## Supplementary material to

## Hydrometeorological drivers of the floods in the Brahmaputra river basin in Bangladesh

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**Figure S1.** Population affected and economic loss caused by the monsoon floods in Bangladesh from 1987 to 2019 (Source: EM-DAT, https://www.emdat.be/).



**Figure S2.** Composite 850 hPa geopotential height during: (a) active and (b) break events over the Himalayan foothill region. Rainfall anomaly during (c) active and (d) break phases. The rectangular box represents the Indian monsoon core zone (Dunning et al., 2015). The purple line indicates the basin boundary of the Brahmaputra river. Data used: ERA5 reanalysis 0.25° x 0.25° gridded data over the period 1987- 2016 (July and August).



**Figure S3.** Rainfall anomaly in eight strong and weak phases of BSISO events for the period 1987-2019 (based on ERA 5 reanalysis).



**Figure S4.** Depth-duration-frequency curve for maximum rainfall of (a) 1 to 30 days (b) 30 to 122 days duration using generalised extreme value (GEV) distribution for the 1987 to 2019 period (Data: ERA5 reanalysis).



Figure S5. Relative water level above/below danger level (cm) for the Brahmaputra and three tributaries.



**Figure S6.** (a) Exceedance probability of annual maximum river flow  $(m^3 s^{-1})$  and (b) Trend of annual maximum river flow  $(m^3 s^{-1})$  of the Brahmaputra river at Bahadurabad gauging station.



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Figure S7. Soil moisture anomaly (top layer, 0-7 cm) in monsoon seasons (June-September) (based on ERA5 reanalysis)