CALC-SILICATE MARBLES OF SYROS, GREECE

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Syros is a small island located in the Aegean Sea and is part of the Cyclades archipelago. The Cyclades are located in the central portion of the Attic-Cycladic metamorphic complex, a crystalline metamorphic belt that extends from Attica, Greece to the Menderes Massif in Turkey. The Cycladic islands have undergone at least two periods of metamorphism. A Cretaceous high-pressure blueschist facies event occurred around 80 Ma (Bröcker and Enders, 1999; Cheney et al., 2000). A Miocene greenschist partial overprint occurred at 19-25 Ma (Schliestedt et al., 1987). Eocene Rb/Sr and K/Ar mineral ages (40-45 Ma) were found by Altherr et al. (1979), but the meaning of these ages is not certain. Bröcker and Enders (1999) also report Paleocene zircon growth on the adjacent island of Tinos at 61-63 Ma, which they attribute to another metamorphic event.

The rocks on Syros consist principally of repeating alternating sequences of northerly dipping calcitic marbles, calcareous schists, and metamorphic mafic rocks. Marbles are found in numerous locations on the island in layers up to 400m thick (Maluski, 1987). Fossil evidence (Schumacher, in preparation) indicates the marble protoliths are Paleozoic in age.

Petrographic and chemical analyses performed on the impure marbles indicate the following mineral assemblage: calcite + quartz + dolomite + white mica + Ca-amphibole. In addition to this assemblage the samples contained one or more of the following: garnet, epidote, clinozoisite, chlorite, titanite, apatite, and paragonite (Table 1). Four key assemblages were used to constrain temperature, pressure, and fluid conditions respectively: garnet + white mica, omphacite + quartz, calcite + quartz + dolomite, titanite + calcite + quartz.

Thermobarometry calculations using these assemblages indicate the rocks on Syros attained temperatures of approximately 350°C – 500°C, minimum pressures of 0.8-1.2 GPa, and were metamorphosed under extremely water rich conditions ($X_{H2O} > 0.99$).

	cal	dol	qz	glauc	phen	clinz	grnt	chlor	mnz	apat	tourm	felds	omph	titan	actin	parag
001B	X		X	X	X			X		X				X		?
001G	X		X	X	X	X		X								
002C	X	X	X	X	X	?		X	?							
002D	X	X	X	X	X	X					X			X		
002E	X		X	X	X		X									
002K	X		X		X			X				X				
005A	X	X	X		X	X	X	?	?	X				X		
005D	X	X	X	X	X	X					X					
003D	X	X	X		X		X									
006D	X	X	X	X	X	X	X		X	X			X	X		X
006E	X	X	X	X	X		X									
007C	X	X	X		X											
007E	X	X	X	X	X	X							X	X	X	
007G	X	X	X	X	X	X						?	X	X		
008B	X		X		X	X										
009G	X			X	X		X	X							X	
009H	X					X										
010C	X	X			X			X								