Title: **Simulating Snow Patterns and Evolution in the East River SFA with a Distributed Snow Dynamics Model**

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BER Program: SBR

Project: University project

Project Abstract:

Spatial and temporal patterns of snow accumulation and melt exert a dominant control on hydrologic and biogeochemical flows in temperate mountain catchments. Mountain snowpack states, fluxes, and properties exhibit extreme and scale-dependent variability, complicating efficient sampling and modeling. Capabilities for evaluating the impacts of system perturbations (e.g. climate shifts, radiative forcing by impurities, forest cover change) on system water availability and nutrient cycling are contingent on robust observations and simulations of seasonal snow dynamics at appropriate scales of action.

To explore snow accumulation and melt process dynamics over the meter to watershed scales, we have implemented a physically-based snow cover evolution model (SnowModel; Liston et al., 2006) at multiple grid resolutions, using different combinations of accumulation process sub-models. We first tested the model in Senator Beck Basin, a well-instrumented study site in southwest Colorado. Model parameterizations for that site were then transferred to the East River SFA where instrumentation is less-reliable.

The simulations over a recent set of years spanning high and low peak accumulation values, were forced with high-resolution mesoscale model (WRF) and data assimilation model (HRRR) output, and are compared with ground measurements as well as snow depth and snow water equivalent (SWE) maps from Airborne Snow Observatory flights. These results help characterize the snow hydrologic system in the East River, and set the stage for future snow data assimilation work and for integration with simulations of connected systems within the SFA.

References:

Liston, G.E., Elder, K., 2006. A Distributed Snow-Evolution Modeling System (SnowModel). J. Hydromet. 7, 1259–1276.