

Provenance Analysis of the Late Ediacaran Basins from Southwestern Iberia (Série Negra Succession and Beiras Group): Evidence for a Common Neoproterozoic Evolution

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Abstract This study makes a comparison of detrital-zircon age populations from upper Ediacaran greywackes of the Ossa–Morena Zone (OMZ) with those from the southern domains of the Central Iberian Zone (S-CIZ). The results reveal that the main difference between the age spectra of both populations of detrital zircon is the Neoproterozoic, in particular the Cryogenian grains. Our new data suggest that deposition in the CIZ and OMZ Ediacaran basins was coeval, indicating a long-lived magmatic event typical of the northern Gondwana margin (Avalonian–Cadomian belt and Pan-African belt). Overall, southwestern Iberia shows the following sequence of Cryogenian and Ediacaran zircon-forming events: (1) ca. 850–700 Ma, Pan-African suture (well represented in the Beiras Group and in the Mares Formation of the Série Negra succession); (2) ca. 700–635 Ma, early

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Cadomian arc (dominant in the Beiras Group and in the Mares Formation of the Série Negra succession); and (3) ca. 635–545 Ma, late Cadomian arc (predominant in the Mosteiros and Escoural formations of the Série Negra succession). The results emphasise that the late Ediacaran basins of southwestern Iberia evolved together in the active margin of North Gondwana in the same palaeogeographical scenario but were sufficiently separated to justify the differences identified in their Neoproterozoic detrital zircon contents. This finding shows that there is no basis for considering that the boundary between the OMZ and the S-CIZ marks a Cadomian suture.

Keywords Detrital zircon • Source areas • Central Iberian Zone • Ossa–Morena Zone • North Gondwana

Introduction

The Ossa–Morena Zone (OMZ) and the southern domains of the Central Iberian Zone (S-CIZ) represent the two main divisions of southwestern Iberia. However, the nature of the boundary between is still a subject of debate (e.g., Robardet 2003 and references therein). The stratigraphy of the OMZ and the S-CIZ contains well-exposed Ediacaran sedimentary rocks (Cadomian basement) overlain by lower Palaeozoic sedimentary rocks (Cambrian–Ordovician) (Linnemann et al. 2008; Pereira et al. 2011, 2012a, b). The Ediacaran basement of the OMZ (the Série Negra succession; Gonçalves 1971 and references therein) can be distinguished from its stratigraphic equivalent in the S-CIZ (the Beiras Group, the lower unit of the Slate–Greywacke Complex; Sousa 1984); The Série Negra succession, which includes the Mosteiros, Mares, and Escoural formations, is characterized by a thick accumulation of greywackes and black shales with interbedded black cherts, mafic volcanics, and minor carbonate rocks variably deformed and metamorphosed. The Beiras Group comprises a thick and monotonous succession of siliciclastic rocks with a low grade of metamorphism, consisting mainly of slates, siltstone, and sporadic greywackes (Sousa 1984; Medina 1996).

This study presents a comparison of the available U–Pb detrital zircon data from the Série Negra greywackes (sampled from the Ouguela-Mosteiros Formation, Linnemann et al. 2008; from the Estremoz-Mares Formation, Pereira et al. 2012a; and from the Santiago do Escoural–Escoural Formation, Pereira et al. 2008) with the Beiras Group greywackes (sampled in the Penacova-Raiva section, Pereira et al. 2012b). The objectives of the study are to: (1) characterize potential source areas by examining zircon-forming older events; (2) better understand the relationship between the OMZ and S-CIZ Ediacaran basins; and (3) improve palaeogeographical reconstructions of the North Gondwana active margin during the Neoproterozoic.