Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.29690

Geochemical and Sr-Nd isotope data for the Ediacaran-Cambrian metasedimentary successions from the Central Iberian Zone (Portugal): provenance implications

LUÍS PORTELA, JORGE MEDINA, MARIA ROSÁRIO AZEVEDO AND BEATRIZ VALLE AGUADO

GeoBioTec, University of Aveiro

In the Portuguese sector of the Central Iberian Zone (CIZ) of the Iberian Variscan Belt, the crystalline basement is dominated by a thick turbidite-like sequence of Ediacaran-Cambrian age, known as the Douro-Beiras Supergroup (DBSG). The DBSG is classically subdivided into two main lithostratigraphic units: the Beiras Group (in the south) and the Douro Group (in the north).

Geochemical data for 42 samples of metapelites and metagreywackes of low metamorphic grade from the Beiras and Douro Groups reveal that the metasediments from the two series define overlapping trends on major element variation diagrams, but show significant differences in their trace element compositions. Compared to their counterparts of the Douro Group, the samples from the Beiras Group display higher Ti and Sc contents, lower abundances in LILE, REE and Th, higher Ti/Nb and lower Th/Yb and Th/Sc elemental ratios. Chondrite-normalised REE patterns for the Beiras metasediments are characterised by low to moderate LREE/HREE ratios (La_N/Yb_N = 4.07-9.40), relatively flat HREE profiles (Gd_N/Yb_N = 1.03-2.35) and distinctive negative Eu anomalies, whilst the samples from the Douro Group tend to exhibit more fractionated REE and HREE patterns (La_N/Yb_N = 9.11-16.36; Gd_N/Yb_N = 1.57-3.08) and similar negative Eu anomalies.

Initial εNd values calculated to a presumed depositional age of 540 Ma are negative for all the analysed samples, varying between -5.46 and -1.04 in the Beiras Group and from -6.02 to -4.36 in the Douro Group. The Beiras Group samples tend to show younger Nd model ages (T_{DM} = 1.12-1.52 Ga) than those from the Douro Group (1.36-1.55 Ga).

Systematic differences in trace element contents and ratios, degree of REE fractionation, εNd_i values and T_{DM}ages suggest that the Douro turbidites received a major contribution from strongly fractionated sources, while a mixed origin involving old continental crust source rocks and input of juvenile materials is postulated for the Beiras metasediments, as proposed by [1] and [2].

[1] Villaseca et al., 2014. Precambrian Research, 245, 131-145.

[2] Cotrim et al., 2024. Geochemistry, 84, 126088.

This work was supported by GeoBioTec (UIDB/GEO/04035/2020) and a PhD scholarship (https://doi.org/10.54499/2021.08848.BD), sponsored by the Portuguese Foundation for Science and Technology.