

Evaluation of radiometric ages pertaining to rocks hypothesized to have been derived by hotspot activity, in and around the Atlantic, Indian, and Pacific Oceans

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ABSTRACT

Hotspot activity has been invoked to explain a number of geological observations and phenomena. The genetic relationship between hotspots and continental flood basalts, as well as “tracks” in many oceans, appears to be commonly accepted by Earth scientists. One critical test that must be applied to such connections or hypotheses is that the pertinent radiometric data must be robust. Herein I critically reexamine some sets of data in this regard. The pertinent $^{40}\text{Ar}/^{39}\text{Ar}$ step-heating data must (1) satisfy rigorous statistical tests for validity and (2) be based on material that can be shown to be fresh or minimally altered. I show that most age data published recently for the Isle of Mull (British Tertiary Igneous Province) are invalid as proper estimates of the crystallization age. I apply a similar mode of examination to rocks thought to represent the tracks of (1) the Yellowstone hotspot, Pacific Northwest, USA, (2) the Tristan da Cunha and Great Meteor hotspots, Atlantic Ocean, and (3) the Kerguelen and Réunion hotspots, Indian Ocean. Few, if any, valid crystallization ages were recovered. These hotspot tracks cannot be temporally defined. Conclusions based on the data rejected herein, in particular those pertaining to the extrapolated paths of such tracks and the calculation of plate velocities, should be subject to critical scrutiny.