

Effects of neotectonic activity on the distribution of petroleum deposits in space (by the example of the volgaural petroleum and Gas province)

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Abstract

© SGEM2015. The goal of this research is to determine characteristic features of petroleum deposits distribution, i.e. to study the spatial variability of the petroleum properties, which are determined by the location and activity of neotectonic uplifts. Statistical analysis of data on 2152 oilfields located within the Volga-Ural Petroleum and Gas Province (Russia) and 4331 oil deposits located within Romashkinskoye oilfield (Tatarstan, Russia) was performed. STATISTICA Base (Basic Statistical Analysis Methods) for calculating descriptive statistics and performing one-way ANOVA was also used. In order to evaluate the intensity of neotectonic movements morphometric analysis of digital elevation models was carried out. Analysis of statistical charts showed that the vast majority of deposits (regardless of the rock age) are located in transition zones. Transition zones are areas with medium level of neotectonic activity: petroleum deposits locate on the slopes of neotectonic uplift and experience predominantly upward movements, but the amplitudes of these movements are 2-3 times less than amplitudes in more active zones. Apparently, such a distribution is not accidental: in these conditions, movements are intensive enough to ensure migration of hydrocarbons and deposits replenishment, and at the same time are insufficient to compromise the integrity of the cap rock. One-way ANOVA results reveal the impact which geodynamic (neotectonic) factors have on oil properties: in areas of high geodynamic activity oil density and viscosity decrease. Thus, these data suggest a significant influence of neotectonic factors on distribution of oil in space, as well as on the processes occurring inside the petroleum reservoir.

Keywords

Neotectonics, Oilfields, Statistics