ABSTRACT

TITLE:	Early Snow Melt Effects on Soil Nitrogen Availability in the Alpine of the San Juan Mountains, Colorado
AUTHOR(S):	Steltzer , Dr. Heidi; Sienicki, Esm; Fullmer, Grace; Daly, Kathryn; Remke, Michael; Bangert, Sarah; Cornell, Emily; Korb , Dr. Julie
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ABSTRACT: Spring snow cover extent has decreased since the early 20th century due to climate warming and may affect alpine ecosystems by altering growing season length and modifying impacts of winter snowpack on microbial and plant nitrogen (N) availability. Early snowmelt when decoupled from seasonal warming may decrease microbial and plant N immobilization during snowmelt leading to increased leachable N. To better understand seasonal N availability in the alpine tundra of the San Juan Mountains of CO, we examined snow N concentrations and the effects of warming on extractable soil N and ion resin N pools during the growing season as well as net N mineralization rates during the pre-monsoon and monsoon seasons. Lack of precipitation resulted in a shallow snowpack which melted early creating a temporal gap between soil N availability and plant N uptake. Mineralization rates, extractable N, and resin N each increased with increased soil moisture with higher available N after snowmelt and during the monsoons. The consequences of reduced snow cover due to climate warming are lower soil moisture levels and greater losses of N from the N-limited alpine ecosystem, which may produce limitations on plant productivity and modify N-cycling leading to decreased alpine ecosystem health.