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Contribution of Polar Ice-Sheet Mass Balance to Present-Day Sea Level Rise

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Mass imbalance of the polar ice sheets is one of the main contributors to present-day global mean sea level rise especially in the presence of anthropogenic climate change. The Gravity Recovery and Climate Experiment (GRACE) satellite gravimetry mission launched in March 2002 provides a means of unprecedented accuracy and temporal and spatial resolutions to quantify global ice mass changes. However, large discrepancy exists among those contemporary estimates. One of the largest contributing geophysical sources to sea-level rise that currently has large discrepancies in its estimates is the Antarctica ice-sheet mass balance, with a range of -180 Gt/yr to -69 Gt/yr based on GRACE. The main causes of the large discrepancies include uncertainties of different Glacial Isostatic Adjustment (GIA) models applied, and of long-wavelength geopotential signals observed by GRACE, etc. Here we provide an updated estimate of the polar ice-sheet mass balance combining GRACE, satellite radar altimetry and other data towards narrowing the current uncertainties between the observed and geophysical causes contributing to present-day sea-level rise.