

STUDY OF ROCK FRACTURING ZONES IN THE BASHKIRIAN STAGE AT THE AKAN OILFIELD, REPUBLIC OF TATARSTAN



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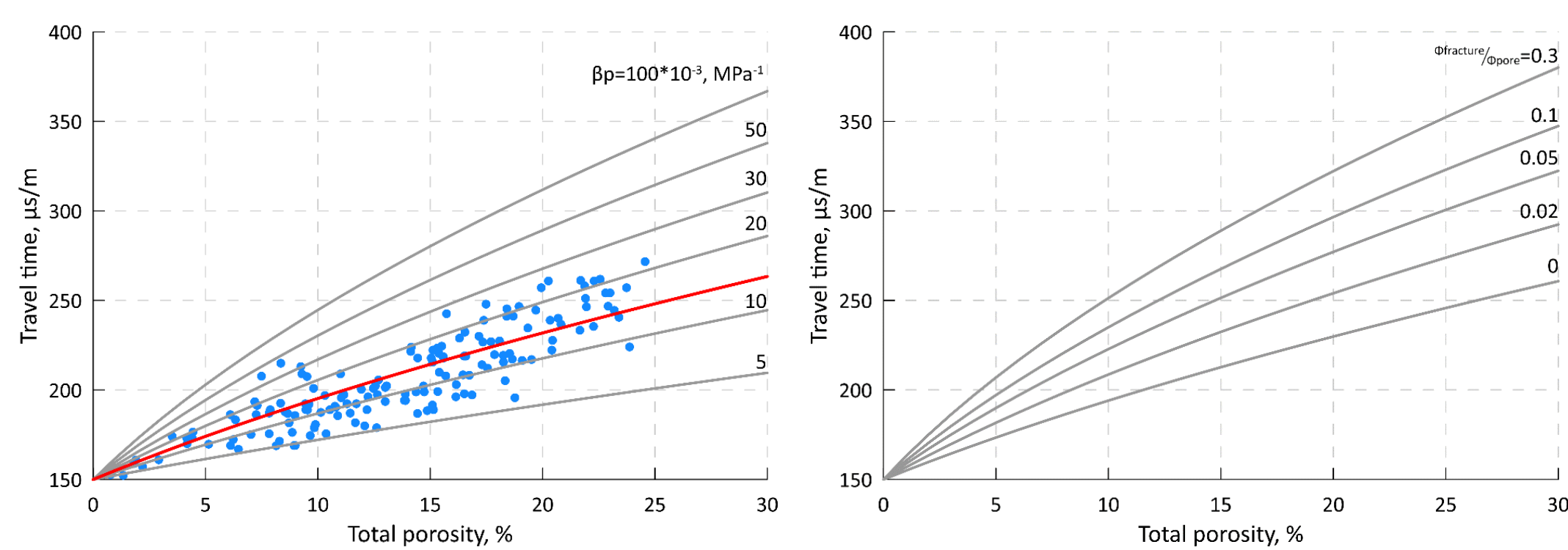


INTRODUCTION

The carbonate reservoirs of the Bashkirian stage at the southeastern Republic of Tatarstan are characterized by a complex pore space structure. Intergranular porosity, vugs and fractures are widely developed within the rock volume. The role of fracture porosity is significant in predicting the reservoir's filtration properties and planning the development system.

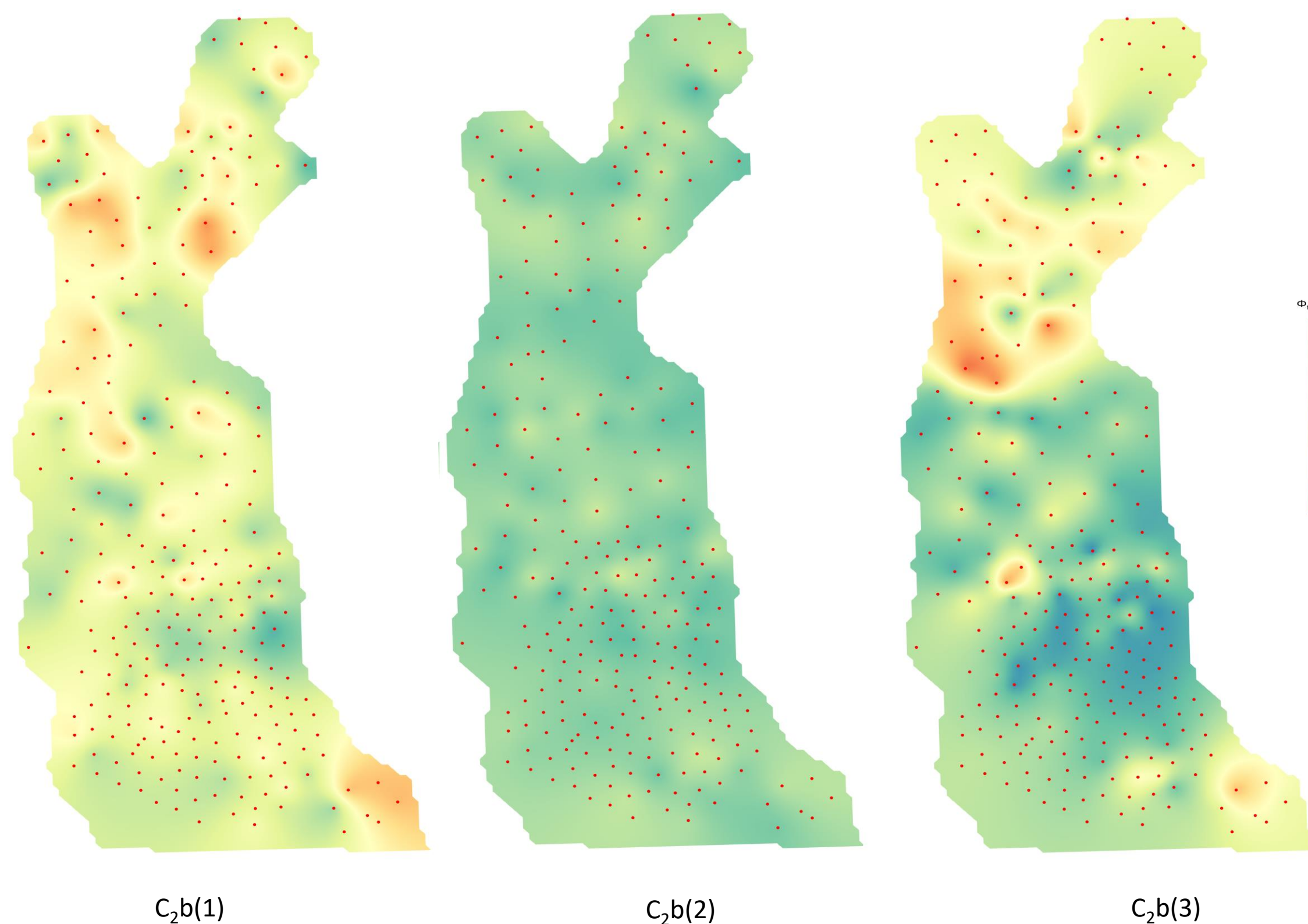
METHODOLOGY

The value of the fracture porosity Φ_{fracture} is evaluated according to the method proposed by Dobrynin (1991). The method is based on the evaluation of the compressibility of pore-fractured-cavernous rocks using two logging curves: acoustic and neutron log, or acoustic and density log. Neutron or density logging curves are used to estimate total porosity Φ_{total} . The proposed approach was adapted to the conditions of the Akan oilfield.



Comparison of theoretical curves $\Delta t = f(\Phi_{\text{total}}, \beta_{\text{pore}})$ with laboratory measurements of travel time and porosity of core plugs saturated with mineralized water

Theoretical curves $\Delta t = f(\Phi_{\text{total}}, \Phi_{\text{fracture}}/\Phi_{\text{pore}})$ for different porosity ratios



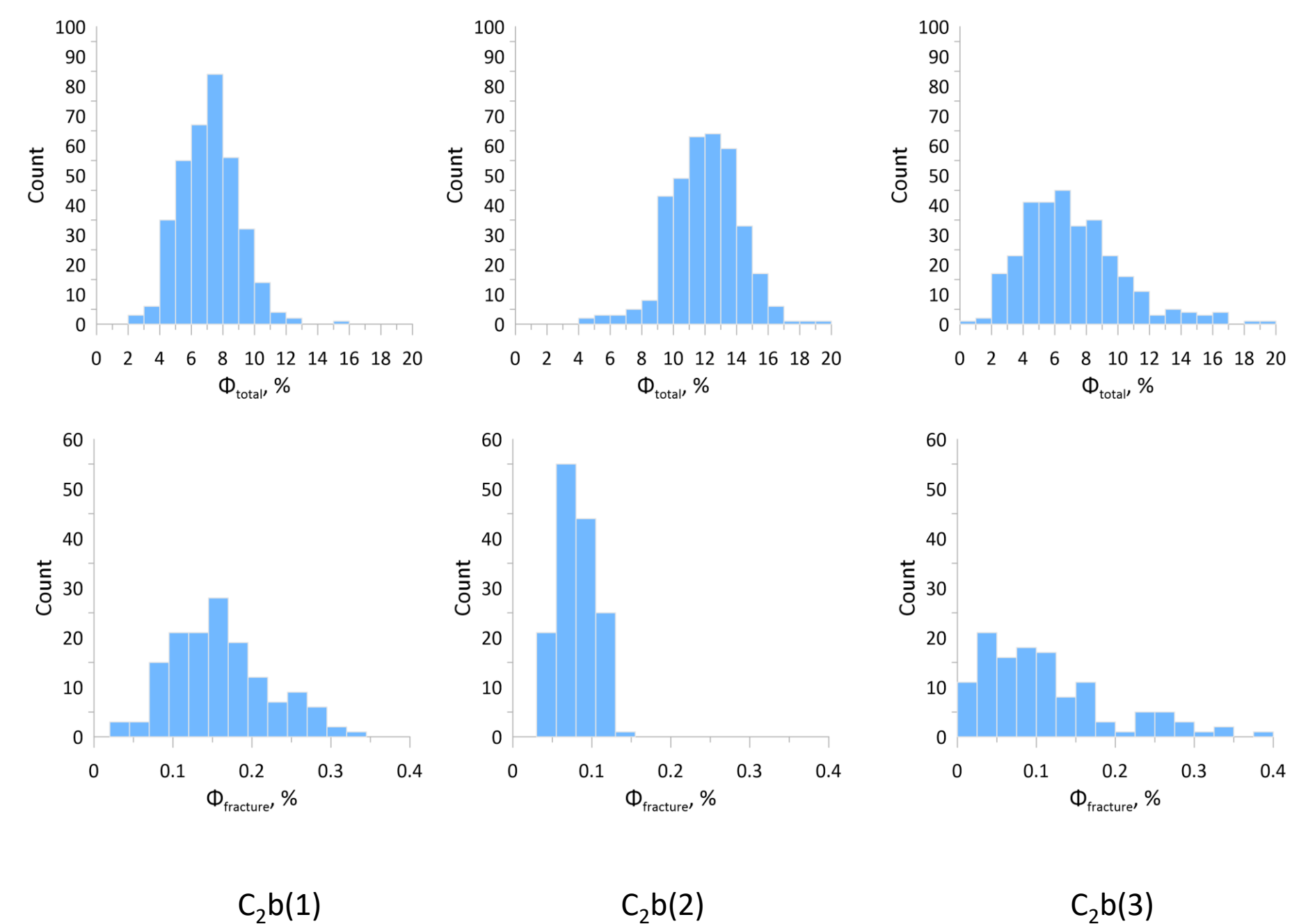
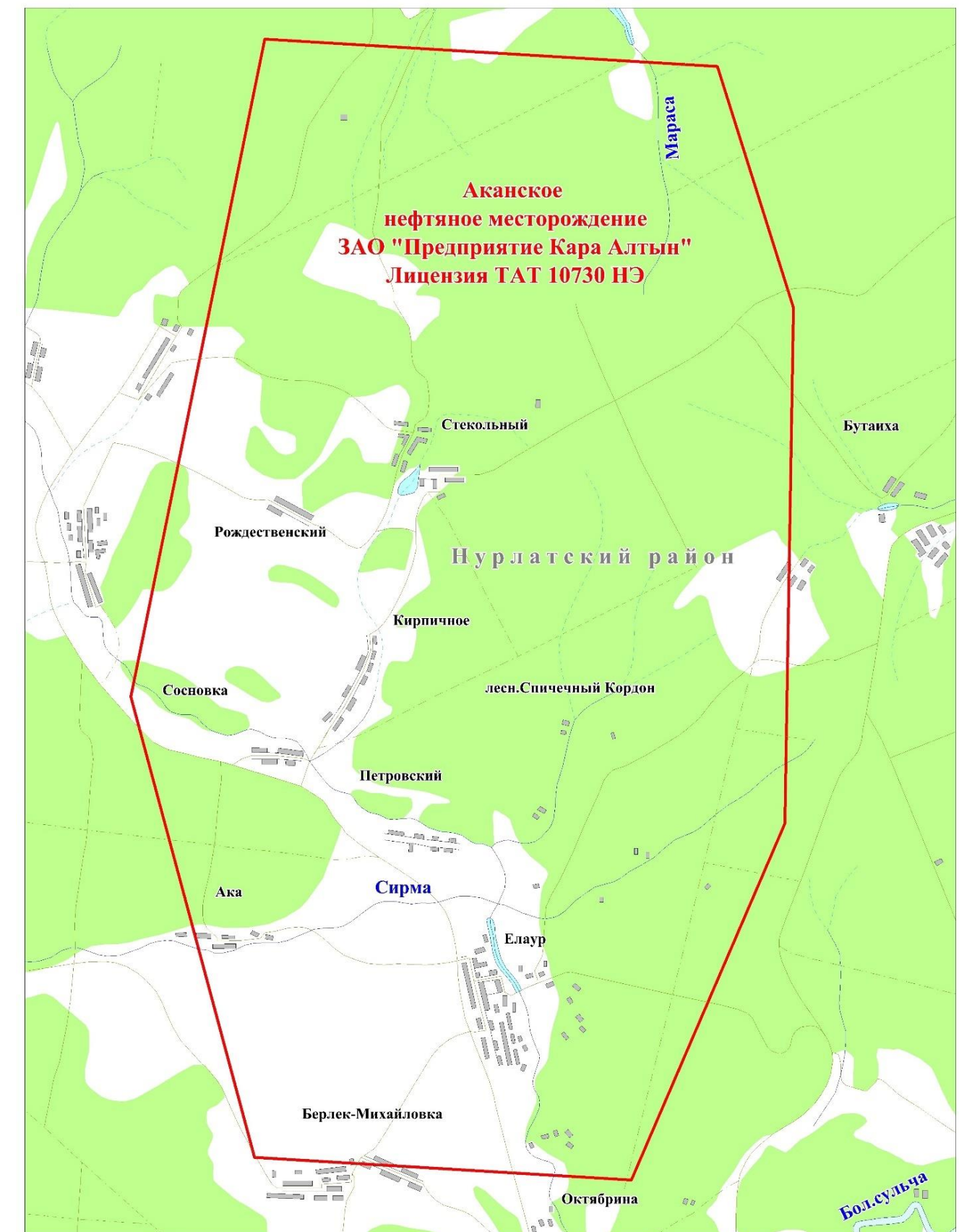
Distribution of fractured porosity for each of three layers over the area in the North part of the oilfield

SUBJECT OF RESEARCH

The Akan oil field is located on the eastern flank of the Melekess Depression in the northern part of the Akan-Stepnozersk swell-like zone.

The deposits of the Bashkirian stage within the Akan field are composed exclusively of limestones with minor thin interbeds of light green argillites (Kolchugin et al., 2020). The Bashkirian section in the Akan field has a tripartite structure, which is well traced by well logging data (Kolchugin et al., 2011; Kosarev et al., 2019).

The main objective of the work was to assess the value of fracture porosity for each of the three layers and to evaluate its areal distribution.



Histograms of the distribution of Φ_{total} and Φ_{fracture} for each of the three layers

CONCLUSIONS

The upper part of the Bashkir deposits is characterized by low values of total porosity. This pack is composed mainly of dense, fractured rocks, which is clearly visible in the distribution of fracture porosity.

The central part of the deposits is the main target for development and is characterized by the highest values of total porosity and the lowest values of fracture porosity. Only the dense layers in this part of the section are marked by the presence of fractures.

In the lower part of the Bashkir deposits, the value of fracture porosity increases again, especially in the northern part of the deposit.

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