Genesis and Morphology of Pedogenic Gypsum and other Sulfate Minerals, USA and Jordan. (S05-buck163913-Oral)

Authors:

- B.J.Buck - *UNLV*
- J.G.Van Hoesen - *UNLV*
- S.Khresat - *Jordan University of Science and Technology*
- Z.Rawajfih - *Jordan University of Science and Technology*
- D.Merkler - *NRCS*
- I.Schiefelbein - *UNLV*
- R.Howley - *UNLV*
- T.Lawton - *New Mexico State University*

Abstract:

Gypsic soils occur in over 200 million hectares worldwide.The accumulation of gypsum and other sulfate salts can affect all physical and chemical characteristics and produce adverse effects on both agricultural and engineering uses of soils. In this study, we examined pedogenic gypsum in soils from New Mexico, Nevada, California, Jordan and paleosols in Mexico. Macro- and micromorphology were studied and the isotopic composition of the hydration water of gypsum (in the New Mexico soils) was analyzed. The results indicate that gypsum accumulates in soils through time in a similar manner as calcium carbonate.Unlike calcium carbonate however, gypsum and other sulfate salts also form small snowballs (spherical accumulations) that form early in pedogenesis. Pedogenic gypsum development in soils should not be the only criteria used to determine relative age of soil development or related geomorphic surfaces. Stable isotopic analyses of the hydration water of pedogenic gypsum indicated heavy enrichment in both dD and dO18. Because gypsum precipitation in soils is driven by evaporation, a more thorough understanding of the precise controls affecting gypsum precipitation is necessary before this technique can be used as a sensitive proxy of paleoclimate.

Corresponding Author Information:

Brenda Buck
University of Nevada, Las Vegas
4505 Maryland Parkway
Las Vegas, NV 89154

phone: 702-895-1694
e-mail: buckb@unlv.edu

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