Developing a System of Criteria for Recognizing and Characterizing Recrystallization of Sedimentary Dolomites Using Advanced Diffraction and Geochemical Techniques

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ABSTRACT

The goal of the proposed research is to advance the understanding of how geological environments control dolomite recrystallization. Most sedimentary dolomites are meta-stable upon formation and either transform into a more stable dolomite phase via recrystallization, or persist in a meta-stable state over deep geological time. How recrystallization alters the crystal structure and chemistry of dolomite remains poorly characterized. The proposed research will fill this gap by explaining the crystallographic changes caused by recrystallization. Understanding recrystallization is important to accurately interpret the genesis and transformation of dolomite rocks, which contain approximately 30% of the petroleum reserves worldwide. Precise genetic interpretation is necessary to successfully predict dolomite reservoir characteristics. High-resolution diffraction data will be collected to characterize the structural parameters of recrystallized dolomites. The central hypothesis to be tested is that the geological environment of recrystallization controls the ultimate crystal structure and chemical parameters of dolomites. New and improved crystallographic data will be collected in this project using neutron diffraction and synchrotron methods, which will provide a basis for future dolomite research. A system of criteria for recognizing and characterizing dolomite recrystallization will be developed, which is expected to be suitable for future studies of dolomite rocks and for characterization of dolomite-hosted petroleum reservoirs worldwide. The proposed research is innovative because it will apply a novel combination of advanced techniques to study the crystal structural and chemical characteristics of recrystallized dolomites.

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