**Metadata: Time Series and Gridded Time Series of the Surface Mass Balance of the Antarctic and Greenland Ice Sheets from MERRA-2/M2R12K and the Community Firn Model**

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The time series are derived from the GSFC v1.2.1 SMB measurements as described in Medley et al. (in Review) that are posted at 5-day resolution on a 12.5 km grid for both the Greenland and Antarctic Ice Sheets. The time period covered is from January 1, 1980 to September 30, 2021. NASA’s MERRA-2 provides the basis for our SMB model, including snowfall, rainfall, and temperature, with additional spatial resolution provided by an offline 12.5 km replay. While MERRA-2 does account for meltwater production, it was not retained as an output variable. Thus, we employ a simple degree-day model trained against observations for the Antarctic and MARv3.5.2 meltwater for the Greenland Ice Sheet. Runoff was generated by forcing the Community Firn Model with the aforementioned forcings. The SMB is calculated using:

where *Sn* is snowfall, *Ra* is rainfall, *Ev* is evaporation/sublimation, and *Ru* is runoff. Snow redistribution processes are not considered.

Comparison within Medley et al. (in Review) of the model derived SMB and observations suggests a 1-sigma uncertainty of 14% and 23% over the Greenland and Antarctic Ice Sheets, respectively, which form the basis of our uncertainty analysis. We used the basin data provided by IMBIE3 to assess the ice-covered area of each 12.5 km pixel by oversampling the grid to 500 m for Greenland and 1250 m for Antarctica. Then we summed the number of 500 m or 1250 m cells that fell within the 12.5 km cell to determine ice area.

**Time Series**

To determine the SMB over each region, we multiply the SMB of each grid cell (m w.e.) by the area of grounded ice (m2) and accumulate over the entire region of interest. Then we divide by 10003 to convert to Gt. We use the covariance of the time series over each region to accumulate correlated errors for each time step. The units are in Gt for each time step. To convert to Gt yr-1, simply multiply by 365/5 (# of days in year / # of days per time step).

**Gridded Time Series**

The spatiotemporal SMB provided are in units of meters of water equivalence for each time step. The 1-sigma uncertainty is

which is based on comparisons with observations in the Medley et al. (in Review). We also provide the grounded ice area per pixel for both the Rignot and Zwally basins as well as the basin IDs.

The data submitted have been submitted to *The Cryosphere Discussions* where it has gone through one round of review. The responses to reviewers and a revised paper were submitted on April 6, 2022, and we are awaiting further guidance from the Cryosphere. I have included the revised submission with this submission as there are numerous improvements that are relevant to this group.

Medley, B., Neumann, T. A., Zwally, H. J., & Smith, B. E. (2020). Forty-year simulations of firn processes over the Greenland and Antarctic ice sheets. *The Cryosphere Discussions*, 1-35.