

Determining Dissolution and/or Precipitation of Pedogenic Carbonate in Drylands Farm Soils in Kimberly, Idaho.



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Introduction

Drylands are characterized by low precipitation and high evaporation rates. They cover about 41% of the Earth's land surface. Despite of being a predominant climate type in landmass at a global scale, their dynamics is still understudied, especially to understand the role and behaviors of pedogenic carbonates in the global carbon cycle. Few studies have examined the impacts of irrigation on stocks of this soil inorganic carbon reservoir in dryland agricultural fields. This study focuses on determining whether dissolution or precipitation of pedogenic carbonate is taking place in farm soils, as well as determining at which rate these reactions are happening. In Tornillo, TX, for example, pedogenic carbonate precipitation is accelerated by irrigation, and it also serves as an additional non-biological source of CO₂ (Ortiz 2022),

Interests

Factors of interest in this research:

- How irrigation water contributes to dissolution and/or precipitation of pedogenic carbonate
- The contribution of crops in soil respired CO₂
- Soil respiration control on calcite solubility
- Sources and concentrations of calcium in the soils
- Locations for these reactions to take place (soil depth)
- At what rate could dissolution or precipitation be happening



Research Area

Kimberly, ID, experiences an arid climate. The Kimberly Research farm site is in the south-central region of Idaho, also known as the Magic Valley. This site is managed by the USDA and in collaboration with institutions like Boise State and UTEP, studies pertaining to the critical zone project are being conducted. The common practice is furrow irrigation, and the main water source comes from the Snake River. This site is also characterized by the silty soil (loess deposits) sitting on top of basalt

General Plans

To understand the pedogenic carbonate-water interaction:

- Follow the flow path.
- Collect irrigation water, soil water, and groundwater samples.

Future

Sampling and data collection in the field will be conducted in Summer 2024 according to data needed/available.