

A New Style of Oceanic Intraplate Volcanism

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Studies of active volcanism on the seafloor traditionally focused along plate boundaries and hotspots where volcanic activity is frequent, and the structures constructed are clearly visible on maps. The rest of the seafloor remains largely uninvestigated, as the abyssal plains in general were believed to be geologically inactive. We have recently identified and examined a large group of high acoustic-backscatter anomalies on 20 Ma old oceanic crust in the NW-Atlantic. Seafloor observations (by video and hydroacoustics) and sampling (dredging, sediment coring) have shown these to be lava flows, which we have named the *Balerion Lava Fields*. Apart from very small cones that presumably mark their eruption centres, the Balerion lavas have no positive bathymetric signature. Radiocarbon dating of overlying sediments indicate a Late Pleistocene age of the flows (< 50 ky). Balerion glasses have compositions different from other oceanic magmas, being Si-saturated basaltic andesites (MgO ca. 5.9 - 6.6 wt.%, SiO₂ ca. 54.3 - 55.3 wt.%, total alkalies 3.3 - 3.9 wt.%) with anomalous depletions in Ca and Fe. Relative to MORB, their incompatible trace element concentrations patterns are steep but with absolute HREE depletion, trace element concentrations are lower than in ocean island basalt (OIB) magmas or, with the exception of the heaviest REE, in petit-spot magmas. Unlike petit-spot magmas, such small-volume, high-Si, mafic and highly incompatible-element-enriched magmas will not be formed by simple melting of a peridotite under anhydrous, hydrous or carbonated conditions. Instead, their petrogenesis appears to require interactions between a deep-formed alkalic mantle melt, possibly derived from the lithosphere boundary and shallow harzburgite. How common such low-relief, intraplate flows are globally is presently unknown - if they are common, they could significantly affect global geochemical budgets, subducted plate composition and the availability of hard substrate and chemosynthetic habitats in intraplate regions.