

Northward drift of Australia and true polar wander in Cenozoic time

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Paleomagnetic data indicate that the Earth rotation axis has been wandering towards Greenland over the past 40 million years (Myr), approximately opposite direction to that before 50 million years ago (Ma). In previous studies, the long-term true polar wander (TPW) has been discussed by taking into account convective processes in the mantle such as downgoing slabs and upwelling plumes. Here I examined a relationship between continental drift under isostatic condition and TPW by noting that the northward drift of Australia substantially started at 40 Ma. I evaluated temporal changes in moments of inertia associated with continental drift during this period based on a paleogeographic reconstruction, in which I estimated the lateral density heterogeneities by taking into account the observed mean land elevation of continents and average age of oceanic lithosphere. The prediction for a viscoelastic Earth model with plausible viscosity models for the mantle indicates that both the change of TPW direction at 50 Ma and TPW towards Greenland over the past 40 Myr might have been caused by the northward drift of Australia, implying a tight relationship between continental drift, surface manifestation of convective processes in the mantle, and TPW.