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A new approach to palynostratigraphy of the middle–late Famennian Gafo Formation, southern sector of the Pulo do Lobo Domain, SW Iberia (Portugal and Spain)

Márcia Mendes[1], Zélia Pereira[1], Nuno Vaz[2,3], Alejandro Díez-Montes[4], João X. Matos[5], Luis Albardeiro[5], Paulo Fernandes[6], Raul Jorge[7] and David Chew[8]

[1]Laboratório Nacional de Energia e Geologia (LNEG), Rua da Amieira, Ap. 1089, 4466-901 São Mamede de Infesta, Portugal; [2]Departamento de Geologia, Escola de Ciências da Vida e do Ambiente, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal; [3]Centro de Geociências de Universidade de Coimbra, Rua Sílvio Lima, 3030-790 Coimbra, Portugal; [4]Instituto Geológico y Minero de España, Plaza de la Constitución, 1, 37001-Salamanca, Spain; [5]Laboratório Nacional de Energia e Geologia (LNEG), Bairro da Val d´Oca. Ap. 14, 7601-909 Aljustrel, Portugal; [6]Centre for Marine and Environmental Research, Universidade do Algarve, Campus de Gambelas, 8005-139 Faro, Portugal; [7]Instituto Dom Luiz (IDL), Faculdade de Ciências, Universidade de Lisboa, Campo Grande, Edifício C6, Piso 4, 1749-016, Lisboa, Portugal and [8]Department of Geology, School of Natural Sciences, Trinity College Dublin, Dublin, Ireland

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Author for correspondence: Márcia Mendes, Email: marcia.mendes@lneg.pt

Abstract

New palynological results from the Gafo Formation (southern sector of the Pulo do Lobo Domain, South Portuguese Zone) are integrated with recently studied sections and drillholes from the Portuguese and Spanish sectors. A total of 44 samples were studied, 27 of which were positive for palynomorph taxonomy. This research revealed well preserved palynological assemblages, including 73 spore species allocated to 28 genera, four acritarch genera, three prasinophyte algae genera plus common chitinozoan remains. Some additional forms were retained under open nomenclature. From this, the first complete age determination for the Gafo Formation in Portugal and Spain was achieved, indicating a middle Famennian (*Grandispora gracilis–Grandispora famenensis*, GF Biozone) to a late Famennian (*Grandispora echinata*, VH Biozone) age. A greywacke sample from the same Gafo Formation was dated by U–Pb zircon geochronology and a maximum depositional age of 369 ± 2.5 Ma was obtained. A correlation between these palynological and U–Pb zircon data and the palynoflora assemblages of previous authors was made, as well as with the ages of felsic volcanic rocks found intercalated in the Gafo Formation, confirming the complex stratigraphy of Pulo do Lobo Domain. The results are consistent with stratigraphic mapping and structural interpretations, allowing a middle–late Famennian age (GF and VH Biozone) to be assigned to the Gafo Formation sedimentary rocks. This work has also contributed to a reinterpretation of Gafo Formation depositional facies correlatives (e.g. the Santa Barbara Group in Spain) as being the same lithological unit.

1. Introduction

The Pulo do Lobo Domain (PLD) antiform structure has been considered an accretionary terrane located between the Variscan Ossa-Morena Zone (OMZ) and the South Portuguese Zone (SPZ) collisional belt (Oliveira, 1990; Oliveira *et al.* 2019; Quesada *et al.* 2019; Fig. 1).

Four main domains are identified in the SPZ, namely: the PLD, Iberian Pyrite Belt (IPB), Baixo Alentejo Flysch Group (BAFG) and the SW Portuguese Sector (Oliveira, 1990; Oliveira *et al.* 2019). This research focuses on the PLD anticlinal structure (Fig. 1), particularly the southern sector, which comprises clastic formations including the Atalaia and Gafo formations. The Gafo Formation is characterized by flysch facies in turbiditic sedimentary rocks. While its petrographic and paleogeographic setting is known, the definition of stratigraphic units for field mapping, the lateral correlation of the facies and depositional age all remain contentious.

This paper discusses the Late Devonian miospore assemblages of the Gafo Formation, southern PLD, comprising palynostratigraphic analysis from drillhole and outcrop samples collected in both the Portuguese and Spanish sectors of the PLD (see location in Fig. 1 and online Supplementary Material, available at http://journals.cambridge.org/geo).

The Gafo Formation was previously studied by PA Lake (unpubl. Ph.D. thesis, University of Southampton, 1991), Rodríguez González (1999) and Pereira *et al.* (2006*a*, *b*, 2008), who attributed a Givetian – early Famennian age, late Frasnian – late Famennian age and early Frasnian

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