Rb/Sr radiometric data from medium- to high-grade metamorphic rocks (Aspromonte nappe) of the north-eastern Peloritani Mountains (Calabrian Arc), Italy

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Abstract: Rb/Sr whole-rock and mica analyses were carried out on paragneisses and augen orthogneisses from the north-eastern Peloritani (Sicily), in order to investigate the Hercynian tectono-metamorphic evolution of the basement terrain in this segment of the Calabrian Arc.

Whole-rock radiometric data from six small slabs of a migmatitic paragneiss and seven orthogneiss samples do not define isochrons, so it was impossible to date either the emplacement of the protoliths of the orthogneisses or the peak of the amphibolite-facies metamorphism that affected the protoliths. Biotite and muscovite ages in the range 292-262 Ma suggest an uplift of the investigated basement, contemporaneous with the emplacement of associated post-tectonic peraluminous granites. The younger biotite dates (173-137 Ma), obtained from unsheared paragneisses in the Milazzo area collected near a mylonite zone, may reflect later disturbance involving only partial resetting. They suggest that Alpine shear effects, found throughout southern Calabria, also occurred in the Peloritani sector of the Calabrian Arc.

The Sr isotopic compositions of the studied metamorphites, recalculated back to the intrusion age of the associated Hercynian S-type granites, are significantly higher than those of the granites (> 0.716 vs = 0.710). Therefore the gneisses or similar basement rocks can be excluded as a dominant component in the source region of the granites.

Key-words: Rb/Sr dating, paragneisses, orthogneisses, Hercynian cooling ages, Alpine overprint, Peloritani Mountains, Sicily.

Introduction

The medium- to high-grade metamorphites of the southernmost sector of the Calabrian-Peloritani Arc (NE Sicily) consist mainly of a metasedimentary sequence of predominant paragneisses, more or less migmatitic, with intercalations of augen orthogneisses, amphibolites and marbles (Atzori et al., 1974). In the absence of any radiometric constraints, various hypotheses have been forward on the metamorphic history of the Arc basement. Some authors (e.g. Atzori et al., 1984 and references therein) have proposed that the main tectono-metamorphic evolution of the medium- to high-grade rocks of the southern part of the Arc (Aspromonte unit) is Hercynian. Bouillin et al. (1984a, b; 1987) have, on the other hand, considered this metamorphism as pre-Cambrian, on the basis of: i) an analogy between the