Geophysical Research Abstracts
Vol. 16, EGU2014-6204, 2014
EGU General Assembly 2014

Postcollisional potassic and ultrapotassic rocks in southern Tibet: Deciphering influences of mantle metasomatism and crustal contamination

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Abstract: Postcollisional potassium-rich magmatism in southern Tibet provides an important insight into the deep processes inducing accelerated plateau uplift and associated geologic episodes during early Miocene. As a major outcropping of postcollisional magmatic rocks in the southwestern Tibet, ultrapotassic and potassic volcanism in Xungba basin occurred coevally at ca. 23 Ma, consisting of bimodal-like volcanic sequence. The mantle-derived ultrapotassic rocks (Group 1) are latites and marked by both mantle and crustal geochemical signatures, similar to other younger (19-10 Ma) ultrapotassic rocks elsewhere in the southern Tibet. The high Th/Yb ratios, low Ba/La and Hf/Sm ratios observed in ultrapotassic rocks strongly imply derivation from a metasomatized lithospheric mantle regions enriched by inputs of pelagic sediment and carbonate during previous Tethyan oceanic subduction, while their relatively high SiO_2 and Dy/Yb, low Ni/MgO and CaO/Al_2O_3, and convex upward $^{87}Sr/^{86}Sr$-$\delta^{18}O_{V-SMOW}$ relationship suggest additional contributions of overthickened lower crust and ancient basement except for enriched mantle sources. The potassic rocks (Group 2), which underlie Group 1 rocks, are intermediate to silicic and exhibit adakitic geochemical affinities with high Sr/Y and La/Yb ratios, and low Y and Yb contents. The fingerprint of overthickened lower crust identified both from ultrapotassic and potassic rocks may be an important feature for magmatism occurred under the background of continental collision. And the bimodal volcanic sequence of Xungba postcollisional magmatism may further corroborate that the removal of lower part of over-thickened lithospheric mantle at depth may have triggered an extension setting associated with Miocene plateau uplift.