V CONGRESO DEL CRETÁCICO DE ESPAÑA

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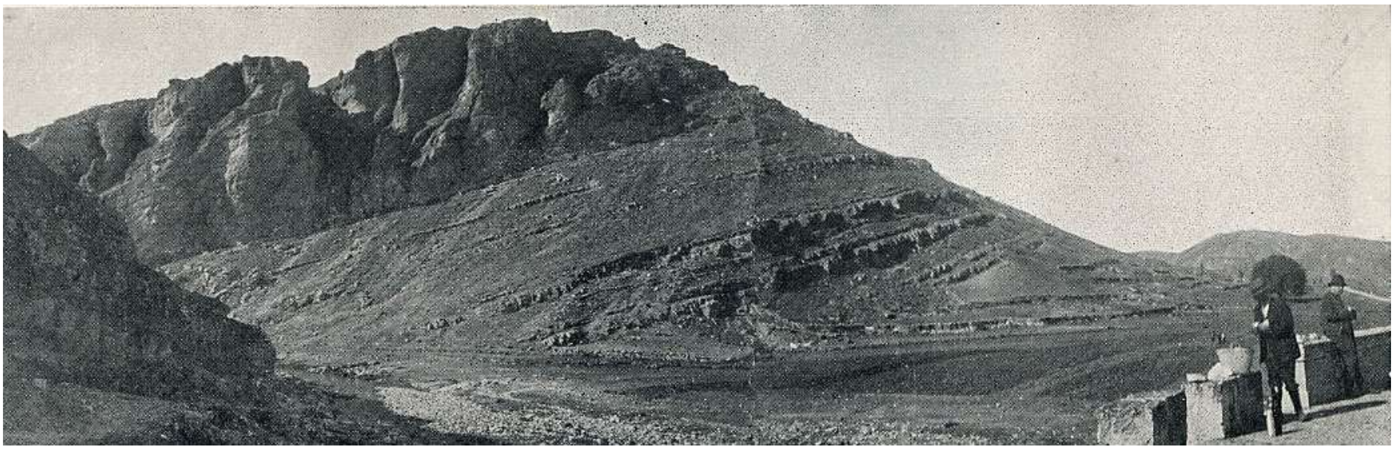

PROVENANCE AND CLIMATE TRENDS RECOGNIZED FROM THE GEOCHEMICAL SIGNAL OF UPPERMOST HAUTERIVIAN TO MIDDLE ALBIAN CLAYS OF THE ERICEIRA REGION (LUSITANIAN BASIN, PORTUGAL)

TENDENCIAS DE PROVENIENCIA Y CLIMA IDENTIFICADAS POR LA SEÑAL GEOQUÍMICA DE ARCILLAS DEL HAUTERIVIENSE TERMINAL AL ALBIENSE MEDIO EN LA REGIÓN DE ERICEIRA (CUENCA LUSITÁNICA, PORTUGAL)

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The geochemistry of major and minor elements of 48 mud-rich beds from the uppermost Hauterivian to middle Albian succession of the Lusitanian Basin (Ericeira region) was used to establish evolutionary trends in sediment provenance and climatic control on weathering conditions. The studied succession is about 150 m thick and includes, from base to top, the Ribamar, Ribeira de Ilhas, Regatão, Crismina, Rodízio and Galé formations, The lithostratigraphic units were defined by Rey (1992) and the regional stratigraphic framework and basin-scale setting is based in the work by Dinis *et al*. (2008).

Sampling space is 3 m in average. To minimize the effects of depositional and post-depositional processes on sediment composition we also followed lithological criteria by sampling fine-grained beds and analyzing the fraction finer than 63 µm.

From the 55 major and minor elements analyzed we selected;

- several ratios involving minor elements that tend to be immobile (mainly Zr, Th, Y, Nb, Ti, Sc, Ni, Co, La and Yb) allowing to distinguish intervals with significant contribution of felsic *vs*. mafic source rocks;
- the oxides that provide the chemical index of alteration of Nesbitt and Young (1982);
- the ratio SiO_2/TiO_2 as a proxy for sediment recycling.

The higher mafic content probably corresponds to more proximal sources, including Precambrian and Paleozoic metamorphic clastics and the latest Jurassic to Early Cretaceous igneous rocks, whereas the hinterland areas are dominated by hercynian granitoids and gneisses (Carvalho *et al*., 1992; Dinis *et al*., 2008).

The parts of the succession that show very high chemical index of alteration coupled with evidences of significant proportion of mafic components and/or minor recycling process are probably associated with warm and wet climates and a landscape with a relatively short clastic travel. These conditions were identified in the Hauterivian to Barremian transition (at the top of the Ribamar Formation), upper Barremian (at the bottom of the Regatão Formation) and uppermost Aptian-lowermost Albian (bottom of the Rodízio Formation) intervals. In the first case it probably reflects an increase in clastic supply, possibly related to increasing humidity. In the Regatão Formation and Rodízio Formation their coarser grain-size and regional correlations points out to a tectonic triggering. The fast transition of mafic signal in the base to the upward dominant felsic one probably records the progradation of distal over proximal materials; ratios associated with extreme chemical alteration become less intense upward, reflecting the inverse deposition of the regolith.

Conversely, units with lower chemical index of alteration that include significant proportion of felsic derived material are probably associated with drier climates after the events that extended upstream the drainage network. The best examples of these conditions were found in the upper Barremian to lowermost Aptian beds of the Cobre Member (the lower of the Crismina Formation), and lower and middle Albian (basal part of Galé Formation). Signal of relatively dry conditions are also prevalent during the middle Barremian (middle part of the Ribeira de Ilhas Formation).

The coincidence of some peaks of less pronounced weathering with clearly transgressive facies cannot be explained merely by reduced erosion and sediment supply due to a lower slope of the drainage system. In fact if the climate in the provenance area was the same as the previous phases (warm and wet), since the weathering mantle would be less eroded, it should be more developed and the erosion did not reach the less chemically weathered base of the regolith. Thus we believe that such coincidence can be interpreted as an argument for aridity controlled reduction of chemical weathering.

Most of the conclusions found by the applied proxies show great concordance or even refine previous works on the subject (e.g. Mendes *et al*., 2010; Dinis *et al*., 2011; Heimhofer *et al*., 2012).

Finally we must note that the presented conclusions are tentative since the analyzed geochemical signal is a product of a complex interaction between many factors. These include those mentioned above and others, like the effects of tectonic uplift on the regional climate and on the drainage pathway, the response of the drainage pattern and supply to precipitation regime, possible depositional bias and diagenesis.

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