

Compositionally, high-Nb basalts are similar to HIMU (high U/Pb) ocean island basalts, continental alkaline basalts and alkaline lavas formed above slab windows. Tertiary alkaline basaltic lavas from eastern Jamaica, West Indies, known as the Halberstadt Volcanic Formation have compositions similar to high-Nb basalts (Nb > 20 ppm). The Halberstadt high-Nb basalts are divided into two compositional sub-groups where Group 1 lavas have more enriched incompatible element concentrations relative to Group 2. Both groups are derived from isotopically different spinel peridotite mantle source regions, which both require garnet and amphibole as metasomatic residual phases. The Halberstadt geochemistry demonstrates that the lavas cannot be derived by partial melting of lower crustal ultramafic complexes, metasomatised mantle lithosphere, subducting slabs, continental crust, mantle plume source regions or an upper mantle source region composed of enriched and depleted components. Instead, their composition, particularly the negative Ce anomalies, the high Th/Nb ratios and the similar isotopic ratios to nearby adakite lavas, suggests that the Halberstadt magmas are derived from a compositionally variable spinel peridotite source region(s) metasomatised by slab melts that precipitated garnet, amphibole, apatite and zircon. It is suggested that high-Nb basalts may be classified as a distinct rock type with Nb > 20 ppm, intraplate alkaline basalt compositions, but that are generated in subduction zones by magmatic processes distinct from those that generate other intraplate lavas.