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Recovering the patterns of sea-level change from geodetic networks

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As glaciers and ice sheets lose mass to the oceans, sea level is effected not only by freshwater flux, but also through crustal motion and perturbations in gravity driven by the surface mass redistribution. The gravity and crustal changes lead to rates of sea-level change that have great spatial variability, with sea level actually decreasing near the melting ice sheet and increasing at rates greater than the global average in the far field. While monitoring mass loss from a particular region may be best done at the source, it is nevertheless important to understand the long-wavelength geometry of meltwater redistribution when interpreting regional sea-level change (and, in particular, when these changes are used to assess the sources of meltwater). In this talk, I investigate our current and potential ability to interpret regional sea-level variations and recover estimates of the sources of mass loss using increasing numbers and types of geodetic measurements. As an example, I compare estimates of inferred mass loss derived from different geodetic measurements of sea-level change as we increase our a priori knowledge (i.e. use more accurate estimates) of mass loss from Greenland and Antarctica in the inversion's forward models. These results will provide a framework for interpreting the estimated individual source contributions to the measured spatial variability of sea-level change.