Mantle source characteristics of Triassic alkaline lavas within the Antalya Nappes, SW Turkey

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The Late Triassic basaltic rocks that are dispersed as several lava sheets in a number of different tectonic slices within the Antalya nappes in SW Turkey represent the remnants of widespread oceanic magmatism with strong intra-plate geochemical signatures. The largest exposures are observed around the Antalya Bay, where pillow structured or massif lava flows are interlayered with Upper Triassic pelagic or carbonate platform sediments. Based on bulk-rock geochemical characteristics, the rocks mostly classify as alkaline basalts and display distinctive OIB-type trace element distributions characterized by significant enrichments in LILE and HFSE abundances, as well as LREE/HREE ratios, with respect to average N-MORB. Quantitative modeling of trace element data suggest that the primary melts that produced the alkaline lavas are largely the products of variable proportions of mixing between melts generated by variable, but generally low (<10) degrees of partial melting of more than one compositionally distinct mantle source. The samples, as a whole, display large variations in radiogenic isotope ratios with $^{87}\text{Sr}/^{86}\text{Sr} = 0.703021–0.70553$, $^{143}\text{Nd}/^{144}\text{Nd} = 0.51247–0.51279$, $^{206}\text{Pb}/^{204}\text{Pb} = 18.049–20.030$, $^{207}\text{Pb}/^{204}\text{Pb} = 15.544–15.723$ and $^{208}\text{Pb}/^{204}\text{Pb} = 38.546–39.530$. Such variations in isotopic ratios correlate with the change in incompatible trace element relative abundances and reflect the involvement of a number of compositionally distinct mantle end-members. These include EMI and EMII type enriched mantle components both having lower $^{143}\text{Nd}/^{144}\text{Nd}$ than typical depleted MORB source with their contrasting low and high $^{206}\text{Pb}/^{204}\text{Pb}$ and $^{207}\text{Pb}/^{204}\text{Pb}$ ratios respectively, as well as a high time-integrated $^{238}\text{U}/^{204}\text{Pb}$ component with high $^{206}\text{Pb}/^{204}\text{Pb}$ at relatively low $^{87}\text{Sr}/^{86}\text{Sr}$ and $\varepsilon\text{Nd}$ values. The results from trace element and radiogenic isotope data are consistent with the view that the initial melt generation was likely related to partial melting of the shallow convecting upper mantle in response to Triassic rifting events, while continued mantle upwelling resulted in progressively increased melting of mantle lithosphere that contained compositionally contrasting lithological domains with strong isotopic heterogeneities.