



An online tool on Paleomagnetism.org to test kinematic restorations against paleomagnetic data

Douwe J. J. van Hinsbergen (1) and Mathijs R. Koymans (2)

(1) University of Utrecht, Department of Earth Sciences, Utrecht, Netherlands (douwework@gmail.com), (2) Royal Netherlands Meteorological Institute (KNMI), De Bilt, the Netherlands

Paleomagnetic data record motion of geological units relative to the geodynamo, which on geological timescales can be assumed to coincide with the Earth's spin axis. Paleomagnetic data can be used to quantitatively inform kinematic reconstructions and are particularly useful to constrain e.g. vertical axis rotations, or paleolatitudinal motions of rock units in intensely deformed orogenic belts.

Reconstructions of such intense deformation is generally performed by describing relative motions between geological units on a sphere using Euler poles of one unit relative to another. A popular platform to develop such restorations is Gplates (www.gplates.org). Integrating paleomagnetic data into such restorations, however, is not straightforward, as there are an infinite number of Euler poles that can be resolved from paleomagnetic data alone, and additional structural geological constraints are required to develop kinematic restorations.

To facilitate the testing and iterative improvement of kinematic restorations using paleomagnetic constraints, we therefore designed an additional tool on the recently developed online platform for paleomagnetic analysis www.Paleomagnetism.org that allows testing of kinematic restorations against paleomagnetic data (see tutorial in the Supplementary Information). This tool allows rotating the Global Apparent Polar Wander Path into the coordinates of a reconstructed block if the Euler poles of this block are provided in 10 Myr intervals relative to South Africa – which is straightforwardly deduced from plate reconstruction software if the restoration is incorporated in a global plate circuit. The thus deduced GAPWaP in the coordinates of our reconstructed block can then be plotted as declination, inclination, or paleolatitude versus time, or as apparent polar wander path, and compared with paleomagnetic data from this block.

In this contribution, we will show how to use this tool, and provide examples of its use in testing kinematic restorations of Iberia, the Apennines, and Corsica-Sardinia in the Mediterranean regions.