



High Resolution Chemostratigraphy of Khartam Member of the Permo-Triassic Khuff Carbonate : Outcrop Reservoir Analog Approach from Central Saudi Arabia

Osman Abdullatif and Ammar Adam

KFUPM, Earth Sciences, Dhahran 31261, Saudi Arabia (g201102790@kfupm.edu.sa) +966 3 860 2595

The Permo-Triassic carbonate Khuff reservoir (and equivalents) in the Middle East are estimated to contain about 15-20 % of the world's gas reserves. Excellently exposed Permian-Triassic outcropping strata in central Saudi Arabia provide good outcrop analog to the subsurface Khuff reservoir. The outcrop analog can allow examining and evaluating the stratigraphical and sedimentological heterogeneity which has important impact on reservoir quality and architecture. This chemostratigraphic study is part of an integrated outcrop analog study utilizing both field and laboratory stratigraphical and sedimentological data. The study objective is to characterize the chemostratigraphic properties and signatures related to depositional facies, diagenetic overprint, cyclicity and stratigraphic hierarchy. The Chemostratigraphic outcrop analog study is intended to provide a database and to enhance understanding and prediction of the Khuff carbonate reservoir rocks heterogeneity and quality. The field work included detailed sedimentological and stratigraphical description and analysis, gamma-ray logging and bed-by-bed sampling of outcrop sections of the Khartam Member. Lithofacies varies from mudstone, wackestone, packstone to grainstone and several meter to less than meter scale cyclicity were determined. For all samples collected chemical analysis was carried out for major, trace and rare earth elements. The chemostratigraphic signatures, based on major, trace and rare earth elements, and observed at the outcrop sections is capable of capturing stratigraphic and sedimentologic features observed at the outcrop scale and related to lithofacies, cyclicity, stacking pattern and surfaces. Reservoir and non reservoir facies were also identified and correlated. The high resolution chemostratigraphic approach used in this study may help to refine of stratigraphic hierarchy and reservoir models based on subsurface data. Consequently, this might contribute to better understanding of reservoir heterogeneity, quality and architecture. It also might help to recommend strategies to explore and develop the Khuff reservoir in the subsurface