

Supplementary for the manuscript “Climate and Cryosphere Cause Regime Shifts in Water Yield over the Upper Brahmaputra River”

Hao Li¹, Liu Liu², Baoying Shan³, Lei Wang⁴, Akash Koppa¹, Feng Zhong⁵, Dongfeng Li⁶, Xuanxuan Wang², Wenfeng Liu², Xiuping Li⁴, and Zongxue Xu⁷

¹Hydro-Climate Extremes Lab, Ghent University, Ghent, Belgium

²Center for Agricultural Water Research in China, China Agricultural University, Beijing, China

³Research Unit Knowledge-based Systems, Ghent University, Ghent, Belgium

⁴Institute of Tibetan Plateau Research, Chinese Academy of China, Beijing, China

⁵College of Hydrology and Water Resources, Hohai University, Nanjing, China

⁶Department of Geography, National University of Singapore, Singapore

⁷College of Water Sciences, Beijing Normal University, Beijing, China

Correspondence to: Liu Liu (liuliu@cau.edu.cn)

Table S1 Information of the six sub-basins and associated hydrological stations.

Basin	River	Station	Longitude(°)	Latitude(°)	Area/km ²
HYZR	Brahmaputra River	Lhatse	87.57	29.12	49739
UYZR	Brahmaputra River	Nugesha	89.71	29.32	43916
NCR	Nianchu River	Shigatse	88.89	29.28	14359
MYZR	Brahmaputra River	Yangcun	91.82	29.26	20004
LSR	Lhasa River	Lhasa	91.15	29.64	25601
LYZR	Brahmaputra River	Nuxia	94.65	29.46	45017
UBR	Brahmaputra River	Nuxia	94.65	29.46	198636

Table S2 The turning points (TP) of water yield over the entire UBR basin

Basin	HYZR	UYZR	NCR	MYZR	LSR	LYZR
TP	1995	1998	1997	1997	1996	1997
<i>p</i> value	<i>p</i> > 0.05	<i>p</i> < 0.05	<i>p</i> < 0.05	<i>p</i> < 0.05	<i>p</i> > 0.05	<i>p</i> > 0.05

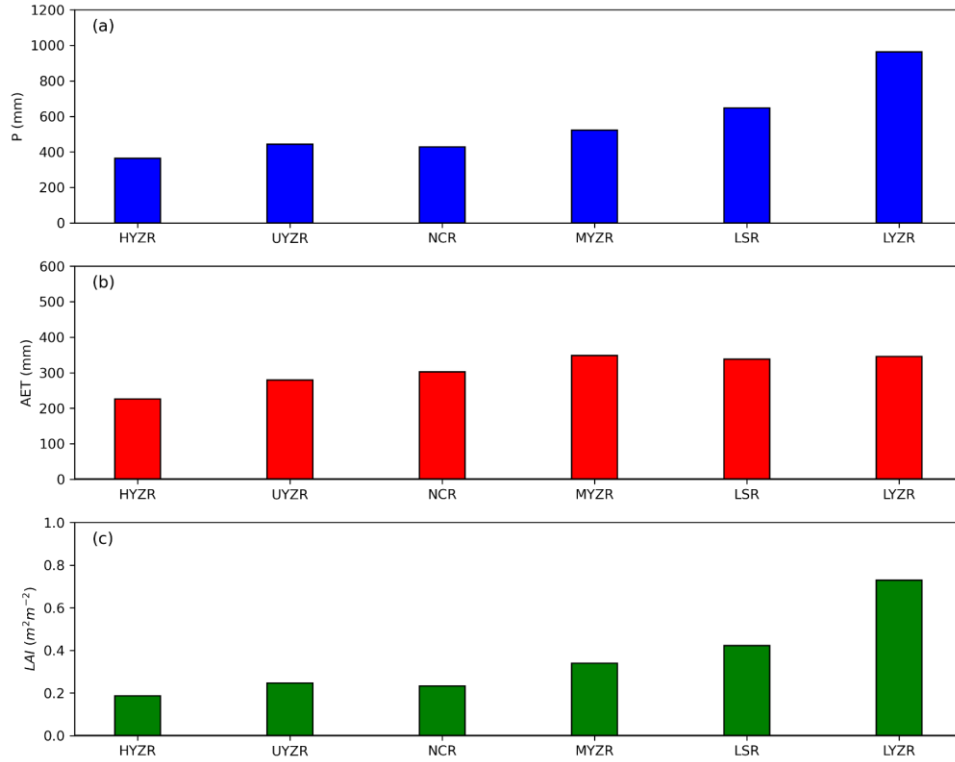


Figure S1. Multi-year average precipitation (P, **a**), actual evapotranspiration (AET, **b**), and leaf area index (LAI, **c**) during 1982–2013 over the entire UBR basin.

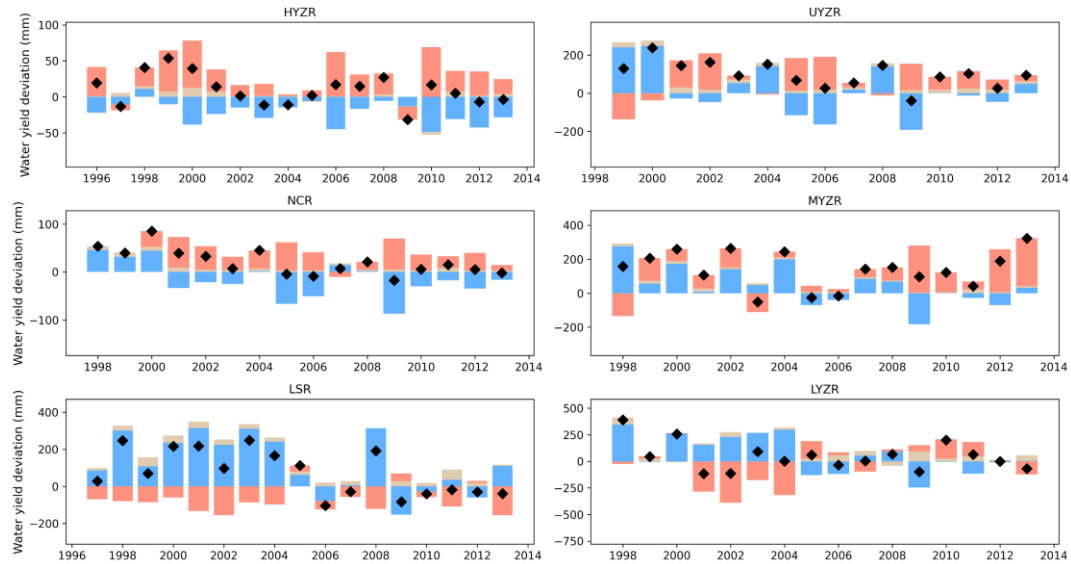


Figure S2. Time-series of the total water yield deviation ($\Delta WY(t)$, black diamond), consisting of water yield deviation from climate ($\Delta WY_c(t)$, blue bar), vegetation ($\Delta WY_v(t)$, tan bar), and cryosphere ($\Delta WY_s(t)$, red bar).

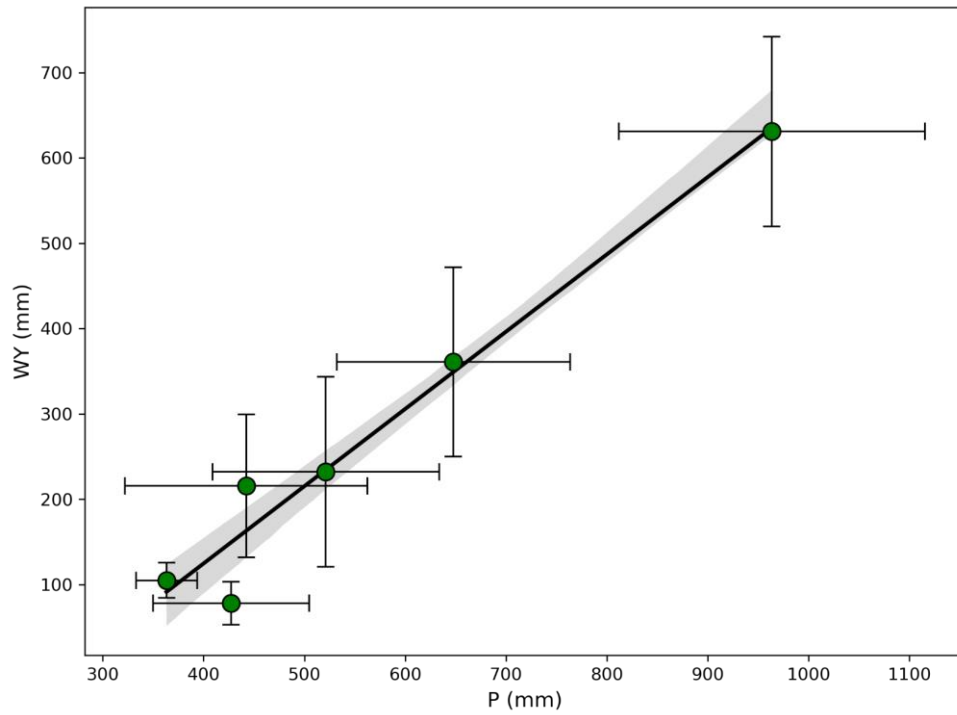


Figure S3. The linear relationship between regional annual precipitation (P) and water yield (WY) over the entire UBR basin.

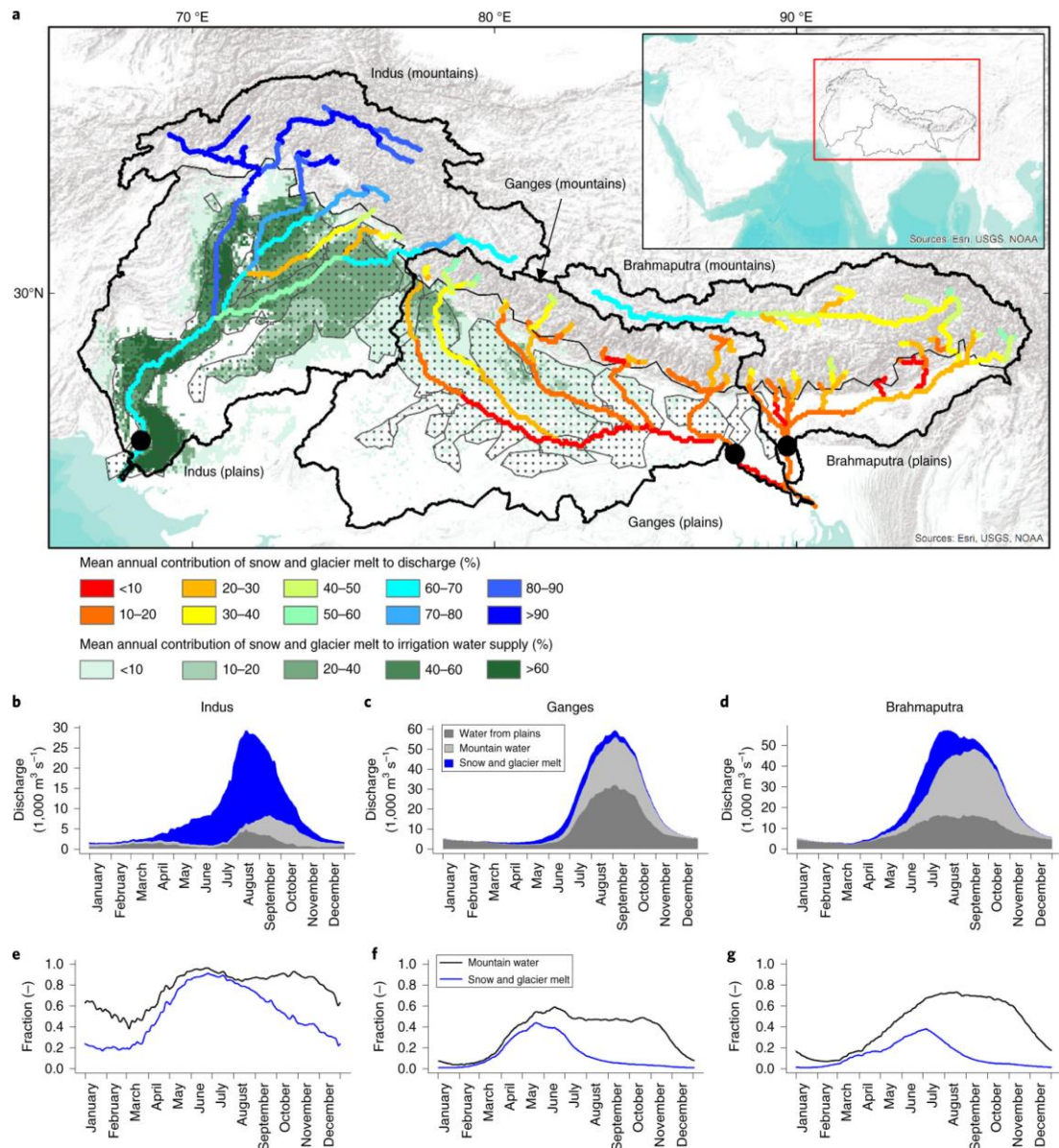


Figure S4. The spatially explicit, mean annual contributions of snow and glacier melt to the discharge (from Biemans et al., 2019).

Reference:

Biemans, H., Siderius, C., Lutz, A.F., Nepal, S., Ahmad, B., Hassan, T., Bloh, W. von, Wijngaard, R. R., Wester, P., Shrestha, A. B., and Immerzeel, W. W.: Importance of snow and glacier meltwater for agriculture on the Indo-Gangetic Plain, *Nat. Sustain.*, 2, 594–601, <https://doi.org/10.1038/s41893-019-0305-3>, 2019.