



Glacial Isostatic Adjustment on the Siple Coast

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The Siple Coast region of Antarctica contains many fast-flowing ice streams, which transport significant amounts of ice from the interior of West Antarctica to the Ross Ice Shelf. The flow of these ice streams controls the mass balance of the region, but estimates for the present-day rate of ice-mass change – derived from a range of techniques – differ, largely due to differences in the Glacial Isostatic Adjustment (GIA) correction which must be applied to gravity observations.

It is not known how changes in ice thickness, related to the stagnation and reactivation of ice streams on the Siple Coast during the past few thousand years, could affect GIA in this region because most GIA models do not consider ice mass changes after ~ 2 ka BP. In this study we use recently-published reconstructions of ice-stream variability along the Siple Coast to create a suite of models for the stagnation-related thickening of Kamb Ice Stream since ~ 1850 and we predict the solid Earth response to this thickening using a GIA model. A number of longer-term loading scenarios, which include the stagnation and reactivation of several ice streams across the Siple Coast over the past ~ 1000 - 2000 years, are also constructed, and used to investigate the longer term GIA signal in the region. The predicted GIA signal for each of the ice loading histories, based on a range of Earth models, is compared with regional GPS-observed uplift rates and an empirical GIA model in an attempt to understand the impact of Siple Coast ice stream stagnation cycles on GIA in this region.