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The geochemical criteria to distinguish continental basalts from arc related ones

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Contamination by continental crust or lithosphere can impart subduction-like signatures and lead to the misidentification of contaminated continental intraplate basaltic rocks as arc related ones. Uncontaminated plume-derived continental basaltic rocks are normally characterized by high Nb/La ratios of higher than or near one, low $^{87}\text{Sr}/^{86}\text{Sr}(t)$ ratios, high $\epsilon_{\text{Nd}}(t)$ values and “hump-shaped” OIB-like mantle-normalized multi-element patterns without negative Nb, Ta and Ti anomalies. As the uncontaminated plume-derived basaltic rocks have been found in the studied volcanic successions, the possibility can be basically excluded that they belong to island-arc or active continental margin volcanic rocks. The contaminated continental basaltic lavas have higher $^{87}\text{Sr}/^{86}\text{Sr}$, concentrations of incompatible trace elements and lower ϵ_{Nd} relative to the arc related ones. For the basaltic lavas with subduction-like signatures, we can judge whether they are really island-arc or active continental margin basalts by utilizing the geochemical diagrams which do not use Nb, Ta or Ti as discriminating factors. The contaminated continental basalts can be distinguished from continental margin by two factors: 1) the overall level of the incompatible elements, including Nb is higher for the contaminated continental basalts, and 2) on trace element diagrams that do not involve Nb, Ta and Ti, even the contaminated basalts exhibit within plate character.

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