

Sawasdee, Pornchanit; A. Hauzenberger, Christoph; E. Booth, John; Gallhofer, Daniela; Skrzypek, Etienne

Geochronology, Geochemistry and Petrology of Metabasites and Metadacites from the Nan Suture Zone, Northern Thailand

Department of Earth Sciences - NAWI Graz Geocenter, University of Graz, Graz, Österreich;
pornchanit.sawasdee@edu.uni-graz.at

Greenschists, blueschists and rare garnet bearing gneisses and amphibolites were tectonically emplaced within the mafic – ultramafic belt of the Nan suture zone of northern Thailand. Greenschist mineral assemblages are Amp (actinolite, barroisite) + Chl + Ep + Ab + Qz + Wm ± Ttn ± Hem. The blueschists are typically composed of Amp (glaucophane – riebeckite, barroisite – winchite) + Ep + Wm + Chl + Ab + Qz ± Ttn. The garnet bearing samples fall into three groups: (1) Grt – Wm; (2) Amp (hornblende) – Grt – Wm; (3) Amp (glaucophane – riebeckite, barroisite, winchite) – Grt – Wm. The rest of their assemblages being + Ab + Chl + Qz ± Stp ± Ep ± Rt ± Aln ± Zrn ± Ap)

Whole-rock geochemical data shows that the blueschist and greenschist protoliths were basalts, with a few outliers of trachybasalt, picrobasalt and basaltic-andesite. Plots follow a general tholeiitic trend, with TiO₂ and Fe₂O₃ increasing as MgO decreases. Samples outside of this trend represent either Cpx + Ol or Plg dominated cumulates. The chondrite normalized REE patterns are generally characteristic of MORB. However, some could be enriched MORB or within plate / ocean island basalts, as compared to normal MORB they are enriched in light and depleted in heavy REE.

The majority of the garnet bearing rocks plot within the dacite field. As a whole the sample group follows a general calc-alkaline trend, with a decrease in TiO₂ and Fe₂O₃ as MgO decreases and SiO₂ increases. They are mainly peraluminous (Shand, 1943) and magnesian (Frost et al., 2001 XFe – SiO₂ diagram).

Zircons have only been found in garnet bearing samples, while allanite occurs in garnet amphibolites and metabasites. Their U-Pb isotopic compositions were analyzed with LA-(MC)ICP-MS, four in-place and two from separated zircons, which are generally euhedral to subhedral and 30 to 100 μm in length. The determined magmatic emplacement ages of these six samples are: 329.9 ± 1.2, 326.3 ± 1.4, 326.0 ± 0.9, 325.5 ± 0.8, 320.0 ± 1.3 and 316.1 ± 0.5 Ma. One garnet amphibolite sample contains an additional group of zircons, with an age of 359.4 ± 2.5 Ma. The allanite grains appear to be magmatic. They are euhedral to subhedral, from 100 to 400 μm in length, some with metamict cores and patchy zonation. They yielded ages similar to those determined from zircons: 338.7 ± 5.5, 333.4 ± 2.1, 330.5 ± 4.9 and 323 ± 29 Ma.

By integrating the geochemical and petrological information with precise radiometric ages, we are beginning to determine the igneous protoliths and metamorphic history of the blueschists, greenschists and garnet bearing rocks that were produced with the subduction zone that destroyed the oceanic Nan basin of northern Thailand. Thus, providing constraints on tectonic models of the amalgamation of Indochina.

Session: *Pangeo workshop: Regional Geology*

Keywords: *Blueschist, Nan-Uttaradit suture, Allanite dating*