Zircon U-Pb ages and Geochemical characteristics of Mafic rocks from Northern Sabah Ophiolite (Borneo), Malaysia

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Ophiolites in Sabah were previously referred to as part of the Chert-Spilite Formation and interpreted as a remnant of the proto South China Sea [1]. The Sabah ophiolite age was mostly obtained from the Southeast part of Sabah, either from radiolarian fossil or by radiogenic K–Ar technique, showing a wide range from Triassic to Eocene. For Northern Sabah Ophiolite, aside from the Lower–Upper Cretaceous age obtained from radiolarian chert, age of the ophiolite magmatic sequences still remains uncertain. This study reports new zircon U-Pb ages and whole-rock geochemical data of the mafic rocks (Gabbro and Basalt) collected from ophiolites complex in Northern Sabah to better understand their petrogenesis and tectonic significance. The U–Pb age analysis performed on zircon separates from two gabbro samples yield $^{206}Pb/^{238}U$ ages of 122Ma and 128Ma respectively. Most of the zircon crystals exhibit oscillatory zoning and have Th/U>0.1, which indicates their magmatic origin. Hf isotope data, obtained from the dated zircon grains display positive εHf(T) values ranging from +28 to +14, consistent with depleted mantle value. Whole-rock geochemical composition of the mafic rocks resemble an NMORB–EMORB pattern displaying depleted and enriched LREE pattern with some samples are comparable to BABB geochemical signature. Considering the Cretaceous ophiolite in this study and the Eocene ophiolite in Central Sabah [2] and Palawan [3] claims to be remnant of Proto South China Sea, hence we suggest that the Proto South China Sea was previously active during Cretaceous until Eocene age as a BABB setting.

[1] Hutchison (2007) 2nd ed. GSM, 433p. [2] Chien *et al*., (2019) *Goldschmidt Abstracts* **2019**, 598. [3] Keenan *et al*., (2016) *PNAS*, **113**(47), E7359-E7366.