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Early Permian Qiangtang flood basalts, northern Tibet, China: A mantle plume that disintegrated northern Gondwana?

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Abstract

The Qiangtang flood basalt province (QFBP) was recently recognized in northern Tibet, China. It erupted during the Sakmarian–Kungurian and covered an area of more than $5.84 \times 10^5 \text{ km}^2$, reaching a maximum thickness of 1.5–2.0 km. The Qiangtang basalts have ocean-island basalt (OIB)-type trace element patterns, with enrichments of light rare-earth elements (LREEs) and Ti–Nb–Ta relative to similarly incompatible elements, as well as exhibiting no Eu-anomalies. The basalts show medium to high Sr and Pb isotopic ratios, and consistently positive $\epsilon_{\text{Nd}}(t)$. Strong correlations between Mg index, and major and trace elements indicate the basalts have experienced fractional crystallization of clinopyroxene and olivine, and may have been generated by partial melting of an OIB-type mantle plume source with negligible crustal contamination. Similar early Permian basalts are also present in the Lhasa terrane,

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