Qeios

Peer Review

Review of: "Uncertainty-Driven Modeling of Microporosity and Permeability in Clastic Reservoirs Using Random Forest"

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Problem presented in the submission is very interesting. Integration of uncertainty analysis with advanced machine learning technique – Random Forest, combined with detailed geological data provided the good result in the determination of domination microporosity and permeability in clastic reservoirs. The uncertainty analysis had a significant impact on improving the model's accuracy by taking into account the natural variability present in geological data.

Authors mentioned also about limitation of the proposed solution pointing out the model's sensitivity to the quality of input data. Authors also suggested that incorporating more detailed sedimentological information, i.e. facies into the model could improve its accuracy.

Some remarks can be considered to improve the manuscript:

Abstract:

Add: porosity, grain size distribution (from .....? , laboratory measurements on core samples?) and spectral gamma-ray (SGR) measurements (from well logging?); add field survey data information.

2. 1. Data Collection and Preparation

The fifth paragraph:

Clay, sand, and silt content were quantified using a combination of sieve analysis for the coarser fractions and hydrometer analysis for the finer particles as an assessment of the grain size distribution within each sample. SGR analysis was also performed on the outcrops.....add: **USING which type of apparatus.**

doi.org/10.32388/K9YF7Y

2.2. Uncertainty Analysis

...**ThK ratio** was adjusted by ±0.5, while the **SM ratio**, EACH ABBREVIATION used first time should be explained,

.....The resampling process generated 200 new datasets..... THE RESAMPLING should be explained

2.3. Machine Learning Model Development

In **Table 2.** *Qualitative evaluation for permeability ranges* **UNITS are necessary**

- **Encoding process** should be explained, in Table 2 there are permeability ranges, there is no
- information on MICROPOROSITY DOMINATION ranges?

Attachments: available at https://doi.org/10.32388/K9YF7Y

Declarations

Potential competing interests: No potential competing interests to declare.