

PRESSURE-TEMPERATURE EVOLUTION OF LAWSONITE-BEARING ECLOGITIC ROCKS IN THE NEW ENGLAND FOLD BELT, EASTERN AUSTRALIA

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Å@High P/T metamorphic rocks consisting of variably altered bimineralic eclogite, lawsonite eclogitic rocks and blueschist, occur as small blocks in a serpentinite melange zone of the New England Fold Belt, eastern Australia (Port Macquarie, Attunga and Gleneden). Lawsonite eclogitic rocks and blueschists from the Port Macquarie area have a high $\text{Al}_2\text{O}_3/\text{CaO}$ ratio (1.6-4.2) and are unusually rich in K_2O (0.6-5.6 wt%), Ba (95-2485 ppm) and light rare earth elements. This implies that the protoliths may be various mixtures of basaltic material and felsic sediments. Å@The main minerals found in the high P/T metamorphic rocks are garnet, omphacite, lawsonite, phengite, glaucophane, titanite and quartz. Lawsonite usually occurs as inclusions in garnet, and itself contains fine-grained glaucophane, titanite and quartz inclusions, indicating equilibrium in the lawsonite-eclogite facie. Estimated metamorphic conditions of the Port Macquarie samples range from 360-400 °C and 1.6-1.8 GPa during an early prograde stage to 480-560 °C and 2.2-2.3 GPa at the highest temperature stage. This indicates a simple prograde path with an average dP/dT of 0.4 GPa/100 °C (= 8 °C/km). The above mineralogical and geochemical characteristics are distinct from those of eclogites from the Attunga and Gleneden areas which (1) have a MORB affinity, (2) have equilibrated under higher temperature conditions of 620-800 °C and (3) do not contain lawsonite or its pseudomorph (Shaw and Flood, 1974; Allan and Leitch, 1992; Watanabe et al., 1999). The results of this present study indicate that the New England Fold Belt may contain a variety of types of eclogitic rocks that record different metamorphic and tectonic histories.