Geophysical Research Abstracts
Vol. 19, EGU2017-5369, 2017
EGU General Assembly 2017

Limited True Polar Wander as evidence that Earth's non-hydrostatic shape is persistently triaxial

Bernhard Steinberger (1,2), Miriam-Lisanne Seidel (3), Trond Torsvik (2,4,1)

(1) GFZ Potsdam, Geodynamic Modelling, Sec. 2.5, Potsdam, Germany (bstein@gfz-potsdam.de), (2) Centre for Earth Evolution and Dynamics, University of Oslo, Oslo, Norway, (3) Werner-von-Siemens Gymnasium, Berlin, Germany, (4) Geological Survey of Norway (NGU), Trondheim, Norway

Earth's spin axis follows the maximum moment of inertia axis of mantle convection, with some delay due to adjustment of the rotational bulge. Here we compute this axis for geodynamic models based on subduction history, assuming constant slab sinking speed, with another contribution due to thermochemical piles. For a wide range of parameters, a large shift of ≈90 degrees is predicted around $80-90$ Ma. It can be largely attributed to a change in circum-Pacific subduction from predominantly in the North and South towards East and West. Actual amounts of true polar wander are much smaller, pointing towards additional inertia tensor contributions, possibly due to slabs in the lowermost mantle below both polar regions. These slabs would have been subducted before ≈150 Ma, when plate motions in the Panthalassa basin are largely unknown. Matching predicted and observed true polar wander can serve at constraining such plate motions.