Metamorphosed tectonic blocks in the Yuli belt, eastern Taiwan: a petrological perspective

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Rare and small meta-mafic/-andesitic and serpentine bodies scattered in the Yuli belt have long been interpreted as tectonic blocks in literature. Although a mélange-like environment has been proposed, the tectonic setting(s) and geological evolution of the whole Yuli belt remain debating. It is obvious that the tectonic blocks differ greatly from the matrix meta-sediments (mainly pelitic and psammitic with minor chloritic) in terms of whole-rock geochemistry and protolith origin. However, whether they were metamorphosed under the same or different conditions is a critical question yet to be answered. High-pressure metamorphic minerals, such as glaucophane and omphacite, have been identified in many of the tectonic blocks but not in the matrix meta-sediments by far. However, more field observations indicate that the former are embedded within the latter. Therefore, it seems less likely that both were metamorphosed at different physical conditions as previously thought. We have investigated representative litho-types from tectonic blocks and adjacent meta-sediments by using electron-beam microscopy, traditional geothermobarometry, and equilibrium phase diagram modeling. Peak metamorphic temperatures for tectonic blocks and country rocks are fairly consistent at around 500-570˚C, whereas peak metamorphic pressures, although less well constrained, are in the range of 10-17 kbar. These P-T estimates indicate that both tectonic blocks and surrounding meta-sedimentary rocks are coeval in petrotectonic evolution and represent a type of subduction zone metamorphism. The apparent difference in mineral assemblage, metamorphic grade, and texture for some similar or different rock types is misleading and probably reflects complex nature or superimposition controlled by bulk-rock composition, deformation, retrogression, metasomatism, and/or fluid activities.

Keywords: high-pressure metamorphism, subduction, glaucophane, omphacite, melange

