

Late cretaceous granitoids along the northern Kuching zone: implications for the Paleo-pacific subduction in Borneo

ABSTRACT

The EW-trending Kuching zone in Borneo is a target region for exploring the southern continuation of Paleo-Pacific subduction from South China, Vietnam to SE Asia. Previous studies mainly focused on mafic igneous rocks, and poor attention has been paid to the contemporaneous granitoids in this zone. This study presented detailed zircon U-Pb geochronology and Lu-Hf isotope and whole-rock geochemistry analyses for late Cretaceous granitoids (granodiorites and granites) in the northern Kuching zone. These granitoids are dated at ~ 77.5 -83.6 Ma with younger ages than the igneous rocks in the southern Kuching zone (~ 130 -144 Ma). The granitoids have variable SiO₂ (64.86-77.37 wt.%) and A/CNK (0.7-1.5) and are strongly enriched in LILE and depleted in HFSE with significant Ba, Nb, Sr, and Ti negative anomalies. They have variable ($^{87}\text{Sr}/^{86}\text{Sr}$)_i (from 0.70656 to 0.71208), ϵ Nd(t) (from -4.4 to +0.9), and zircon ϵ Hf(t) (from -1.2 to +12.4) with high ($^{206}\text{Pb}/^{204}\text{Pb}$)_i ratio of 18.78-19.74, suggesting derivation from a hybrid source involving meta-sedimentary and meta-igneous rocks. Combined with previously-published data, two episodes of Cretaceous (~ 77 -98 Ma and ~ 130 -144 Ma) magmatic activities are identified in the Kuching zone, showing a younging age trend from south to north. These episodes of Cretaceous igneous rocks and their spatial distribution in the Kuching zone can be totally comparable to those in South China and Vietnam. Thus, the Kuching zone was likely a part of the Paleo-Pacific subduction system during the Cretaceous, northerly linking to Vietnam and South China.