

Investigation of the Compaction Trends in the Shales of the South Caspian Basin

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Abstract

The South Caspian basin is distinct by its thick sedimentary layer reaching up to 25 km. Shales, as in almost all basins, comprise the majority of the section and is very important as both a source rock and a seal. As a result of the rapid sedimentation in the basin, the pressure equilibrium was not reached and the occurrence of the anomalously high pressures can be regionally traced across certain formations. Compaction state of the shales indicates the pressure regime in the system and its sealing capacity, which are critical in exploration prospecting. This paper is dedicated to classification of shales by their compaction trends and provides detailed analysis of different parameters that control these trends. By incorporating the historical and modern laboratory data and further by integrating with the well logs, the compaction trends were identified and classified based on mineralogical and stratigraphic differences of shale formations. Furthermore, the relationship between the thickness of the shales, effective stress and the compaction were investigated and tested on the data from offshore oil and gas fields in Azerbaijan. As a result of this classification, compaction trends for compressional and shear velocities, density and porosity were constructed and used as an input into the South Caspian basin modeling to support the exploration activity in the region.