



Late Jurassic–Early Cretaceous palynostratigraphy of the onshore Mandawa Basin, southeastern Tanzania

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ABSTRACT

New palynostratigraphic data are presented for Upper Jurassic and Lower Cretaceous formations of the Mandawa Basin, southeastern Tanzania. A Late Jurassic (Kimmeridgian Tithonian) age is confirmed for the Kipatimu Formation, from which the terrestrial sporomorphs allow a rough correlation to the mid Oxfordian Tithonian *Classopollis Araucariacites Shanbeipollenites* Assemblage Zone. A dinoflagellate cyst assemblage recorded in the Mitole Formation correlates to the *Dingodinium jurassicum*–*Kilwacysta* assemblage as described from the Tithonian *Trigonia smeei* Bed of the Tendaguru Hill, southeast Tanzania. Dinoflagellate cyst assemblages in the upper Nalwehe Formation contain species typical of the Hauterivian Barremian, while the Kihuluhulu Formation contains marine microfloras of Aptian to Albian ages. The palynological records confirm the presence of sediments related to profound marine transgressions and subsequent sea-level high-stands in the Late Jurassic (Kimmeridgian Tithonian) and in the late Early Cretaceous (Aptian Albian).

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1. Introduction

The Mandawa Basin of Coastal Tanzania is located onshore, about 80 km west of the giant offshore gas discoveries in Lower Cretaceous to Miocene formations (Mbede, 1991) (Fig. 1). The present study is a supplement to the Mandawa Basin Project, a research and educational project organized between the Universities of Oslo and Dar Es Salaam, the Tanzania Petroleum Development Corporation (TPDC) and Statoil (Tanzania) (Dypvik et al., 2015a,b). The main objective of the project is to study the sedimentological and stratigraphical developments of the Mandawa Basin, along with its structural evolution.

The present investigation covers palynological analyses of selected samples from a shallow exploration well (Tanzania drilling program, TDP40A; Mweneinda, 2014) and outcrops in the Mandawa Basin (Fig. 1). The main objective was to identify and document terrestrial and marine microfloras applicable for biostratigraphic age determinations of the studied formations, as a means for correlations among the lithostratigraphic and sequence-stratigraphic units defined in the basin. Schrank (2005, 2010) distinguished four informal dinoflagellate cyst assemblage zones and two informal sporomorph assemblage zones through the Upper Jurassic and Lower Cretaceous (i.e. mid-Oxfordian Hauterivian) succession in southern Tanzania. Where

possible, the palynological records in the present study are correlated to these zones. Further, the present palynostratigraphic record from well TDP40A is correlated to the foraminiferal assemblages described from this drillhole by Mweneinda (2014). Possible correlations to contemporaneous palynomorph assemblages recovered in the Rovuma Basin (Ruvuma in Tanzania), Northern Mozambique, are also discussed.

2. Sedimentary succession and lithostratigraphy

The sedimentary succession of the Mandawa Basin spans Triassic to Neogene formations (Figs. 1, 2) dominated by shallow marine shelf to coastal deposits of evaporitic, siliciclastic and carbonate facies. The sandstones of the Mandawa Basin include fluvial, tidal and shallow marine formations as well as possible turbiditic beds in younger units. In times and regions with confined clastic input, carbonates were deposited, often with oolitic composition.

The basin evolution was mainly controlled by tectonic events related to the breakup of the Gondwana Supercontinent, the opening of the Indian Ocean, and the subsequent development of the East African rift system (Kent et al., 1971; Kent, 1972; Kapilima, 2003; Said et al., 2015). In southern coastal Tanzania, the crystalline basement is overlaid by continental Permo–Carboniferous to Lower Jurassic Karoo deposits (Fig. 2). In the Ruvuma and Mandawa basins, the succession is intercalated with restricted marine deposits, including some marl and evaporites. During the Middle Jurassic shallow marine depositional conditions were established in the basins (Hudson, 2011).

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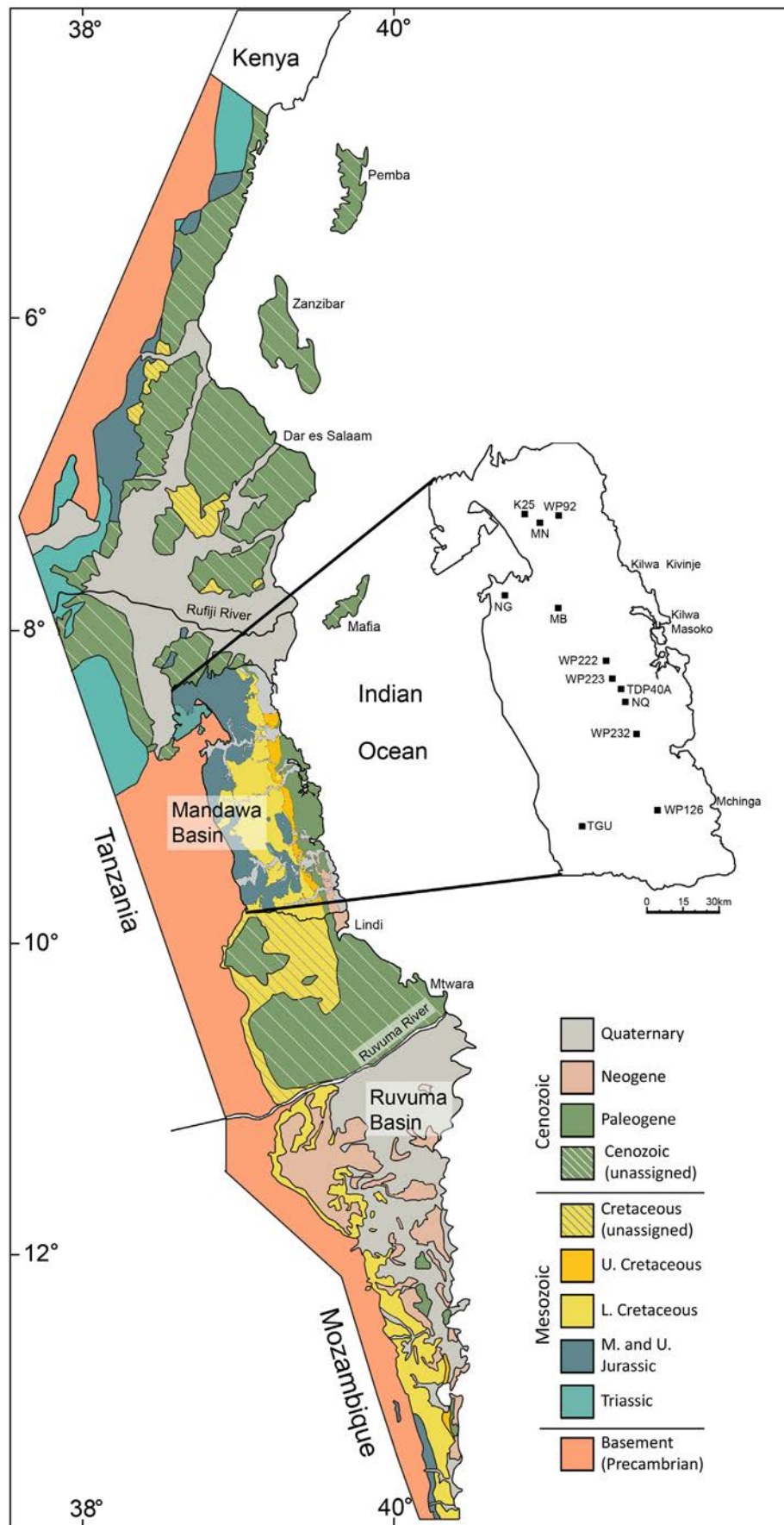


Fig. 1. Geological map of the Mandawa Basin in southern Tanzania and Rovuma Basin in northern Mozambique, with enlarged map showing the locations of samples and drillhole TDP40A included in the present study.

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