

Paleogeographic Reconstruction of the Cyrenaican Miocene Carbonate-Evaporite Sequences of the Ar-Rajmah Group, Al-Jabal Al-Khdar Uplift and Soluq Trough, Northeast Libya

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Abstract

The theme of this work is the palaeogeographic reconstruction of the depositional facies of the Cyrenaican Miocene carbonate-evaporite ramp sequences, northeast Libya. The sequence stratigraphic correlation of the Ar-Rajmah Group depositional facies is determined from 29 measured stratigraphic sections, 14 spectral gamma-ray profiles, and 4 carbon stable isotope curves along 135 km. The Ar-Rajmah Group Miocene carbonate rocks consist of six 3rd-order sequences. The Early Miocene Benghazi Formation is up to 46 m thick, dominated by subtidal coralline red algal, subtidal bioclastic packstones, and contains some oolitic grainstone. The Middle and Late Miocene Wadi Al-Qattarah Formation is up to 26 m and 25 m thick respectively, dominated by continuous oolitic grainstones and microbialites that associated with evaporites and siliciclastics.

Mapping analysis of the Cyrenaican Miocene depositional facies in their sequence stratigraphic context resulted in three paleogeographic maps that illustrate the depositional facies distribution during the Early, Middle, and Late Miocene. Reconstruction of the paleogeographic maps of the Ar-Rajmah Group sequences indicate that the Cyrenaican Miocene carbonate platform deposited within a structurally controlled elongated basin that extends roughly north-south parallel to two major fault lines that form the present day lower and upper escarpments. This elongated basin was shallow at both northern and southern ends and deep in the middle. The deeper parts were occupied by subtidal coralline red algal, subtidal bioclastic packstones and the shallow parts were occupied by ramp crest oolitic grainstone and peritidal microbialites. The ramp crest oolitic grainstone facies and the peritidal facies started since the Early Miocene to prograde from the northern and southern ends of the elongated basin towards the ramp subtidal facies in the centre of the elongated basin. During the Middle and Late Miocene the ramp crest oolitic grainstone facies kept prograding towards the basin centre filling up the space on the expenses of the ramp subtidal bioclastic packstone and coralline red algal packstone facies.

The Ar-Rajmah Group carbonate ramp facies deposited within elongated fault controlled basin. The ramp deposits extend for more than 130 km along the strike and their width is up to 40 km.