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## Variation of i-butane/n-butane ratio in oils of the Romashkino oil field for the period of 1982–2000: Probable influence of the global seismicity on the fluid migration

D.K. Nourgaliev\*, R.Kh. Muslimov<sup>1</sup>, N.N. Sidorova<sup>1</sup>, I.N. Plotnikova<sup>1</sup>

*Faculty of Geology, Kazan State University, Kazan, Russian Federation, 420008*

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### Abstract

Changes in oil composition in the course of the development depend on numerous factors including both technogenic and natural ones. Physicochemical compositional analysis of 2456 oil samples collected in the Romashkino field in 1982–2000 from two productive strata (Devonian and Carboniferous reservoirs) has indicated statistically significant variations in the i-butane to n-butane content ratio (i-b/n-b). This ratio is characterized not only by a trend of steady growth but also by a significant variation with a period of ~4.5 years. The i-b/n-b ratio variations are well correlated ( $R^2=0.61$ ) between these two reservoirs (Devonian and Carboniferous) occurring at different depths. However, the average i-b/n-b ratios recorded in these reservoirs are essentially different (~0.44 and ~0.55, respectively). A possible relationship is discussed between the i-b/n-b ratio variations and those in global seismicity.

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*Keywords:* Romashkino oil field; Oil composition; Oil migration; Global seismicity

### 1. Introduction

The study of physicochemical, compositional, and time-dependent changes in oils of fields under development is an exceptionally challenging and multifaceted problem. From a practical point of view, this analysis allows the prediction of oil properties for the nearest future (Pedersen et al., 1989), and its scientific application permits the acquisition of explicit data on the migration of hydrocarbons through thick and permeable

beds. These specific, natural experiments cannot be carried out in laboratory conditions. The longer this natural experiment proceeds (i.e. oil field development time), the larger the volume of rocks that becomes involved in it, and the greater the amounts of fluid undergoing migration. The development of the oil field and its depletion are naturally expected to be accompanied by the regular increase in density and viscosity as well as by the decrease in the gas content of oil. Variations in physicochemical properties of oil can also occur through the action of numerous other factors. An oil field is a complex formation consisting of a number of relatively isolated portions. For this reason, some deviations from the natural general trend are observed in the course of the development, depending on the applied production methods. Variations in oil properties can also

\* Corresponding author. Tel.: +7 843 292 81 35.

E-mail address: [danis.nourgaliev@ksu.ru](mailto:danis.nourgaliev@ksu.ru) (D.K. Nourgaliev).

<sup>1</sup> Tel.: +7 843 292 81 35.