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Post-Seismic Deformation in the Northern Antarctic Peninsula Following the 2013 Magnitude 7.7 Scotia Sea Earthquake

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Large earthquakes in the vicinity of Antarctica have the potential to cause post-seismic deformation on the continent, affecting measurements of displacement and gravity field change from GRACE or those attempting to constrain models of glacial isostatic adjustment.

In November 2013 a magnitude 7.7 strike-slip earthquake occurred in the Scotia Sea around 650 km from the northern tip of the Antarctic Peninsula. GPS coordinate time series from the Peninsula region show a change in rate after this event indicating a far-field post-seismic deformation signal is present. At these far-field locations, the effects of fault after-slip are likely negligible and hence we consider the deformation to be due to post-seismic viscoelastic deformation. Here we use a global spherical finite element model to investigate the extent of post-seismic viscoelastic deformation in the northern Antarctic Peninsula. We investigate possible 1D earth models that can fit the GPS data and consider the effect of including a simple 3D earth structure in the region. These results, combined with previous results showing East Antarctica is still deforming following 1998 M_w 8.2 intraplate earthquake, suggest that much of Antarctica is deforming due to recent post-seismic deformation.