We present a newly reprocessed data set of GPS-determined vertical crustal rates for regions of GIA interest in Antarctica. Data from ~40 Antarctic stations (both permanent and episodic) are processed in a global reanalysis of 15-years of GPS data. We align our daily non-fiducial solutions to IGS05, i.e. a CM frame. We investigate the sensitivity of the resulting rates to the reference frame realization.

We compare our GPS-derived Antarctic vertical rates with those predicted by the Ivins and James and ICE-5G deglaciation models, after converting to a CE frame. We also compare our rates to two recent empirical models and to previously published GPS rates. In general, the GPS uplift rates are smaller than the rates predicted by the GIA models, particularly in West Antarctica (WA). We suggest two possible explanations: (i) the GIA models over predict the amount of ice at the Last Glacial Maximum; (ii) the mantle viscosity, in WA in particular, could be lower than has previously been suggested.

A new GIA model for Antarctica has been developed using a combination of ice sheet and GIA modelling. The sparse distribution of both relative sea-level data and glacial geological data limits the degree to which it is possible to constrain past ice mass changes and Earth structure; a range of uncertainty will feed into the new GIA model predictions.

The new GPS-derived velocities presented are invaluable in helping to tune, and bound errors of this new GIA model, and are used to differentiate between different GIA model solutions.