

Evaluating uncertainties in modelling the hydrology of the Fraser River Basin, British Columbia

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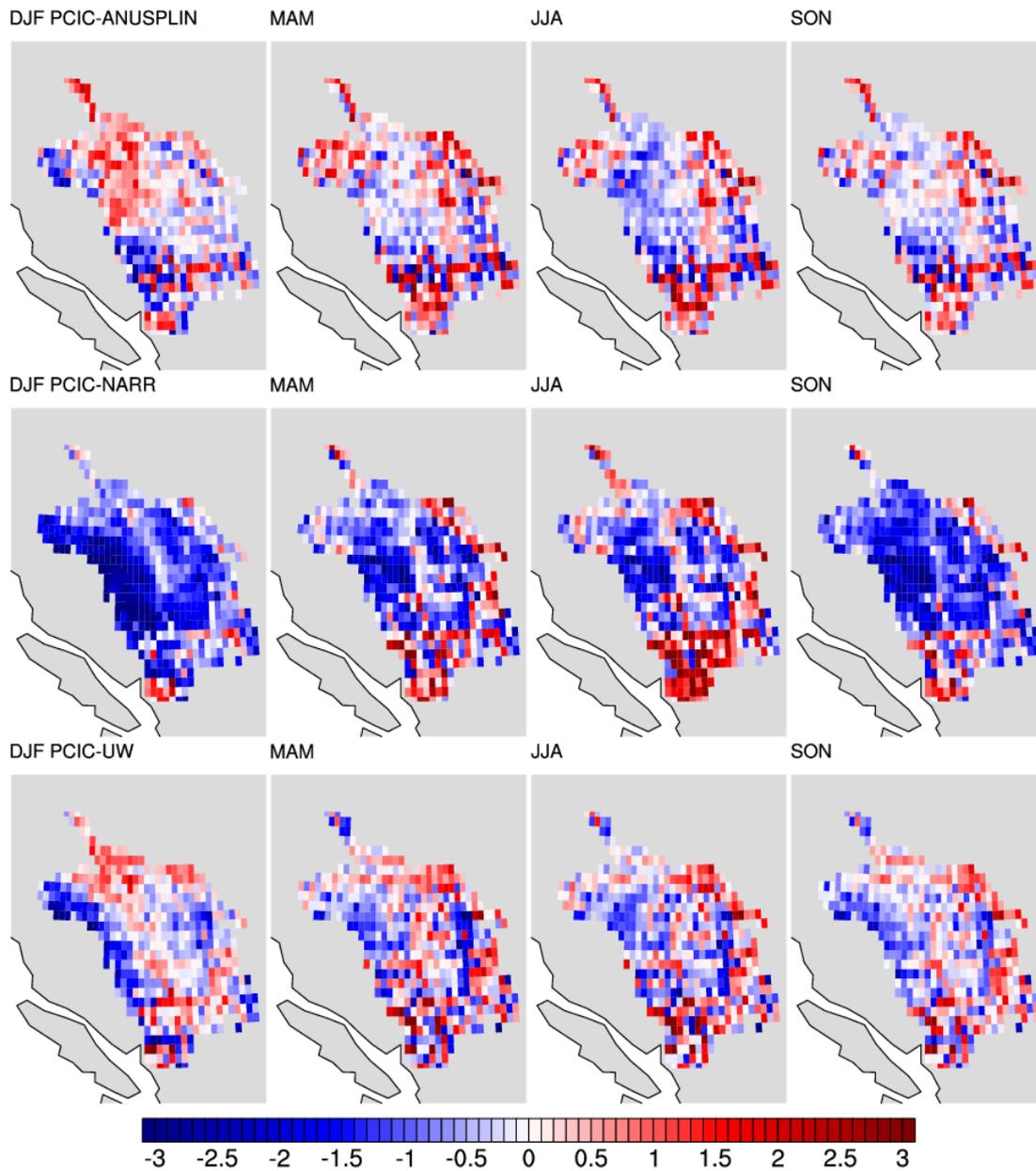
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Supplementary material

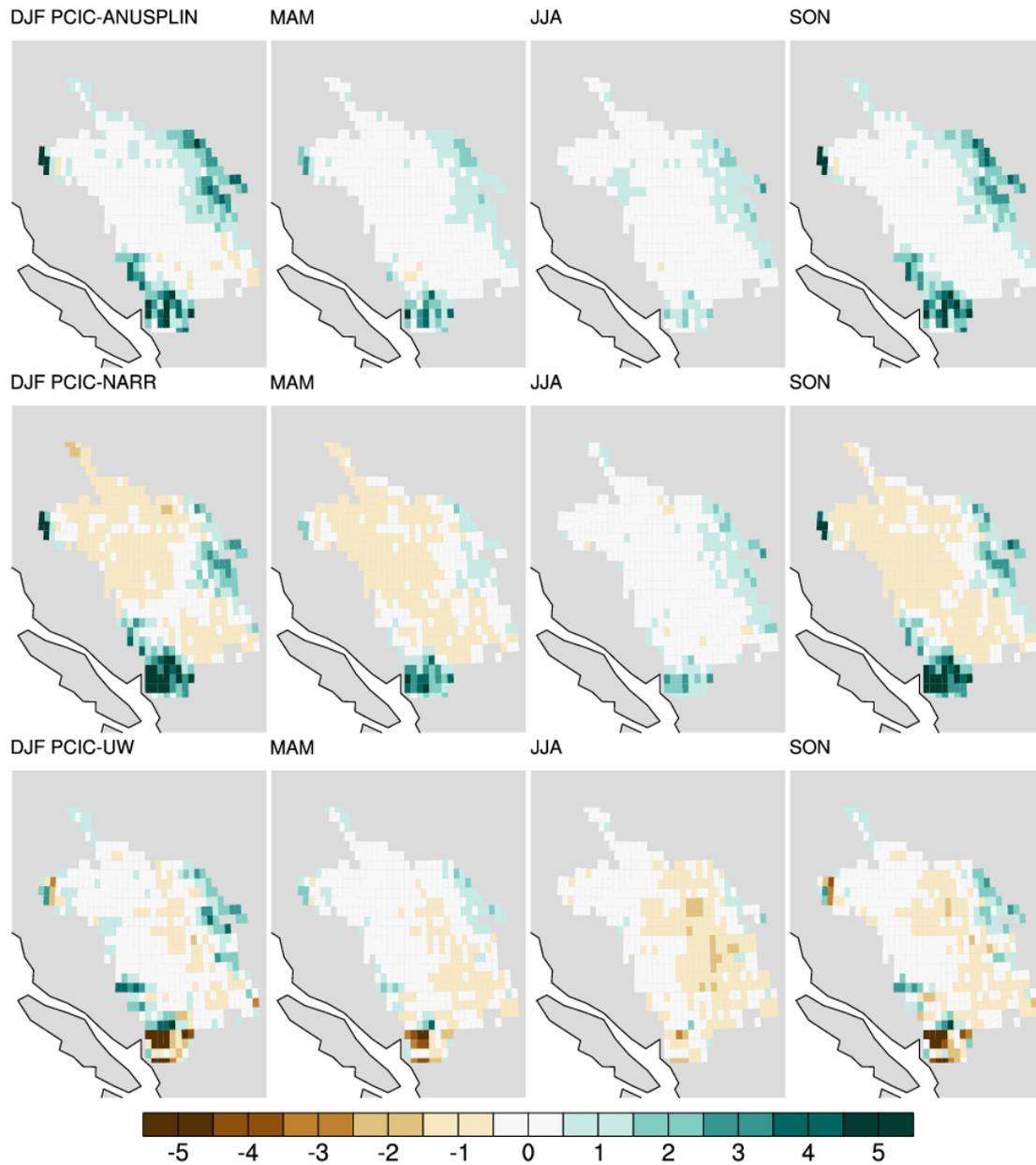
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Supplementary Table 1: Details of Fraser River main stem at Hope (LF) and major sub-basins within Fraser River Basin. The list includes information of sub-basin abbreviations (in parentheses), mean elevation, gauged area, percentage gauged area relative to LF, and latitude and longitude of the gauge at the outlet of each sub-basin (Déry et al. 2012).

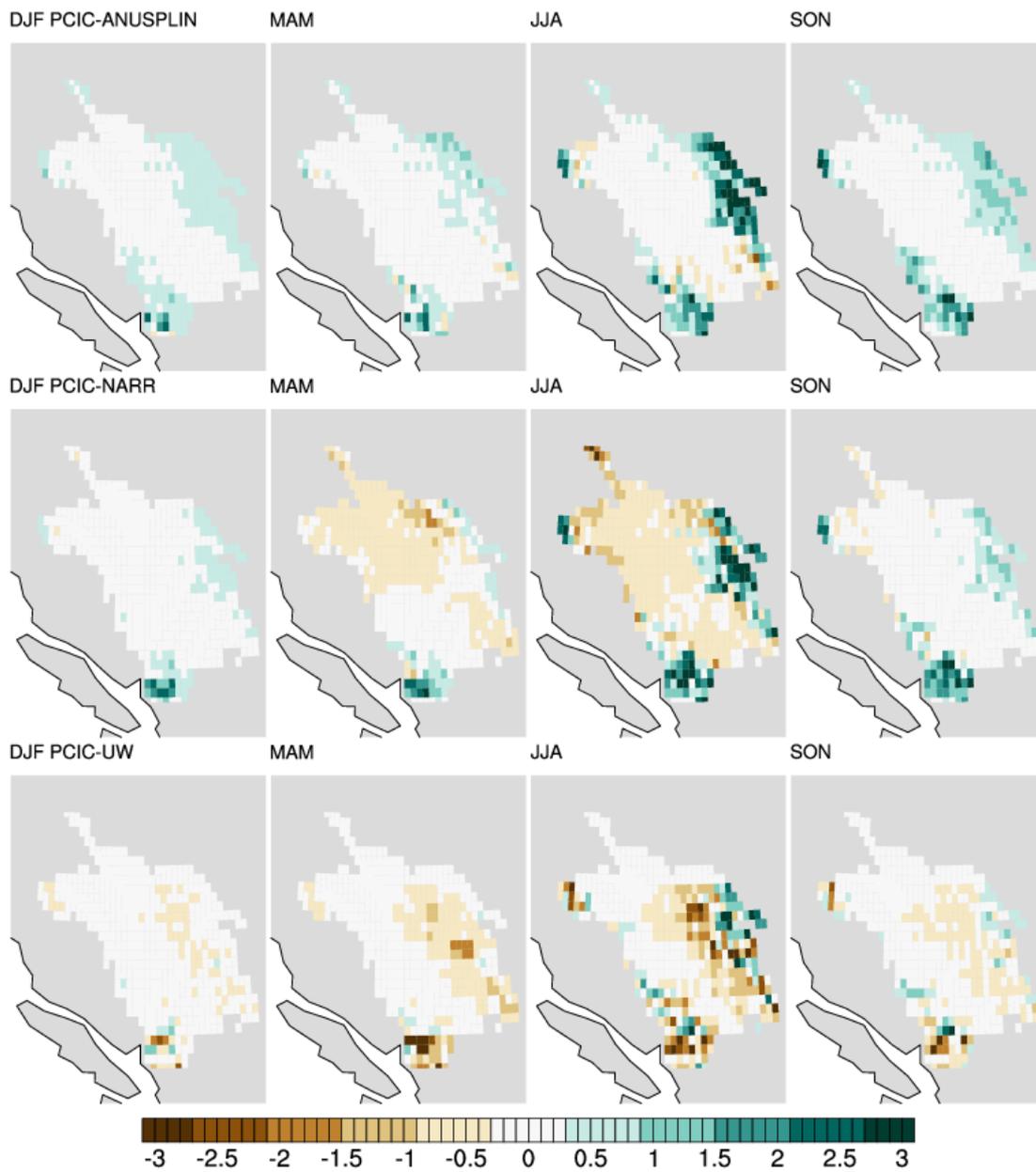
Sub-basin	Mean basin elevation [m]	Gauged area [km²]	Gauged area relative to LF [%]	Latitude (°N)	Longitude (°W)
Fraser-Shelley (UF)	1413	32,400	14.9	54.01	122.62
Stuart (SU)	1097	14,200	6.5	54.42	124.27
Nautley (NA)	1070	6030	2.8	54.08	124.59
Quesnel (QU)	1391	11,500	5.3	52.84	122.22
Chilko (CH)	1756	6940	3.2	52.07	123.54
Thompson-Nicola (TN)	1363	54,900	25.3	50.35	121.39
Total	1356	125,970	58.1	-	-
Fraser at Hope (LF)	-	217,000	100.0	49.38	121.45



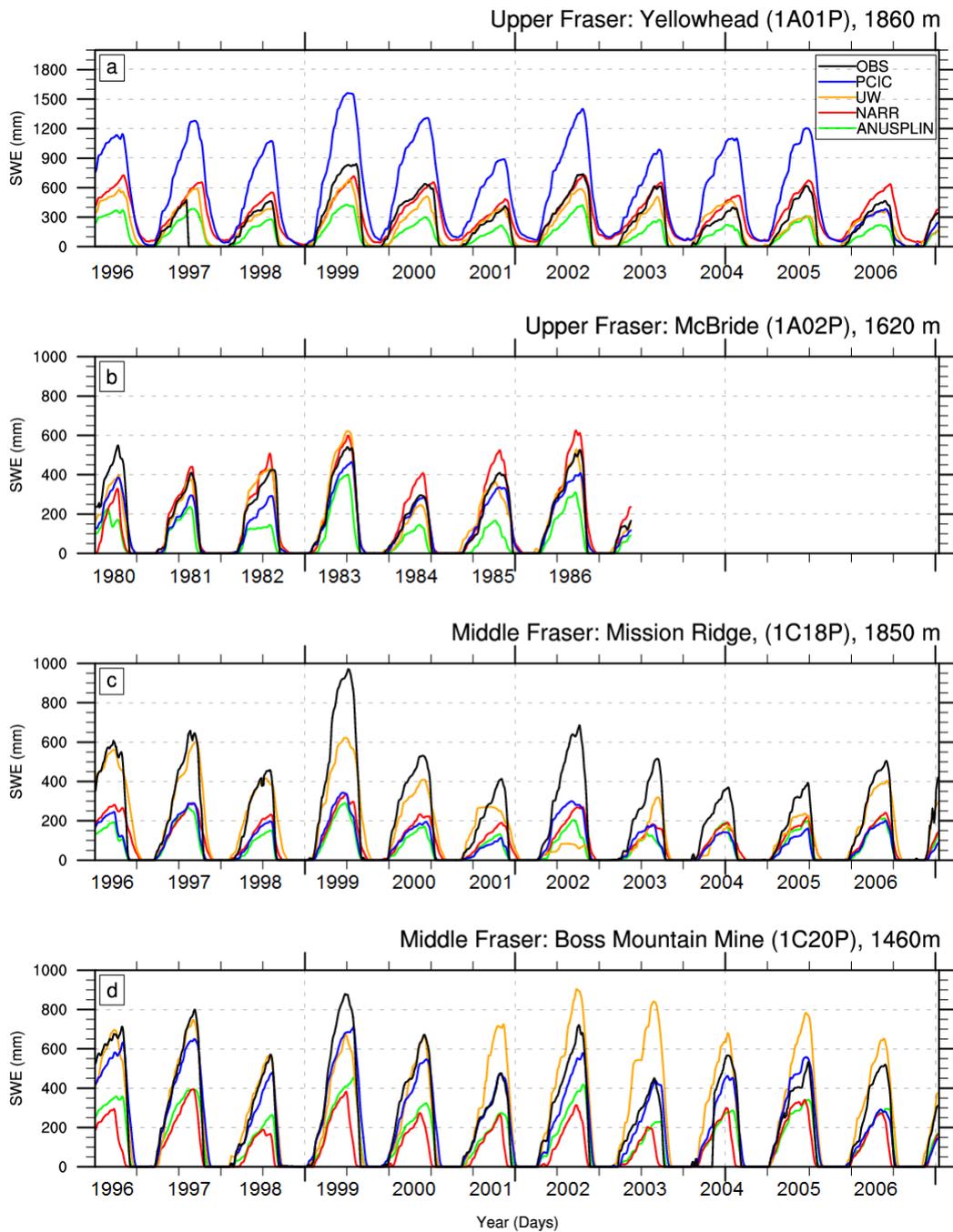
Supplementary Figure 1: Spatial differences of mean air temperature based on PCIC-VIC minus ANUSPLIN-VIC (1st row), NARR -VIC (2nd row) and UW (3rd row) simulations over the water years 1979-2006. DJF, MAM, JJA and SON correspond to winter, spring, summer and autumn seasons respectively. Units are in °C.



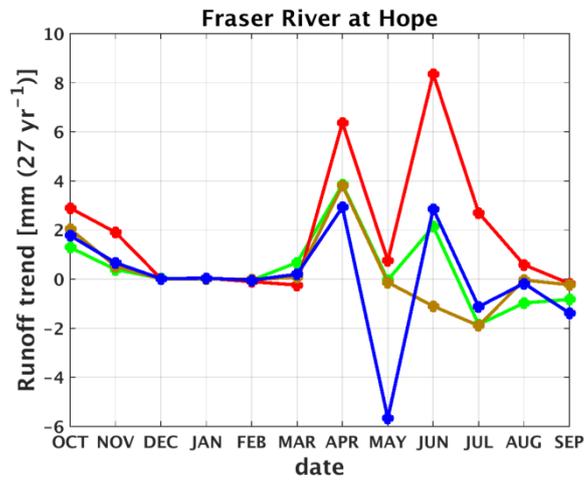
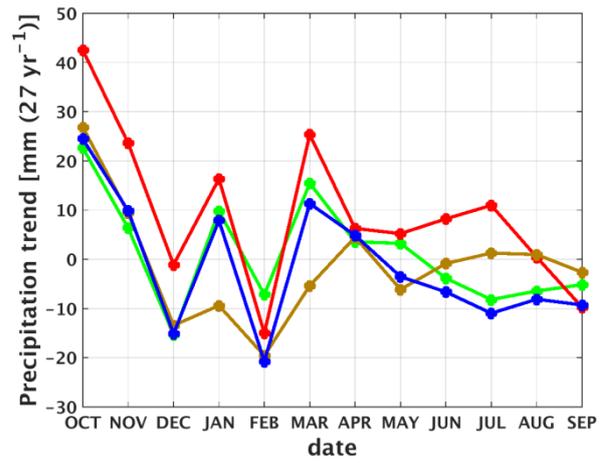
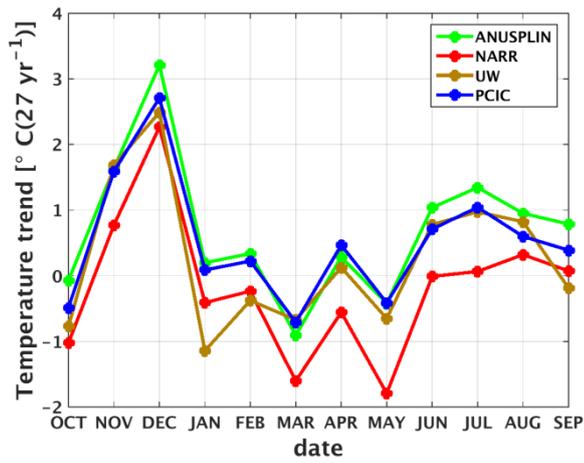
Supplementary Figure 2: Same as Supplementary Figure 1 but for precipitation. Units are in mm/day.



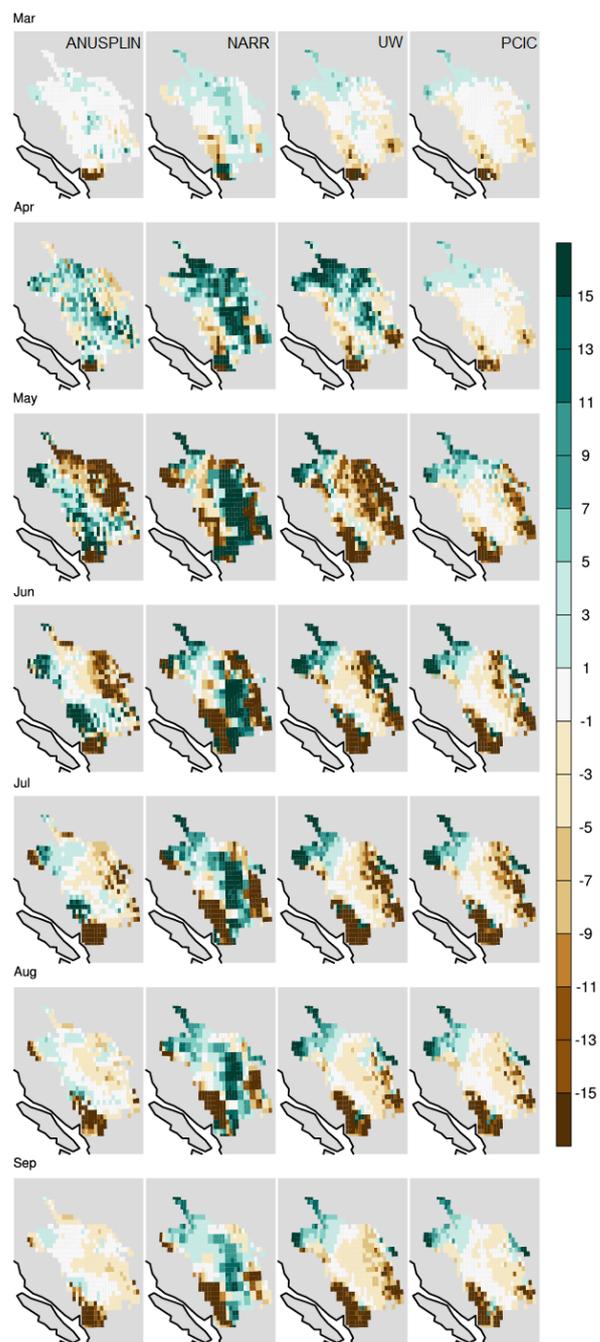
Supplementary Figure 3: Same as Supplementary Figure 1 but for total runoff. Units are in mm/day.



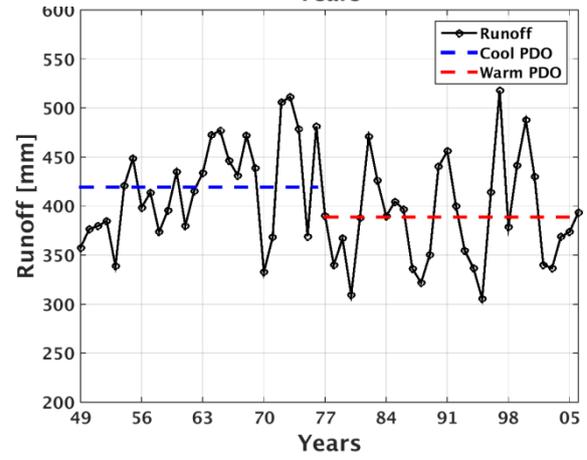
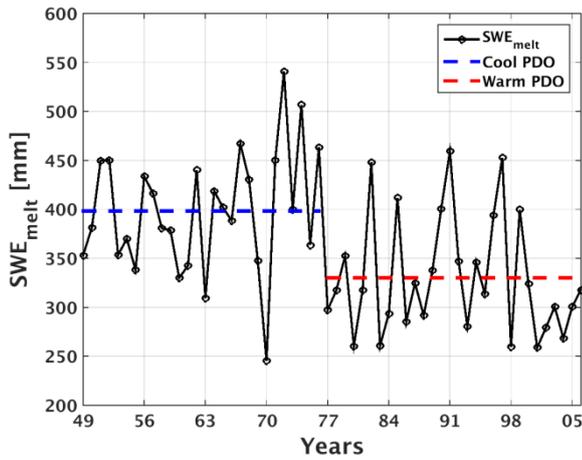
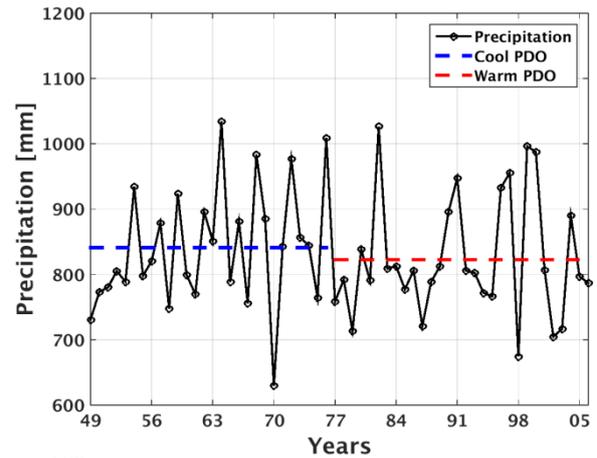
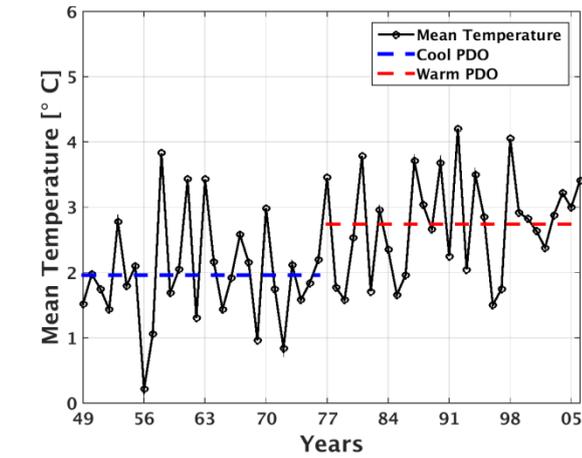
Supplementary Figure 4: Comparison of the ANUSPLIN-VIC, NARR-VIC, UW-VIC and PCIC-VIC simulated daily snow water equivalent (SWE) with the BC snow pillow daily SWE observations in the upper Fraser at (a) yellow head and (b) McBride and in the middle Fraser at (c) Mission Ridge and (d) Boss Mountain Mine.



Supplementary Figure 5: Monthly trends in the ANUSPLIN, NARR, UW and PCIC air temperature, precipitation and their VIC simulated runoff. Air temperature and precipitation forcings are averaged across the FRB gridcells whereas runoff is calculated using external routing model for Fraser River at Hope over the water years 1979-2006.



Supplementary Figure 6: Spatial patterns of monthly trends in the ANUSPLIN-VIC, NARR-VIC, UW-VIC and PCIC-VIC simulated runoff for the months Mar-Sep over the years 1979-2006.



Supplementary Figure 7: Annual variation of air temperature, precipitation, SWE_{melt} and runoff in cool (blue line) and warm (red line) phases of the PDO. Variables are. Air temperature and precipitation forcings and simulated SWE_{melt} are areally-averaged over all FRB's grid cells whereas runoff is calculated using external routing model for Fraser River at Hope. Results are for UW forcings and its VIC driven simulation only.

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