

New petrologic indications of subduction metamorphism in the Yuli belt, eastern Taiwan

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Previous reports of high-pressure (HP) metamorphism in the Yuli belt are mainly from meta-igneous and meta-volcaniclastic rocks, which are minor constituents within allochthonous metabasite-serpentinite blocks embedded in the dominant metasedimentary schists. By contrast, no HP minerals have yet been found in the metasedimentary rocks, whereas serpentinite is not suitable for pressure constraint. Thus skepticism on whether the Yuli belt is truly a HP metamorphic belt still exists. To solve this problem, we have investigated garnet-bearing pelitic schists using quartz-inclusion Raman spectroscopy barometry and surveyed the metasomatic zones around the Tsunkuanshan serpentinite body. Our Raman spectroscopic analyses on quartz inclusions in garnet from three metapelitic samples yielded residual (entrapment) pressures of 11-15 kbar at temperatures of 420-620°C (constrained by Raman spectra of carbonaceous material thermometry). These results are essentially consistent with those of HP metabasites, glaucophane schists, and metaplagiogrinites in the Yuli belt by recent pseudosection modeling. In the Tsunkuanshan area, meter-scale metasomatic zones crop out at the contact between serpentinite and surrounding pelitic schists. We discovered rare early-stage glaucophane (crossite) in an intermediate amphibole-albite rich rock in the metasomatic zones. This new occurrence indicates that serpentinite bodies might have been incorporated into a (paleo) subduction channel and subsequently recrystallized together with the host metasediments in HP conditions. Both the new pressure-temperature constraints from metasedimentary rocks and the finding of blue amphibole in metasomatic zones around serpentinite bodies indicate that the Yuli belt was subject to 'warm' subduction metamorphism.

Keywords: glaucophane, metasomatic zone, serpentinite, garnet, quartz-inclusion Raman barometry