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Using gravity and uplift trends in Antarctica to discriminate among existing ice models

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Two phenomena are superimposed in Antarctica: the PGR and present-day melting. Models of both are weakly constrained by using only one data source, even one of the richest like GRACE. In the gravity field the two phenomena have opposite sign so, by appling our new mass weighted technique, it is possible to isolate a good first guess for their signals. By simulating total uplift due to present-day ice mass variation plus PGR (based on different ice models, as ICE-3G, ICE-5G, ANU, IJ05) we show how it is possible to improve constraints on ice-models and viscosity profile. Beside that, by using GRACE data and a traditional subtraction technique, for each PGR/ice model we derive an associated pattern of present-day ice mass variation: the greater is the PGR signal and the greater is the resulting ice melting. In the uplift pattern (measured by GPS for example) the rebound due to PGR and its associated present-day ice mass variation have the same sign. For this reason a simple difference in PGR pattern produced by different ice models, becomes discriminant once we add the uplift produced by their associated present-day mass variation. In this way we show in particular that ICE-5G(VM2) produces a pattern much greater than the one realistically observed (in gravity and uplift) while IJ05 fits better.