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Snow Accumulation and Melt Simulations in Dry Through Wet Years in the East River

Jeffrey S. Deems[1*] and Mark S. Raleigh[1]

[1] CIRES National Snow and Ice Data Center, University of Colorado

Contact: deems@nsidc.org

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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 are implementing a physically-based snow cover evolution model (SnowModel; Liston et al., 2006) at multiple grid resolutions, using different combinations of accumulation process sub- models, over a recent set of years spanning high and low peak accumulation values. These simulations, forced with high-resolution mesoscale model (WRF) output, are compared with ground measurements as well as snow depth and snow water equivalent (SWE) maps from Airborne Snow Observatory flights. These initial 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.

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