

Geology of the Rosário–Neves Corvo antiform, Iberian Pyrite Belt, Portugal: new insights from physical volcanology, palynostratigraphy and isotope geochronology studies

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Received: 18 May 2012 / Accepted: 28 December 2012 / Published online: 31 January 2013
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Abstract The lithostratigraphic sequence in the Rosário–Neves Corvo antiform comprises the Phyllite–Quartzite Group, whose top is of Famennian age, the Volcanic Sedimentary Complex, of Strunian to upper Visean age, and the Mértola Formation (the lower unit of the Baixo Alentejo Flysch Group) of upper Visean age. The volcanic sedimentary complex comprises a lower sequence of Strunian (Late Famennian) age and an upper sequence of lower to upper Visean age. Detailed mapping of the antiform towards NW of the Neves Corvo mine, supported by palynological dating, identified two new lithostratigraphic units: the Barranção member (upper Famennian) ascribed to the Phyllite–Quartzite Group and made up of laminated dark shales with siliceous lenses and nodules, and the Ribeira de Cobres Formation of the Volcanic Sedimentary Complex, containing shales, siltstones and fine volcanoclastic rocks. Based on zircon U–Pb isotope dating, five discrete felsic magmatic events were identified at approximately 354, 359, 365, 373

and 384 Ma. This suggests that the volcanic activity in the area has extended for about 30 Ma, in a context of high regional heat flow as indicated by the geochemical signatures of the felsic volcanic rocks. The characteristics of magmatism and the depositional environment indicated by the sedimentary record should therefore have been highly favourable for massive sulphide formation. However, evidence of massive sulphide mineralization in the study area is still to be found. Moreover, reconstruction of the volcanic facies architecture demonstrated that the volcanic units in the Rosário area are strongly dominated by coherent facies typical of the inner part of thick lavas/domes. In fact, most of their external part, the more favourable location for possible massive sulphide mineralization, is missing. Palynological dating indicates a significant hiatus, recognised between the lower and upper sequences of the volcanic sedimentary complex, which implies erosion of the top of the volcanic centre, where VHMS deposits could possibly

Editorial handling: F. Tornos

Electronic supplementary material The online version of this article (doi:10.1007/s00126-012-0453-0) contains supplementary material, which is available to authorized users.

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