

GEOCHEMISTRY AND ZIRCON U-PB GEOCHRONOLOGY OF IGNEOUS ROCKS FROM SOUTHWESTERN VIETNAM AND SOUTHEASTERN CAMBODIA

Nong, A.¹, Hauzenberger, C.¹, Gallhofer, D.¹, Nguyen, H.², Pham, H.² & Dinh, S.³

¹Institute of Earth Sciences, Department of Petrology and Geochemistry, University of Graz, Universitaetsplatz 2, A-8010 Graz, Austria

²Faculty of Geology, University of Science, 227 Nguyen Van Cu Street, Hochiminh, 70000, Vietnam

³Faculty of Petroleum, PetroVietnam University, Vietnam Oil and Gas Group, Vung Tau, Vietnam
e-mail: anh.nong@edu.uni-graz.at

Main subduction-related magmatism occurred in Vietnam from the Late Paleozoic to the Late Mesozoic which is related to two significant tectonomagmatic periods: (1) the opening and closure of the Tethyan Ocean and (2) the subduction of the Paleo-Pacific Ocean beneath the Eurasian continent. Two main distinct groups of Mesozoic igneous rocks, based on their zircon U-Pb ages, were found in southwestern Vietnam–southeastern Cambodia (SWVN-SEKH). The igneous rock suite related to the first event (Honkhoa suite) displays an Early Mesozoic age (ca. 210-180 Ma) and is mainly composed of biotite-hornblende granodiorite dispersedly outcropping at small islands in southernmost Vietnam. The latter event resulted in the emplacement of voluminous basic to felsic rocks (i.e. gabbro-diorite to granite) in the SWVN-SEKH during the Late Mesozoic (ca. 108-78 Ma). Within the SWVN-SEKH area, four different igneous suites can be distinguished based on their petrological and U-Pb age features: (1) the Dinhquan intrusive magmatic suite comprises mainly gabbro-diorite, monzodiorite, monzonite, and syenite, which are visibly altered by intensive K-feldspar metasomatism leading to a noticeably high amount of potassium; (2) the Deoca-Phnom Den magmatic suite is the major magmatic group, consisting mainly of granodiorite and granite; (3) the Ankroet-Ba Phnom suite is composed of fine to medium-grained granite; and (4) the Pha Aok-Tamao suite comprises muscovite-bearing granite and coarse-grained biotite granite. The Honkhoa rocks point to a calc-alkaline series typical for a plutonic arc-related nature. Their U-Pb zircon age yields 195 ± 2.1 Ma coincident with the Early Mesozoic magmatism which is linked to the Indosinian Orogeny driven by accretion of the Sibumasu terrane to the Indochina–South China block. The Dinhquan and the Deoca-Phnom Den rocks are metaluminous to peraluminous and usually contain the minerals amphibole, sphene, and allanite. The observed trends in trace and rare earth elements indicate a close genetic relationship of those and are typical for arc magmatism. The obtained ages are 105.0 ± 0.6 for the Dinhquan suite and 86.5 ± 1.9 to 94.4 ± 1.9 Ma for the Deoca-Phnom Den suite, compatible with the subduction event which existed along the eastern margin of the Eurasian continent during the Late Mesozoic, referred to as the Late Yanshan Orogeny. The slightly younger Ankroet-Ba Phnom suite, 89.3 ± 0.9 Ma, shows a peraluminous composition and higher contents in heavy rare earth elements. Their strong negative Eu, Sr, Ba, Ti anomalies suggest high fractionation, indicate a transition from arc magmatism to a subsequent extension regime compatible with a within-plate tectonic setting. Rocks from the Pha Aok-Tamao suite display a pronounced peraluminous nature, reveal a distinctly young age of 78.0 ± 0.4 Ma which might be related to the collision tectonic setting between the Indochina and Luconia block marking the halt of the Mesozoic subduction event in the SWVN-SEKH area.