



## **Evidence of oceanic units in the core of the External Rif (Morocco): intramargin hiatus or South-Tethyan remnants?**

Mohamed Benzaggagh (1), Abdelkhader Mokhtari (1), Abdelkhader El Maz (1), Philippe Rossi (2), André Michard (3), Omar Saddiqi (4), Ahmed Chalouan (5), and Ech-Cherki Rjimati (6)

(1) Moulay Ismael Univ., Meknes, Morocco, (2) B.R.G.M., Orléans, France, (3) Paris-Sud Univ., Orsay, France, (4) Hassan II Univ., Casablanca Ain-Chock, Morocco, (5) Mohamed V Univ., Rabat Agdal, Morocco, (6) Energy and Mines Minist., Rabat, Morocco

Our work is based on extensive field campaigns in the central area of the External Rif Belt and on petrological-geochemical study of the magmatic samples. The aim is to disclose the westward extension of the Mesorif suture zone evidenced in the Tamsamane zone of eastern Rif (Michard et al., 2007). We first describe Jurassic-Early Cretaceous sections involving basaltic rocks, spread along the 200 km-long, arcuate Prerif-Mesorif boundary zone west of the Tamsamane massif. These sections are thoroughly dated by ammonites and calpionelles from the late Oxfordian to late Berriasian (Benzaggagh, 2011). They display varied traces of submarine, basic volcanism such as volcanoclastic complexes within Upper Berriasian marls, and basalt flows, olistoliths and clasts in the upper Oxfordian-lower Berriasian clayey breccias or in the lower Tithonian brecciated calcareous beds. Volcanic activity took place at the margin of a carbonate platform during the Kimmeridgian-early Tithonian interval, then in a pelagic basin from late Tithonian onward. Petrographic and geochemical studies point to E-MORB basaltic magmas (Rossi, in Benzaggagh, 2011), thus testifying for strong crustal thinning in this part of the African paleomargin. Strong support to this inference is found in the occurrence of two small tectonic units of gabbros associated with basalt flows, fault-scarp breccias and radiolarites. A preliminary study of the gabbros reveals that, in thin section, many petrographic types display ortho- to heteradcumulate texture. The typical sequence of crystallization is plagiocl-cpx-ilmenite and the composition ranges from troctolitic olivine gabbro [An 66-60; Fo 73-71 & 68; cpx Wo 46, En 44, Fs 10 with content in Cr<sub>2</sub>O<sub>3</sub> up to 1%] to ferrogabbro [(An 50-45); Fo 53; cpx Wo 44, En 40, Fs 16]. Plot of these rocks onto an AFM projection fall on the cumulative composition field along the FM joint and TR patterns display systematic Eu positive anomaly characterizing cumulative plagioclase. Some more differentiated (lower MgO, higher total REE) samples that do not contain olivine display REE patterns closer to those of typical MORB (with a weak Eu positive or negative anomaly) and feature near liquid composition. Near the contact between gabbros and volcanic-sedimentary formations, gabbros are crosscut by trondhjemitic veins. These typically oceanic units are associated with the marginal, E-MORB basalts-bearing units in the same suture zone as the serpentinite-bearing Tamsamane massif itself. The inversion of the corresponding, Jurassic-Cretaceous thinned crust/oceanic domain took place during the Miocene Iberia-Africa collision. Accordingly, the Maghrebide external suture zone is now recognized over 500 km from Oran (Algeria) to Ouezzane (Morocco) where it disappears beneath the Flysch Nappes. The relationships of this suture zone with the Tethyan suture itself need more elucidation.