



## Petrology and Th-U-Total Pb Monazite Ages from The Inthanon Core Complex, Thailand

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The Inthanon Zone is regarded as the main suture between the Indochina and Sibumasu blocks and comprises ultramafic rocks, marine sediments and crystalline basement rocks. The gneissic basement is exposed in two different structural domains: (1) the Inthanon core complex located to the west of the Chiang Mai basin, and (2) the Mae Ping shear zone located to the south of the core complex. Here, we present new petrological and geochronological results from gneisses and schists of the Inthanon zone. Four different mineral assemblages can be recognised in gneisses and schists: (1) garnet-muscovite-biotite±sillimanite±chlorite schist, (2) garnet-muscovite-biotite-plagioclase-K-feldspar gneiss, (3) tourmaline-bearing muscovite-biotite-orthogneiss, and (4) migmatitic biotite gneiss. These rocks typically contain accessory ilmenite, pyrite, apatite, tourmaline, monazite, xenotime, and zircon. In-situ Th-U-total Pb dating of monazite reveals at least two metamorphic events, one in the Early Jurassic and another one in the Early Paleocene. A garnet-muscovite-biotite-sillimanite schist sample shows matrix micas and fibrolitic sillimanite wrapped around garnet porphyroblasts. Multi-equilibrium thermobarometry using Tweequ (Berman, 1996) yields metamorphic peak conditions of 0.5 GPa and 570 °C. Monazite dating yields two age populations at  $189 \pm 5$  and  $61 \pm 7$  Ma. A second sample belonging to this group contains chlorite instead of sillimanite and has a main schistosity with tightly folded relicts of a former fabric. Garnet porphyroblasts exhibit pressure shadows with quartz and mica. Monazite dating gives a single age population of  $65 \pm 6$  Ma. Garnet-muscovite-biotite-plagioclase-K-feldspar gneiss samples show corona textures with plagioclase, quartz, biotite, and muscovite around garnet porphyroblasts, indicative of pressure decrease. P-T conditions of 0.6–0.7 GPa and 680–700 °C were calculated using the garnet-biotite-plagioclase-quartz and garnet-biotite geothermobarometers. The formation of coronae around garnet occurred during exhumation at slightly lower conditions of 0.4–0.5 GPa and 640–660 °C. Monazite dating yields a main population at  $189 \pm 5$  Ma with few 50–70 Ma dates. Tourmaline-bearing muscovite-biotite-plagioclase-K-feldspar gneiss samples are characterized by an ultramylonitic texture. Large K-feldspar augen and tourmaline porphyroclasts are surrounded by a fine-grained, foliated matrix of quartz, and feldspar. The mineral assemblage indicates middle amphibolite grade. Monazite dating of this sample yields two populations at  $192 \pm 3$  and  $58 \pm 4$  Ma. Migmatitic biotite-gneiss samples preserve a biotite-plagioclase-K-feldspar-quartz assemblage in both the melanosome and leucosome. Monazite dating provides a single population of  $61 \pm 2$  Ma. Two tectono-metamorphic events are revealed by our data: a widespread medium P-T regional metamorphic phase, and a younger

overprint of unclear grade (low to high T assemblages are found) but significant spatial extent. While the first event was coeval with abundant plutonism during Sukhothai-Sibumasu collision (~185 Ma), the second one (~60 Ma) does not appear to be connected with regional plutonic activity and might be related to large scale shearing as seen in the Mae Ping and Three Pagoda shear zones.