



Influence of the Iceland Plume on the Topography of the Irish Lithosphere-Asthenosphere Boundary

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The Irish Seismological Lithospheric Experiment (ISLE 2002/3, *Eos*, 85, 337 & 340-341) yielded high-quality earthquake waveform recordings at a 23-station passive network and 2 permanent stations in southern Ireland. We examine the structure of the lithosphere underneath the ISLE network with the S-to-P receiver function (Sp-RF) method. Sp-RFs are waveforms that enhance compressional (P) wave signals which were converted from shear (S) waves at seismic discontinuities inside the Earth underneath the receivers. The spatial distribution of our Sp-RF show two main features: A more or less flat Moho at 26-32 km depth and a lithosphere-asthenosphere boundary (LAB) with considerable topography. On average the LAB rises from about 85 +/- 5 km underneath southern Ireland to 55 +/- 5 km underneath northern Ireland. Our preferred model for this lithospheric thinning is thermal erosion of the Irish lower lithosphere by the Tertiary proto-Iceland plume. The northern part of Ireland belongs to the British Tertiary Volcanic Province which formed rapidly at about 60 Ma BP. The source of the magmatism is attributed to the head of the spreading Iceland plume at that time, and geochemical evidence requires a deep origin of the melts. In northern Ireland the plume-related volcanic activity lasted at least until 43 Ma BP (Kirstein & Timmerman, *J Geo Soc*, 157 923-927), and even today the shear-wave velocity is still relatively low in the asthenosphere as found by the Sp-RF modelling.