

Geochemistry and crystallography of recrystallized sedimentary dolomites

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Most sedimentary dolomites [CaMg(CO₃)₂] are meta-stable upon formation and either transform into more stable dolomite via recrystallization, or persist as meta-stable phases over deep geological time. The stability of dolomite has long been considered to be influenced by ordering and stoichiometry [1]; however, how recrystallization alters the crystal structure and chemistry of dolomites remains poorly understood.

In order to better understand the relationship between various chemical and crystallographic properties and the underlying geological processes, sedimentary dolomites, formed in various diagenetic environments, were investigated in detail. The innovative aspect of this study is the application of high resolution diffraction techniques, such as synchrotron X-ray and neutron diffraction, together with various geochemical proxies, including clumped isotopes, to characterize recrystallized sedimentary dolomites.

The age of the studied samples ranges from Holocene to Cambrian. The diagenetic environments of dolomitization and recrystallization were determined primarily on the basis of petrographic and geochemical data [2, 3, 4]. Rietveld refinement of high-resolution diffraction data revealed notable differences in crystallographic parameters across the various dolomite types.

Several dolomite bodies have been identified as potential sites for CO₂ sequestration [5]; therefore, new insights into what factors control dolomite ordering and stoichiometry will contribute to an improved understanding of dolomite reactivity and may be particularly important for CO₂ sequestration studies.

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