Geophysical Research Abstracts
Vol. 16, EGU2014-9216-3, 2014
EGU General Assembly 2014

Sedimentological and Petrophysical Heterogeneity of Glaciogenic Paleovalley, Late Ordovician Sarah Formation, Central Saudi Arabia

Waseem Razzaq, Osman Abdullatif, Ali Sahin, and Mustafa Hariri
KFUPM,Dhahran, Saudi Arabia (g201102790@kfupm.edu.sa)

The Late Ordovician Sarah Formation deposited in glaciogenic environment, mainly dominated by braided river outwash system. Compared to the subsurface, the Sarah formation is considered as important tight gas sandstone reservoir at southern and northern parts of Saudi Arabia. Ten outcrops from Al-Ilb paleochannel were studied in detail to identify the heterogeneity in terms of the types and distribution of facies and related petrophysical properties. The Sarah Formation shows highly heterogeneous behavior at all scales. The main facies observed at Al-Ilb paleovalley are 64% trough-cross bedded sandstone, 23% horizontally stratified sandstone facies, and 2% massive conglomerates are observed at the proximal, medial and distal parts of the paleovalley. The remaining facies are trough-cross bedded sandstone facies that is laterally changes to horizontally stratified sandstone facies and in some cases to planner cross-bedded sandstone facies. The petrophysical analysis revealed good quality of porosity present in all parts of paleovalley. On the other hand the permeability values are high and ranging between 53mD to 5D. The descriptive statistics clearly indicate the normal distribution of porosity values for proximal, medial and distal parts of paleovalley and can be described as homogeneous. For permeability the distribution is heterogeneous as it is log-normally distributed. The scatter plots of porosity versus horizontal and vertical permeability shows very poor correlation for each part of paleochannel. This heterogeneity is attributed to depositional and post-depositional viabilities. These variables are grain size and shape distribution, sorting, packing, distribution of matrix and cementing material, and the presence of clays like kaolinite, smectite, and palygorskite. These observations further indicate that Sarah Formation is affected by shallow burial conditions during diagenesis. However, Sarah Formation shows highly heterogeneous behavior at outcrop scale that might be unpredictable and challenging in the subsurface.