

國立東華大學自然資源與環境學系

碩士論文

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Master's Thesis

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東臺灣玉里帶萬榮地塊變質鐵鎂質岩之岩象特徵與溫壓制約

*Petrographic characterization and P-T constraints on metamafic rocks
from the Wanjung block of the Yuli belt, eastern Taiwan*



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Abstract

The Yuli belt is recognized as a blueschist metamorphic terrane because of the existence of glaucophane and omphacite in some high-pressure (HP) rocks. This belt mainly consists of metasedimentary schist containing minor blocks of serpentinites associated with metamafic rocks. Metamafic rocks are the major rock type in the Wanjung tectonic block and HP metamorphism is by far only found in omphacite-bearing metagabbro within serpentinite. This study classifies metamafic rocks into metagabbro, greenschist, and new finding rock types of garnet-bearing veinlet, mafic-intermediate gneiss, amphibole-albite rock, and barroisite schist. On the basis of petrographic and mineral compositional analyses for those rocks, this study presents the first finding of glaucophane as new evidence of HP metamorphism in the Wanjung area and of honeycomb garnet in the Yuli belt and Taiwan. Amphibole core-to-rim zoning trend in garnet-bearing rocks is commonly glaucophane, barroisite, and actinolite respectively, implying clockwise pressure-temperature (P-T) metamorphic evolution. This study applied quartz Raman geobarometry and garnet-amphibole geothermometry and constrained peak P-T conditions of metamafic rocks as 1.3–1.7 GPa and 460–580 °C. Pseudosection modeling (Perple_X) on garnet-bearing mafic-intermediate gneiss yielded similar metamorphic conditions. These results suggest that the Wanjung rocks were metamorphosed in a subduction zone setting.

Keywords: glaucophane, honeycomb garnet, quartz Raman barometry, pseudosection modeling, subduction metamorphism

摘要

藍閃石及綠輝石等高壓指標礦物的出現，是玉里帶為一高壓變質帶之重要的岩石學證據。在萬榮地區，高壓變質作用目前僅報導於萬榮構造地塊蛇紋岩體中少量出現之含綠輝石變質輝長岩，其構造地塊主體之變質鐵鎂質岩的變質溫壓條件仍不明確。經本研究的岩石學分析，此區變質鐵鎂質岩可區分為變質輝長岩、綠色片岩、及新發現的含石榴子石岩類，包含鐵鎂質或中性片麻岩(mafic-intermediate gneiss)、鈉長石角閃石岩、凍藍閃石片岩。其中，在凍藍閃石片岩中發現之藍閃石為本區首次報導。角閃石成分由核部至邊部為藍閃石→凍藍閃石→陽起石，指示一順時針之溫壓路徑。此外，在含石榴子石岩類亦首次發現蜂巢狀石榴子石 (honeycomb garnet)。本研究應用石榴石-石英包裹體-拉曼地質壓力計及石榴石-角閃石地質溫度計，制約此區變質鐵鎂質岩之峰期溫壓條件可達 1.3–1.7 GPa，460–580 °C，以熱力學相平衡模擬(Peple_X)計算亦獲得相近的溫壓條件。綜合岩象分析及峰期變質條件計算，推論萬榮地塊曾經歷隱沒變質作用。

關鍵字：藍閃石、蜂巢狀石榴石、石榴石-石英包裹體-拉曼地質壓力計、相平衡模擬、隱沒變質作用