

Title: Constraining Physical Understanding of Aerosol Loading, Biogeochemistry, and Snowmelt Hydrology from Hillslope to Watershed Scale in the East River Scientific Focus Area

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BER Program: SBR

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Project Abstract:

The mountain snowpack is a critical component of regional hydrology, ecology, biogeochemistry, and climate in the Western US. This project leverages the East River Scientific Focus Area (SFA), as an outdoor laboratory to address a significant gap in our understanding of the mountain snowpack; namely, how atmospheric constituent deposition on snowpack influences snow energy balance and nutrient/chemical cycling, and how snowmelt timing and intensity exerts controls on emergent biogeochemical and ecohydrologic behavior. This aligns with East River SFA goals to integrate landscape scale measurements and physical based modeling tools to improve understanding of controls on runoff production, ecohydrology, biogeochemical cycling, and land surface energy partitioning in high mountain watersheds. We will present current observation and results from the project, including observations of snowpack at multiple scales such as surface elevation and snow reflectance measurements from NASA-JPL's Airborne Snow Observatory, high-resolution measurements of snow and deposited aerosols physical, chemical, and optical properties, and discuss future planned observations for tracking of deposited aerosols residence and reaction times in the watershed, and in situ time series of surface energy balance, water flux, and water chemistry. We will also highlight how we plan to fuse the remotely sensed and ground based measurements with an operational, physics-based hydrologic model, the WRF-Hydro/National Water Model system, to test and improve its capability to represent alpine snow dynamics, and related control on ecohydrologic and biogeochemical processes, from the hillslope to watershed scale.