Hydrology and
Earth System
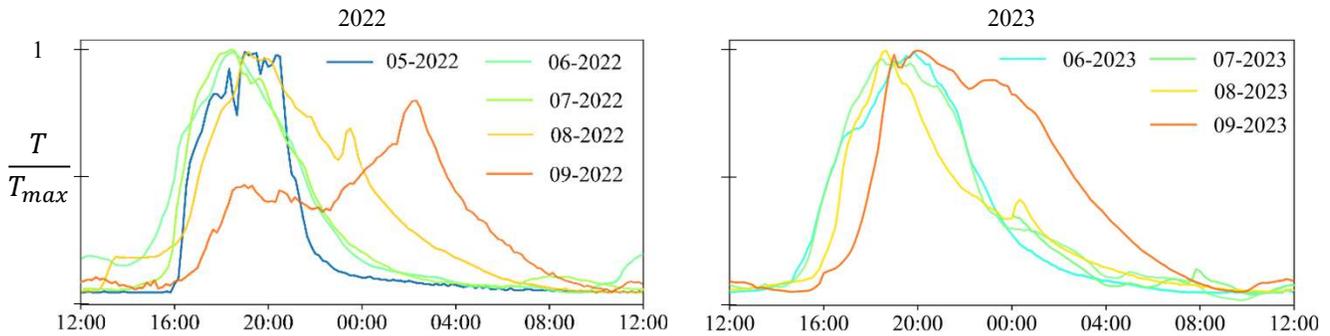Sciences

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Supplement of

Water flow timing, quantity, and sources in a fractured high mountain permafrost rock wall

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Figure S1

Normalized hourly flow-rate cycles for each month in 2022 (left column) and 2023 (right column). For each month, only days with continuous flow were included to avoid averaging periods with no discharge. The flow-rate values were normalized by their monthly maximum, making the y-axis unitless. The averaging windows used for each month were for 2022: May (26–29), June (10–23), July (1–15), August (28 July–8 August), September (1–15), and for 2023: June (23–30), July (8–15), August (10–20), September (3–15). These periods capture the representative diurnal flow variations during days with active discharge.

Figure S2
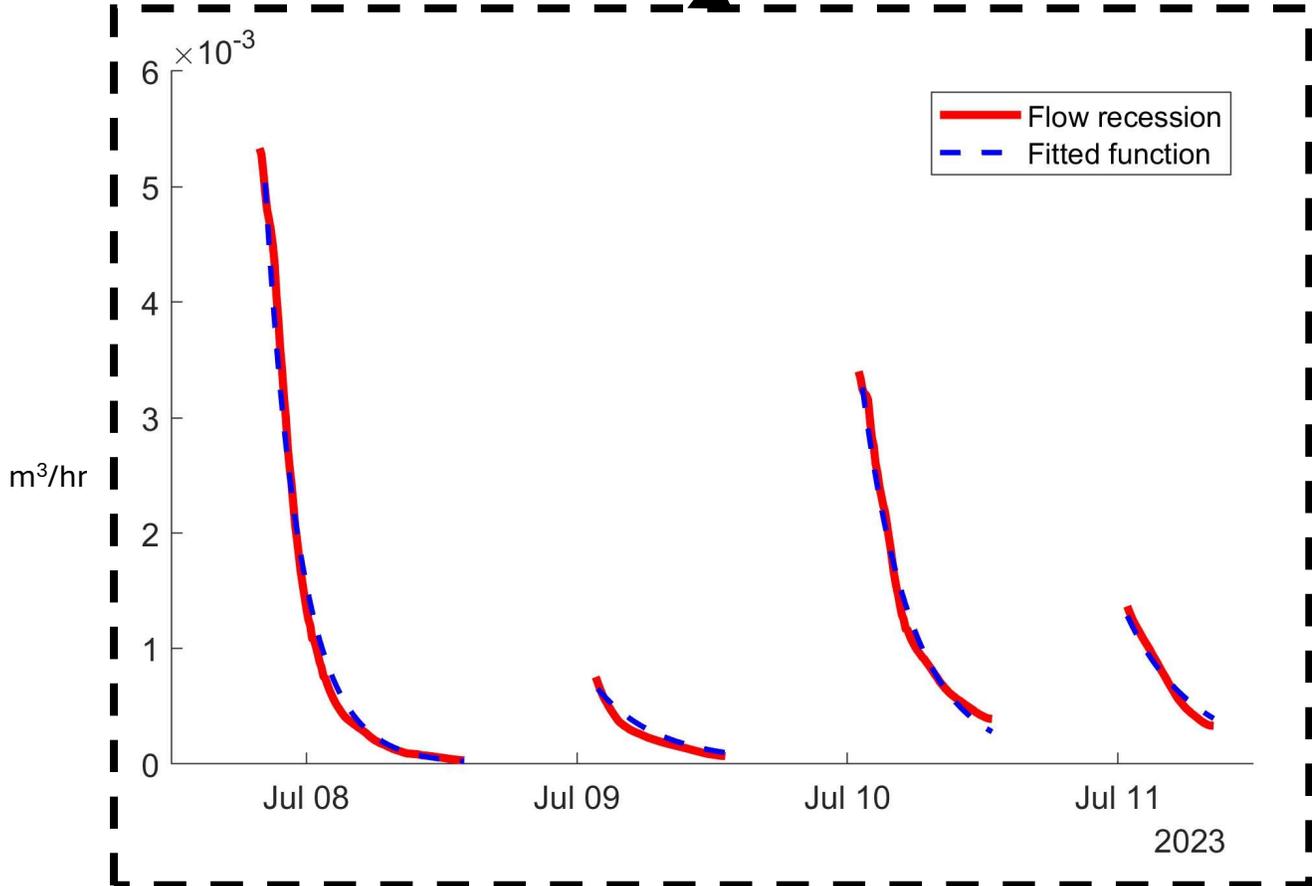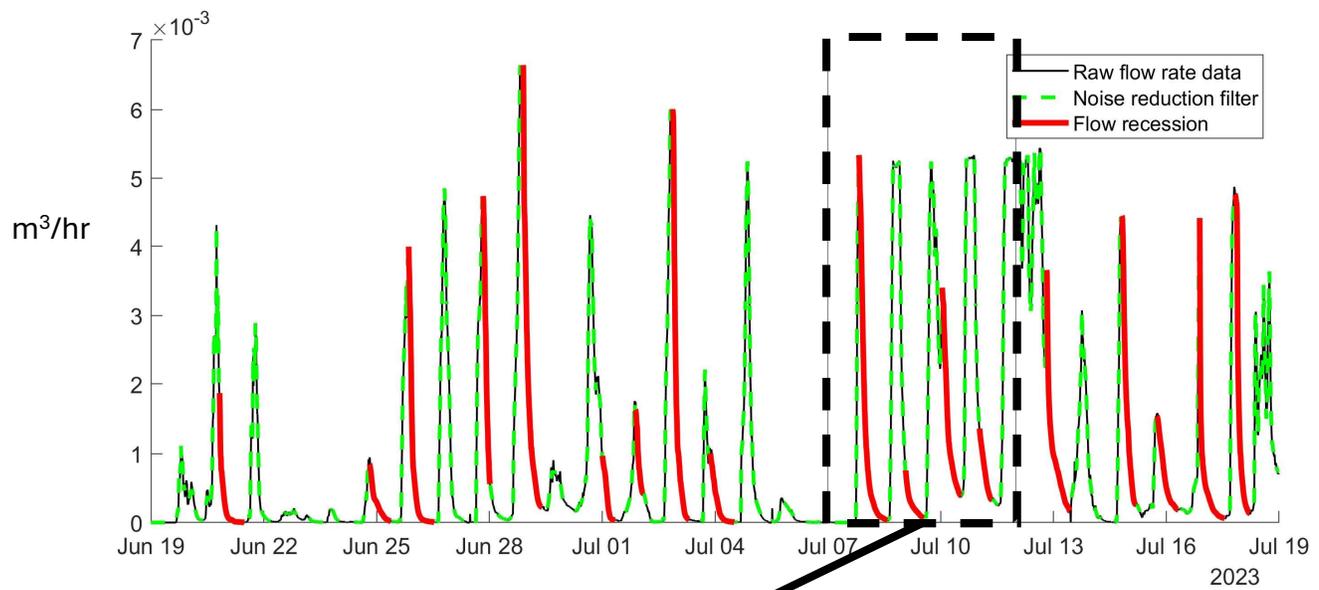
Recession fit example. The upper plot shows the observed flow data (solid black line) in box 1 between 19 January 2023 to 19 Jul 2023. The dashed green line is the flow data after noise reduction filter, and the red line is the automatic extraction of the recession limb of the hydrograph. The lower panel shows the fitted recession curves according to Equation 3 in dashed blue.
Only recession curves that fitted with an R^2 above 0.80 are plotted and used in the analysis.
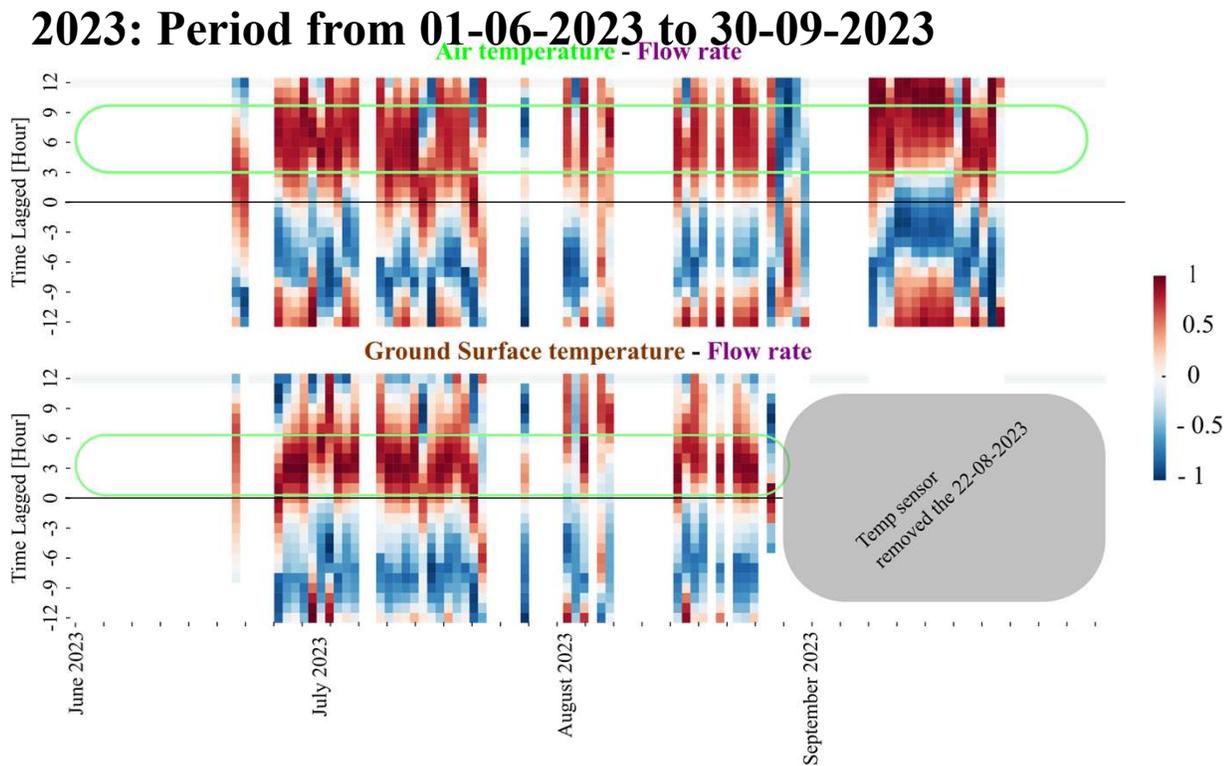
Figure S3

Figure S3: Results of moving-window cross-correlation analysis between the water flow rate and the (A) air temperatures and (B) the ground surface temperatures, during 2022 season. The horizontal axis represents the time (one strip per day), and the vertical axis represents the lag time, in hours. The color bar represents the value of the Pearson correlation coefficient (PCC) (1: high correlation, 0: no correlation, -1: reverse correlation). The green frame marks the range of lag times that show high PCC. Results of the cross-correlation analysis of 2022 season show similar results and are presented in figure 8.
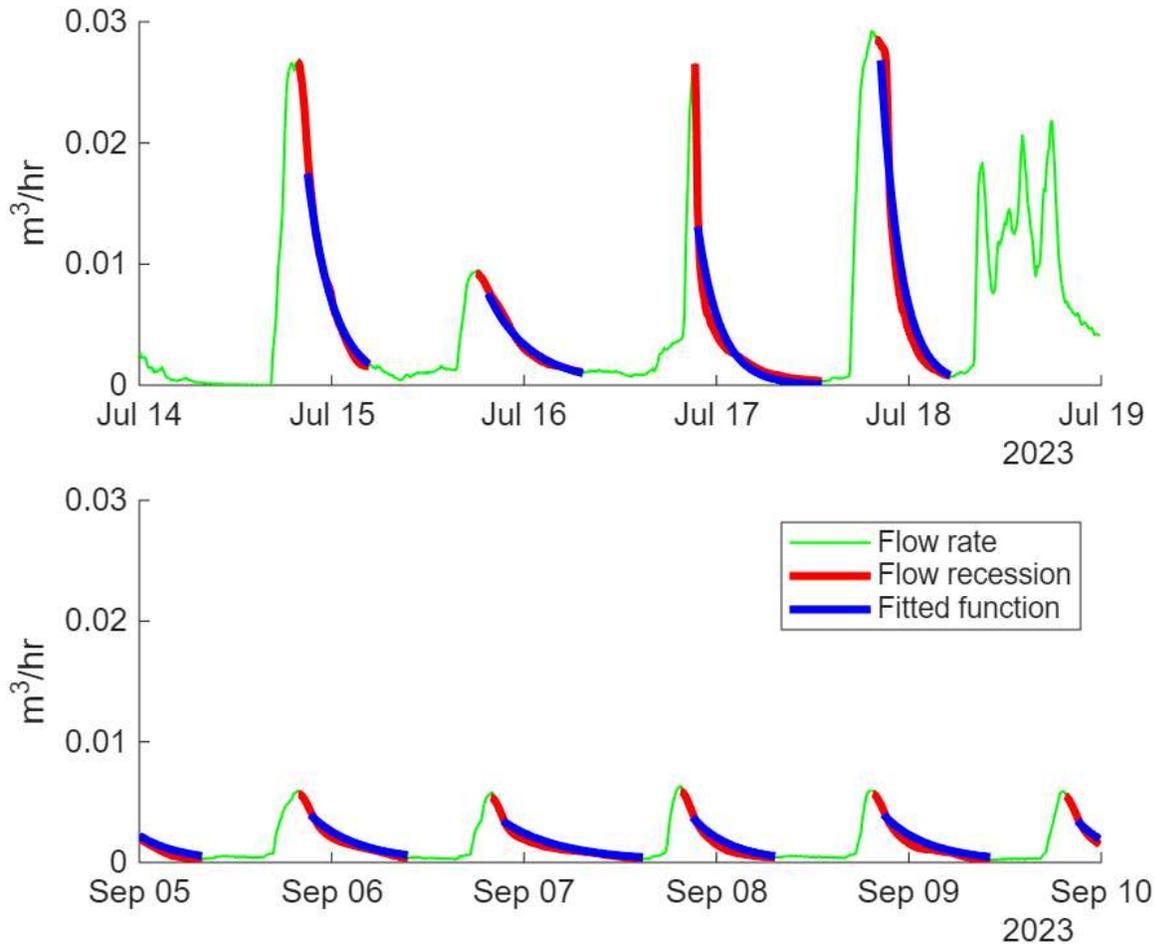
Figure S4

Figure S4: Comparison of flow recession (red line) and fitted function (blue line) to flow rate (green line) in the beginning of the thawing season (top) and at the end of the season (bottom) in 2023.