Tectonic and Metamorphic Evolution of the Temsamane Units, External Rif, Northern Morocco. Implications for the Evolution of the Rif and the Betic-Rif Arc

F. Negro[1,2], P. Agard[3], B. Goffe[2], and O. Saddiqi [4]
[1] Institut de Geologie, Universite de Neuchatel, Switzerland
[2] Laboratoire de Geologie, Ecole Normale Superieure, Paris, France
[3] Laboratoire de Tectonique, Universite Paris VI, France
[4] Departement de Geologie, Universite Hassan, Casablanca, Morocco

Located at an intermediate position in the External Rif nappe pile, the Temsamane units (northern Morocco) present an abnormally intense metamorphism and a penetrative ductile deformation. We present new metamorphic data showing that, in spite of their external position in the Rif, part of the Temsamane underwent medium-pressure low-temperature (MP-LT) conditions (c.a 7-9 kbar; 330-430°C), possibly during the Oligocene. Structural data show that the exhumation of these units, during Middle to Late Miocene times, was characterized by an intense ~E-W stretching and by top-tothe-west shear senses. We discuss two possible origins for the MP-LT Temsamane units: (1) an internal origin related to the subduction and the HP-LT event recorded in the Internal Rif (Alboran Domain) or (2) an external origin, implying a second subduction system within the External Rif, parallel and almost contemporaneous with that of the Alboran Domain. The tectonic and metamorphic evolution of the Temsamane is set back within the External Rif tectonic time frame and compared with the Alboran Domain units of the internal Rif. At a larger scale, we show that the exhumation history of the Temsamane, which strongly resembles the one documented in the Sierra Nevada in the Betics, is compatible with the westward slab retreat occurring during the Middle to Late Miocene in the Betic-Rif region.

Keywords : Alboran, metamorphism, Rif, Temsamane