EGU2020-17007
https://doi.org/10.5194/egusphere-egu2020-17007
EGU General Assembly 2020

Machine learning technique for the quantitative evaluation of tight sandstone reservoirs using high-pressure mercury-injection data

JingJing Liu and JianChao Liu
Chang'an University, China (liujingjing@chd.edu.cn)

In recent years, China's unconventional oil and gas exploration and development has developed rapidly and has entered a strategic breakthrough period. At the same time, tight sandstone reservoirs have become a highlight of unconventional oil and gas development in the Ordos Basin in China due to its industrial and strategic value. As a digital representation of storage capacity, reservoir evaluation is a vital component of tight-oil exploration and development. Previous work on reservoir evaluation indicated that achieving satisfactory results is difficult because of reservoir heterogeneity and considerable risk of subjective or technical errors. In the data-driven era, this paper proposes a machine learning quantitative evaluation method for tight sandstone reservoirs based on K-means and random forests using high-pressure mercury-injection data. This method can not only provide new ideas for reservoir evaluation, but also be used for prediction and evaluation of other aspects in the field of oil and gas exploration and production, and then provide a more comprehensive parameter basis for “intelligent oil fields”. The results show that the reservoirs could be divided into three types, and the quantitative reservoir-evaluation criteria were established. This method has strong applicability, evident reservoir characteristics, and observable discrimination. The implications of these findings regarding ultra-low permeability and complex pore structures are practical.