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Carboniferous palynostratigraphy of the borehole SDJ1 from the Santa Susana region, Ossa Morena Zone, Portugal

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Abstract

The borehole SDJ1, with a total depth of 404.5 meters, was drilled in 1991 by the Serviço de Fomento Mineiro to investigate an Electromagnetic TEM conductor (Oliveira & Matos 1991). This hole is located in the eastern sector of the Santa Susana/Moinho da Ordem coal mine (1927-1944), in the Jongeis mine sector. The borehole log indicates that it cuts lithologies of the Carboniferous Toca da Moura Complex (TMC) and the Santa Susana Formation (SSF). The TMC is a bimodal volcano-sedimentary sequence whose outcrops are dispersed along the southwestern border of the Portuguese part of the Ossa Morena Zone (OMZ). The TMC is dated of late Tournaisian to mid Late Viséan age based on miospores (Cunha in Andrade et al., 1991; Pereira et al., 2006). The TMC is followed by the continental coal-bearing detritic sediments of the late Moscovian SSF, based on macroflora (Wagner & Sousa, 1983) and miospores (Machado, 2010), by a probable fault contact. The SDJ1 borehole is one of the few in this region and offered the unique opportunity to recognize the TMC and SSF in depth.

Considering the current LNEG mapping surveying in the region (Escoural 1/50000 scale map), the SDJ1 borehole was carefully sampled for palynostratigraphic studies and five lithological intervals were examined: (1) 3.5-57m, consists of black shales and basic volcanics of the TMC and yielded miospores assemblages assigned to the mid late Viséan (NM Biozone). (2) 58-230 m consists of volcanic rocks (mainly rioidacites), (3) The following interval, from 231.1-294.9m, consists of grey to black shales with microconglomerates and rare arenites. Assemblages recovered in this interval, yielded abundant and moderately preserved miospores of NM Biozone of mid late Viséan age. This age does not agree with the previous interpretation from this interval, based only on lithological grounds that correlated it to the continental coal-bearing sediments of SSF (Oliveira & Matos 1991). (4) The samples collected in the interval 305-377.8 m consist of volcanic rocks (possibly intrusives) and thin black shales beds; the last provided a moderately preserved association of miospores assigned, again, to the NM Biozone. (5) The last interval between 390.7-404.5m consists of black shales which were correlated to the SSF on lithological grounds. However, the sampled shales between 390.7 and 397.7m yielded miospores assigned to the NM Biozone of mid Late Viséan. Whereas, the shales from the 400.6 and 404.5m interval provided an assemblage assigned to the SL Biozone of mid Moscovian age, suggesting a fault contact between the two shale units.

Thus, the borehole SDJ1 cuts mainly the TMC of mid Late Viséan age to the mid Moscovian age. For the first time TMC reaches the mid Moscovian age, meaning that this complex has a larger geographical expression, as shown during the current mapping survey. Further detailed research is being undertaken to investigate this question. Together with the Carboniferous miospores are reworked Lower Palaeozoic palynomorphs, a common signature throughout, that may represent an important tool for the interpretation of the tectonics of the Toca da Moura - Santa Susana basins (see Lopes et al. this volume).

Keywords

Carboniferous; Stratigraphy; Ossa Morena Zone