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Flooding in Myanmar: joint occurrence of high discharges and high sea water levels?

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In the summer of 2015 serious flooding occurred in Myanmar when cyclone Komen made landfall in Bangladesh, bringing strong winds and heavy rains to Myanmar. The cyclone struck the country during the monsoon season and resulted in widespread flooding, temporarily displacing over 1.6 million people. It was hypothesized that there could be a relation between occurrences of storm surges and extreme discharges in Myanmar. Comparable studies have shown that dependence between storm surge at Hoek van Holland in the Netherlands and high river discharges of the Rhine at Lobith exist with a lag of 6 days (Klerk et. al, 2015). The processes generating high discharges in the Ayeyarwady river and storm surges along the Myanmar coast were analyzed using global precipitation data (EU FP7 eartH_2Observe), a distributed wflow-sbm hydrological model of the Ayeyarwady and a global storm surge model. About 15 historical tropical storms and hurricanes affecting Myanmar since 1992 were analyzed in terms of rainfall distribution over the country, discharged river flow volumes and storm surge extent and magnitude. All storms except for Komen in 2015 occurred between October and May, which does not coincide with the monsoon season (mainly June, July and August). The intensities and the paths of the 15 studied cyclones varied considerably and largely affected the spatial extent and the magnitude of storm surges. The study showed that high Ayeyarwady river flows and high surges generally do not coincide for the following reasons: the large scale of the river basin, the estimated one week travel time of water from the upstream catchment to the mouth, the occurrence of the majority of historical storms outside the monsoon season and the (relatively) limited spatial extent of a storm surge (at the scale of Myanmar).
While the applied method is deemed successful for the identification of joint probabilities of surges and river discharges, this study indicates that such analyses are more relevant in small to meso-scale catchments close to the coast, where the joint occurrence of storm surges and local rainfall is more likely to influence flood levels.

Reference:
W J Klerk, H C Winsemius, W J van Verseveld, A M R Bakker and F L M Diermanse, 2015, The co-incidence of storm surges and extreme discharges within the Rhine–Meuse Delta, Environmental Research Letters 10