



# ASO + M3 Works Modeling Report

Boulder Creek River Basin

Model date: May 16, 2023



Historical data and reports can be found at:  
[data.airbornesnowobservatories.com](https://data.airbornesnowobservatories.com)

# BOULDER CREEK RIVER BASIN MAY 16, 2023 MODELING REPORT

**Current model date:** May 16, 2023

**Model Total Snow Water Equivalent:** 72.0 TAF

**Model Mean Snow Water Equivalent:** 5.9 in.

**Model Mean Cold Content:** -0.0 MJ/m<sup>2</sup>

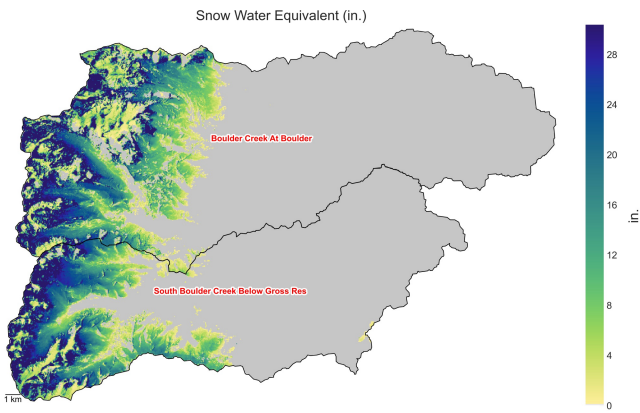
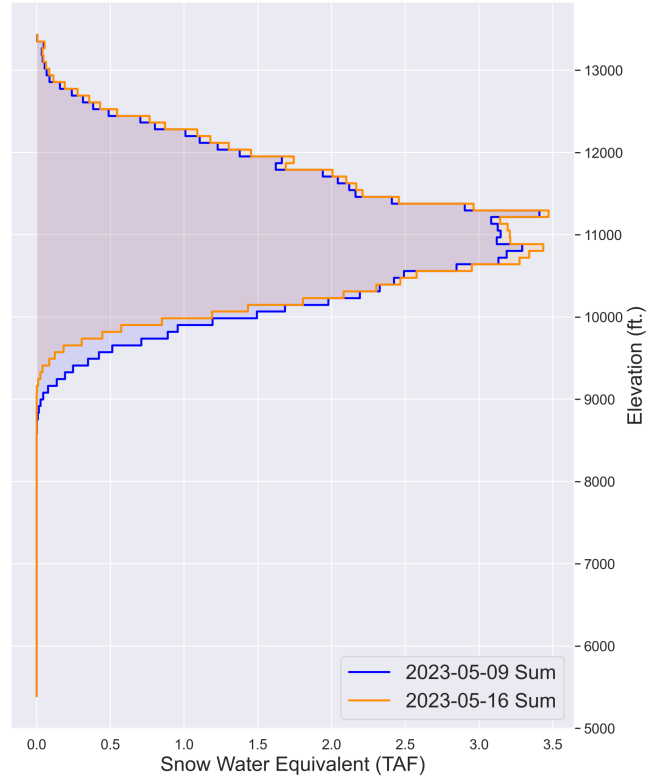
**Model reporting period:** May 09 - May 16, 2023

**Change in Total Snow Water Equivalent:** -1.8 TAF

**Change in Mean Snow Water Equivalent:** -0.1 in.

**Change in Mean Cold Content:** 0.0 MJ/m<sup>2</sup>

Total Snow Water Equivalent (TAF) by Elevation



DESCRIPTION	TOTAL	SOUTH BOULDER CREEK BELOW GROSS RES	BOULDER CREEK AT BOULDER
Mean SWE in.	5.9	5.5	6.2
Total SWE TAF	72.0	27.5	44.6

The model has been updated with ASO survey data, a brief summary of the changes to the model are provided:

May 09 update summary: added 5.8 TAF of Snow Water Equivalent

## State of the Snowpack

### Interpretation Notes

Elevation bands are in increments of 1000 ft, e.g., 4000 is 4000 - 5000 ft.

Mean SWE is calculated over the total basin area. Mean cold content is calculated over the snow covered area to reflect the ripeness of the existing snowpack.

Surface Water Input (SWI) includes liquid water leaving the bottom of the snowpack and rain on bare ground.

Forcing data is created with the Spatial Modeling for Resources Framework (SMRF) using the High Resolution Rapid Refresh (HRRR) output fields as inputs. The HRRR data is locally optimized for mass input to the basin.

### Model Results

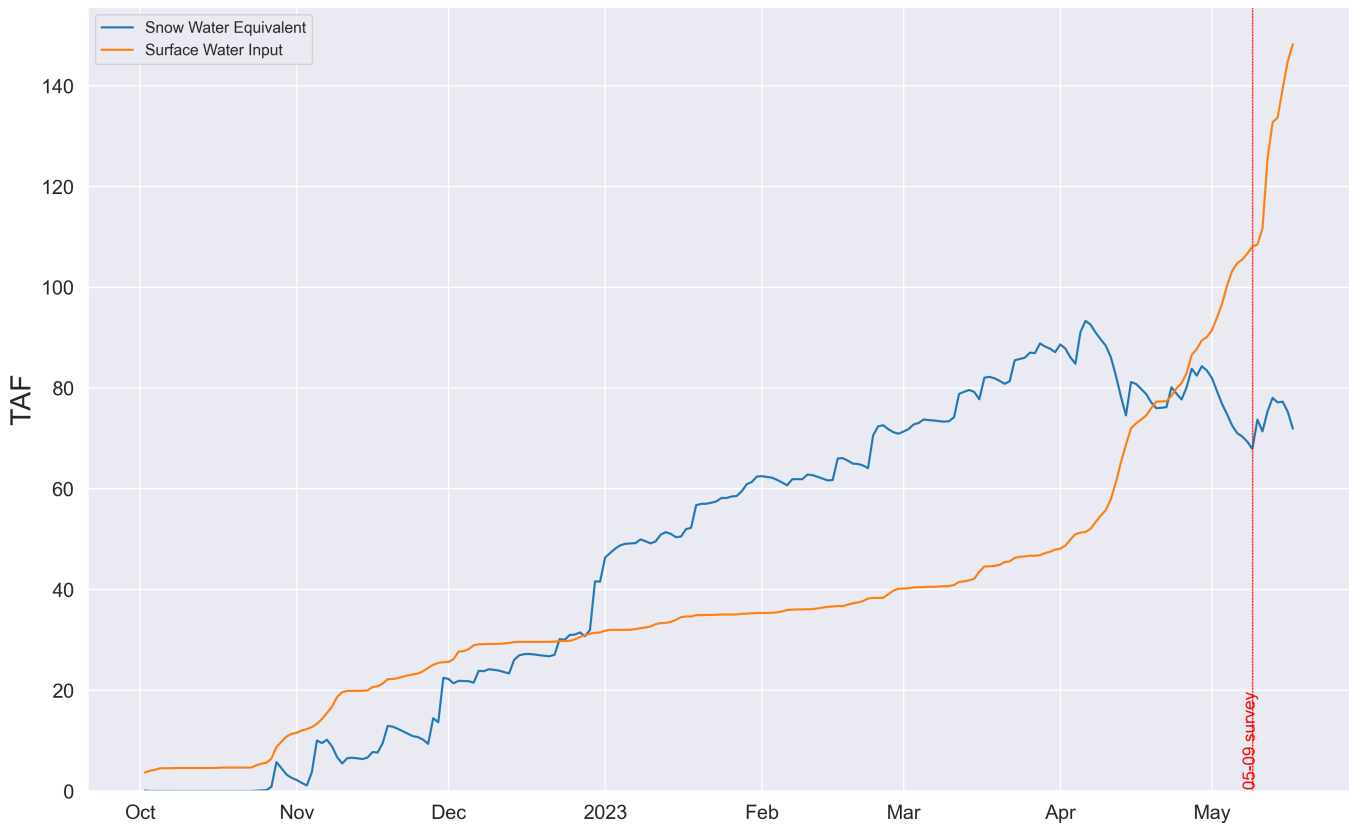


Fig.3 Water Year timeseries. Vertical lines indicated ASO survey dates.

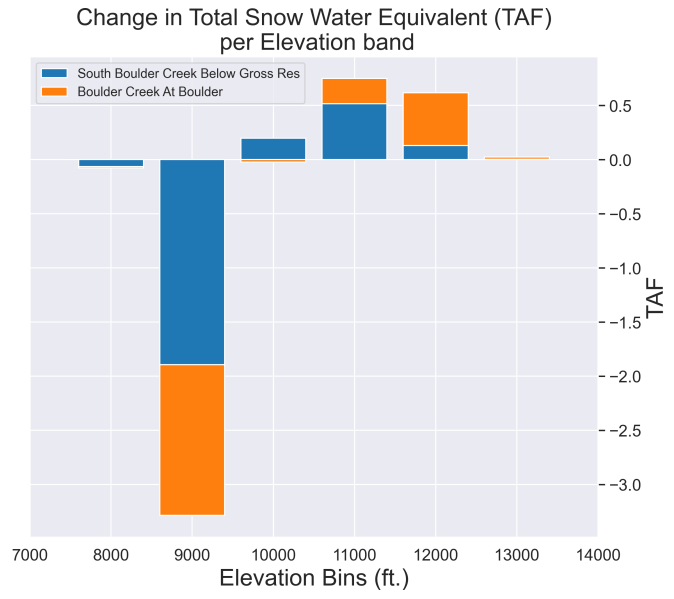
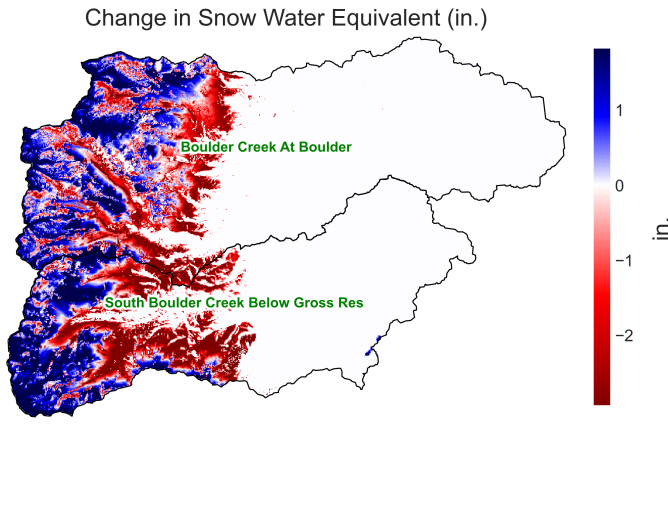


Fig.4 Change in Snow Water Equivalent from 2023-05-09 to 2023-05-16

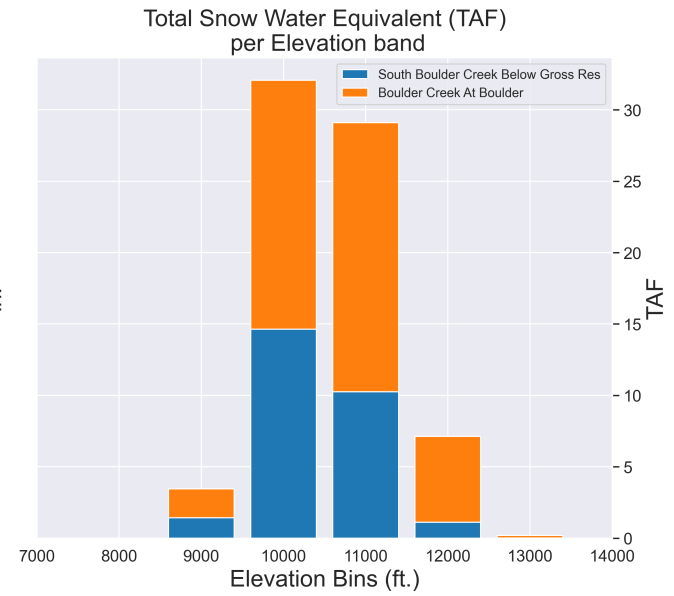
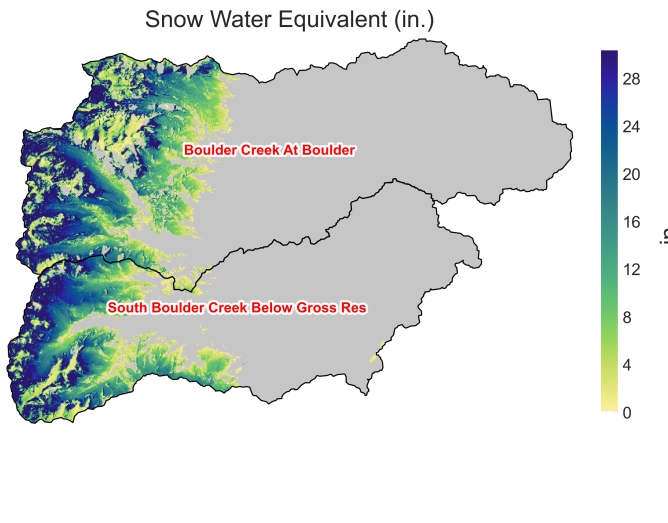


Fig.5 Snow Water Equivalent as of 2023-05-16

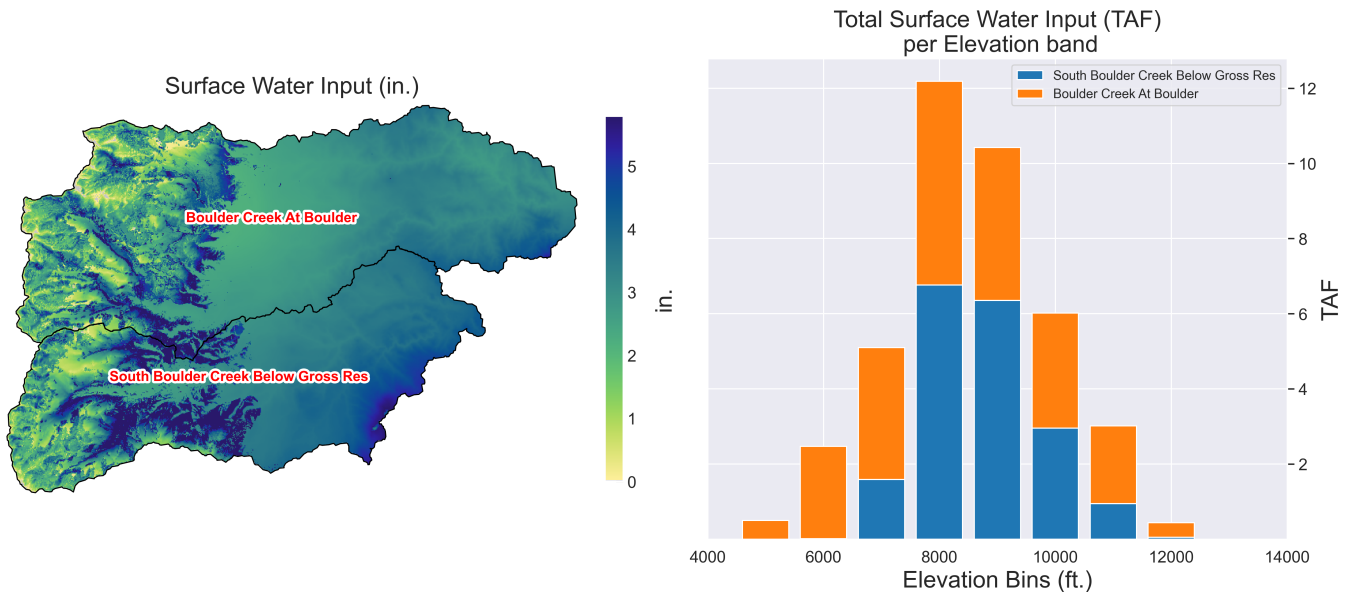


Fig.6 Accumulated Surface Water Input from 2023-05-09 to 2023-05-16

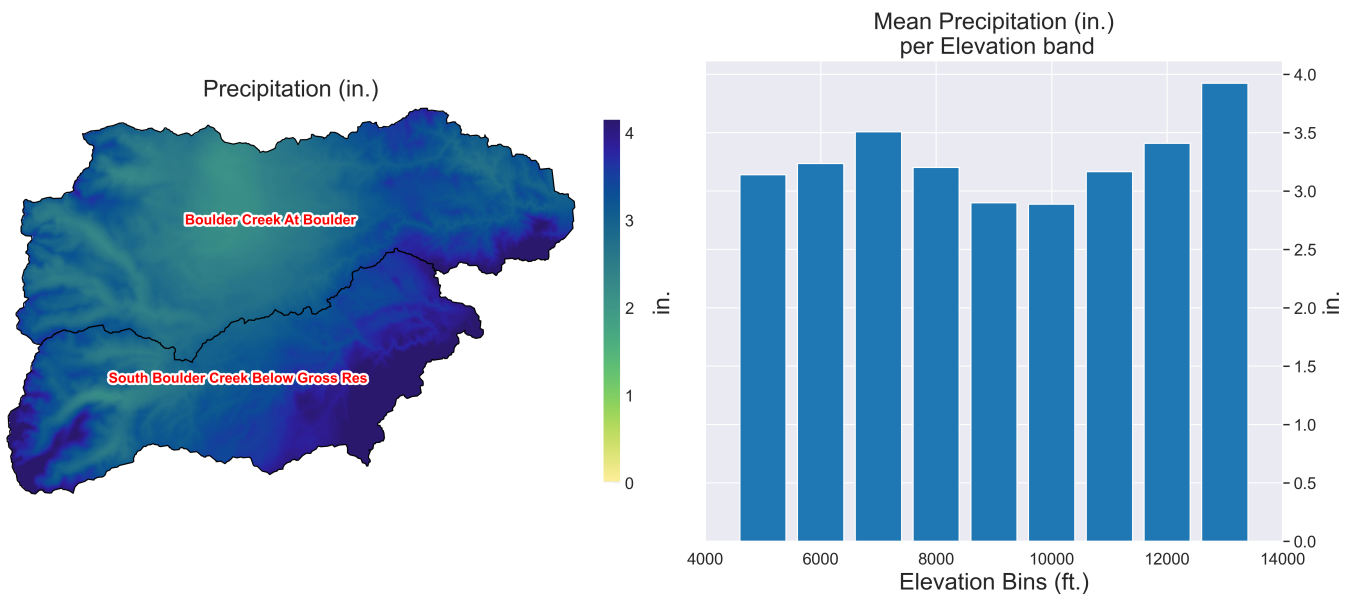


Fig.7 Accumulated Precipitation from 2023-05-09 to 2023-05-16. Precipitation fields are locally interpolated using SMRF with underlying data from HRRR.

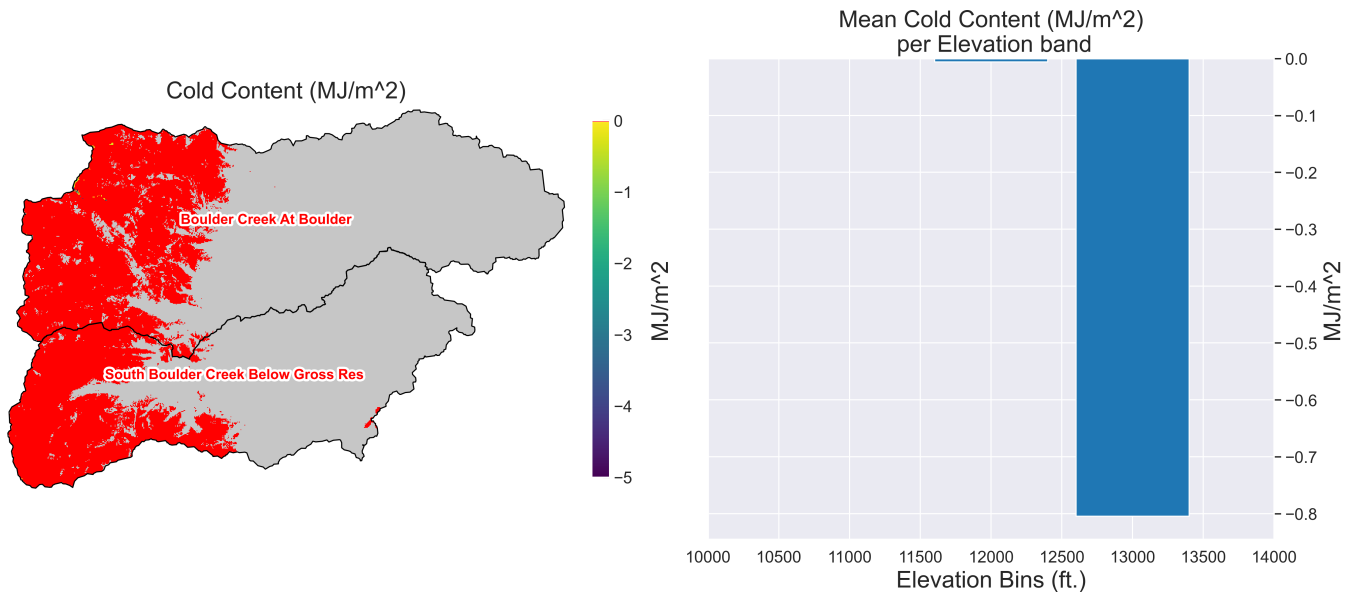


Fig.8 Cold Content as of 2023-05-16

Very little cold content remains in the Boulder Creek basin. The remaining un-ripe snow exists only above 11805 ft., and represents approximately 0.28% of the basin SWE.

# BOULDER CREEK RIVER BASIN MAY 16, 2023 MODELING REPORT

Model to station comparisons are a comparison of 50 meter cells to a point within the basin. Some differences are expected when comparing modeled and measured snowpack behavior at these different spatial scales. ASO 3m snow depth measurements at each station are indicated by the red '+' symbols. Absence of these symbols indicates that the station location or data quality are suspect, and they were not used in the ASO survey validation and report.

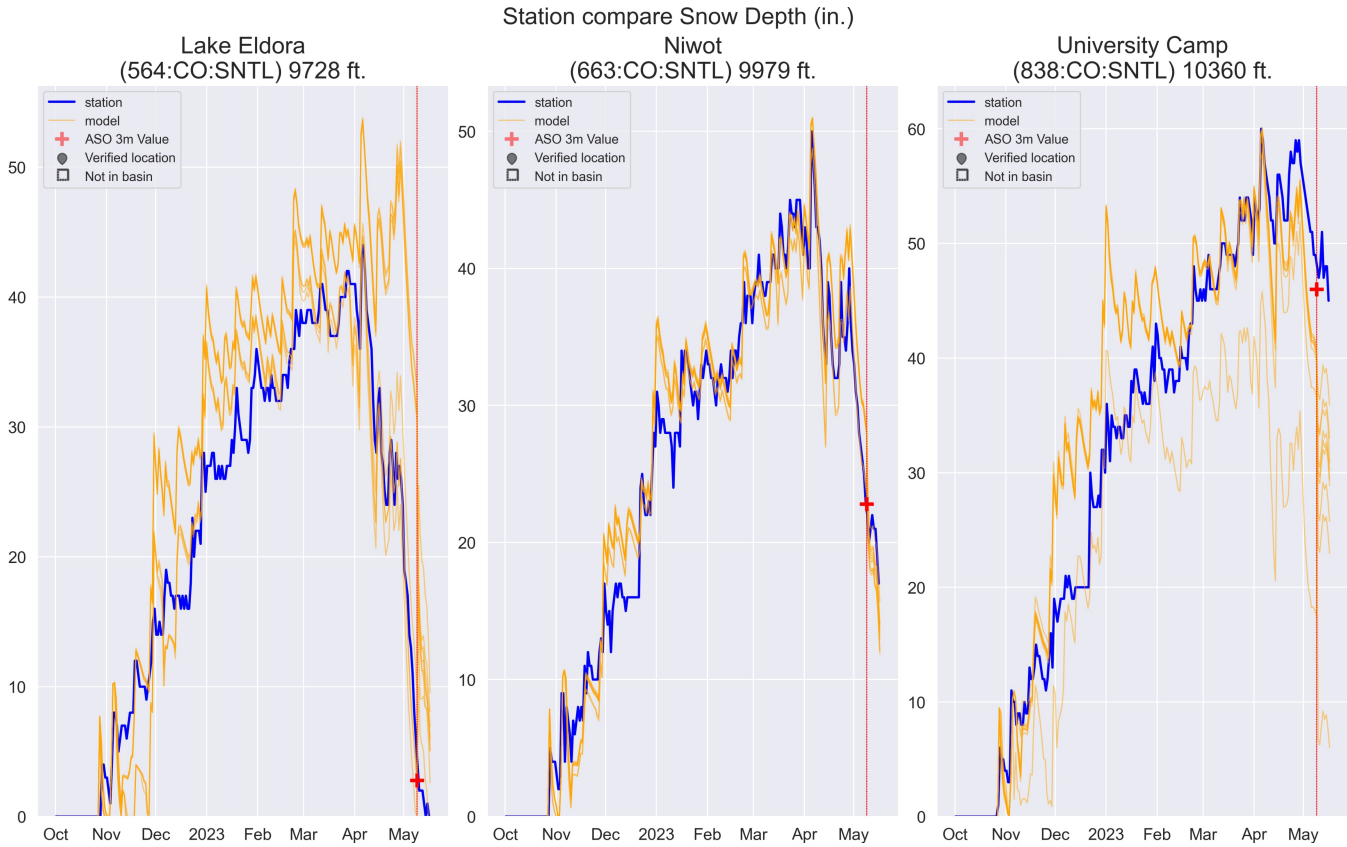


Fig.9 Comparison of modeled and measured Snow Depth. Comparisons of model pixels to measured station data are performed with the 9 nearest model pixels to give a more spatially complete view of model behavior.

# BOULDER CREEK RIVER BASIN MAY 16, 2023 MODELING REPORT

## Model Description

Modeled data is generated using the Automated Water Supply Model (AWSM). Underlying forcing data is sourced from the High Resolution Rapid Refresh model (HRRR). AWSM simulates the snowpack state using the physically based, distributed energy and mass balance snow model, iSnoBal.

For more information on the Airborne Snow Observatories Inc. visit [airbornesnowobservatories.com](http://airbornesnowobservatories.com).

More information about M3 Works can be found at [m3works.io](http://m3works.io).

## Additional Details

Total Snow Water Equivalent values (TAF) on 2023-05-16

ELEVATION RANGE	TOTAL	SOUTH BOULDER CREEK BELOW GROSS RES	BOULDER CREEK AT BOULDER
8000 - 8999	0.0	0.0	0.0
9000 - 9999	3.5	1.4	2.0
10000 - 10999	32.1	14.6	17.4
11000 - 11999	29.1	10.2	18.9
12000 - 12999	7.2	1.1	6.0
13000 - 13999	0.2	0.0	0.2

Accumulated Total Surface Water Input values (TAF) from 2023-05-09 to 2023-05-16

ELEVATION RANGE	TOTAL	SOUTH BOULDER CREEK BELOW GROSS RES	BOULDER CREEK AT BOULDER
5000 - 5999	0.5	0.0	0.5
6000 - 6999	2.5	0.0	2.5
7000 - 7999	5.1	1.6	3.5
8000 - 8999	12.2	6.8	5.4
9000 - 9999	10.4	6.4	4.1
10000 - 10999	6.0	3.0	3.1
11000 - 11999	3.0	0.9	2.1
12000 - 12999	0.4	0.1	0.4
13000 - 13999	0.0	0.0	0.0

Change in Total Snow Water Equivalent values (TAF) from 2023-05-09 to 2023-05-16

ELEVATION RANGE	TOTAL	SOUTH BOULDER CREEK BELOW GROSS RES	BOULDER CREEK AT BOULDER
8000 - 8999	-0.1	-0.1	-0.0
9000 - 9999	-3.3	-1.9	-1.4
10000 - 10999	0.2	0.2	-0.0
11000 - 11999	0.8	0.5	0.2
12000 - 12999	0.6	0.1	0.5
13000 - 13999	0.0	0.0	0.0