Characterization of the Vermont Snowpack

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ABSTRACT

Across the northeastern United States, snowfall and the local to regional snowpack are critical components of the hydrologic cycle, yet their effect on the surrounding environmental system are relatively understudied. The most recent region-wide analyses of snow and winter-season climate in the northeast extend to the early 2000s, with low spatial coverage. Yet the northeastern snowpack plays a first principle role in delaying water availability to the terrestrial system by storing water until periods of intermittent and continuous snowmelt. Further, the amount of water in the snowpack and the timing of snowmelt are expected to strongly influence downstream runoff (timing and volume), spring nutrient fluxes, flooding, and drought. Both snow water equivalent (SWE) and snowpack water storage representation have largely been overlooked in the northeast, in part due to scarce observations. In response, a cold-weather environmental observation network has been established to span the summit-to-shore continuum in Vermont for advanced environmental analysis and planning and operational decision-making capability. The 22 monitoring stations span from near Lake Champlain in Burlington, VT, to a high-elevation station near the summit of Mount Mansfield and extends to the Sleepers River research Watershed in Danville, VT to incorporate and build upon existing longer-term records of snow observations. Using distributed ground-based sensors combined with unmanned aircraft system (UAS)-based sensing and hydrologic modeling, this effort provides an improved understanding and characterization of snowpack spatial and temporal variability across aspects, elevations, and canopy coverage regimes.

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