Geophysical Research Abstracts
Vol. 18, EGU2016-2959, 2016
EGU General Assembly 2016

Highly fractionation origin of the Himalayan leucogranites: Insights from the Kampa dome in South Tibet

Xiao-Chi Liu (1), Fu-Yuan Wu (1), Zhi-Chao Liu (2), Wei-Qiang Ji (1), and Jian-Gang Wang (1)

(1) Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China, (2) School of Earth Science and Geological Engineering, Sun Yat-sen University, Guangzhou, China

Himalayan leucogranites are the best example presently known of granites generated during continental collision by partial melting of tectonically thickened crust. It is generally thought that these leucogranites were originated from partial melting of the high-grade metamorphosed pelitic rocks of the High Himalaya, and it represents one kind of in situ S-type intrusion during exhumation of the High Himalayan material mostly in the Miocene. However, the present study on the granites exposed in the Kampa dome indicates that the Himalayan leucogranites could be of highly fractionated origination. The Kampa dome is located in the middle part of the Tethyan Himalaya, and composed mostly by Early Paleozoic (ca. 500 Ma) orthogneiss with minor Oligocene (ca. 26 Ma) leucogranitic intrusions. These garnet-bearing two-mica leucogranites have high contents of SiO_2 (74.4–75.6 wt. %), total alkali (8.0–9.6 wt. %), and low P2O5 contents (<0.03 wt. %), with aluminum saturation index (ASI) values of 1.14–1.28. Mineral indicating a nature of strongly peraluminous or S-type granitic magma is not present. Geochemically, these granites are characteristically enriched in lithophile trace elements, such as Rb, Cs, Y and depleted in Ba, Nb, Sr, P. In terms of REE elements, these granites show typical tetrad effects with significant negative Eu anomalies, which is also identified from apatite within granite. These features, together with high coherently saturation temperature of 635–675 °C for both zircon and monazite, suggest that the Kampa leucogranites might be a kind of high temperature magma originally, which had undergone an intensive crystal fractionation. The leucogranites have unradiogenic Nd isotope compositions (εNd(t)=-12.3 to -8.4), identical to those of the hosted granitic gneisses (εNd(t)=-14.8 to -8.8). Therefore, it was proposed that the leucogranites might be derived from the host gneisses of the Indian basement, but not from the metapelitic rocks as previously suggested. However, the obvious intrusive relationship between leucogranites and orthogneisses indicated that the leucogranitic melts were not in situ, but had been transported for a significant distance from the source rocks after partial melting.