

## **Aluminium-phosphate-sulphate minerals as markers of sustained acidic conditions during the Permian–Triassic transition in E Iberia.**

Violeta Borruel-Abadía (1), Ana Belén Galán-Abellán (2), José F. Barrenechea (2), Raúl De la Horra (2), Francisco Javier Luque (1,2), Jacinto Alonso-Azcárate (3), and José López-Gómez (1)

(1) Geosciences Institute (CSIC), Madrid, Spain (violeta.borruel@igeo.ucm-csic.es), (2) Faculty of Geology, Complutense University, Madrid, Spain, (3) Faculty of Environmental Sciences and Biochemistry, University of Castilla-La Mancha, Toledo, Spain

Strontium-rich hydrated Aluminium phosphate-sulphate (APS) minerals are markers of an acidic formation environment due to their precipitation at low pH conditions. However, their small size (0.5–6  $\mu\text{m}$ ), low concentrations, and optical properties represent the main problems to quantify these minerals.

This study provides quantitative data on APS mineral concentrations for the Late Permian and Early–Middle Triassic in different continental sections of East Iberia. By quantifying APS minerals useful insight can be obtained into the environmental conditions that prevailed during the biotic crisis of the PTB and during the later recovery of life at the end of the Early Triassic. For that, a quantification method based on element mapping of randomly selected areas of thin sections on the electron microprobe is proposed, with relative errors ranging from 5.6% to 11.7%.

The results are considered on a detailed petrographic, sedimentological, and palaeontological framework, and compared with other geochemical. Thus, in the first sedimentary record after the Permian–Triassic boundary (Olenekian), it has been possible to correlate relatively high concentration levels of APS minerals with the lack of signs of living organisms. Our findings suggest a long period of sustained acidic conditions followed by an environmental change that permitted the recovery of life, as reflected by lower APS mineral contents detected at the end of the Spathian and the first presence of bioturbation, paleosols, footprints, and plant remains.

Early Anisian acidic episodes were much more sporadic than those during the Olenekian deposition, in which APS mineral concentrations were an order of magnitude higher. This fact would indicate punctual acidic conditions still during the beginning of the Anisian. Based on these results, this method is proposed as a tool for addressing environmental changes that took place during the Permian–Triassic transition in continental environments.