

Petrogenesis of the Triassic rhyolites in the East Kunlun Orogenic Belt, northern Tibetan Plateau and their tectonic implications

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The East Kunlun Orogenic Belt (EKOB), which is in the northern part of the Greater Tibetan Plateau, contains voluminous Late Triassic intermediate-acid volcanic rocks that are dominated by Orashan Formation (~232-225 Ma). In the east end of the EKOB, we identified a set of rhyolites (~210 Ma) whose chemical characteristics are obviously different from Orashan Formation. Combining bulk-rock major and trace element and Sr-Nd-Pb-Hf isotope analyses and non-traditional Fe isotope data, the recently recognized rhyolite shows remarkable similarity to the peculiar peralkaline rhyolite. Their characteristics offer convincing lines of evidence that they are straightforward consequence of protracted fractional crystallization from basaltic melts. Compared with the widespread Orashan rhyolites, they are characterized by elevated abundances of high field strength elements, especially the very high Nb and Ta, the very low Ba, Sr, Eu, P and Ti and the extremely high $^{87}\text{Sr}/^{86}\text{Sr}$ ratio (up to 0.96). The distinctive high Nb and Ta are inherited from the parental alkali basaltic melts. The extremely high $^{87}\text{Sr}/^{86}\text{Sr}$ ratio is actually feature of those typical peralkaline rhyolite, such as the Glass House comendites. Because of the removal of Ca-rich plagioclase during the protracted magma fractionation, Sr (also Ba and Eu) are also consumed and thus very high Rb/Sr ratio, indicating more radiogenic ^{87}Sr accumulated from the ^{87}Rb since the volcanism. Compared with the near-peralkaline rhyolites, we argue that the Orashan rhyolites are originated from the lower crust by decompressive melting under the post-collision extensional tectonic setting.