Supporting Information for

Regional difference in runoff regimes and changes in the Yarlung Zangbo river basin of southern Tibetan Plateau

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Captions:

Figure S1. Mean monthly precipitation, temperature, and simulated total runoff in the YZ and its sub-basins for 1971–2020.

Figure S2. Monthly time series of observed and simulated runoff at eight hydrological stations in sub-basins of the YZ for 1971–2015 (1981–2000 for YG and 2004–2013 for BM).

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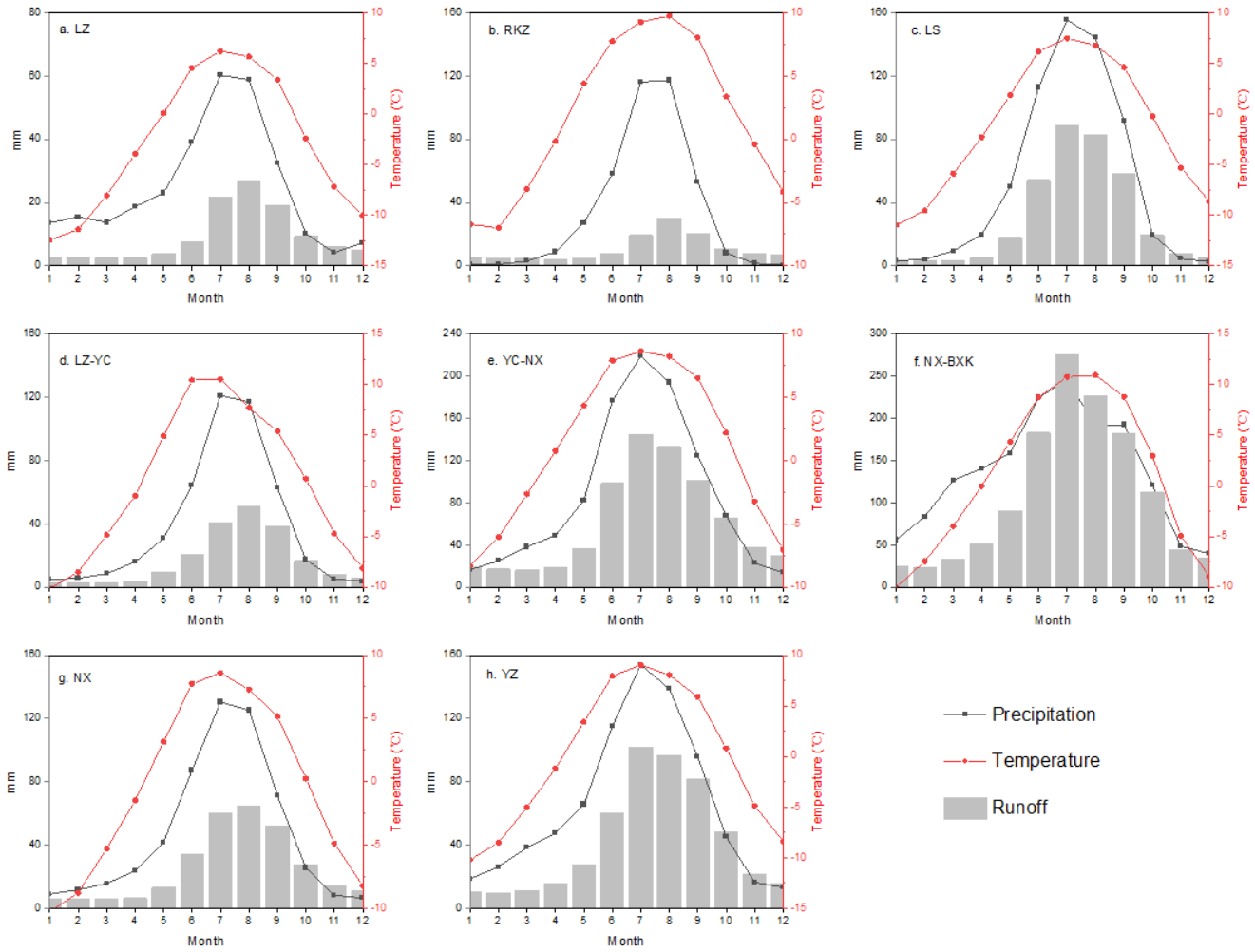
Figure S9. Annual variations of contributions of rainfall, glacier, and snowmelt runoff to total runoff in the YZ and its NX and NX-BXK sub-basins for 1971–2020, respectively.

Figure S10. Mean monthly vertical integral of atmospheric moisture budget (mm) in June, July, August, and September from the ERA5 data across the Yarlung Zangbo river basin for 1978–2020

(indicated by colors). Arrows represent the directions of vertical integral of water vapor flux ($kg \cdot m^{-1} \cdot s^{-1}$).

Table S1. Changes in mean seasonal precipitation (%), temperature (℃), total runoff, and three components (%), and their contributions to total runoff (%) in 1998–2020 relative to the period 1971–1997 in the entire YZ and its NX and NX-BXK sub-basins.

Table S2. Threshold of drought and flood events, and tendency of drought, flood, and annual maximum daily runoff in the entire YZ and its NX and NX-BXK sub-basins.



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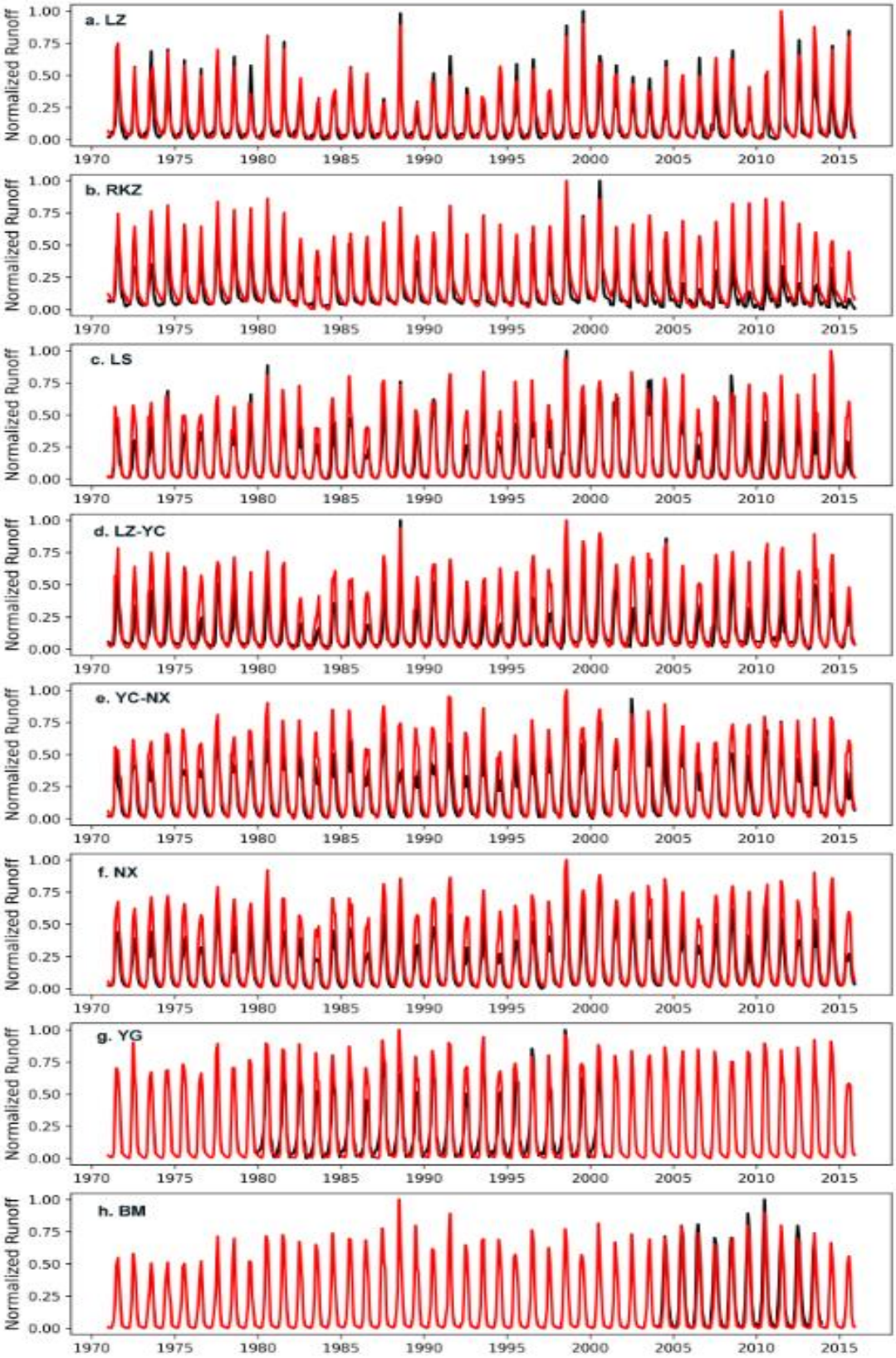

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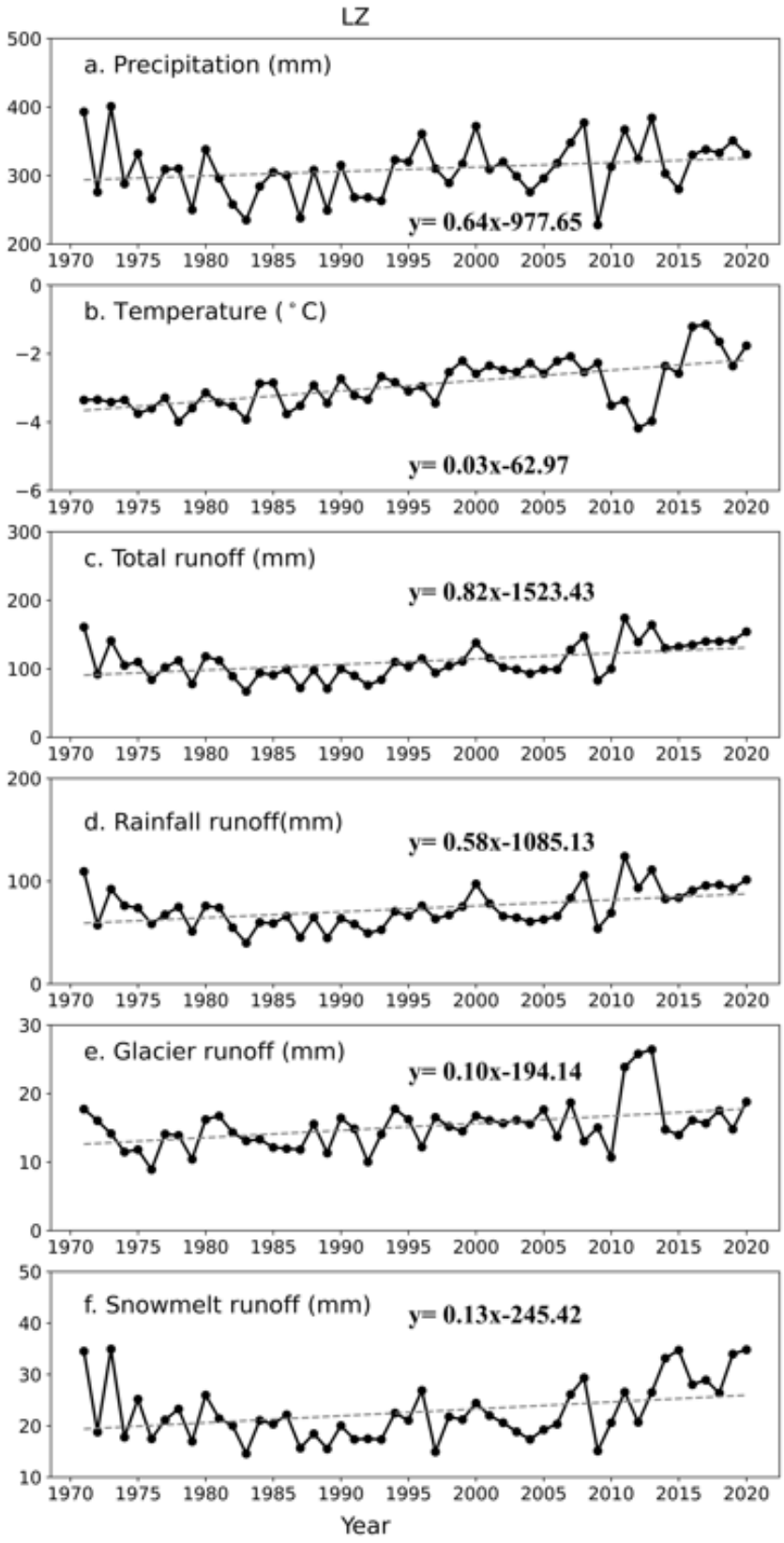

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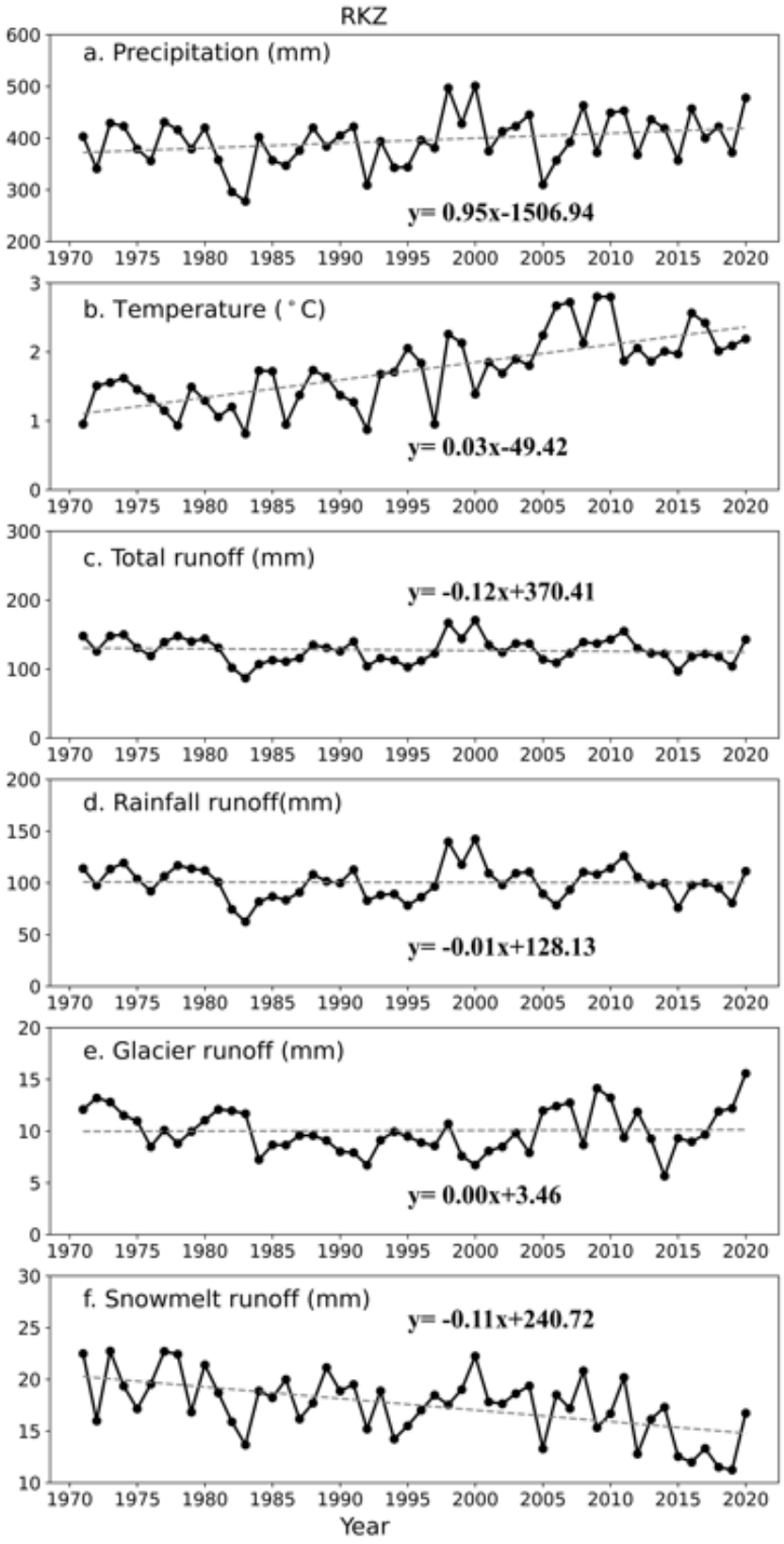

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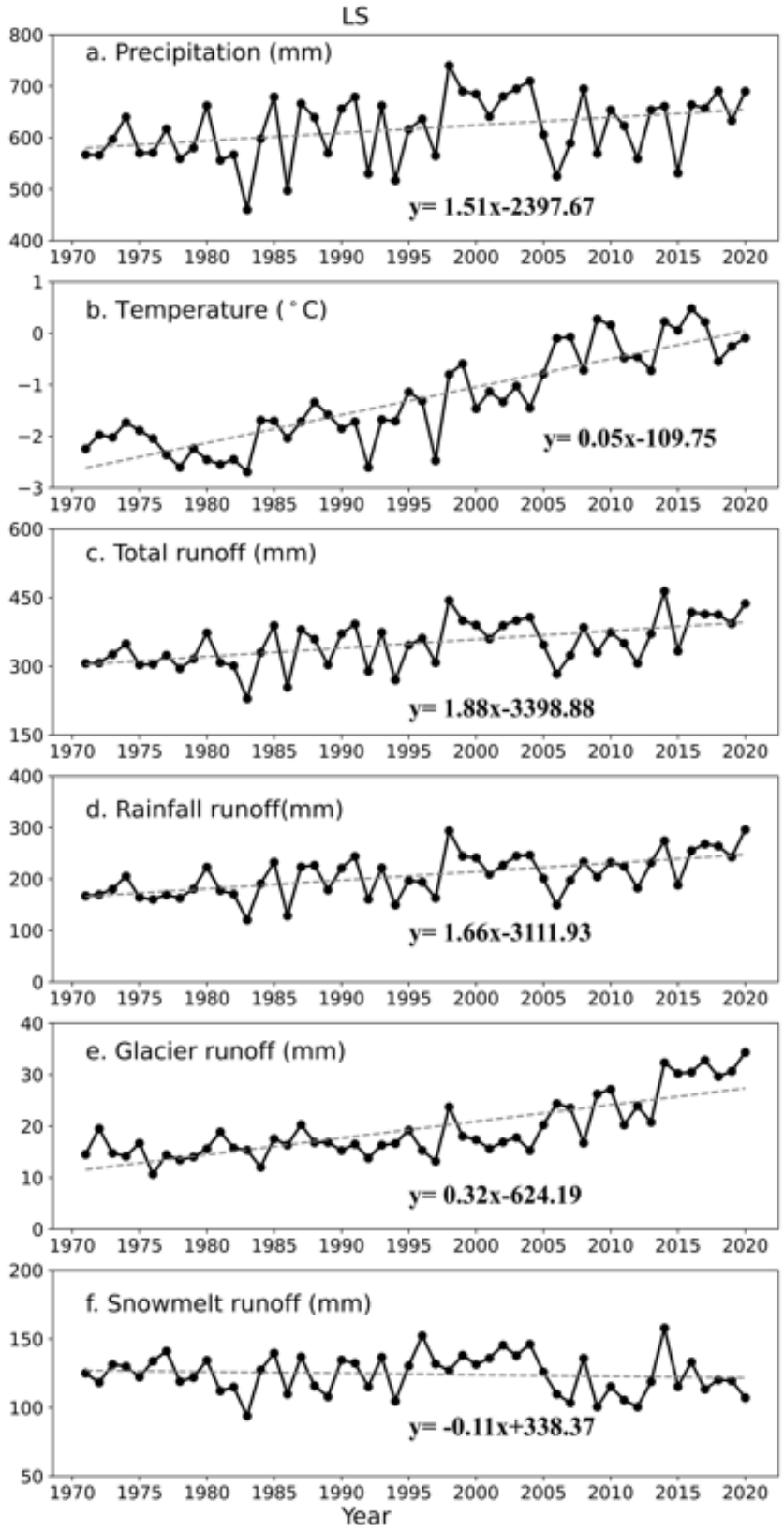

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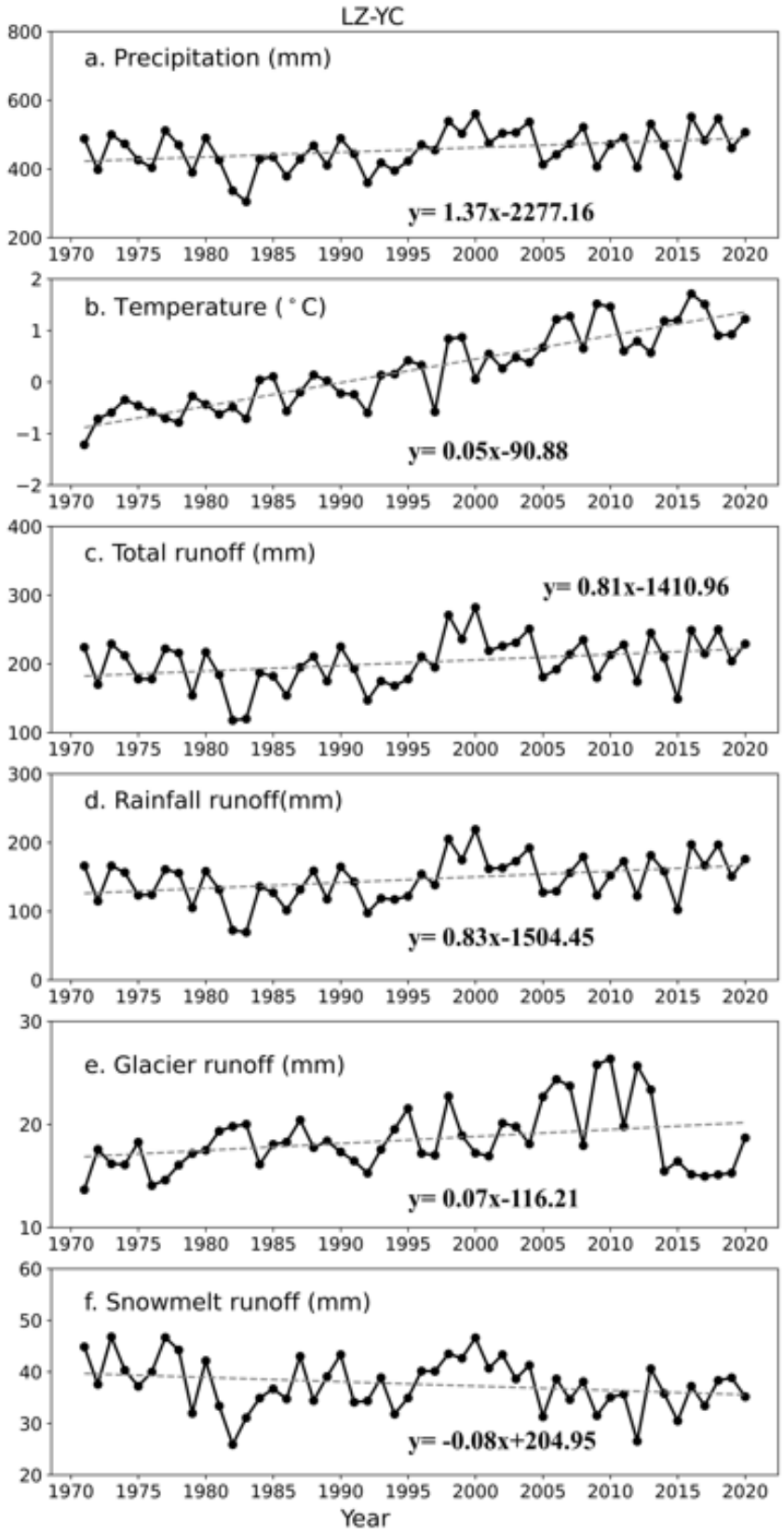

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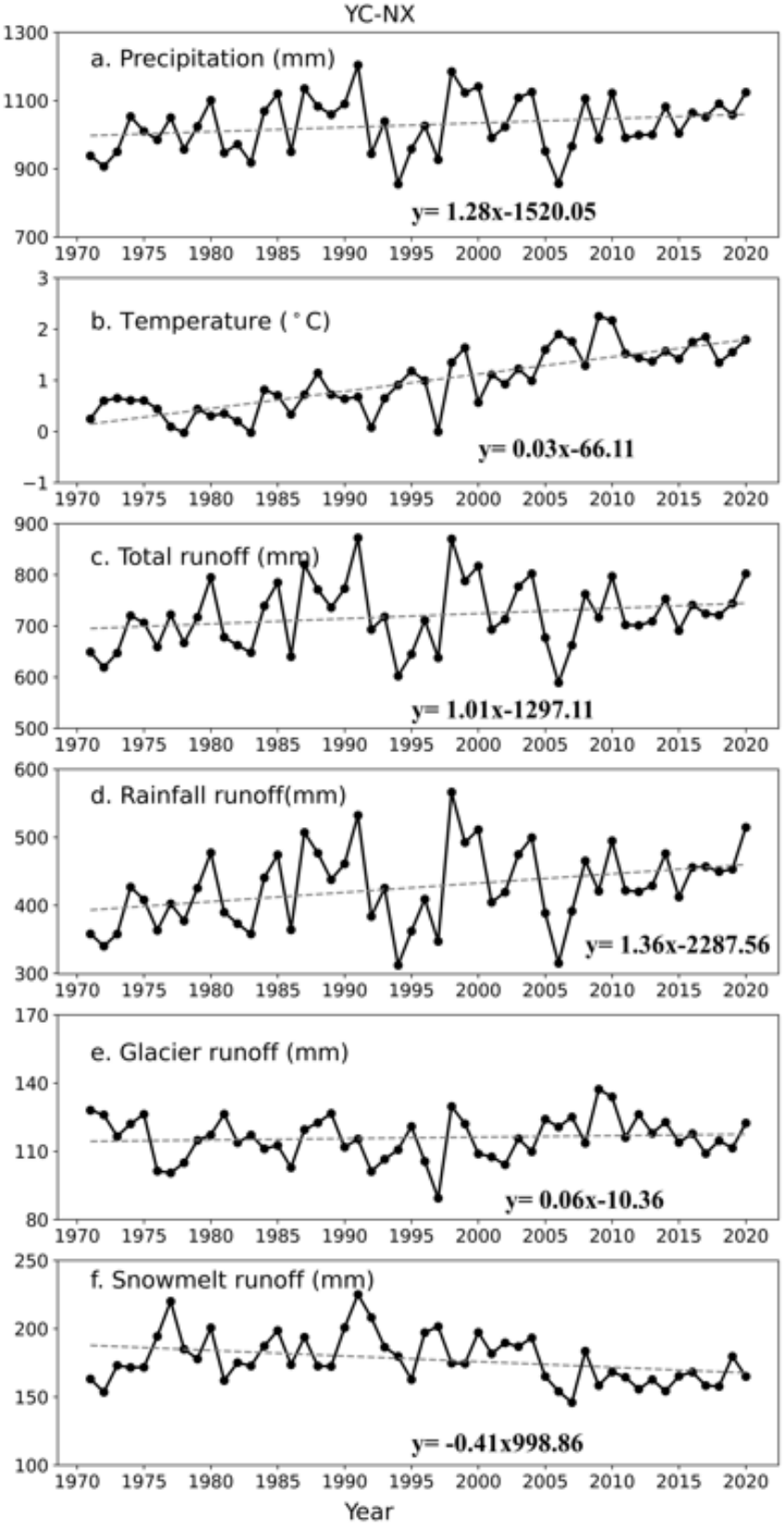

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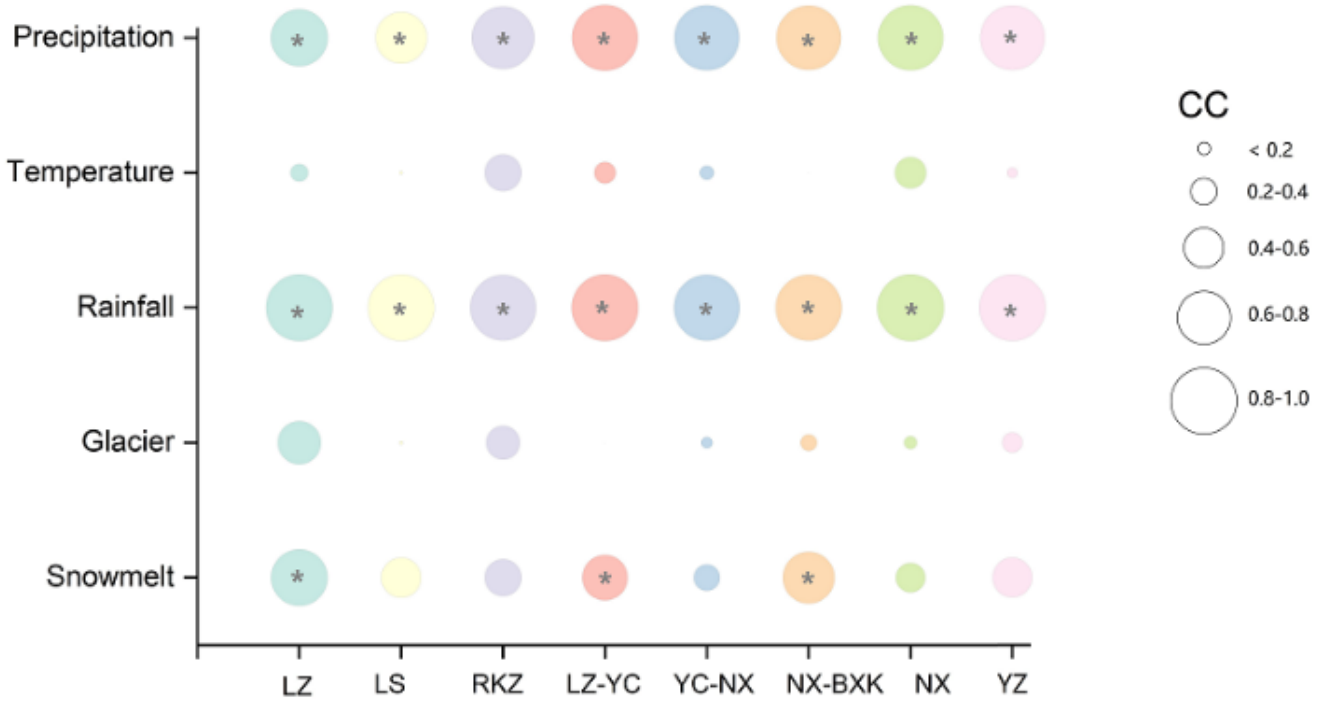

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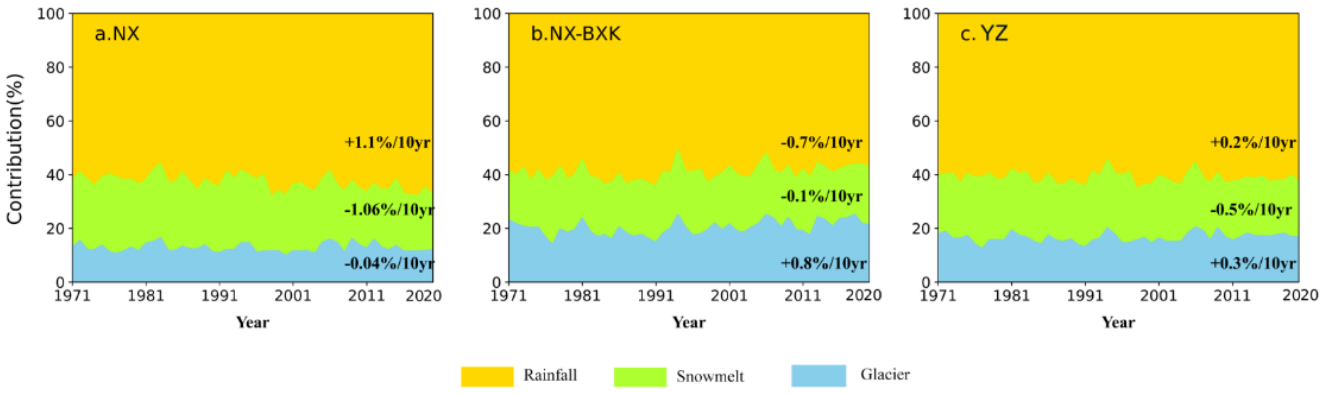

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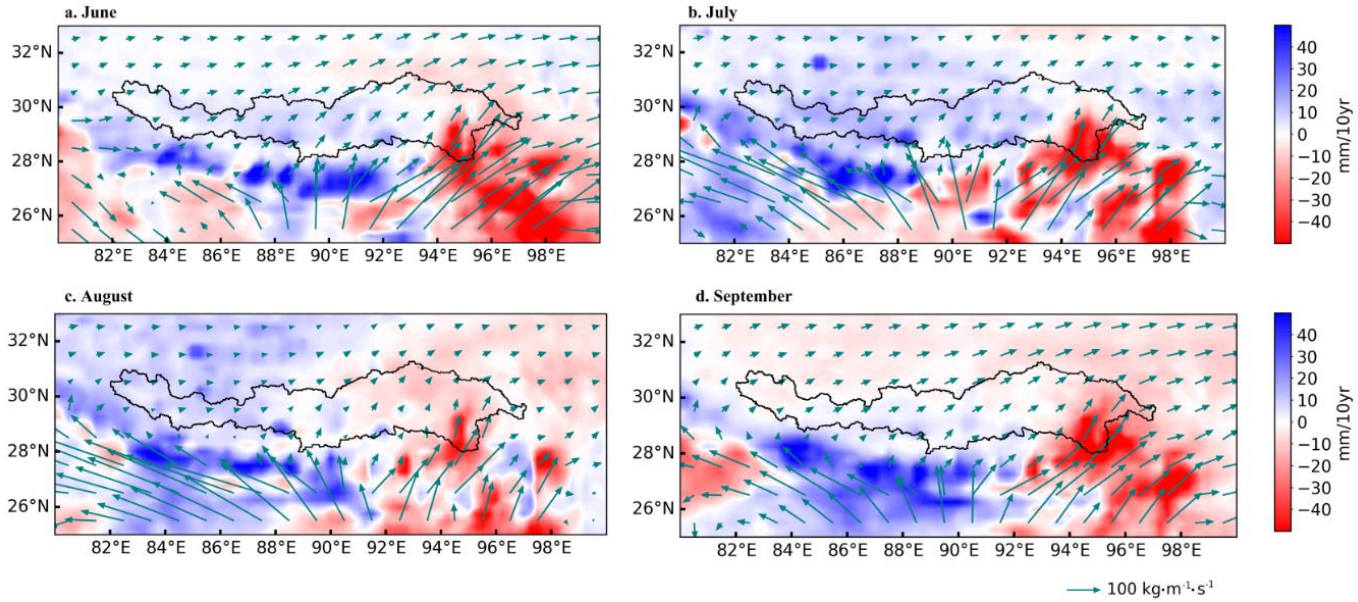

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Table S1. Changes in mean seasonal precipitation (%), temperature (℃), total runoff and three components (%), and their contributions to total runoff (%) in 1998–2020 relative to the period 1971–1997 in the entire YZ and its NX and NX-BXK sub-basins.

	Month	Pre	Tem	Total	Glacier	Snow melt	Rainfall	CG	CS	CR
NX	Jan	1.31	1.19	4.83	77.72	54.4	3.57	0.03	1.15	-1.18
	Feb	3.01	1.17	4.84	44.75	35.68	2.99	0.08	1.62	-1.70
	Mar	-0.88	0.35	9.41	15.5	50.35	2.65	0.07	5.09	-5.16
	Apr	6.14	0.85	17.19	11.11	33.49	4.82	-0.33	5.70	-5.37
	May	17.62	0.4	22	6.56	23.58	25.24	-1.42	0.81	0.61
	Jun	9.08	0.55	10.83	9.3	-2.47	30.16	-0.23	-6.17	6.40
	Jul	15.81	0.44	20.74	8.91	-9.2	37.54	-1.71	-5.92	7.63
	Aug	8.28	0.59	11.36	8.79	-14.35	20.41	-0.34	-4.84	5.18
	Sep	-2.58	0.69	6.63	12.72	-19.89	16.22	0.88	-6.42	5.54
	Oct	6.15	0.7	6.14	20.83	-3.94	8.61	0.93	-2.30	1.37
	Nov	-11.89	1.54	7.05	2.53	29.92	4.3	-0.05	2.35	-2.30
	Dec	-11.19	2.2	5.74	12.6	24.49	4.99	0.01	0.70	-0.71
NX-BXK	Jan	-9.97	0.63	-9.54	-16.55	-4.14	-9.84	0.00	0.33	-0.33
	Feb	-16.21	0.69	-14.74	12.27	-18.2	-14.21	0.03	-0.79	0.77
	Mar	-15.12	-0.1	-18.38	-19.86	-28.89	-13.89	0.02	-3.87	3.85
	Apr	-11.04	0.16	-19.61	-20.57	-17.26	-21.08	-0.02	1.02	-1.00
	May	3.11	0.09	-13.28	1.65	-5.45	-21.75	0.66	3.10	-3.77
	Jun	-8.35	0.35	-6.32	4.43	-6.08	-9.86	1.54	0.15	-1.68
	Jul	-3.15	0.41	-1.34	11.85	-9.5	-3.06	2.81	-1.90	-0.91
	Aug	5.23	0.34	-3.54	5.02	-21	-3.97	2.76	-2.39	-0.37
	Sep	-20.5	0.57	-5.98	-0.1	-15.41	-7.94	1.69	-0.81	-0.88
	Oct	-10.74	0.46	-16.49	14.12	-22.58	-22.93	6.16	-0.38	-5.78
	Nov	-9.09	0.51	-7.05	-0.28	6.97	-7.85	0.09	0.64	-0.72
	Dec	-18.61	0.86	-8.29	6.76	-14.03	-8.09	0.02	-0.20	0.17
YZ	Jan	-3.19	0.58	-1.01	10.56	8.3	-1.4	0.00	0.37	-0.37
	Feb	-5.56	0.58	-2.92	20.51	-3.37	-2.91	0.03	-0.04	0.01
	Mar	-6.06	0.14	-4.76	-2.93	-8.45	-3.72	0.03	-0.74	0.71
	Apr	-2.51	0.38	-5.55	-2.53	-1.92	-8.12	0.07	1.44	-1.51
	May	5.28	0.18	-1.75	1.8	2.93	-8.11	0.17	2.11	-2.28

Jun	1.01	0.28	0.48	3.25	-1.25	1.43	0.37	-0.85	0.48
Jul	4.88	0.23	3.87	5.81	-5.58	6.96	0.46	-2.14	1.68
Aug	3.88	0.29	2.51	3.08	-9.65	5.46	0.10	-1.87	1.76
Sep	-5.79	0.36	0.93	1.84	-10	3.16	0.26	-1.63	1.37
Oct	-1.87	0.35	-3.48	8.36	-7.61	-4.86	1.61	-0.63	-0.98
Nov	-5.79	0.72	0.43	0.31	10.92	-0.77	-0.01	1.07	-1.06
Dec	-9.2	1.04	-0.27	3.87	4.21	-0.48	0.01	0.22	-0.23

Note: Pre= Precipitation; Tem= Temperature; CG= contribution of glacier runoff to total runoff; CS= contribution of snowmelt runoff to total runoff; CR= contribution of rainfall runoff to total runoff.

Table S2. Threshold of drought and flood events, and tendency of drought, flood, and annual maximum daily runoff in the entire YZ and its NX and NX-BXK sub-basins.

		NX	BXK	YZ
Threshold (mm/day)	Drought (5%)	0.17	0.74	0.32
	Flood (95%)	2.34	9.52	3.61
Tendency of drought (days/10year)	1971-2020	-6	6	3
	1971-1997	-2	3	3
	1998-2020	-4	-3	-1
Tendency of flood (days/10year)	1971-2020	6	-3	-1
	1971-1997	2	6	5
	1998-2020	-1	-6	-4
Tendency of annual maximum daily runoff (mm/10yr)	1971-2020	0.1	-0.3	0
	1971-1997	0.08	0.7	0.13
	1998-2020	-0.01	-0.5	-0.1