GLAUCOPHANE MARBLES AND ASSOCIATED HIGH-PRESSURE ROCKS ON THE ISLAND OF SYROS, CYCLADES, GREECE

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The rocks of the island of Syros are part of the Attic-Cycladic blueschist belt that formed during Eurasia-Africa subduction, which began in the Mesozoic. The rocks of Syros, as presently understood, can be broadly divided into three tectono-stratigraphic units: (I) metasedimentary and metavolcanic rocks, (II) remnants of oceanic crust, and (III) the Vari gneiss. With the exception of the Vari gneiss in the southeast, the rocks contain high pressure mineral assemblages reflecting conditions of at least 15 kbar and 500°C. Peak metamorphism is probably Late Cretaceous (Broecker & Enders, 1999; Cheney et al., 2000) rather than Eocene as earlier studies suggested. Unit I is a sequence of volcano-sedimentary rock types. The lowermost rocks of Unit I consist of metamorphosed felsic tuffs that may contain felsic clasts, mafic schists), marbles, and finely-laminated manganese cherts. These rocks give way upwards to a section dominated by marble horizons. The two main lower marble horizons are typically dolomitic, in part, and are separated by glaucophane-schists, greenschists (retrograde), and minor quartzites and manganese cherts.

Relatively pure layers of calcite in the marble commonly display a columnar structure that is interpreted as calcite pseudomorphs of aragonite. At many localities, thin layers bearing silicate minerals define the foliation in the marbles. In addition to carbonates and quartz, the assemblages contain various combinations of Na-amphibole, Na-pyroxene, epidote, garnet and white mica. The mineral assemblages and compositions in marbles and associated rocks tightly constrain the metamorphic P, T and the fluid composition attained by the marbles. For example, the common occurrences of both Na-amphibole + $CaCO_3$ and dolomite + quartz suggest that the P-T trajectory crossed a reaction like: albite/Na-pyroxene + dolomite + quartz => Na-amphibole + $CaCO_3$, but did not cross dolomite + quartz => tremolite. The P-T locations of both reactions are very sensitive to fluid composition and suggest $X(H_2O)$ in the range 0.97-0.99.