



Past and future flooding in Bangladesh

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Currently, an average of about 20 % of the land surface in Bangladesh is flooded each year, affecting one of the most densely populated regions in the world. We aim to understand the processes currently determining flooding in the Ganges-Brahmaputra-Meghna (GBM) basin, in particular the role of precipitation and sea-level rise, as well as to assess how climate change might impact flood characteristics in the future.

Water level and discharge data were provided by the Bangladesh Water Development Board on a daily basis for a period of 1909-2009. Monthly maps based on daily sea level anomalies from the Data Unification Altimeter Combination System DUACS are available on a 0.25° by 0.25° grid for the time period 1993-2014. Ensemble model output for upper catchment precipitation and annual mean thermosteric sea-level rise is taken from historical and RCP scenario runs conducted with the CCSM4.

We first analyzed daily water levels of the past 100 years in order to detect potential shifts in extremes. The available observations are then used to set up a generalized linear model to detect how precipitation influences flooding in the GBM basin. This model can then be used to give a prognosis on changes in future flooding.

Our analysis suggests that water levels have indeed changed over the course of the past century. While the magnitude and duration of average flood events decreased, the frequency of extreme flood events has increased. Low water levels have also changed, with a significant decrease in the annual minimum water level most noticeable when we compare the time periods 1909–1939 and 1979–2009.

For the future, first results confirm the decrease in return periods of strong flood events found in previous studies. The impact of climate change on flooding will also be compared to the impact of man-made structures such as Farakka barrage, built across the Ganges on the border between India and Bangladesh and operating since 1975. This is of particular interest as several large structural projects are currently being planned in the GBM basin.