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Editorial
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Editorial

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It is my pleasure to welcome you to the April issue of *Water Management*, which brings together four interesting research papers on the diverse, but interconnected, topics of extreme rainfall, flood routing, reservoir floodgate operation and riverbank collapse mechanisms.

The paper of Yilmaz (2017) investigates stationarity and non-stationarity in extreme rainfall data in southern Turkey and the potential consequences for the accurate derivation of design rainfall events with different return periods. Vatankhah (2017) reports on the predictive capabilities of non-linear Muskingum model (NLMM) approaches used for flood hydrograph routing and how they can be influenced by the specification of different parameterisations for channel storage. The study by Chen *et al*. (2017) proposes new methods to distribute reservoir releases for the optimisation of floodgate operation in a cascade reservoir system incorporating hydropower plants. Finally, Patsinghasanee *et al*. (2017) conduct experimental and numerical investigations linking riverbank erosion processes to the initiation of a cantilever bank failure mechanism that can rapidly increase both channel width and sediment input into river channels.

The expected increase in the frequency and magnitude of extreme rainfall events, in the context of climate change, presents a significant global challenge both in mitigating the potential exacerbation of flood-related disasters and in developing new methods to improve flood resilience. Furthermore, the non-stationarity of extreme rainfall data can lead to uncertainty in the prediction of design rainfall events used to upgrade or design new existing urban drainage and sewage systems, and larger-scale hydraulic infrastructure such as reservoir spillways.

In the first paper of the issue, Yilmaz (2017) conducts an analysis of extreme rainfall data from the Antalya region of southern Turkey to investigate whether non-stationarity can be detected through the combined use of stationary and non-stationary generalised extreme value (GEV) distribution models. Statistical comparisons between these two GEV model outputs indicate no evidence of non-stationarity, with stationary GEV models found to be capable of fitting extreme rainfall data at all seven stations tested. Bias-corrected future design rainfall intensities are predicted to be significantly larger (up to 37%) than observed design rainfall intensities for longer return periods (up to 100 years), although the author acknowledges that uncertainties exist over the accuracy of these predictions due to the relatively short length of extreme rainfall datasets. Yilmaz (2017) concludes that further studies are required in the Antalya region to better understand the relationship between climate change and extreme rainfall, possibly using multiple climate models and GHG emissions scenarios to cover a wide range of future rainfall scenarios for the region.

Flood routing approaches, such as the NLMM, are particularly useful for the simulation of flood events in unmanaged catchments and along ungauged river reaches that are lacking in geometrical data, such as cross-sectional properties, longitudinal bed slopes and bed roughness characteristics. The accuracy of these methods, however, is known to be strongly dependent on the parameterisations used in algebraic storage equations utilised within the NLMM approach. The paper by Vatankhah (2017) proposes a new continuous inflow-based exponent parameterisation for the storage equation to account for potential changes to the discharges of future inflow hydrographs when compared to inflow hydrographs used in the model calibration stage. Furthermore, this new storage model parameterisation accounts for potential differences between inflow and outflow hydrograph volumes to represent cases where lateral inflows or outflows are expected to play a significant role in the flood-routing procedure. In general, the results from the proposed NLMM show good predictive capabilities in simulations of outflow hydrographs and storage rates for benchmark hydrograph datasets consisting of smooth and non-smooth, single and double-peaked hydrograph events. The author concludes that any additional model complexity, for example, an increased number of fitting parameters used in the NLMM, may result in a decrease in the predictive power of the model and is therefore undesirable.

The importance of optimising releases from reservoirs for flood-control purposes has come into sharp focus recently, with the critical damage and potential failure risk observed on the main and auxiliary spillways of the Oroville Dam in California, USA, following a period of extreme rainfall. However, optimisation of reservoir release operations is also an essential consideration in maximising the potential benefits offered by their multiple purposes such as in hydropower generation, irrigation, drinking water supply, as well as flood control. In the paper by Chen *et al*. (2017), a multi-step progressive optimality algorithm (MSPOA) has been developed along with a floodgate table to optimise floodgate operations through a series of cascade reservoirs. These methods are applied to calculate specific outflows generated from each reservoir in the cascade, with the distribution of reservoir releases optimised through the floodgates of hydropower plants. In order to provide verification of the proposed MSPOA method, it is utilised in the prediction of optimal floodgate operation within a cascading reservoir system consisting of four hydropower plants on the Yalong River, China. The authors indicate that it provides improved results and faster convergence rates than other progressive optimality algorithms, while the floodgate table offers an effective way to distribute reservoir releases to floodgates, optimising both the number and extent of floodgates openings and, hence, the frequency of their operation in flood control.

The erosion and failure of riverbanks provides a substantial sediment input volume into river systems and can result in significant environmental and economic damage due to the loss of valuable agricultural land and the destruction of infrastructure. This can also lead to large-scale morphodynamic changes within river channels (e.g. channel widening) and present serious river engineering problems such as sediment deposition in lower river reaches, leading to increased flood risk. In the last paper of the issue, Patsinghasanee *et al*. (2017) present a combined experimental and numerical modelling study of the complex mechanisms involved in the erosion and cantilever failure of cohesive riverbanks with varying sand–silt–clay compositions, under a range of different hydraulic conditions. The simulations indicate that erosion of the lower bank generates an overhanging cantilever block that develops tension cracks on the upper surface when the cantilever is close to failure. The dominant failure mechanism is observed to be a beam failure, which the authors confirm is consistent with previous studies. Results also demonstrate that banks with higher clay–silt contents are more susceptible to cantilever failure than those with lower contents, which is also found to be in agreement with previous findings. The numerical model simulations, based on a triple-grid approach for the flow field, sediment transport and bed deformation, and cantilever bank failure, are shown to reproduce, in a qualitative sense, the observed lower bank erosion and cantilever failure mechanism for the overhanging block of cohesive riverbank. The authors conclude the paper by recommending more detailed examination of the validity of the cantilever block model through additional comparisons with experimental data and local observations.

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