

GEOCHRONOLOGY AND GEOCHEMISTRY OF ADAKITIC DYKES IN XIGAZE FORE-ARC BASIN ZONE: IMPLICATIONS FOR MIOCENE E-W EXTENSION

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Abstract

The east-west extension, the adakitic magmatism, and the potassic-ultrapotassic magmatic activity are three important tectonic-magmatic events in the Southern Tibet during Miocene. However, it remains unknown when the east-west extension started. This study analyzed the chronology and geochemistry of the E-W trending diorite porphyritic dyke and the near N~S trending fine grain dioritic dyke (cut across by former) exposed in Xigaze fore-arc basin zone. Geochemistry and geochronology of dioritic dykes in different directions and cross cutting reveal the three events during Miocene. Both dykes show adakitic signature, characterized by high aluminum, high sodium, high Sr/Y ratio, and high La/Yb ratio. All samples collected from the porphyritic and fine grained dioritic dykes exhibit light rare earth element (LREE) enrichment, heavy rare earth element (HREE) depletion, no obvious Eu anomaly, together with enrichment of large ion lithophile elements (LILE, Th, U, K, Pb, Sr, etc), and strong depletion of high field strength elements (HFSE, Nb, Ta, Ti). The E~W trending diorite porphyritic dyke yielded zircon U-Pb age of 14.8 Ma, and the emplacement time of the N~S trending dyke is slightly earlier. All of the above characteristics indicate both of these dykes have the same source area which is likely to be the thickened juvenile lower crust. According to the previous studies on the adakitic rock in the southern Tibetan region during Miocene, the partial melting of the thickened mafic crust is likely to be caused by the delamination of the lithosphere of the Lhasa terrane. This important geodynamic change induced upwelling of asthenosphere material, which led to adakitic magmatic activity and east-west extension. Age of adakitic dykes in Xigaze fore-arc basin zone constrains initiation of east-west extension earlier than 15 Ma.