Title: Identifying Controls on Carbon Exchanges in High Altitude Headwaters to Improve Representation in Earth System Models

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Abstract:

The hydrology of high-elevation, mountainous regions is poorly represented in Earth Systems Models (ESMs). In addition to regulating downstream water delivery, these ecosystems play an important role in the storage and land-atmosphere exchange of carbon and water. In an effort to resolve this hydrologic gap in ESMs, this study seeks to better understand the interactions between groundwater, carbon flux, and the lower atmosphere in these high-altitude environments through integration of field observations and model simulations.

Here we use observations from a meteorological station co-located with an eddy covariance tower in the East River Basin—a Colorado River headwaters basin, which is emblematic of other high-elevation basins. The meteorological and carbon flux data collected from these instruments over water year 2017, coupled with snow surveys, will be used to force an integrated single-column hydrologic model, ParFlow-CLM. These observations will be used to better constrain the water, carbon, and energy fluxes in the coupled land-atmosphere model to increase our understanding of high-altitude headwaters. Through obtaining more accurate and higher resolution evapotranspiration and carbon cycling data and applying it to a coupled hydrologic model, this study can lead to better representation of mountainous environments in all Earth Systems Models.