ITRF2014 Plate Motion Model

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SUMMARY

For various geodetic and geophysical applications, users need to have access to a Plate Motion Model (PMM) that is consistent with the ITRF2014 frame. The aim of this paper is to describe the approach used for determining a PMM from the horizontal velocities of a subset of the ITRF2014 sites away from plate boundaries, Glacial Isostatic Adjustment regions and other deformation zones. We show that it is necessary to include in the inversion model a translation rate vector between the ITRF2014 origin (long-term averaged center of mass of the Earth as sensed by SLR) and the center of tectonic plate motion. We additionally assess the impact of the site distribution (i.e. network effect) on both the estimated Euler poles and translation rate vector (called here Origin Rate Bias – ORB). The site selection finally adopted for the ITRF2014-PMM adjustment leads to a relatively small ORB (0.3 mm/yr in the Z-component). Nevertheless, in order to accommodate operational geodesy applications that require access to the ITRF2014 frame through pure plate rotation poles, we also provide an alternative model, without ORB, based on plate-by-plate rotation pole adjustments.