

## THE MANTLE ORIGIN FOR ALKALINE INTRUSIONS: ARGUMENTS FOR AND AGAINST A "HOTSPOT" IN NORTHEASTERN NORTH AMERICA

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Cretaceous alkaline intrusions occur with elongate field patterns in southern Quebec and central New England, and similar magmas formed the chain-like New England Seamounts in the adjacent western North Atlantic Ocean basin. This magmatism has been related to a "hotspot" model, in which the North American plate overrides a stationary mantle plume between 125 and 70 million years ago. Evidence for the hotspot includes enrichment in certain elements and isotopes at magma sources, a progression of some radiometric ages for the New England seamounts, and an apparent orientation of intrusions with plate motion. The model is often related as accepted fact rather than as one of several viable hypotheses, especially given its popularity as a general explanation for seamount chains and selected continental igneous provinces.

But problems remain with the hotspot model in northeastern North America, some of which are solved with tectonic ("leaky fracture") models for regional magmatism. Many intrusions in northeastern North America have locations and ages that do not fit any hotspot track, although they are otherwise identical in chemistry, age, and petrology. The physical and genetic relationship of mantle plumes with mantle circulation patterns, continental rifts, ocean ridge magmatism, and other basalts such as continental tholeiites remains problematic. No one model is acceptable as a general explanation for alkaline igneous rocks in northeastern North America.