classes as a surface mass balance downscaling method for coupling of ice sheet and climate models**

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Coupling of ice sheet and climate models is an active area of research, and a major focus on international efforts such as the Ice Sheet Model Intercomparison Project. Here, we present an evaluation of the method used in the Community Earth System Model to downscale the surface mass balance (SMB) to the ice sheet model grid (4 km resolution). The SMB is calculated at several fixed elevations in the land component (CLM) of the climate model, via energy balance scheme with explicit calculation of albedo and refreezing. After that, bilinear (horizontal) and linear (vertical) interpolations to the ice sheet grid are performed.

The method is evaluated for three different climatologies corresponding to end-of-20th-century, namely from CESM1.0, CESM2.0 and reanalysis. The sensitivity to the downscaling of the atmospheric forcing (e.g., temperature lapse rate) and number of elevation classes is addressed.