

Rifting inception of the Variscan Cycle at the Central Iberian Zone

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The Central Iberian Zone (CIZ) of the European Variscan Belt preserves thick sedimentary sequences of Ediacaran-Lower Cambrian age, the Douro-Beiras Supergroup. They were deposited in two large basins during the late stages of the Cadomian Orogeny. This study focuses on metabasic rocks occurring in the upper units of the Douro-Beiras Supergroup of the CIZ, in the Viseu-Tondela region.

The metabasic rocks are tholeiitic ($Nb/Y < 0.67$), comprising fine-grained amphibolites and coarse-grained meta-gabbros testifying, respectively, the occurrence of volcanism coeval with sedimentation (Lower Cambrian?) and younger basic intrusive activity. These two types of rocks are not comagmatic as demonstrated by distinct ϵNd_i (+4.6 to +4.9 for the amphibolites and +5.7 to +6.3 for the meta-gabbros). Accordingly, amphibolites and meta-gabbros are also characterized by distinct incompatible trace element ratios, such as, respectively (Nb/Y : 0.43 to 0.66 and 0.15 to 0.16; $(La/Sm)_N$: 1.97 to 2.04 and 0.90 to 0.92; $(La/Yb)_N = 3.99$ to 4.49 and 1.08 to 1.26). $(Ba/Nb)_N < 1$ emphasizes the low LILE/HFSE ratios characterizing the studied rocks, when relatively immobile elements are considered. This supports the lack of subduction-related fingerprints in these rocks.

The geochemical temporal evolution revealed by the differences between the amphibolites and the later meta-gabbros suggests a progressive stretching/thinning of the lithosphere (temporal increasing of β values) resulting in an increase of partial melting extent and leading to the post-Lower Cambrian generation of rocks with N-MORB affinities (the meta-gabbros). We consider that these magmatic events mark the onset of the Variscan times, i.e. of a new Wilson cycle in the Iberian Massif after the end of the Cadomian Orogeny. The positioning of these metabasic rocks within the CIZ pinpoint the separation limit of the two basins that comprise the Douro-Beiras Supergroup.

This publication was supported by FCT - Project UID/GEO/50019/2019 - Instituto Dom Luiz.