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The effect of recent accumulation changes in the Antarctic Peninsula upon Glacial Isostatic Adjustment

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The Antarctic Peninsula (AP) is undergoing Glacial Isostatic Adjustment (GIA) in response to ice mass changes since the Last Glacial Maximum. Models of GIA remain poorly constrained, with large differences seen between recent models. Improvement of GIA models is particularly crucial for determining accurate present-day ice mass changes from GRACE gravity data. Changes in AP ice mass during the last few hundred years also have the potential to contribute substantially to the present-day GIA signal. Evidence exists for a significant accumulation increase in recent decades, e.g. the Gomez ice core from Palmer Land demonstrates a doubling of accumulation over the past 150 years. This extra accumulation, although over a relatively short time scale, has the potential to affect the observed GIA uplift rate. This study aims to model the increase in accumulation observed at Gomez and other ice cores in order to estimate the contribution to present-day GIA in the AP. Empirical orthogonal functions are estimated for 1989-2010 climate model output to determine the spatial pattern of accumulation over the AP. This spatial pattern is then combined with ice core records from the AP to estimate annual accumulation between 1855 and 1984. High resolution ice sheet modelling shows approximately 20 m of ice accumulation in the area of the Gomez ice core in response to the increase in accumulation over 130 years. We report on the effect of this mass increase on estimates of present-day GIA.