Climatology of Snow to Liquid Ratio in the Central Wasatch Mountains of Northern Utah

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Introduction

Snow to liquid ratio (SLR) is important for snow forecasting, avalanche prediction, and winter road maintenance. Alcott and Steenburgh (2010) investigated the SLR at the Alta Collins (CLN) site in Little Cottonwood Canyon. They found that the SLR was highly variable, which can contribute to snow forecasting errors. This research examines how SLR varies at five different sites in the central Wasatch Mountains to quantify spatial variability and uncertainty due to measurement techniques and site characteristics.

Methodology

Examined data for daily snowfall and daily liquid precipitation at the five sites from 2004-2020

Analyzed data and deleted duplicates

Filtered data for the cool season from October to March

Focused on days with snow greater than or equal to 4 inches and liquid precipitation greater than or equal to 0.1 inches

Calculated SLR by dividing snowfall by liquid precipitation

Removed snow to liquid ratio (SLR) with value greater than 50, which may be erroneous

Results

- We found that the median SLR at the five sites ranges from 12.3 to 13.3, with Alta Guard the lowest (12.3) and Spruces and Alta Collins the highest (13.3).
- We also found that although Alta Guard and Alta Central are just 100 m apart, their SLR distributions and medians (12.5 at ALTA and 12.3 at AGD) differ, which could be the result of measurement practices or site characteristics.
- The National Weather Service Coop sites (SLB and ALTA) observed the most days with high SLR, which may reflect precipitation gauge bias.

Acknowledgement

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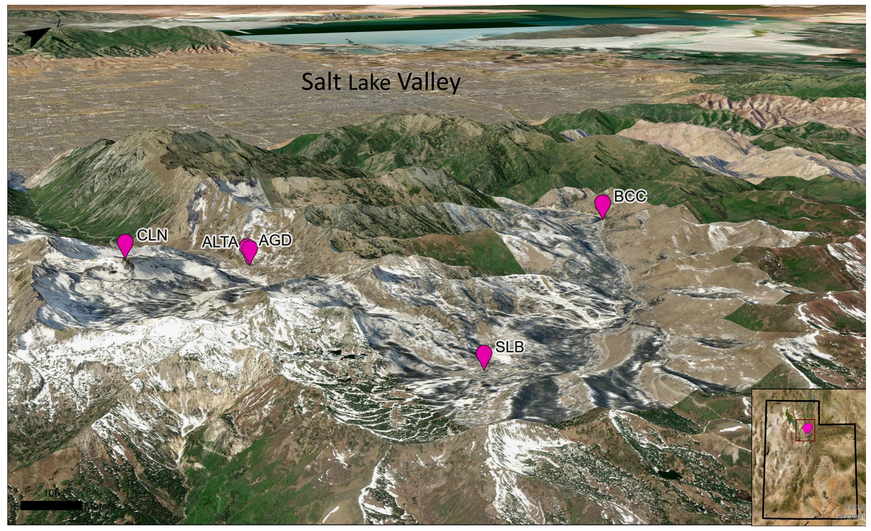
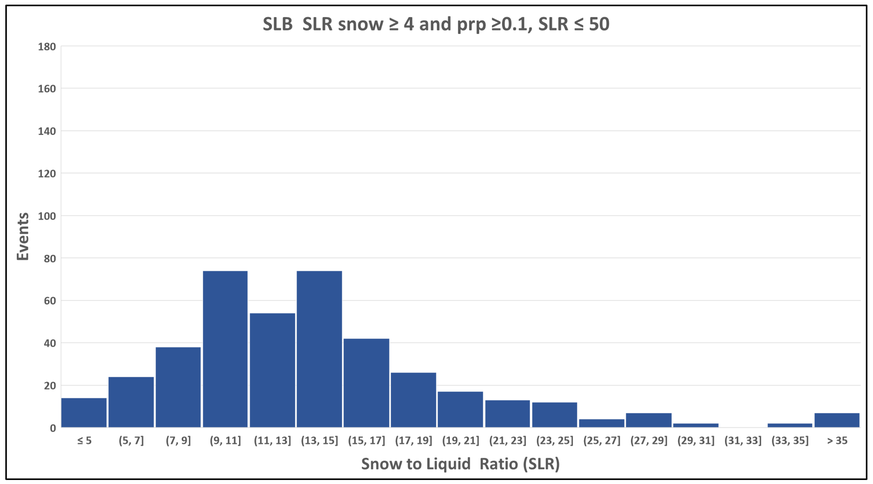
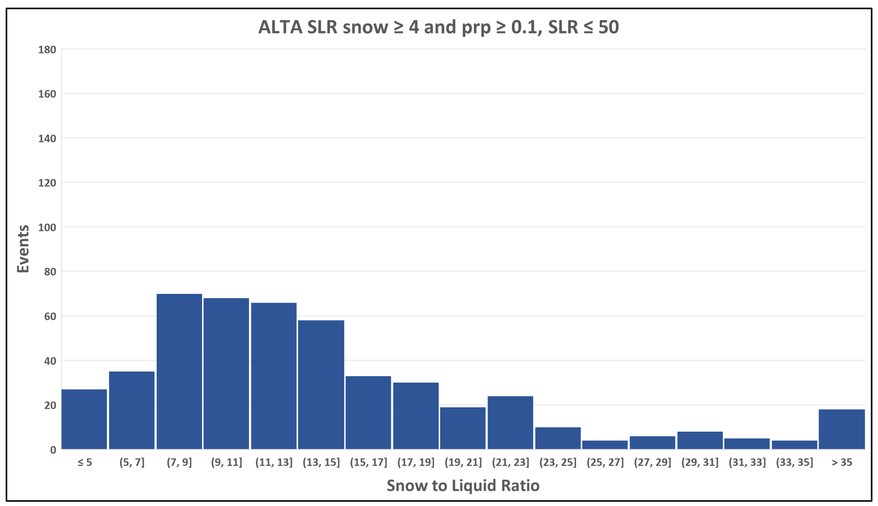
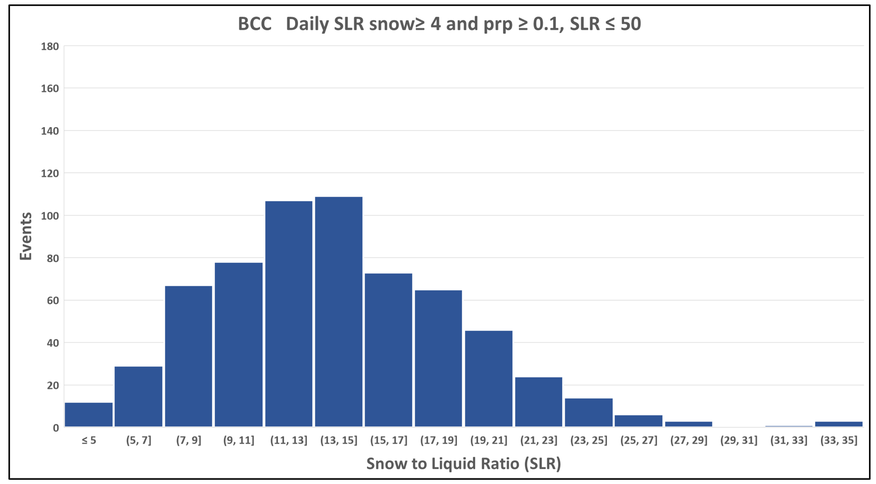
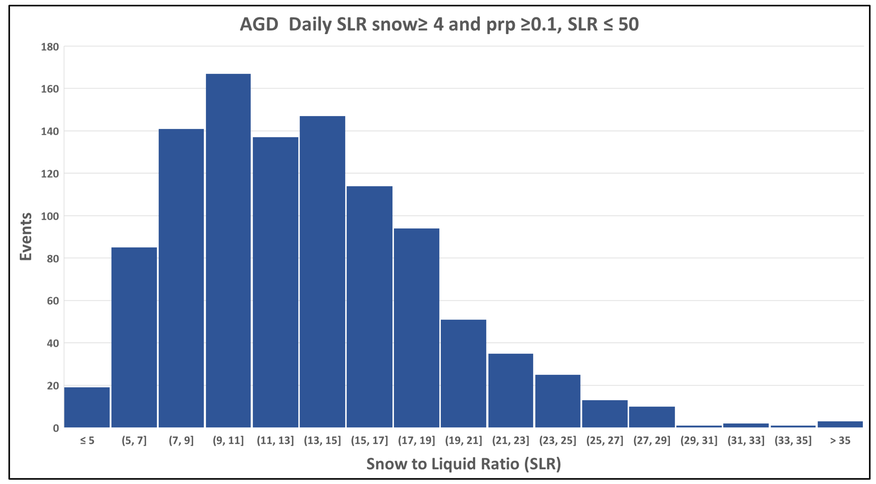
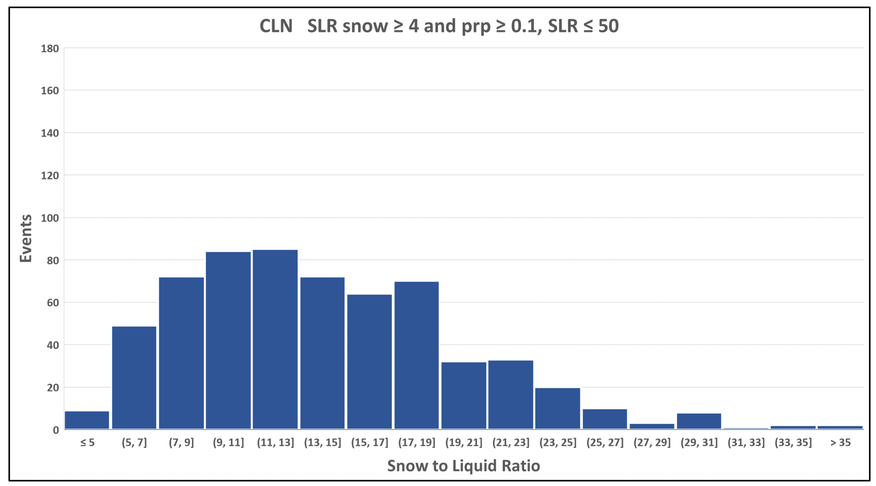




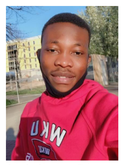








SLR≤ 50	BCC	AGD	CLN	SLB	ALTA
Median	13.3	12.3	13.3	13.2	12.5
Mean	13.9	13.0	14.1	13.9	14.0
95th percentile	22.2	20.0	25.0	21.7	25.0
90th percentile	20.2	22.7	21.9	26.0	32.0
75th percentile	17.1	16.0	17.7	16.3	17.6
25th percentile	10.3	9.0	9.5	9.8	8.9



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Reference: Alcott, T. I., and W. J. Steenburgh, 2010: Snow-to-Liquid Ratio Variability and Prediction at a High-Elevation Site in Utah's Wasatch Mountains. *Weather Forecast.*, **25**, 323–337, https://doi.org/10.1175/2009waf2222311.1.