Calcite clumped-isotope thermometry reveals conditions of diagenesis & temperatures of fluid migration along faults

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We are developing **clumped isotopes** as a tool to quantify **temperatures** (±1-2°C) of sub-surface carbonate growth and re-crystallization and the δ¹⁸O of fluid-rock systems in basins.

**Burial Diagenesis on the Colorado Plateau, AZ**

This proof-of-concept study shows how clumped isotopes can constrain the crystallization temperature of diagenetic calcite, δ¹⁸O values of diagenetic waters, and fluid-rock ratios.

**Syndepositional deformation features, Guadalupe Mountains, NM**

Syndepositional faults and fractures affect early fluid flow in carbonate platforms. Our study (petrography, fluid inclusions, clumped isotopes) shows that they are active fluid conduits throughout a strata’s entire history.

**Structures & Fluids along the Moab Fault, Paradox Basin, UT**

Clumped isotopes show rapid penetration of surface waters down intensely jointed fault intersections while deformation bands block fluids—confirming the key role of structures in transmission and compartmentalization of fluids in porous rocks.