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Sea level changes from monthly solutions of ice sheet mass balance

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ABSTRACT

We present mass change time series at basin scale for both Greenland and Antarctica, derived from GRACE data, and use these data to find the associated global sea level changes. We use two independent methods for GRACE ice mass loss estimation, including use of different GIA models and estimation of appropriate error bars. The first method applied is based on a mass inversion, while the second one uses integration over a representation given in water equivalent. We find good agreement between the resulting mass changes based on the two independent methods, especially in the behavior of time series. We also compare our GRACE derived regional estimates with independent mass change results based on altimetry data from NASA's Ice Cloud and land Elevation Satellite.

From the estimated Greenland and Antarctica mass changes we compute the gravitationally self-consistent sea-level changes and its associated uncertainties, and show results of the impact of Earth model uncertainties in the global sea level change and its regional "fingerprints".

Keywords: ice mass balance, global sea level rise.