42-13 - Booth No. 180: SEDIMENT PROVENANCE WITH IMPLICATIONS FOR DUST PRODUCTION AS RELATED TO CLIMATE CHANGE IN THE SAN LUIS VALLEY, COLORADO, USA

Sunday, September 22, 2024

8:00 AM - 5:30 PM

Hall D (Anaheim Convention Center)

Booth No. 180

Abstract

We link the >1Ga of geologic history represented in the Sangre de Cristo Range, southern Colorado, to the production of sediment and ultimately eolian dust that affects snowmelt, groundwater, and nutrient transfer the San Luis Valley (SLV). In the snowpack-dominated SLV, meltwater sustains baseflows during the summer; however, increased eolian transport and dust deposition on snowpack resulting from land-use changes and disturbances have potential to substantially alter snowmelt timing and magnitude in coming decades. An estimated 30% of modern eolian sand in the SLV is derived from the Sangre de Cristo mountains (e.g., Madole et al., 2008), which only account for ~4.7% of the exposed SLV drainage area.

We seek to understand contribution and modes of weathering of the Sangre de Cristo source rocks through forensic geology and modern geochemical methods to identify dust provenance. Motivating research questions include: What minerals comprise the sand, sediment, and dust in the San Luis Valley? What lithologic units in the Sangre de Cristo range are the sediments derived from? What, if any, minerals are present within bed rock units but absent from SLV sediments and can chemical weathering of silicate minerals account for this discrepancy? Are given lithologic units over-represented in the sediment record and what physical or chemical properties account for the prevalence of such units as sediments?

Provenance analysis of sand samples collected from field locations in the San Luis Valley provide opportunity to determine the sources and transport distance of sands based on mineralogy and clast characteristics. Petrographic analysis of thin sections combined with field observations of the main lithologic units of the Sangre de Cristo range provide basis for the physical and chemical durability of source lithologies, including mineralogy and degree of cementation/compaction to determine the extent to which sands were derived from these local sources. Sand analysis and petrologic comparison includes close observation of minerals in hand samples and outcrop, optical mineralogy and modal abundance characterization assisted by the Image J software package; geochemical

comparison of sediment and potential source rocks is achieved through back scatter electron images, energy dispersive spectroscopy, and X-Ray fluorescence.

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