



Large igneous province locations and their connections with the core mantle boundary

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28 out of 30 Large Igneous Provinces (LIPs) of the past 300 Myrs are shown to have been erupted close to vertically above the sources of mantle plumes that originated at the edges of the two Large Low Shear-wave Velocity Provinces (LLSVPs) in the deep mantle. Two other LIPs (e.g., the Siberian Traps) are linked to similar but smaller low shear-wave velocity provinces at the core-mantle boundary (CMB). In order to refine the plume generation zones (PGZs) on the CMB we have tested different seismological maps and find that most maps gave closely comparable results in both mantle and palaeomagnetic plate motion frames. All performed reasonably well in displaying the loci of PGZs on the CMB. The Earth contains two antipodal equatorial LLSVPs in the deep mantle. I.e. the Earth is of degree-2 in that respect but that mass-distribution has been suggested from numerical modelling to date from a fairly recent time (since about 200 Ma). Because our 30 LIP dataset straddles in age the time during which a transition from degree-1 to degree-2 is suggested to have occurred we mapped both LIP and kimberlite populations of 100 Ma to 200 Ma and 200 Ma to 300 Ma to test whether there was any evidence of this change. Our results demonstrate no significant differences in PGZ distribution between or within the two intervals. We conclude that there has not been a change in deep mantle mass-distribution from degree-1 to degree-2 during Pangea assembly and dispersal and that the deep mantle mass-distribution has always been of degree-2 since the Late Palaeozoic.