Simple estimation of non-exceedace probability for extreme storm events using storm transposition

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In order to prepare for disasters caused by abnormal extreme rainfall events, it is important to evaluate the overall disaster defense capability of a city rather than to evaluate whether flood control facilities are well constructed and operated according to the design standards. In order to establish a wise policy for urban flood defenses, the priority is given to estimating the overflow risk of various facilities, and therefore the social demand on the development of reliable estimation method for non-exceedance probabilities of exceptionally extreme rainfall events and their uncertainties is very high. However, the conventional non-exceedance probability estimation for extreme rainfall events is made through statistical analysis of historical heavy rainfall events, which shows a large difference in the non-exceedance probability for a specific big rainfall event depending on the data recording period. This can be attributed to the non-stationarity inherent in the rainfall data itself and the sampling error from the limits of the data recording period. In this study, we try to reduce the error from the size of the sample by expanding the data of the rainfall observatory using the concept of storm transposition which is mainly used in the estimation of the probable maximum precipitation. Major rainfall events in Korea are transposed to the Busan and Gangneung observatories to estimate the non-exceedance probability. The applicability of the proposed method is investigated by comparing the 24-hour duration probability rainfall depth estimated by the conventional frequency analysis which is performed using the annual maximum time series of a single station with the corresponding rainfall depth estimated by the proposed method. It will be shown that the proposed method can provide a relatively stable estimation result for the case of the relatively long return period.