

Integrated mountain system monitoring and snow system research at Senator Beck Basin, San Juan Mountains, Southwest Colorado

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Abstract. Mountain systems throughout the American West are demonstrating sensitivity to regional climate change, as manifested by altered snowcover and hydrologic characteristics, changes in plant communities and biogeochemical fluxes, and seasonal shifts in energy budgets. The Senator Beck Basin Study Area (SBBSA) has been developed in the western San Juan Mountains near Silverton, Colorado by the Center for Snow and Avalanche Studies as a sentinel monitoring site immediately adjacent to and downwind of the Colorado Plateau. The San Juan Mountains are a significant contributor to the Colorado River Basin and are the primary headwater of the Rio Grande River. SBBSA is a 290 ha catchment spanning elevations from 3353 to 4118 m and contains alpine tundra and proxy arctic conditions at the highest elevations, sub-alpine forest at the lowest, and a krumholz ecotone between. Intensive arrays of instrumentation at study plots located above and below tree line monitor weather, snowpack, energy budget, and soil condition parameters year-round. A nearby micro-met station monitors 'free air' wind, air temperature and humidity. A broad-crested, notched weir at the SBBSA pour-point monitors basin discharge and water properties. Research teams currently utilizing SBBSA are exploring the effects of desert dust depositions on snowpack ablation, biogeochemical processes, and plant community responses to altered energy budgets. New methods for monitoring snowpack albedo and dust-in-snow concentrations have been developed and new methods for estimating snowcover distribution and ablation at the SBBSA scale are being tested. Regional water districts are currently supporting the development of forecasting tools incorporating the effects of desert dust impurities on snowmelt timing and intensity.

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