Idaho State University

Departments of

Mathematics & Statistics
and
Geosciences

Colloquium

How dust and forest structure shape snow melt in western U.S. headwater basins.

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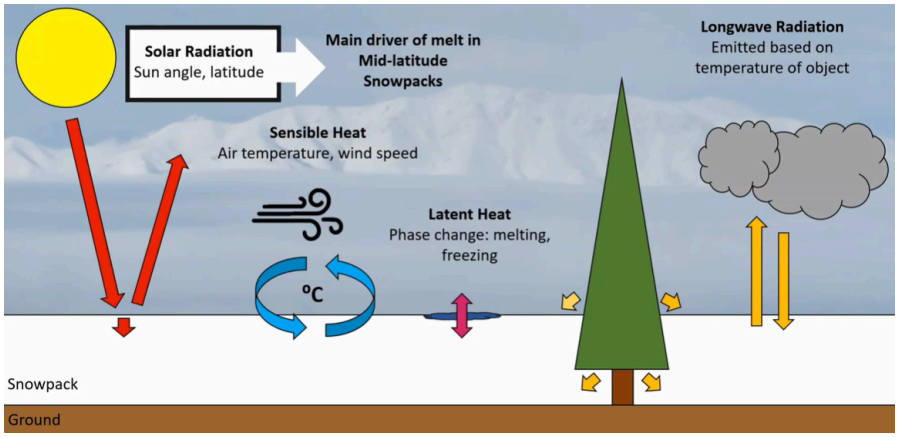

In the intermountain western United States, around two-thirds of streamflow originates as melt from seasonal mountain snowpacks. These snowpacks hold cold-season precipitation for several months into the warmer and drier summer, when water demand is highest. Knowledge of the timing and magnitude of spring snowmelt is important for water managers but can be challenging to predict. Melt timing is highly sensitive to radiation exchange between the snowpack and its surrounding environment and can vary drastically across different years, as well as over different topographic and vegetation gradients.

In this talk, we present a series of studies where we examine snowmelt responses to (1) dust on snow events, which reduce snow albedo, increase absorption of solar radiation, and result in earlier snowmelt, and (2) forest canopy disturbance that strongly alters how much solar and thermal radiation reaches the underlying snowpack. We investigate these responses in the Great Salt Lake Basin (GSLB) and the 2024 Pack Trail & Fish Creek burn scar region (Togwotee Pass, Wyoming), respectively.

Results show that the impacts of mineral dust on snowmelt timing in the GSLB have consistent spatial patterns with elevation, and that the magnitude of snowmelt impacts is strongly modulated by melt season meteorology. Results from the burn scar suggest that coniferous canopy disturbance is linked to spatial patterns in melt timing which are related to variability in canopy density and structure. Together, these studies enhance our understanding of energetic snowmelt controls under changing spatial and temporal drivers.

Wednesday, Feb. 11 | 4:00 pm / PS 108

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