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Isotopic and trace element compositions of alkaline dykes in the Deccan trap province: evidence for Reunion plume connection

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Trace element and Sr-Nd isotopic compositions of alkaline dykes intruding the Deccan trap flows around Bombay have been measured. Our aim was to investigate and identify the nature and source compositions involved in the genesis of these rocks, as they represent the veining stages of development of this province. In contrast to the wide range of Sr and Nd isotopic compositions in the Deccan basaltic flows ($^{87}Sr/^{86}Sr$= 0.7039-0.7122 and $\varepsilon_{Nd}T$= +7.9 to –8.7) these dykes display limited variation ($^{87}Sr/^{86}Sr$= 0.70384-0.70420 and $\varepsilon_{Nd}T$ = +4.3- +3.5). The dyke compositions are identical to flows of the Ambenali formation considered to be the least contaminated of the Deccan flows, Mauritius lavas and Reunion basalts, suggesting a genetic link with the Reunion plume.

The large variation in Sr-Nd isotopic compositions of the Deccan basalt lavas raised doubts about the extent of Reunion plume involvement in them. In fact, similarity of some of the Deccan basalt samples (having depleted isotopic compositions) to ridge basalts in the Indian ocean supports Anderson's contention that these [Anderson, 2000] flood basalts were a manifestation of decompression melting within the depleted upper mantle. However, based on trace element geochemistry, we interpret that the Sr-Nd isotopic variations in the Deccan basalts were caused due to variable assimilation of continental lithosphere into the Reunion starting plume head and the pristine isotopic compositions of the dykes could represent the uncontaminated plume axis magmas of the Reunion plume.

References

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