

## Microfacies Analysis and Paleoenvironmental Trends of the Paleocene Farrud and Mabruk Reservoirs, Concession 11, West Sirte Basin, Libya

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**Abstract :** Investigation of representative core samples under the petrological microscope reveals common petrographic and mineralogical characteristics with distinct faunal assemblages, allowing establishing of the microfacies associations and deducing the paleoenvironmental trends of the Paleocene Farrud and Mabruk rock units. Recognition of the early and post-diagenetic processes, particularly dolomitization and micritization, as well as dissolution and precipitation of spary drusy calcite as a new morphism process affecting the reservoir rocks, is established. The microfacies trends detected from the investigation of 46 core samples from Farrud member (Lower Paleocene) representing six wells; QQQ1-11, GG1-11, LLL1-11, RRR1-11, RRR40-11, and RRR45-11 indicate that the deposition was started within the realm of shallow supratidal and intertidal subenvironments followed by deeper environments of the shelf bays with maximum sea level during inner shelf environment where fossiliferous bioclastic packstone dominated. The microfacies associations determined in 8 core samples from two wells LLL1 and RRR40 representing Mabruk Member (Upper Paleocene), indicate paleoenvironmental trends marked by sea level fluctuations accompanied with a relatively marine shelf bay conditions intervened with short-lived shallow intertidal and supratidal warm coastal sedimentation. As a result, dolostone, evaporitic dismicrites, and gypsiferous dolostone of supratidal characters were deposited. They reflect rapid oscillation of the sea level marked by drop land-ward shift of the sea shore deposition prevailed by supratidal gypsiferous dolostone and numerous ferruginous materials as clouds straining many parts of dolomite and surrounded the micritized fossils. This situation ends the deposition of the Farrud Member in most of the studied wells. On the other hand, the facies in the northern part of the Concession -11 field indicates deposition in a deeper marine setting than in the southern facies.

**Keywords :** Farrud and Mabruk members, paleocene, microfacies associations, diagenesis, sea level oscillation, depositional environments

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