



Prediction of Geomechanical Properties from Thermal Conductivity of Low-Permeable Reservoirs

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A key to assessing a sedimentary basin's hydrocarbon prospect is correct reconstruction of thermal and structural evolution. It is impossible without adequate theory and reliable input data including among other factors thermal and geomechanical rock properties. Both these factors are also important in geothermal reservoirs evaluation and carbon sequestration problem. Geomechanical parameters are usually estimated from sonic logging and rare laboratory measurements, but sometimes it is not possible technically (low quality of the acoustic signal, inappropriate borehole and mud conditions, low core quality). No wonder that there are attempts to correlate the thermal and geomechanical properties of rock, but no one before did it with large amount of high quality thermal conductivity data.

Coupling results of sonic logging and non-destructive non-contact thermal core logging opens wide perspectives for studying a relationship between the thermal and geomechanical properties. More than 150 m of full size cores have been measured at core storage with optical scanning technique. Along with results of sonic logging performed with Sonic Scanner in different wells drilled in low permeable formations in West Siberia (Russia) it provided us with unique data set. It was established a strong correlation between components of thermal conductivity (measured perpendicular and parallel to bedding) and compressional and shear acoustic velocities in Bazhen formation. As a result, prediction of geomechanical properties via thermal conductivity data becomes possible, corresponding results was demonstrated.

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