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On the value of satellite remote sensing to reduce uncertainties of regional simulations of the Colorado River

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	Baseline			Forcing-Adj			Veg-Adj			Snow-Adj		
	CC (-)	**RMSE (°C)**	**Bias (°C)**	**CC (-)**	**RMSE (°C)**	**Bias (°C)**	**CC (-)**	**RMSE (°C)**	**Bias (°C)**	**CC (-)**	**RMSE (°C)**	**Bias (°C)**
Green	0.93	7.36	1.08	0.93	7.44	2.66	0.94	6.12	0.54	0.94	6.37	0.25
	0.86	5.85	-0.62	0.86	5.7	1.1	0.87	5.58	0.99	0.87	5.56	0.67
Upper Colorado	0.91	6.84	1.24	0.91	7.12	2.9	0.92	5.94	1.01	0.92	6.53	0.27
	0.86	5.38	-0.46	0.87	5.37	1.4	0.87	5.29	1.31	0.87	5.25	0.48
Glen Canyon	0.93	7.2	2.37	0.93	7.39	3.15	0.93	6.2	1.29	0.93	6.39	1.31
	0.89	4.83	-0.11	0.89	4.75	0.16	0.9	4.62	0.02	0.9	4.63	-0.07
San Juan	0.92	6.92	1.75	0.92	7.13	2.61	0.93	5.89	0.53	0.92	6.19	0.47
	0.87	5.09	0.27	0.87	4.98	0.62	0.87	4.83	0.46	0.88	4.85	0.27
Grand Canyon	0.92	6.69	1.99	0.92	6.83	2.57	0.93	5.68	0.39	0.93	5.87	-0.41
	0.89	4.77	-1.14	0.89	4.37	-0.18	0.9	4.2	-0.22	0.9	4.15	-0.27
Little Colorado	0.9	7.35	2.04	0.9	7.53	2.78	0.91	6.28	0.4	0.9	6.59	0.65
	0.87	4.77	0.42	0.87	4.65	0.65	0.88	4.48	0.42	0.88	4.51	0.37
Lower Colorado	0.92	6.01	1.74	0.91	6.2	2.29	0.92	5.39	0.38	0.92	5.54	-0.41
	0.91	4.36	-0.79	0.91	4.08	-0.44	0.91	3.98	-0.52	0.92	3.9	-0.54
Gila	0.89	6.06	1.18	0.89	6.21	1.82	0.9	5.5	0.28	0.89	5.77	-0.11
	0.87	4.88	-1.39	0.88	4.54	-0.87	0.88	4.46	-0.93	0.88	4.43	-1

Table S1. CC, RMSE, and Bias of LST of each subbasin for each adjustment step. Results for nighttime are shaded in grey.

Table S2. Structural Similarity Index Measure (SSIM), Spatial Efficiency metric (SPAEF; Demirel et al., 2018), RMSE, and Bias computed for the long-term climatology of simulated and MODIS LST fields over 2003-2018.

	Baseline	**Forcing-adj**	**Veg-adj**	**Snow-adj**
SSIM Daytime	0.881	0.878	0.927	0.927
SSIM Nighttime	0.662	0.703	0.698	0.701
SPAEF Daytime	0.763	0.798	0.925	0.930
SPAEF Nighttime	0.746	0.796	0.806	0.835
RMSE Daytime	2.701	3.256	1.624	1.597
RMSE Nighttime	2.394	1.965	1.958	1.952
Bias Daytime	1.552	2.493	0.538	0.331
Bias Nighttime	-0.607	0.242	0.135	-0.076

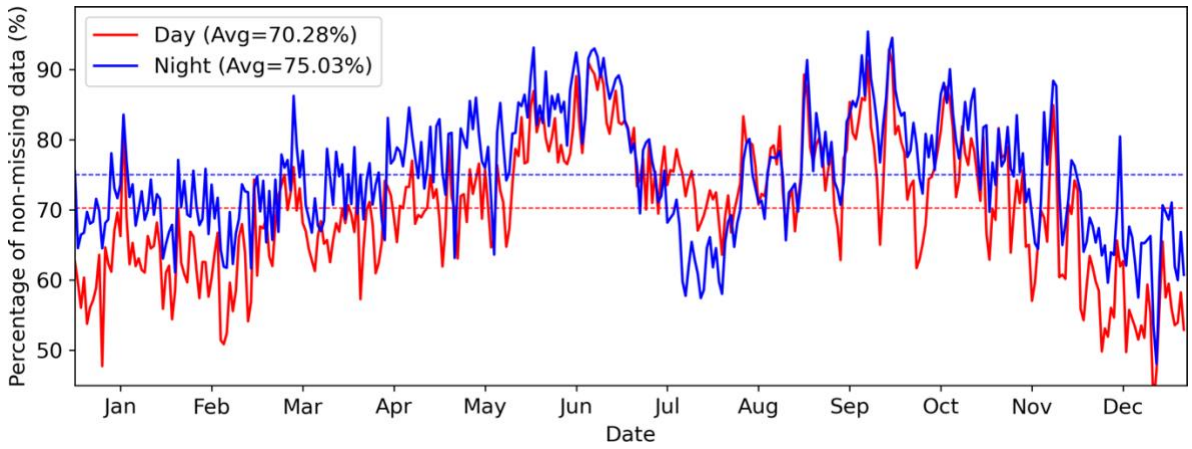

Figure S1. Multiyear daily mean of percentage of pixels with non-missing records of LST from MODIS for daytime and nighttime in the CRB. Overall means shown with dashed horizontal lines.

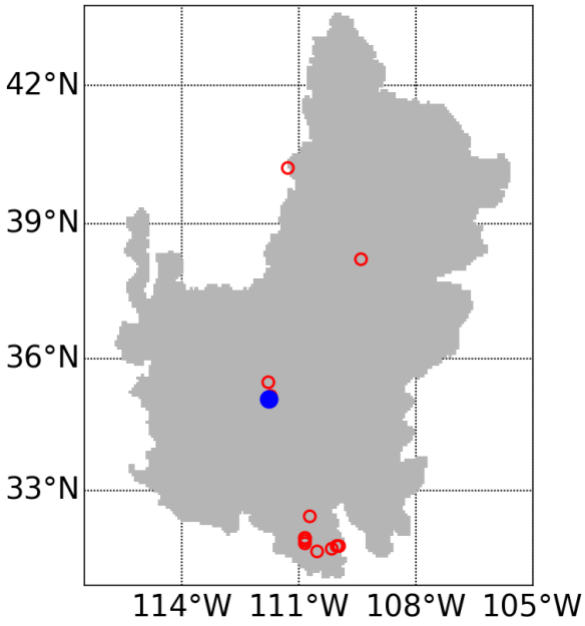

Figure S2. Locations of 14 eddy covariance stations with valid records longer than 300 days during 2003-2018. The location of station Fuf is marked in blue.

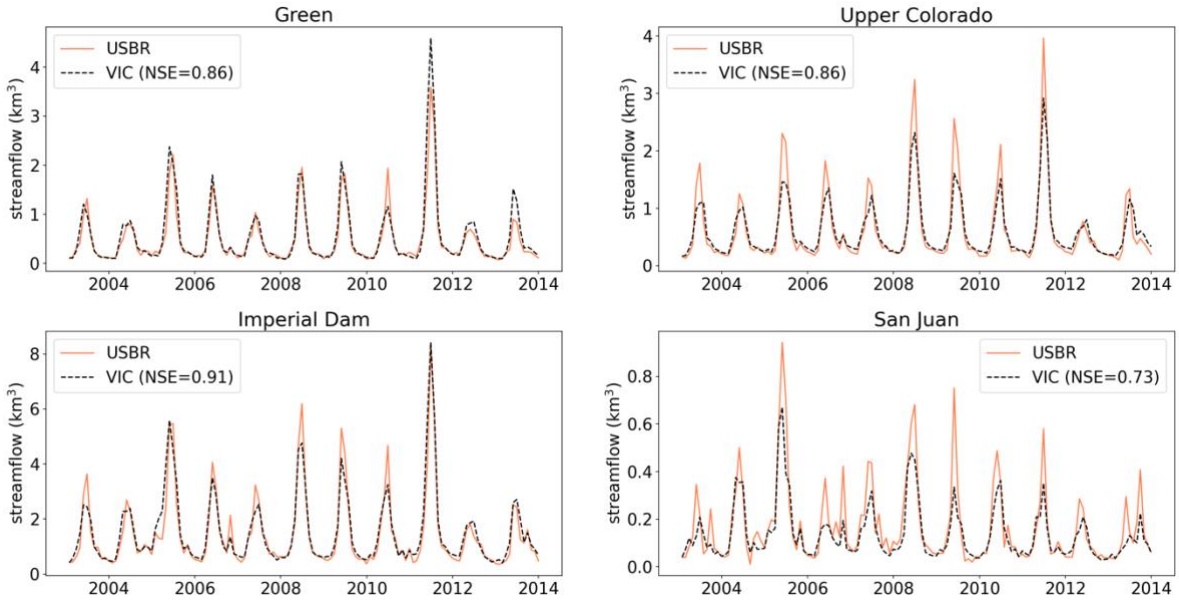

Figure S3. Time series of monthly runoff volume simulated by VIC (black) and the USBR reconstructed naturalized flow (orange) at three subbasins of Fig. 1b and the Imperial Dam (USGS 09429490). Nash-Sutcliffe Efficiency (NSE) is reported in the legend.

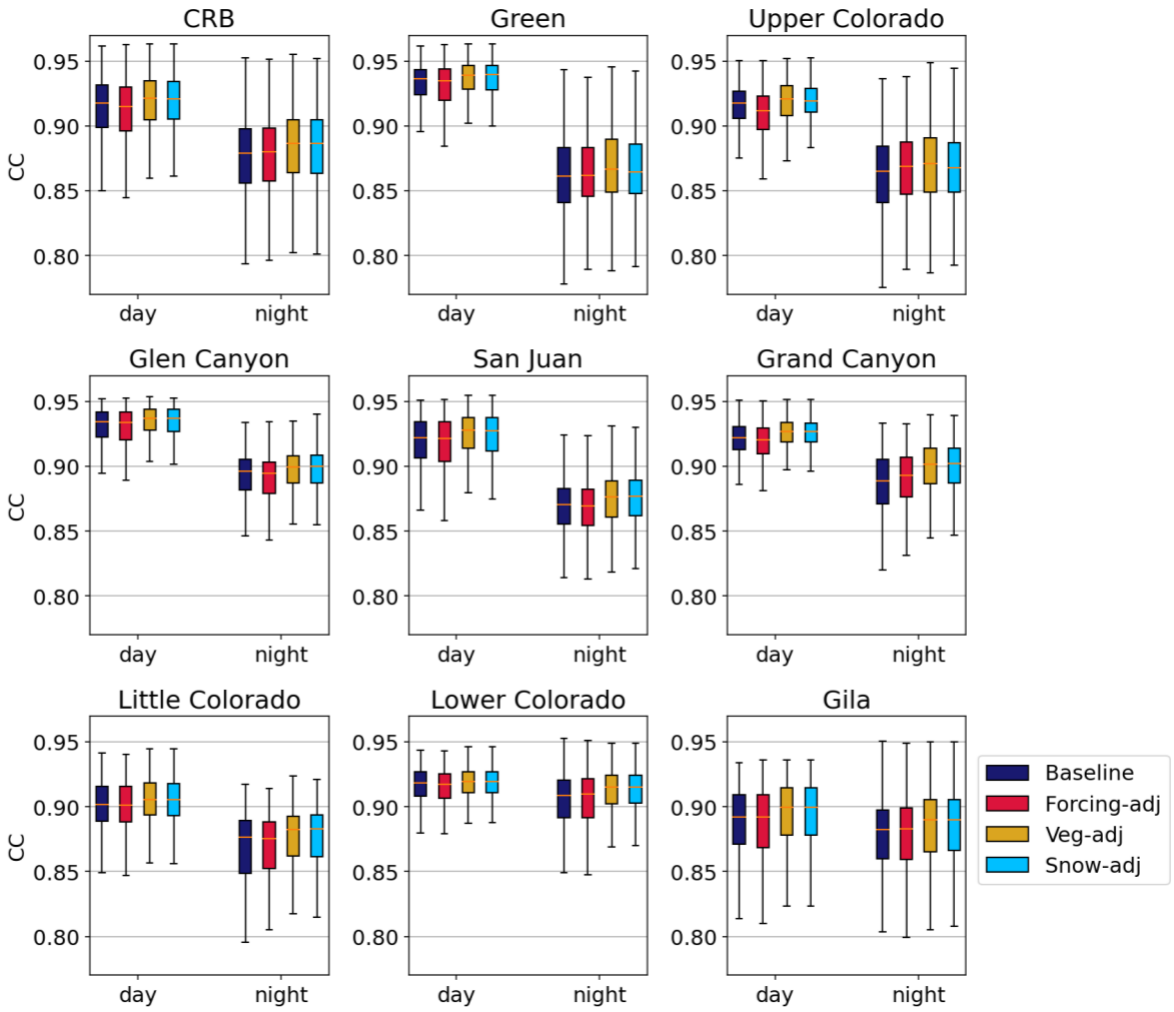

Figure S4. Boxplots of CC derived by comparing VIC and MODIS daytime and nighttime LST at grid cells of the CRB and each subbasin. Different colors indicate the different adjustment steps.

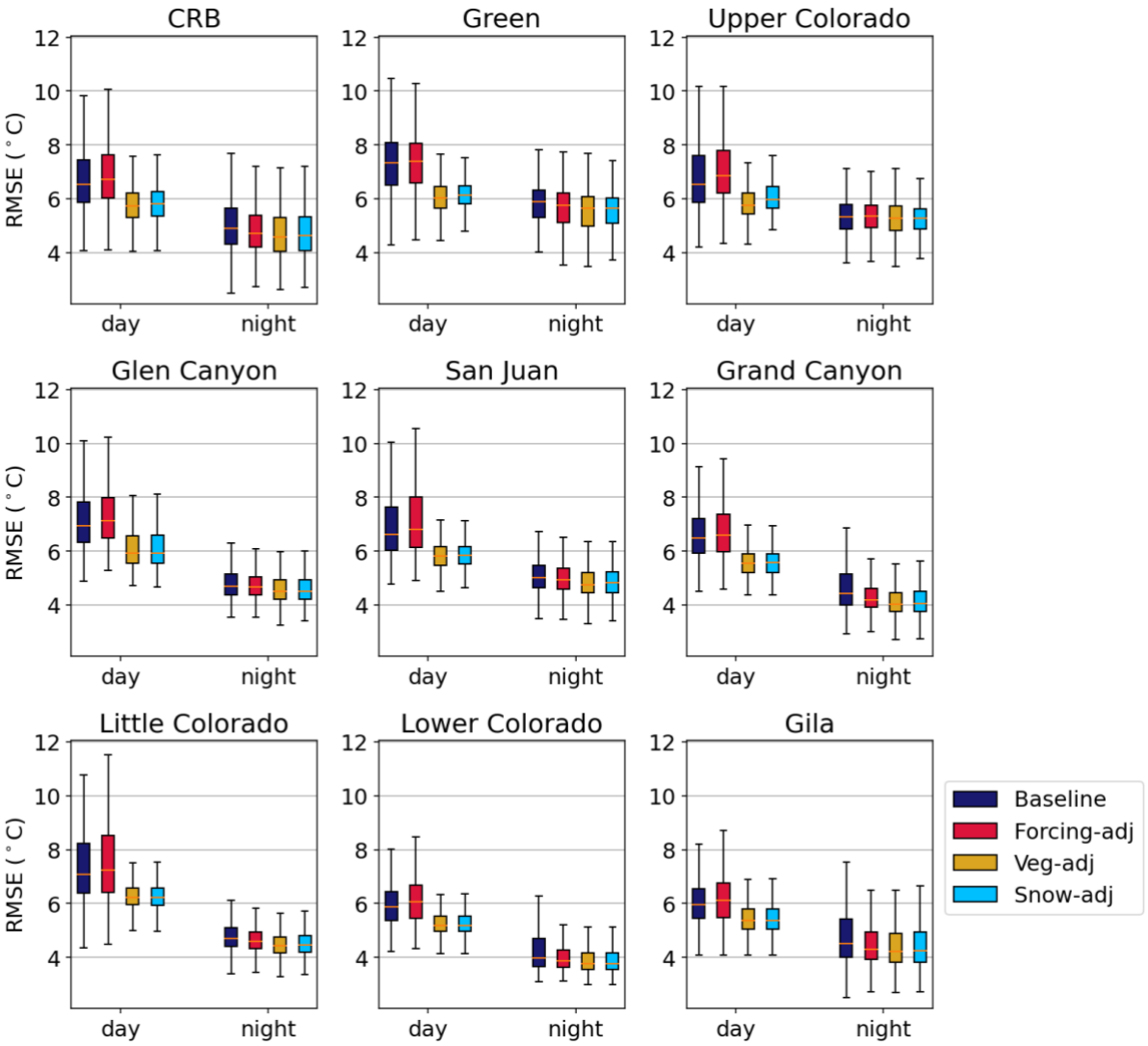

Figure S5. Same as S4 but for RMSE.

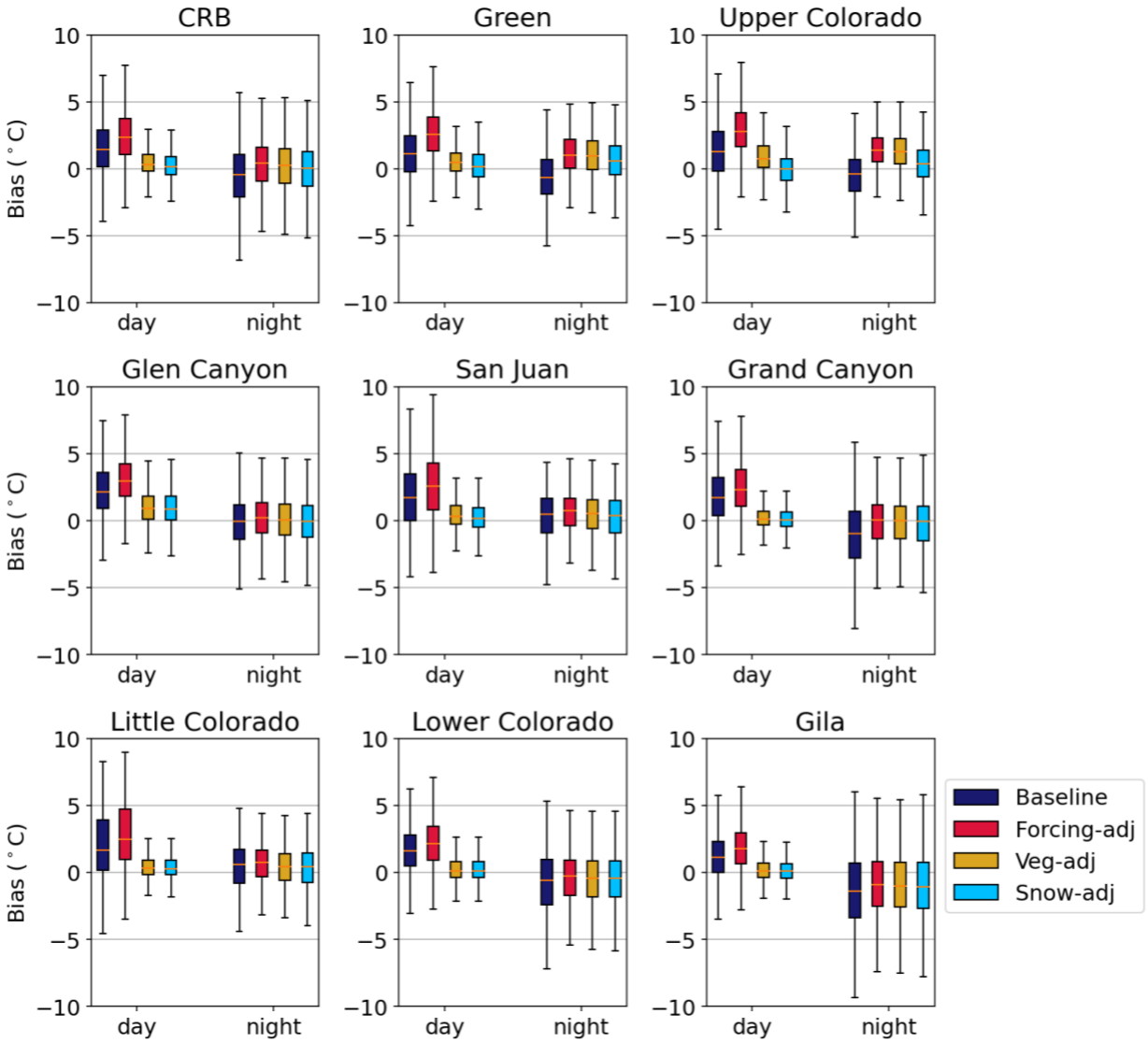

Figure S6. Same as S4 but for Bias.

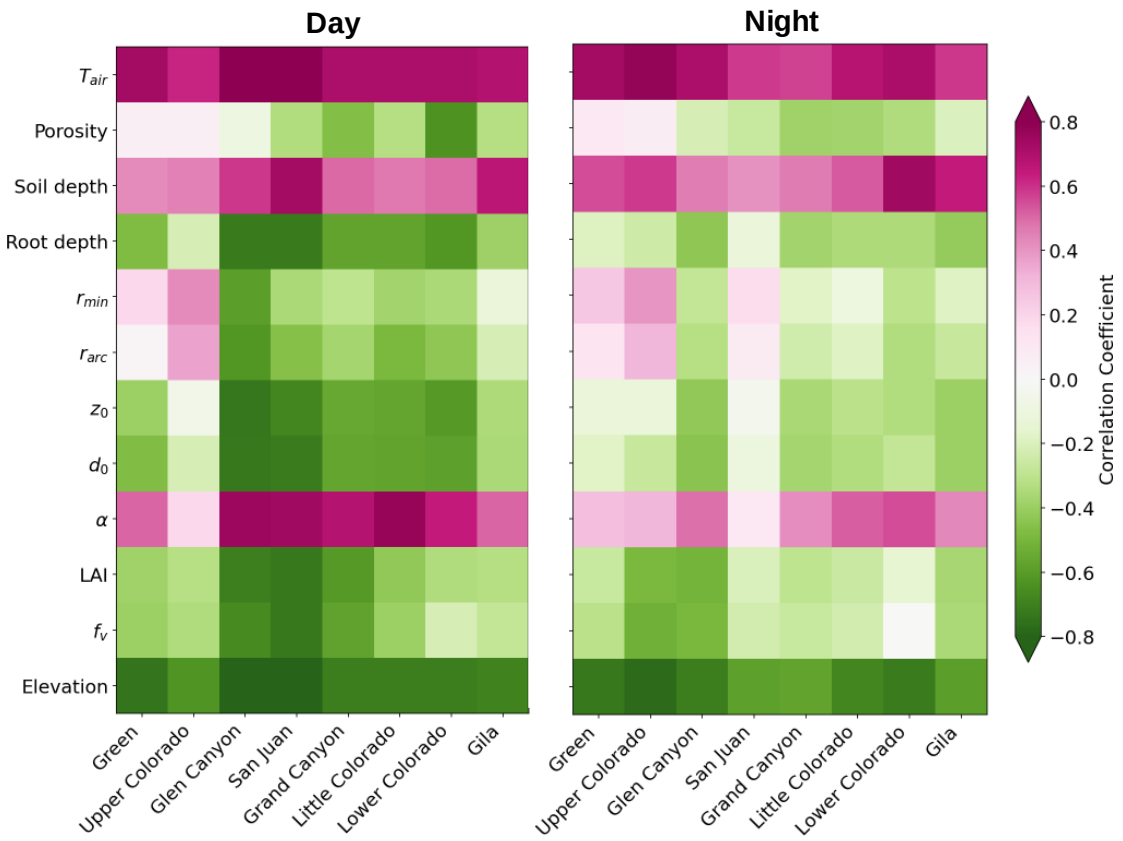

Figure S7. Heatmaps showing the correlation coefficient between T_{air} or key soil and vegetation parameters involved in the energy balance with CC of LST_M and LST_V at each subbasin (left: daytime, right: nighttime) for the baseline simulation.

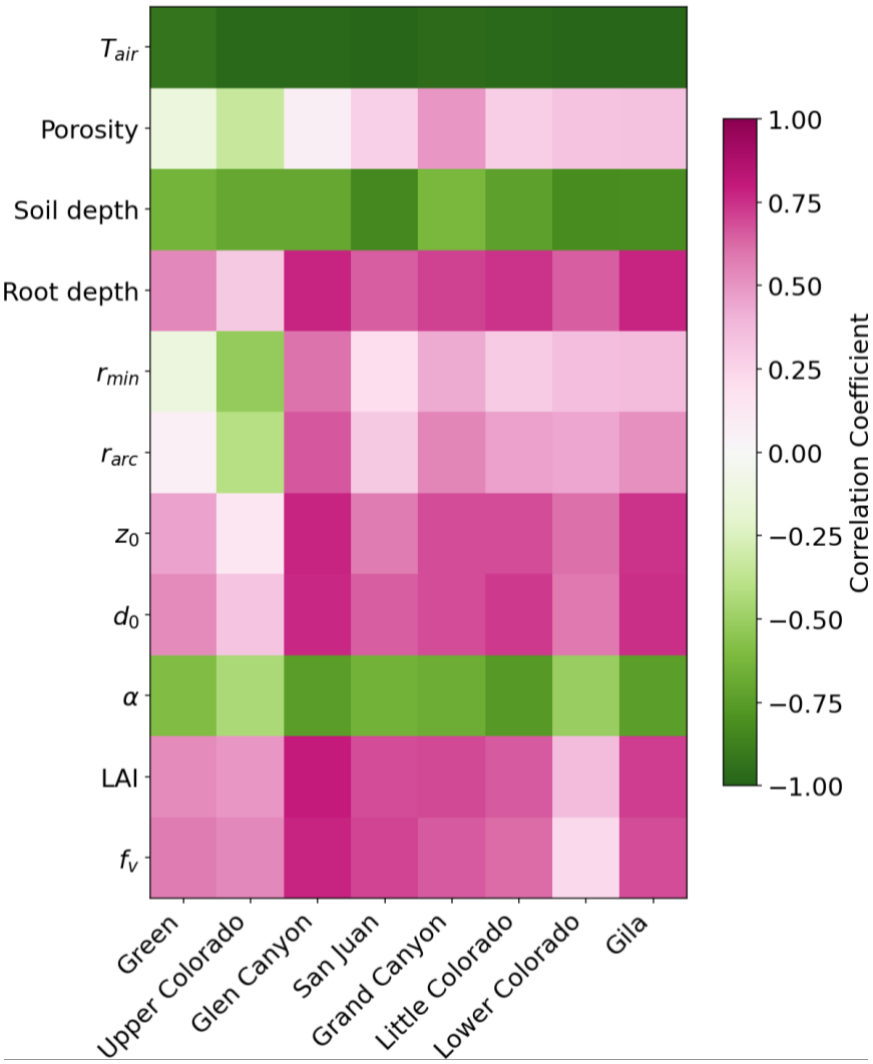

Figure S8. Heatmaps showing the CC between key variables involved in the energy balance and elevations at each subbasin for the baseline simulation.

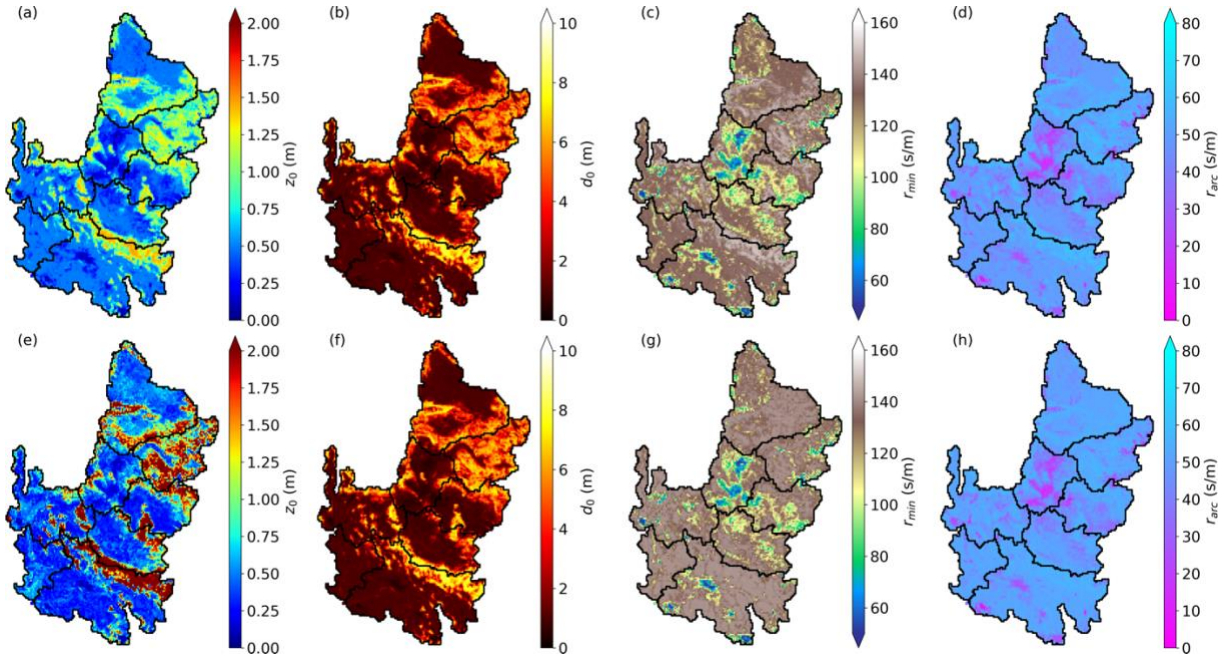

Figure S9. Spatial maps of pixel-averaged vegetation roughness height (z_0), displacement height (d_0), minimal stomatal resistance (r_{min}), and canopy architectural resistance (r_{arc}) for (a to d) baseline and (e to h) Veg-adj simulations.

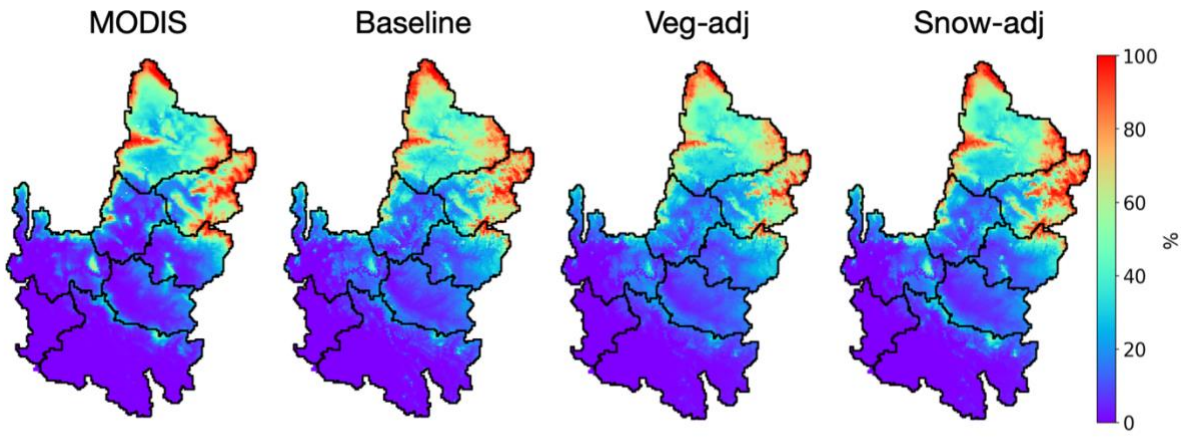

Figure S10. Long-term climatology of monthly snow cover (in %) derived from MODIS observations and VIC simulations in the snow season (November-May) over 2003-2018 for three calibration step.

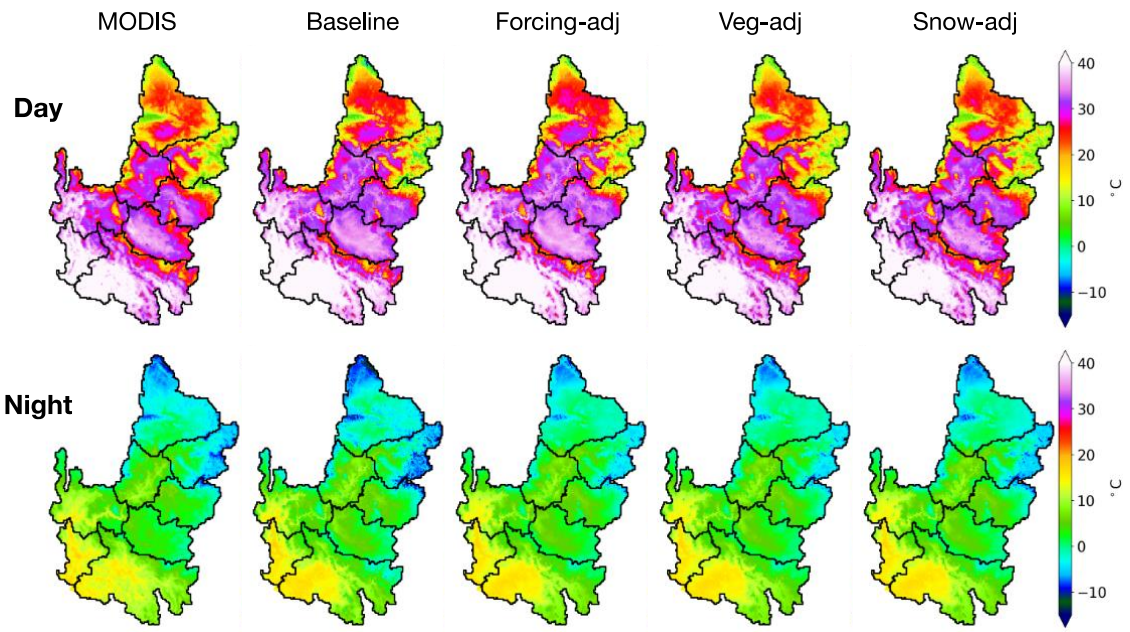

Figure S11. Long-term climatology of LST over 2003-2018 derived from MODIS observations and VIC simulations for each calibration step. Top (bottom) row is the daytime (nighttime) LST.