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A Revised Understanding of the Awali Field: Employing Combined Palynology and Chemostratigraphy to Identify Key Unconformities and Improve Reservoir Correlation in the Palaeozoic Rocks of the Awali Field, Bahrain.

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Abstract

A revised stratigraphic framework for the Palaeozoic rocks of the Awali Field, Bahrain, has been developed based on combined biostratigraphy (palynology) and chemostratigraphy (using ICP OES & MS analysis). In this framework, formations and members are differentiated by age as well as the varying abundance of feldspars, clay minerals, carbonate minerals, heavy minerals and organic matter. The mineralogy of the Palaeozoic rocks is interpreted to be controlled by temporal changes in sediment provenance, climate, and depositional environment. Palynology supports the paleoenvironmental interpretations and the age-constraint of the study interval has allowed key unconformities and missing stratigraphy to be identified, which has huge implications for both the understanding the geological history of Bahrain and future drilling operations.

The combined results have facilitated substantial revisions to the chronostratigraphic and lithostratigraphic framework of the Awali Field, particularly the identification of the Fiy'adh, Subbat, and Qasr Members of the Devonian Jauf Formation, suggesting that the Jauf Formation is thicker than previously envisioned, with more than just the Hammamiyat Member (D3B marker bed) present. The stratigraphic evaluation also revealed the absence of the Ra'an and Tawil Formations and allowed the placement of the Silurian / Ordovician boundary.

The revised framework has greatly improved understanding of the Bahraini subsurface as well as confidence in both well siting and TD placement for future development boreholes in the Awali Field.