Oxygen isotope evidence for crustal contamination in Deccan Basalts

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Abstract

A set of whole rock lava flows and dykes from the western part of Deccan Traps was analyzed for oxygen isotope ratios. $\delta^{18}O$ stratigraphy of the upper formations in the Mahabaleshwar section of the Western Ghats area can be correlated with the Sr and Nd isotopic stratigraphy. Increased $\delta^{18}O$ values are associated with increased initial $^{87}Sr/^{86}Sr$ and decreased initial $\varepsilon_{Nd}$. The increases of $\delta^{18}O$ values (up to +11.8 ‰) exceed the range of primitive mantle-derived materials, strongly suggesting that isotopic variations of these suite of Deccan basalts are due to crustal contamination rather than input of continental lithospheric mantle as previously considered. The co-variations of $\delta^{18}O$ vs $^{87}Sr/^{86}Sr$ and $\delta^{18}O$ vs $\varepsilon_{Nd}$ indicate that there are at least two contaminating domains, most likely (1) Archean granitic upper crust and (2) Archean carbonates plus granulitic lower crust.