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Magmatic geochemistry and relict textures in blueschist-eclogite facies rocks on the island of Syros, Greece

***Schumacher, J C**

EJc.schumacher@bristol.ac.uk

AFUniversity of Bristol, Dept. of Earth Sciences, Wills Memorial Bldg, Bristol, Bristol, Avo BS8 1RJ United Kingdom

Brady, J B

EJbrady@email.smith.edu

AFSmith College, Department of Geology, Northampton, MA 01063 United States

Trinkler, D R

EJtrinkedr@acs.wooster.edu

AF:

College of Wooster, Geology Department, Wooster, OH 44691 United States

Walton, A J

EJwaltona@stu.beloit.edu

AFBeloit College, Dept. of Geology, Beloit, WI 53511 United States

Wheeler, L M

EJwheeler@email.smith.edu

AFSmith College, Department of Geology, Northampton, MA 01063 United States

Sibbitts, A G

EJgsibbitts@amherst.edu

AF:

Amherst College, Department of Geology, Amherst, MA 01002 United States

Cheney, J T

EJjcheney@amherst.edu

AF:

Amherst College, Department of Geology, Amherst, MA 01002 United States

The island of Syros is part of the Attic-Cycladic blueschist belt and high-P mineral assemblages indicating peak metamorphic conditions of at least 15-16 kbar and 500 C are common. Two main marble units, which locally contain Mississippian fossils, are partly dolomitic, contain abundant calcite pseudomorphs after aragonite (Dixon, 1969), and are intercalated with the glaucophane (Glau)-schists, retrograde greenschists, and minor quartzites and Mn-cherts. Discrete, fault-bounded packages of blueschist/eclogite-facies mafic rocks with minor serpentinite are also present. The mineral compositions and assemblages in marbles and associated rocks tightly constrain the metamorphic P, T and the fluid compositions and suggest X(H₂O) in the range 0.97-0.99. In general, the mafic rocks have a variety of textures and modes, but most are either fine-grained, blueschists with a well-developed fabric (S approx.=L) or coarse-grained (>1 cm), massive omphacite- or Glau-rich rocks. Based on textures, mineralogy and field relations, previous workers (Dixon and Ridley, 1987) have interpreted the mafic rocks as meta-basalt and metagabbros. Evidence of pillow structures, as well as metamorphosed

alteration zones which are interpreted as evidence of ocean-floor metamorphism (?) have survived locally. We obtained whole-rock XRF and INAA analyses for fine- and coarse-grained mafic and felsic rocks and some mica-rich samples. Low chemical index of alteration (CIA) for most samples suggest very minor weathering. On a TAS diagram, mafic rocks span the basalt - basaltic andesite - trachy-basalt - basaltic trachy-andesite fields. REE patterns generally fall between 10-100 times chondrite and show flat to moderately LREE-enriched patterns. Coarse-grained rocks have positive Eu anomalies, consistent with their interpretation by other investigators as fractionally crystallized gabbros. Felsic rocks (now epidote-mica-schists) that are associated with the metamorphosed gabbros have negative Eu anomalies, and modeling of the REEs suggests that the felsic rocks represent residual melts during the crystallization of the gabbros. The low CIA-values indicate that the mica-schist precursors lacked significant clay material. The presence of abundant epidote (Zo) is consistent with a feldspar-rich (magmatic) protolith for the mica-schists.

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