

## **Kaolinite Bentonites in the Ordovician Hawaz and Mamuniyat Sandstone, Murzuq Basin, Libya: Implications in Regional Correlation and Palynological Age Constraint**

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### **Abstract:**

The Murzuq Basin in southwest Libya is an intracratonic basin, comprises of a thick Paleozoic sedimentary infill. The basin was located in the northern margin of Gondwana during the early Paleozoic and subjected to extension during Ordovician. Due to polyphase tectonism, multiple volcanic ash layers (bentonite) were deposited interspersed with the Ordovician quartzitic sandstone of the Hawaz and Mamuniyat formations; latter is hydrocarbon reservoir in concession NC101, northern Murzuq Basin.

Three correlatable bentonite beds in the cores of wells Q1-, E1-, E2-, E3- and J3-NC101 are selected for this study to understand the genesis of the beds, as tools for regional correlation, as calibration to palynological age dating and finally, to put the bentonites in the framework of global Ordovician bentonites. Petrography, mineralogy (XRD), spectral core gamma, geochemical analysis (XRF) and palynological analysis were carried out to achieve the objectives.

Thin section/XRD analysis suggests bentonite beds are dominantly kaolinite/dickite (16% to 93%) and quartz (7% to 84%) unlike most of the worldwide Ordovician bentonites with mixed layer illite-smectite. High Th content is characteristic of all the studied beds and makes them excellent correlation tool using spectral core/downhole gamma logs. Immobile elements (Ti, Zr, Y, Nb, Ta, Rb) and major oxides plots suggests an original rhyolitic magma. Palynological studies in the interval 7743 to 7753' in J3-NC101 yields Late Ordovician, Ashgill age based on highest occurrence of acritarch species *Veryhachium subglobosum* and *V. oklahomense*. Further palynological studies for E3-NC101 and geochronological work is being carried out to better calibrate the age.