

Gravimetric mass balance products for the Antarctic and Greenland ice sheet

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Within the framework of ESA's Climate Change Initiative (CCI) mass balance products for both the Antarctic Ice Sheet (AIS) and the Greenland Ice Sheet (GIS) have been developed by the AIS_cci and the GIS_cci project. These Gravimetric Mass Balance (GMB) products are derived from satellite gravimetry data acquired by GRACE (Gravity Recovery and Climate Experiment), which is the only sensor directly sensitive to changes in mass. Using monthly GRACE gravity field solutions covering the period from 2002 until present two different GMB products are derived: (a) time series of monthly mass changes for the entire ice sheet and for individual drainage basins, and (b) gridded mass changes covering the entire ice sheet. The gridded product depicts spatial patterns of mass changes at a formal resolution of about 50 km, although the effective resolution provided by GRACE is about 200-500km.

The algorithms used for the product generation have been selected within an open round robin experiment and are optimized to account for the complex GRACE error structures, to advance the limited spatial resolution and to separate signals super-imposed to mass changes of the cryosphere.

Here the first release of the ESA CCI GMB products is presented. Both the basin averaged and the gridded products are assessed regarding their signal content and error characteristics. Finally, up-to-date mass balance estimates are presented for both ice sheets. The GMB products are freely accessible through data portals hosted by the AIS_cci and the GIS_cci project.