Journal of African Earth Sciences 189 (2022) 104496

Contents lists available at ScienceDirect

Journal of African Earth Sciences

journal homepage: www.elsevier.com/locate/jafrearsci

New data on the palynostratigraphy and paleoenvironments of the late Miocene (Tortonian) Quifangondo Formation in the Cabo Ledo section, Kwanza Basin, Angola

Márcia Mendes [a,*], Gilda Lopes [b], Zélia Pereira [a], Cristina Rodrigues [c,d], Pedro C. Nsungani [d], Heritier Wandofusu [d], M.J. Lemos de Sousa [c]

[a] LNEG, Rua da Amieira, 4465-965, S. Mamede de Infesta, Portugal
[b] Centro de Investigação Marinha e Ambiental (CIMA), Universidade do Algarve, Campus de Gambelas, 8005-130, Faro, Portugal
[c] Departamento de Geologia, Faculdade de Ciências, Universidade Agostinho Neto, Avenida 4 de Fevereiro, 71, Luanda, Angola
[d] FP-ENAS, Universidade Fernando Pessoa, Praça de 9 de Abril, 349, 4249-004, Porto, Portugal

ARTICLE INFO

Keywords:
Palynology
Palynofacies
Tortonian
Biostratigraphy
Kwanza basin

ABSTRACT

A detailed palynostratigraphic and palynofacies analysis, associated with a lithological control, was carried out on eleven outcrop samples from the Quifangondo Formation in the Cabo Ledo (Petrofina) section, Kwanza Basin, Angola. The samples yield relatively diverse and well-preserved terrestrial and marine palynomorphs. A systematic analysis of the samples enables the identification of nine spore genera and 3 species, 20 pollen genera and 13 species, and 32 dinoflagellate cyst genera and 34 species. In addition, 10 genera of other aquatic palynomorphs, such as Chlorophyceae green algae, are identified. Dinoflagellate cysts and other aquatic palynomorphs typically dominate throughout the assemblages. In this section, a combined pollen - dinoflagellate cyst zonation is used to define two palynoassociations. The first palynoassociation is middle Tortonian in age and is characterized by the presence of the pollen grain *Fenestrites spinosus* and the first occurrence of the dinoflagellate cyst species *Selenopemphix armageddonensis*. Additionally, diverse Chlorophyceae green algae dominate most of this interval samples. The second palynoassociation is assigned to the late Tortonian and is characterized by a drastic decrease in Chlorophyceae green algae, as opposed to the gonyaulacales dinoflagellate cysts. The first occurrence of the pollen grain *Fenestrites longispinosus* marks the transition between the palynoassociations. Lithologically, the Cabo Ledo (Petrofina) section is dominated by a claystone with an increase in the silt and carbonate components towards the upper section. The lithological data, integrated with palynostratigraphy and palynofacies, suggests that the upper part of the Quifangondo Formation was mainly deposited in an inner to middle neritic environment characterized by dysoxic conditions punctuated by periods of terrestrial inflows. Such conditions typically result from seasonal fluctuations. The age and depositional environment of the upper Quifangondo Formation inferred from this new data allows a correlation with the other Quifangondo sequences previously studied by the authors. This multi-proxy approach is important for further stratigraphic analysis with other age-controlled lithostratigraphic units in the basin. Furthermore, the improvement of paleoenvironmental and depositional models for this unit is of great importance for cross-basin correlation and future petroleum exploration plays.

1. Introduction

The Quifangondo Formation has been considered one of the potential source rocks of the post-salt Paleogene/Neogene petroleum systems of the Kwanza Basin, Angola (Brognon and Verrier, 1966; Burwood, 1999; Brownfield and Charpentier, 2006). However, until now, no economically viable hydrocarbon accumulations generated by the source rocks in the Quifangondo Formation have been discovered (Brownfield and Charpentier, 2006), probably due to the lack of exploration studies. Nevertheless, available organic petrology and geochemical data are quite favourable to hydrocarbon generation, indicating that the Quifangondo Formation source rocks are generally

* Corresponding author.
E-mail address: marcia.mendes@lneg.pt (M. Mendes).

https://doi.org/10.1016/j.jafrearsci.2022.104496
Received 8 September 2021; Received in revised form 27 January 2022; Accepted 11 February 2022
Available online 18 February 2022