GLACIAL ISOSTATIC MOTION IN ANTARCTICA FROM CONTINUOUS GLOBAL POSITIONING SYSTEM MEASUREMENTS: RESULTS FROM THE NORTHERN TRANSANTARCTIC MOUNTAINS AND MARIE BYRD LAND

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GPS measurements collected quasi-continuously between November 1997 and January 2001 in the northern Transantarctic Mountains (nTAM), and between November 1998 and January 2002 in western Marie Byrd Land (wMBL) indicate postglacial rebound of up to 12.6 ± 4.1 mm/yr in western Marie Byrd Land, and 4.6 ± 3.8 mm/yr in the northern TAM. These vertical rates deviate significantly from uplift predictions based on deglaciation models ICE-3G and 4G; they are consistent with uplift rates on the order of 6.7 ± 2.3 mm/yr at the O'Higgins continuous GPS station on the Antarctic Peninsula. The measured uplift rates support an interpretation of ice mass changes larger than predicted by global deglaciation models such as ICE-3G, or mantle viscosity beneath West Antarctica significantly less than the 10^{21} Pa-s (as assumed in ICE-3G), coupled with mid-late Holocene neoglacial fluctuations. The large uplift rate in wMBL indicates significantly lower mantle viscosity there, assuming that the ice mass change at Roosevelt Dome began 4000 years ago. The inferred low mantle viscosity in Marie Byrd Land is to be expected due to the past subduction history, and is consistent with recent extensive volcanism there.