

**ANTARCTIC GLACIAL HISTORY AND IMPLICATIONS FOR GLOBAL SEA-LEVEL CHANGE AND ICE-MASS BALANCE**

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An Antarctic ice-sheet history model (IJ05) is based on a synthesis of the current constraints on past ice history and present-day mass imbalance. It provides about 10 m of equivalent eustatic sea-level rise since Last Glacial Maximum (LGM), one-third to one-half of that of many previous models. The model is tuned to ice core stratigraphy, glacier moraine and rock surface exposure dates, and offshore grounding line retreat chronology. IJ05 offers improvements in four aspects compared to previous models: (i) the timing of ice-mass change in the region ranging from the Ross Sea to the Antarctic Peninsula; (ii) the peak ice height change in parts of the Ellsworth and Transantarctic Mountains; (iii) the seaward extent of the grounding line in Pine Island Bay, Bellingshausen Sea, the Antarctic Peninsula, and in the Ross Sea, and the timing of the ensuing retreat; (iv) present-day net mass balance estimates. Some regions, such as the Weddell Sea sector, still lack strong constraints and future revisions to the model could be substantial. The predicted present-day glacial isostatic adjustment (GIA) uplift rates peak at 14 - 18 mm/yr and geoid rates peak at 4 - 5 mm/yr for two contrasting viscosity models. If the asthenosphere underlying West Antarctica has a low viscosity then the predictions could change substantially due to the extreme sensitivity to recent (past two millennia) ice mass variability. The relatively small Antarctic contribution to sea-level rise since LGM provided by this model implies that another ice sheet(s) must have been larger than generally assumed in order to provide the total amount of sea-level rise required by far-field sea-level observations. The model post-LGM water mass lost by Antarctica does not provide a significant fraction of the sea-level rise associated with meltwater pulse 1A, a short-lived period of rapid sea-level rise circa 13-14 kyr BP. This indicates that ice sheets in the northern hemisphere must have had a substantial, if not dominant, role in generating meltwater pulse 1A.