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An evidence-based model for the north-Atlantic igneous province

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Major features associated with Iceland and the north Atlantic igneous province require radical *a posteriori* adaptions of the classical Plume hypothesis to explain them. The timescale of precursory regional uplift and the absence of subsequent subsidence do not fit the classical plume model. There is virtually no evidence for a time-progressive volcanic track, a seismic anomaly in the lower mantle, or high mantle potential temperature beneath the region. Melt extraction has persistently occurred at the mid-Atlantic ridge, and not migrated east as predicted by hotspot reference frames. Complex and unstable microplate tectonics persist in the region, analogous to Easter microplate tectonics, involving spreading about a parallel pair of ridges and ridge migrations. A captured microplate that may contain oceanic crust up to $\sim$ 30 Myr old, and perhaps also continental crust, is required by space considerations to underlie Iceland. It is submerged beneath younger lavas. This may account for local thickening of the seismic crust there. The Greenland-Iceland-Faeroe ridge separates two contrasting oceanic tectonic regions to its north and south. The Plate model views the magmatism and tectonics as strongly influenced locally by the old Caledonian suture, the frontal thrust fault of which crosses the mid-Atlantic ridge at the latitude of Iceland. In this model, persistent enhanced magmatism results from high local mantle fertility from subducted Iapetus oceanic crust recycled into the melt zone beneath the mid-Atlantic ridge. Isentropic upwelling of eclogitised crust or a crust-peridotite mixture produces the excess melt. The ocean basin north of Iceland formed within the Caledonian suture and the basin to the south formed outside of it. The Plate model attributes the Iceland and the north Atlantic igneous province to structures and processes related to plate tectonics, sourced in the shallow upper mantle, and not to a deep mantle plume.