

Sonic Scanner “a tool for basement exploration?”

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Abstract:

Sonic Scanner (MSIP*) is a new generation of tools being introduced in Sudan to help resolve complex issues in bedded clastic reservoirs. Wells drilled lately have penetrated the lithologically, very complex and often-tight basement rock, which is considered to have the potential to produce hydrocarbon from fractured intervals.

As the basement is not clastic or carbonate type of reservoir with little or no inter granular type of porosity, conventional resistivity and porosity tools have limited application. The fracture systems seen by imaging tools like FMI* and acoustic tools of Sonic Scanner type are in general of two categories. The natural fractures (most likely mineralized) prevalent in the rock due to geological forces and drilling induced (open) fractures with limited extent. Using the PDOC well Ruman NNE-1, we have tried to identify fracture zones and classify the type of fracture system. Additionally slowing down of Stoneley wave was utilized to indicate the presence of permeable zones (fracture permeability).

Demonstrate that the Stoneley permeability estimation is a useful derivation. Identify and classify natural fractures in basement rock. Integrate the results of Stoneley fracture analysis and permeability estimation with FMI* processing.

Raw waveform data acquired using sonic scanner (MSIP*) was processed using the BestDt* application within the Geoframe*

Software package. Compressional, Shear and Stoneley slownesses were recomputed using appropriate set of filter parameters as well as refined mud slowness value to optimize the data quality. Additionally Stoneley fracture analysis was carried out on raw waveforms data as primary input.

Stoneley Permeability was derived from the differences between logged Stoneley slowness and a modeled Stoneley slowness derived using bulk density, porosity, compressional and shear slownesses as well as lithological information.

Recognize fracture zones in the basement intervals. Indication of permeability spikes confirms presence of fractures. Integration with FMI* images and fracture identification.

Satisfactory agreement between MDT* mobility and Stoneley Permeability.

Fracture analysis using Stoneley data acquired with Sonic Scanner tool is effective in basement formation and complements fracture analysis performed using FMI* images. Calibrated Permeability derived from Stoneley slowness is a source of continuous permeability log, which could be, utilized either for production or injection type of planning.