Petrogenesis of Triassic and Cretaceous metamorphic rocks from Khanom (Peninsular Thailand); monazite CHIME dating and thermo-barometry

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Thailand is built-up by two major terranes which both have their origins in Gondwana; Sibumasu in the west and Indochina in the east. In between the so called Inthanon Zone and the Sukhothai arc belt are situated. Whereas such a terrane model was established in the northern part of the country and is widely accepted, the terrane arrangement and derivation in the south is still a matter of debate. Thus further petrochronological work is currently conducted in Peninsular Thailand.

One candidate for further work is the Khanom complex, a polymetamorphic crustal unit located in Peninsular Thailand SE of Surat Thani. It was first described by Kosuwan (1996) and consists of high-grade gneisses, schists, calcsilicates, marbles and is crosscut by post-orogenic granites. The complex is examined to bring more clearness whether these rocks have a similar evolutionary history to the high-grade metamorphic rocks in the north of the country or not.

Petrological investigations combined with geochronological studies were carried out on two gneisses (Haad Nai Phlao Gneiss and Laem Thong Yang Gneiss), to further understand the metamorphic and the timing and tectonic evolution of Peninsular Thailand.

These gneisses are typically granitic in composition and thus mainly consist out of feldspar, quartz and two micas. Whereas the Laem Thong Yang Gneiss is coarse-grained and has big feldspar augen, the Haad Nai Phlao gneiss is fine to coarse-grained with interlayers of calcsilicate and fine-grained amphibole bearing gneiss. Garnet and aluminosilicates which were formerly described could not be found.

Al-in-hornblende barometry (Schmidt, 1992; Anderson, 1996) coupled with monazite-xenotime thermometer yield peak pressure estimates around 0.61 ± 0.03 GP) and a wide temperature range of 624 ± 91 °C.

Furthermore, in-situ chemical Th–U–total Pb isochron method (CHIME) monazite dating was applied: two different events could be determined one at 216 ± 19 Ma and the other at 87 ± 7 Ma).