Carbon Isotope Fractionation by Soil Bacteria During Pedogenic Carbonate Formation. (S05-lindemann171744-Poster)

Authors:

- W.C.Lindemann* New Mexico State University
- H.C.Monger New Mexico State University
- R.A.Kraimer New Mexico State University

Abstract:

The delta 13C values of pedogenic carbonates have been used to infer the types of plants present during carbonate formation with the assumption that pedogenic carbonate records carbon isotope fractionation by C3, C4, and CAM photosynthetic pathways. The purpose of this study was to measure carbon isotope fractionation by soil bacteria. Eleven bacteria were isolated from an Aridisol that formed carbonate crystals on solid media enriched with calcium. The isolates were grown in liquid shake cultures enriched with calcium, and the delta 13C values were determined of the media, cells, and carbonate crystals. Cells, crystals, media before growth, and media after growth had delta 13C values of -19.08, -16.56, -18.68, and -17.52 0/00, respectively. Pedogenic carbonate crystals were enriched with 13C relative to the cells, media before growth, and media after growth. The media after bacterial growth was enriched with 13C relative to the media before bacterial growth. Carbonate crystals were mainly calcite, but some isolates produced vaterite or mixtures of calcite and vaterite. These results imply that soil bacteria may contribute to the enrichment of pedogenic carbonate by about 2 0/00.

Corresponding Author Information:

William Lindemann New Mexico State University Agronomy and Horticulture, MSC 3Q Las Cruces, NM 88003 phone: 505-646-1907 e-mail: wlindema@nmsu.edu

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