

Integration of Geology and Geophysics on Sedimentary Sands Prediction in Lithology Strata Traps

Zhao Ning¹, Zhang Guangya², Huang Jiangqin³, Chen Zhongmin¹

¹RIPED,CNPC; ²PetroChina Research Inst. of Petr. E & D; ³CECEP

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Abstract

Applying sole geophysics methods, such as seismic attributes or seismic inversion for reservoir sands prediction is more and more difficult, especially in lithologic strata traps location. Based on high-resolution sequence stratigraphy, paleotopography restoration was done on faulted Abu Gabra (AG) formation, in Muglad basin. On the statistics of 92 wells source rock evaluation (TOC, HI, Ro and T_{max}), reservoir sands evaluation (favorable sands distribution and porosity) and cap rock evaluation (shale thickness) were done. (1) Source rock in AG2 and AG3 members were favorable in AG formation of high TOC and mature, most in oil generation phrase with II1-II2 type. (2) Subaqueous distributary channels and turbidite sands were favorable for lithology traps of relatively high sand/bed ratio, slope belt in paleotopography restoration, with 10-40% neutron porosity. (3) 100-400m gross shale thickness from AG4 to AG2 member were favorable cap rock. Based on paleotopography restoration result, sequential gaussian simulation interpolation of 87 wells was applied for sedimentary facies analysis, and sedimentary models of five members in AG formation were established. According to comparison result of wells and 3D seismic attributes, RMS can be a useful method for sands/shales interlayers prediction. Setting different cutoff values of RMS to highlight sands distribution, turbidites, braided delta channels, and delta channels can be detected. Moreover, ten lithology-strata traps have been identified, including strata traps (stratigraphic unconformity and stratigraphic overlap) and lithologic traps (sand lens and lithologic dipping annihilation), and traps resources amounts to 2.86 billion tons. It is a huge amount of resources for lithology-strata traps.

