

## **Mechanisms of Dolomite Precipitation and Growth**

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Deposits of dolomite represent 80% of all carbonate reservoirs of oil and gas in the United States, host economic accumulations of metal ore, and serve as an important sink for carbon and magnesium throughout geologic time. Yet dolomite remains poorly understood: although abundant in the rock record, it is rare in the modern, and experimental attempts to precipitate dolomite at earth surface temperatures have largely failed. Prior laboratory studies have been based on limited geochemical analyses available for modern dolomite-producing environments, which have not included variables such as carbonate mineral saturation states, degrees of sulfate reduction, carbon/sulfur redox cycling, and other precise carbonate system determinants.

In this study, a field examination was undertaken to determine the pore water and solid phase geochemistry of a modern dolomite-producing lagoon setting near Rio de Janeiro, Brazil, previously cited as a location of microbially-mediated dolomite formation. Based on these findings, a series of controlled laboratory precipitation experiments was designed. Changing solution chemistry will be monitored throughout each experiment, and high-resolution SEM, STEM and AEM images and elemental maps of produced overgrowths will be obtained. AEM and STEM analyses of natural dolomites and high-Mg calcites cored in the field will also be undertaken to better characterize their mineralogy and chemical composition and to compare them with prior work on carbonate microstructure. We hypothesize that hydrogeochemical and microbial processes maintain relative degrees of carbonate mineral saturation that permit dolomite nucleation and growth.