Dispersion of hotspot trends: A tool for estimating motion between groups of hotspotsDispersion of hotspot trends: A tool for estimating motion between groups of hotspots

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It is widely believed that groups of hotspots in different regions of the world are in relative motion at rates of 10 to 30 mm a^{-1} or more. Recent work on plate motions over the past ≈50 Ma indicate no significant motion between hotspots and place an upper bound on such motion of ≈10 mm a^{-1}. Here we present a new method for analyzing geologically current motion between groups of hotspots beneath different plates. In an inversion of 56 globally distributed, equally weighted hotspot trends, misfit magnitudes range from 0˚ to 86˚ (median= 9˚; standard deviation =23˚). The dispersion is dominated by differences in trend between different plates rather than dispersion within plates, lending support to the notion that groups of hotspots beneath different plates do indeed move relative to one another. The absolute value of mean angular difference for a given plate decreases significantly with increasing absolute plate speed. When these angular misfits are converted to vperp, the rate of hotspot motion perpendicular to the direction of absolute plate motion, there is no significant dependence on absolute plate speed. Moreover, vperp differs significantly from zero for only two of ten plates and then by no more than 1 mm a^{-1}. Thus, motion between groups of hotspots may be as low as 1 mm a^{-1} and perhaps even slower when considering plate non-rigidity and errors in relative plate motions. The upper bound on | *vperp*| is 3.2 ±2.8 mm a^{-1}. Therefore, groups of hotspots move between 1 mm a^{-1} and 6 mm a^{-1} relative to the mean hotspot frame, substantially slower than found in some prior work.

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