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TIME-RESOLVED DUAL CARBONATE CLUMPED ISOTOPE (Δ_{47} AND Δ_{48}) AND NON-LINEAR MIXING INVESTIGATION OF DOLOMITE

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Dolomitisation often proceeds through intermediate Ca-Mg carbonates (e.g., high-Mg calcite), producing mixed-mineralogical assemblages that are widespread in nature and the geologic record. These mixed phases yield Δ_{47} and Δ_{48} signatures that are not straightforward to interpret. Although recent studies have proposed process-based interpretations of non-equilibrium trends in the Δ_{47}-Δ_{48} space, distinguishing endmember mixing from other processes, such as CO_2 degassing, during transformation remains challenging without independent mineralogical constraints. This study uses time-resolved aragonite-to-dolomite transformation experiments at 175 °C to evaluate how dual clumped isotope ratios evolve as mineralogy changes during the reaction. At this temperature, samples were taken at each timestep from 0 to 600 hours and quantified for their mineralogical properties and proportions using X-ray diffraction with Rietveld refinement. The same aliquots were measured for their Δ_{47} and Δ_{48} together with $\delta^{13}C$ and $\delta^{18}O$. The Δ_{47}, $\Delta_{48,}$ and isotopic values for each time series were compared with their constrained mineralogical parameters to test whether mixed phases can generate trajectories that mimic the process signals. Preliminary results indicate an evolution that trends downwards and to the right of the equilibrium line, moving off it as mineralogical composition changes. This result suggests that mixing during transformation can potentially influence the dual clumped isotope signature. Ongoing work aims to develop a model for interpreting Δ_{47} and Δ_{48} in partially transformed materials. This approach would improve our understanding of dual clumped isotope applications to dolomitisation mechanisms and interpretation of diagenetic carbonates in the geologic record.