

## **Geochemistry of the volcanic rocks of the Moroccan Central Hercynian Massif: geodynamic significance**

A. NTARMOUCHANT<sup>1</sup>, T. BENTO DOS SANTOS<sup>2\*</sup>, H.  
SMAILI<sup>1</sup>, M. DAHIRE<sup>1</sup>, K. SABRI<sup>1</sup>, M.L. RIBEIRO<sup>3</sup>, Y.  
DRIOUCH<sup>1</sup>, A.R. SOLÁ<sup>3</sup>, R. CALVO<sup>3</sup>

<sup>1</sup> LGRN – Laboratoire de Géodynamique et de Ressources  
Naturelles, Université Sidi Mohammed Ben Abdellah –  
Faculté des Sciences – Dhar El Mehraz – Fès, Morocco

<sup>2</sup> IDL – Instituto Dom Luiz, Universidade de Lisboa, Portugal

<sup>3</sup> LNEG – Laboratório Nacional de Energia e Geologia,  
Portugal (\*correspondence: [tmsantos@fc.ul.pt](mailto:tmsantos@fc.ul.pt))

The SE sector of the Moroccan Central Hercynian Massif (MCHM) of the Western Meseta of Morocco comprises two volcanic sequences interlayered in Carboniferous formations: i) the Dhar Lahmar Sequence, composed of Upper Visean basaltic lava flows and pyroclastic deposits; and ii) the Kef Al Asri Sequence, composed of Visean – Serpukhovian intermediate to acid rocks. Both magmatic sequences present an effusive character at the bottom, evolving to explosive volcanism towards the top. The Hercynian explosive volcanism was already recognized in the Eastern Meseta [e.g.: 1], but unknown in the MCHM of the Western Meseta.

A spatial and temporal link between the two sequences is evidenced by field observations, petrography and geochemistry. Harker diagrams and REE patterns suggest a continuous compositional evolution from the basic to the intermediate/acid magmatic rocks, implying cogenetic magmatism controlled by fractional crystallization and AFC processes of a calc-alkaline magmatic suite. Nb, P and Ti anomalies, Th/U and Th/Ta > 1, as well as Zr/Y > 3 is consistent with an orogenic evolution within an active continental margin setting.

This explosive volcanism, previously unidentified in the MCHM, has similar petrographic and geochemical characteristics to its Eastern Meseta analogues. Emplacement of these magmatic rocks must have occurred at similar geodynamic settings for both major geological domains, i.e.: the Eastern and Western Moroccan Mesetas can be envisaged as a homogeneous Hercynian plate overriding a subducted slab, whether with western [2] or eastern vergence [3].

*Publication supported by FCT - project  
UID/GEO/50019/2013 - Instituto Dom Luiz.*

[1] Bennouna *et al.* (2004) *J. African Earth Sci.* **39**, 3-5, 369-374. [2] Roddaz *et al.* (2002) *Tectonics* **21**, 5, 1043. [3] Michard *et al.* (2010) *Tectonophysics* **492**, 1-24.