

Abstract for the 241 st National ACS Meeting Denver Colorado

Title: Calcite Growth-Rate Inhibition by Fulvic Acid and Magnesium Ion at 25 C, pH = 8.5, and Calcite Supersaturation (IAP/K_{sp}) = 4.5 -- Potential Reduction of Calcite Formation Rate in Marine Calcifying Organisms

Author: Michael M. Reddy¹

¹ US Geological Survey, Water Resources Discipline, National Research Program, Denver, Colorado, 80225

Abstract: (words 150)

Calcite seeded crystallization rates, at constant solution composition and calcite supersaturation, are measured in the presence and absence of a natural organic acid (fulvic acid, FA, 0.5 mg/L), in the presence and absence of magnesium ion (Mg, 10⁻⁴ M), and in the presence of both FA and Mg. FA and Mg reduce calcite crystal-growth rates by 47 % and 38 %, respectively, compared to control experiments containing no added growth-rate inhibitor. Growth-rate experiments in the presence of both FA and Mg reduce the calcite growth rate to 5 % of the control rate. In combination, FA and Mg interactions in solution and/or on the growing calcite surface dramatically decrease calcite growth rates. This result suggests that FA and Mg concentrations at biocalcification sites in marine calcifying organisms mediate calcite crystallization rates. FA and Mg influence rate-dependent metal-ion partitioning and must be considered when using carbonate trace-metal records as paleoclimate proxies.