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Application of Automated Mineralogy in Fluid-Solid chemical reactivity transmission on reservoirs

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Automated mineralogy (AM) is a semi-automatic mineralogical tool based on a scanning electron micrography-energy dispersion spectrometry (SEM–EDS) platform. It has the functions of large-area high-resolution field image scanning, particle mineralogical analysis, specific mineral search, trace mineral search and so on. It can realize the identification and quantification of core minerals, surface porosity and pore morphology, mineral particle size and pore distribution characteristics, element occurrence form and so on. Therefore, AM data can be used to analyze the sedimentary environment and diagenetic evolution process of oil and gas reservoirs and even to evaluate oil and gas reservoirs. The best highlight of AM is that the large-area images provide a reference for selecting sites for further nano-micro structure analysis. The linkage procedure of AM images and FE-SEM facilitates the observation of the same nano-micron scale mineral or pore changes after different fluid actions. This technique is beneficial for studying the effect of fluid chemical reactivity transmission on reservoirs during reservoir development or CO2 geological storage. The mineral distribution phase diagram obtained by AM can be registered with the same position CT scan image, which can improve the accuracy of CT data to distinguish minerals. However, because AM itself is not good at identifying the fine types of clay minerals and because some mineral densities are similar, it increases the difficulty of CT image registration and segmentation, so the accuracy of the constructed 3D mineral distribution needs to be improved. With the improvement of the registration algorithm and in situ CT scanning accuracy, the combination of AM and CT will play a more important role in the study of the fluid reactive transport effect during reservoir development or CO2 geological storage, especially in the study of short-lived minerals and pore changes, as well as fluid migration.

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