



Fluid flow paths discrimination in tight sand gas reservoirs using the Hydraulic Flow unit approach with an example from the Algerian Sahara

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In this work, fluid flow paths are discriminated from standard well logs and core data through the utilization of Hydraulic Flow Units Approach (HFU) and an intelligent network. Firstly, the flow zone indicator (FZI), which is a unique parameter for each hydraulic unit, was used to characterize each rock type. The number of hydraulic flow units and mean values of FZI for each HFU were calculated from porosity and permeability measured from core-rocks. Application to data of a borehole located in the Algerian Sahara shows the existence of three HFUs and a correlation coefficient greater than 0.9 in each HFU was observed. Some FZI were attributed for un-cored wells using the Fuzzy Logic system (FL).

Well-logs data that are used as an input to train the fuzzy system are the neutron porosity, the bulk density, the slowness of the P wave, the resistivity of the shallow and the deep zones and the natural gamma ray. The calculated FZI associated to these depths interval are used as an output. The presented methodology was successfully applied to a large data set of laboratory and well logging measurements from the Hassi D'zaabat field.

Keywords: Fluid flow; FZI, Hydraulic Flow Unit (HFU); Fuzzy logic.