Quantifying Mountain Snowpack and Controls on its Accumulation for Improved Water Forecasting


Rosemary Carroll Ken Williams

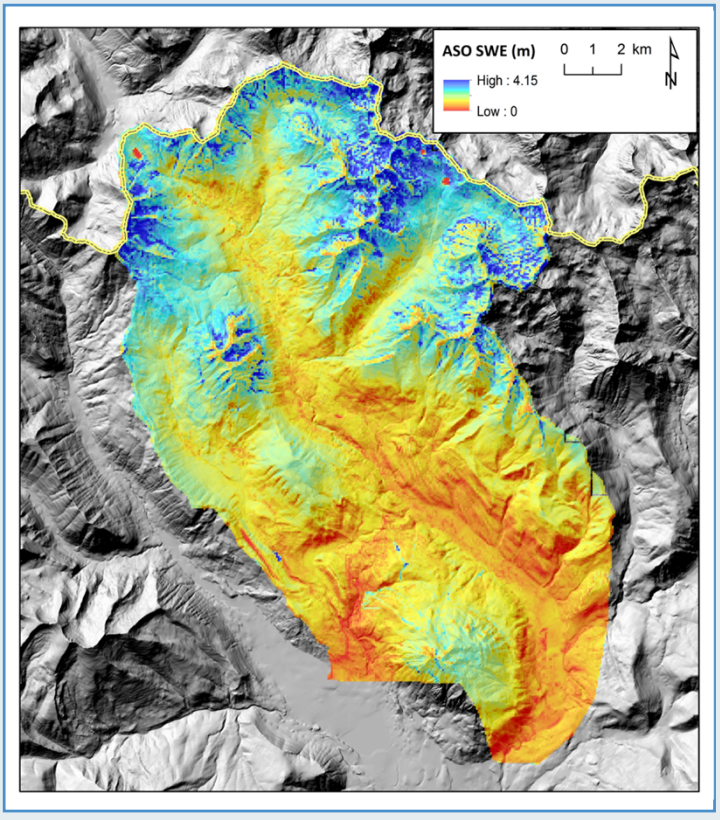
werri.lbl.gov

Motivation

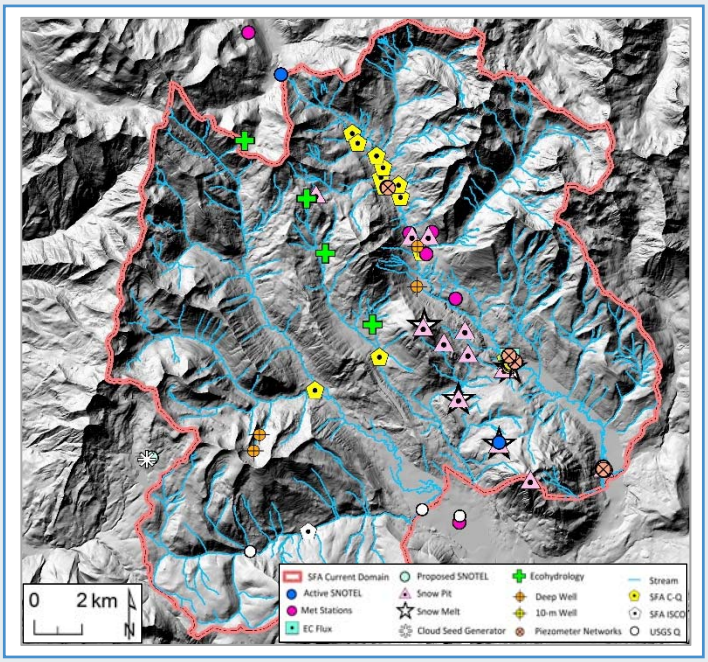
The accumulation, retention, and melt of snowpack within mountainous systems, such as the Sierra Nevada and Rocky Mountains, provides a critical source of water for meeting the needs of agricultural, energy, industrial, and domestic users. Improved forecasts of water availability in a given season or year derived from snow melt are needed to better support this user base and to more effectively manage water resources during periods of scarcity.

Technological Challenges

Accurate forecasting of water availability emanating from mountainous systems is often hindered by sparse, ground-based measurements of snow depth and snow water equivalent (SWE). Spatially extending these measurements via airborne-based approaches is tractable; however, optimized, computationally efficient approaches for assimilating such data into predictive forecasting models are sorely needed.



Watershed-scale assessment of snow water equivalent (SWE) derived using NASA's Airborne Snow Observatory (ASO)



Observational network within Berkeley Lab's East River, CO Community Watershed used to constrain and validate predictive models describing hydrologic fluxes.

Research

Ground- and airborne-based measurements of snow properties, such as depth, SWE, albedo, and chemical composition, are being used to understand the factors and processes that control snow accumulation, re-distribution and melt within the East River, CO watershed that serves as the testbed for Berkeley Lab's Watershed Function Science Focus Area. Berkeley Lab is working with Desert Research Institute and its other collaborating institutions to link such measurements over a range of spatial and temporal scales and over a range of elevations and vegetation types with predictive models describing flows of water within and out of the watershed. This work is expected to play a critical role in improving National efforts to link observations and models for more robust estimates of future water availability.

Acknowledgements

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