

## Large Igneous Provinces and Plate Tectonics

<sup>1</sup>ELDHOLM, O. and <sup>2</sup>COFFIN, M. F.

<sup>1</sup>Department of Geology, University of Oslo, P.O. Box 1047 Blindern, N-0316 Oslo, Norway; <sup>2</sup> Institute for Geophysics, The University of Texas at Austin, 4412 Spicewood Springs Road, Building 600, Austin, TX 78759-8500, USA.

Large Igneous Provinces (LIPs) result from voluminous mafic magmatism caused by mass and energy transfer from the mantle which acts both independently of, and in conjunction with, the upwelling systems producing new oceanic crust by sea floor spreading along the mid-oceanic ridge system. LIPs, manifested as continental flood basalts, oceanic plateaus and volcanic margins, constitute broad areas, >100000 square kilometers, of volcanic and plutonic rocks erupted over about one million years. Compared with plate dimensions, LIPs are smaller, localized features which form both in plate interiors and at plate boundaries. Nonetheless, the transient flux rates of the mantle-derived melts constitute a significant fraction of, or in some cases may even exceed, the integrated flux rates from sea floor spreading. Plate tectonic theory does not readily explain the massive magmatism, which is commonly attributed to mantle plumes. Most LIPs form in extensional oceanic or continental plate tectonic settings, suggesting a relationship with thinned lithosphere. Deformed LIP complexes in intraplate continental settings suggest formation throughout most of Earth history. The post-150 Ma LIP record reveals both many events and large melt volumes from 135-85 Ma, and a distinct decline since 50 Ma. These trends may reflect variations in mantle circulation and have links to global environmental change. Following formation, oceanic LIPs may be carried laterally by the plates to regions of plate convergence. Subsequent accretion of major LIPs into continental crust contributes episodically to continental growth.