Jubaila Formation, Tuwaiq Mountain Escarpment, Saudi Arabia: Window to Lower Arab-D Reservoir Faunal Assemblages and Bedding Geometry

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ABSTRACT

Stratigraphic mapping of an 82 feet-thick and kilometer-long road cut provides two-dimensional information about faunal assemblages and bedding geometry for the Upper Jubaila Formation. The map depicts major vertical and lateral stratigraphic variations along depositional strike as seen in a mosaic of 72 photos. A petrographic analysis of 193 samples revealed that the faunal, lithologic and textural calibration for the mapped sequence resembles those of the cored lower Arab-D reservoir in Saudi Arabia.

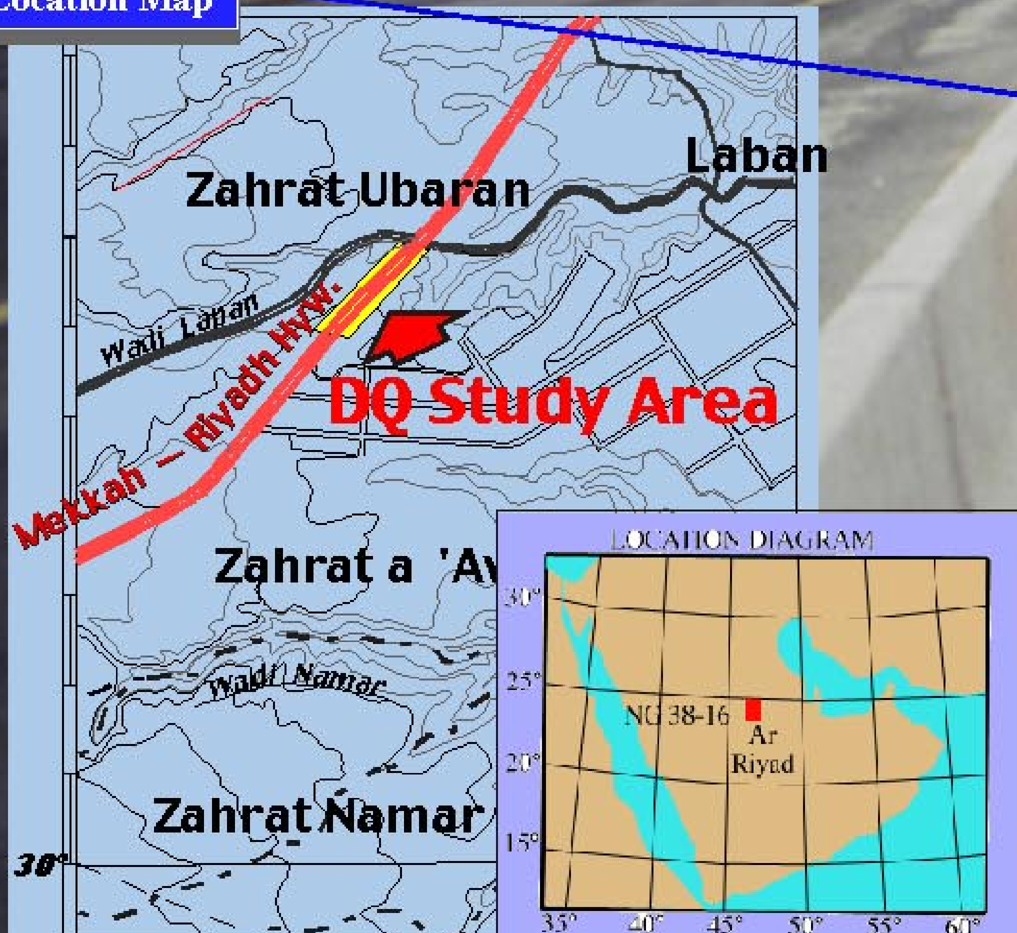
Semi-quantitative micropaleontological analysis shows the representative samples from the exposure include species of polymorphinids, hispid calcispheres, sponge spicules, and intensively-ribbed echinoid spines that represent the *in situ* deeper marine forms typical of the lower Arab-D reservoir. Admixed with these faunas are a variety of allochthonous shallow marine forms such as *Kurnubia palastiniensis* and *Nautiloculina oolithica*.

Stratification exhibits even or wavy parallel, and non-parallel curved or wavy bedding planes. Parallel stratification dominates mud-dominated tabular units. Bounded by laterally extensive pause surfaces, these low permeability strata traverse the length of the outcrop. Non-parallel stratification outlines lenticular grain-supported accumulations enclosed by curved or wavy planes. These permeable units represent laterally discontinuous slump and channel deposits. An interval of slump structures occurs 13 feet above the measured section base. Traced over two kilometers to adjacent road cuts, this distinctive interval is up to 3 feet thick. Coherent slump blocks with en echelon arrangement exhibit concave upward shear planes and a backward rotation.

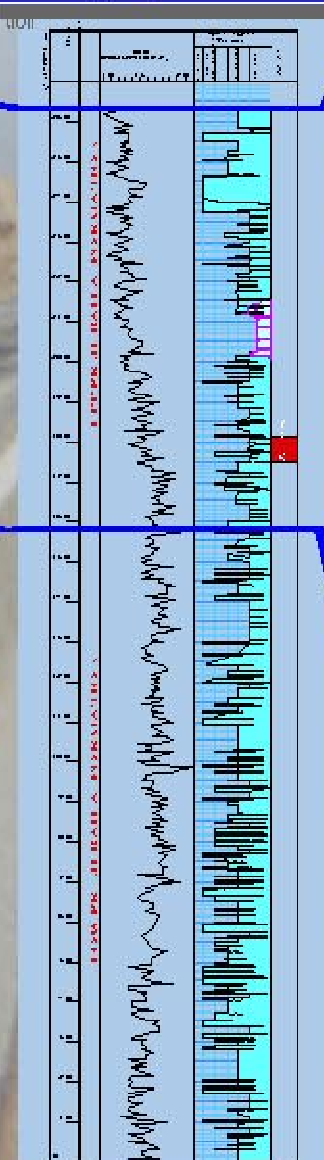
Porous channel deposits range up to 3 feet in thickness, and up to 2100 feet in length. A conglomerate, coral-stromatoporoid fill distinguishes the largest channel complex located 30 to 60 feet above the base of the measured section.

The environmental significance of faunal elements and their relation to the two dimensional geometry of various sedimentary units together with the sedimentological processes that caused the deposition of slump and channel-fills fashion a foundation for developing improved geologic models for the lower Arab-D reservoir.

Location Map



Stratigraphic Position



Outcrop and Subsurface Comparison of Lithologies and Faunas