



Supplement of

Operational water forecast ability of the HRRR-iSnobal combination: an evaluation to adapt into production environments

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5.2 SNOTEL comparison



Figure S1 - SNOTEL snow depth comparison for the water years 2020 (left) and 2021 (right). The range for HRRR-iSnobal values represents the chosen 2x2 grid around the SNOTEL site. ASO only surveyed the area once in 2020 around the Butte SNOTEL site.



5 Figure S2 – Differences between HRRR-iSnobal simulated mean snow depths (2x2 grid around the sites) to SNOTEL observed across all simulated years (2018 - 2021). The orange dashed lines are marking the peak snow depth measured at the sites.

Table ST1 – Overview of snow depth Mean Difference (MD) between HRRR-iSnobal and SNOTEL sites per simulated year. The MD was calculated from the 2x2 grid around the sites and categorized by accumulation (Until peak SWE) and ablation (Melt) season. The percentage difference is relative to the measured snow depth at the site.

		2018		2019		2020		2021	
	Mean Difference	(m)		(m)		(m)		(m)	
Butte	Until peak SWE	0.05	12%	-0.01	-2%	-0.09	-16%	-0.02	-4%
	Melt	0.11	27%	0.11	13%	-0.04	-6%	0.13	25%
Schofield Pass	Until peak SWE	0.01	1%	-0.18	-15%	-0.21	-21%	-0.03	-3%
	Melt	0.15	19%	-0.23	-17%	-0.27	-46%	-0.04	-5%
Upper Taylor	Until peak SWE	0.27	37%	0.22	23%	0.22	28%	0.14	21%
	Melt	0.54	72%	0.6	46%	0.32	51%	0.38	57%

Table ST2 – Overview of HRRR-iSnobal and ASO differences at SNOTEL site locations. The maximum (max) and minimum (min) values for HRRR-iSnobal and ASO are from the 2x2 grid surrounding the SNOTEL site. Values with a dash (-) indicate that no survey data from ASO was available for that location.

		E	arly season fligh	Late season flights		
	Snow depth (m)	2018-03-31	2019-04-07	2020-02-14	2018-05-24	2019-06-10
Butte	SNOTEL	0.76	1.37	0.97	0.00	0.00
	ASO max	0.69	1.25	0.64	0.00	0.75
	ASO min	0.32	0.98	0.49	0.00	0.00
	HRRR-iSnobal max	0.89	1.41	0.79	0.00	0.41
	HRRR-iSnobal min	0.86	1.37	0.78	0.00	0.37
Schofield Pass	SNOTEL	1.70	2.69	-	0.23	1.50
	ASO max	1.75	2.76	-	0.74	1.68
	ASO min	1.44	2.36	-	0.49	1.25
	HRRR-iSnobal max	1.78	2.37	-	0.77	1.61
	HRRR-iSnobal min	1.74	2.26	-	0.43	0.84
Upper Taylor	SNOTEL	-	1.45	-	0.00	0.13
	ASO max	-	1.51	-	0.01	0.03
	ASO min	-	1.40	-	0.00	0.00
	HRRR-iSnobal max	-	2.06	-	0.85	1.68
	HRRR-iSnobal min	-	1.61	-	0.35	0.84

5.3 ASO comparison



Figure S3 – Spatial comparison (left) and difference distribution per HRU (right) of simulated HRRR-iSnobal against observed ASO lidar-based snow depths for the single survey in 2020. ASO values were subtracted per grid cell from HRRR-iSnobal (50 m resolution).

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Figure S4 – Daily precipitation differences for SNOW-17 and HRRR categorized by HRU across all comparison years (2018 – 2021). The HRRR values were divided by the SNOW-17 values to get to the daily percentage differences.





6.4 Improvements to iSnobal

Figure S5 – Comparison of the SMRF distributed total annual HRRR precipitation amounts per pixel categorized by aspect across the years. Mean values are shown with the red diamond, while the dashed lines are the median values.