

## **An Example of Calc-Alkaline, Orogenic-Type Volcanism Emplaced in a Rift Setting (Cambrian Oued Rhebar Horst, Western Meseta, Morocco)**

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In the northwestern part of the Hercynian Moroccan Meseta, the Oued Rhebar volcanic complex is interbedded within the middle Cambrian ("Acadian") Schistes à Paradoxides series. The volcanic series includes andesites, tarchyandesites and coarse pyroclastic materials.

New major, trace and rare earth element analyses make it possible better to characterize the magmatic affinity, nature and origin of the Oued Rhebar magma. Chemical analyses of the studied rocks were carried out at the Granada University (Spain).

Extrusive rocks display a microlitic and porphyritic texture and include a mineral paragenesis made up of plagioclase, sanidine, quartz, brown amphibole, biotite, clinopyroxene relics, iron oxides, chlorite and calcite. The matrix mainly contains plagioclase and opaque minerals. Accessory minerals are apatite and zircon.

Compatible elements contents are weak; Ni<27ppm, V varying between 157 and 70ppm, Cr<50ppm, reflecting a rather evolved character. The values of the alumina, varying between 16 and 19% are although higher and similar to those from calc-alkaline rocks.

Rocks are also characterized by high contents in Y (9-35ppm), Zr (80-170ppm) and in Th (2-3ppm). The low Hf/Th (<3) ratios are the same than those from volcanic arc calcalkaline basalts. This can be also demonstrated in the Ti/100- Zr-Y.3 diagram. The Th/U and Th/Ta ratios (>1) are closer to rocks originated in an orogenic context.

All the analysed rocks samples display fractionated light REE and flat heavy REE (4,95<La/Yb<27,07). Patterns are similar to those of calc-alkaline series. HREE patterns are weakly enriched indicating probably the existence of garnet in the source region.

In a primitive mantle-normalized plot, all the volcanic samples exhibit similar patterns. They are parallel and fractionated (LILE/HFSE>10 ratio) and display Nb, Ta and Zr relative depletions typical of calc-alkaline orogenic and/or metasomatized mantle magmas. These anomalies and the high Ba/Nb ratios (>30) are similar to those from orogenic andesites.

The La/Nb ratios are relatively high (5.2), suggesting a lithospheric mantle origin. The La/Ta ratios, higher than 26, and the negative Nb anomaly indicate a lithospheric source contaminated by the continental crust. In conclusion, the middle Cambrian calc-alkaline Oued Rhebar volcanic complex is comparable to rocks generated in a mesetian mid-cambrian rift and inherited the orogenic signature from the partial melting of a previously metasomatized mantle.

Key words: calc-alkaline volcanism, Middle Cambrian, Oued Rhebar, Western Meseta, Morocco