

On the Age of the High-Pressure Metamorphism on Sifnos (Greece)

Preliminary Report

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Abstract. K/Ar dating on five phengites and two paragonites from five blueschists and one eclogite collected on the island of Sifnos indicate that a subduction process and related high-pressure metamorphism took place during the Late Eocene.

Résumé. K-Ar datations sur cinq phengites et deux paragonites des cinq schistes à glaucophane et d'une éclogite, qui son pris de l'île de Sifnos, indiquent, que le procès de subduction et le métamorphisme de haute pression a eu lieu pendant l'eocène supérieur.

Critical mineral assemblages in the Cyclades crystalline complex indicate different baric types of regional metamorphism. Contrasting geothermal gradients are represented by the high-P assemblage jadeite + quartz, recognized in the glaucophane-rocks on the islands of Syros and Sifnos, versus the Barrow type metamorphism on Naxos ranging up to the sillimanite zone. A paramount problem for the Cyclades crystalline complex is the temporal relationship of both types of metamorphism. In this paper, first results on the age of the high-pressure rocks on N-Sifnos are communicated.

Mineral assemblages of investigated blueschists and one eclogite from a road cut near Cherrónisos are:

Si74-127: quartz-phengite-chlorite-garnet-glaucophane,

Si74-129 (eclogite): pheng.-omphacite-garn.,

Si74-131: qtz.-pheng.-parag.-jadeite-chlor.-glauc.-garn.,

Si74-132: qtz.-pheng.-parag.-jadeite-glauc.-garn.,

Si74-133: qtz.-pheng.-glauc.-garn.-epidote,

Si74-134: qtz.-pheng.-jadeite-glauc.-garn.-(lawsonite),

Si74-135: qtz.-jadeite-parag.-glauc.-garn.

These assemblages point to water vapour pressures of more than 10 kb. The K/Ar dates determined on the white micas are not uniform. Paragonites Si74-132 and -135 yielded model ages of 50 and 47 m.y. respectively, phengite -127 45 m.y.. The phengites -129, -133, and -134 yielded model ages between 42 and 41 m.y.. Much lower ages of 35.4 and 34.7 m.y., respectively, were determined on the phengite/paragonite pair Si74-131. Although the K-contents of phengites and paragonites differ by an order of magnitude, the respective dates do not deviate very much from each other. Consequently, the model ages should not be affected by excess argon seriously. On the contrary, by the pattern of sample -131, i.e. the lower age with the lower content of potassium, losses of argon are conjectured. So the age of the high-pressure metamorphism should be higher than 35 m.y.. The range of the data points can be characterized by a lower reference isochron of 35 m.y. and an initial ratio of recent atmospheric argon (295.5) and an upper reference isochron of  $44.4 \pm 0.5$  m.y. and a slightly elevated initial ratio of  $305.5 \pm 1.5$ , which is defined by the paragonites -132, -135, and the phengite -134. We assume that 45 m.y. (Middle to Late Eocene) is close to the age of the high-pressure metamorphism related to subduction. This metamorphic event clearly predates the Barrow-type metamorphism and related igneous activity for which Miocene mineral ages are reported (ANDRIESSEN et al., 1976; ALTHERR et al., this volume). ANDRIESSEN et al.: Fourth European Colloquium of Geochronology, Cosmochronology, Isotope Geology, Amsterdam, 1976 (Abstract).