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The use of Artificial Neural Networks with different sources of spatiotemporal information for flash flood predictions

Lydia Maria Tsiami (1), Eleni Zacharopoulou (1), Dionysios Nikolopoulos (1), Ioannis Tsoukalas (1), Nikos Mamassis (1), Andreas Kallioras (2), and Andreas Efstratiadis (1)

(1) National Technical University of Athens, Water Resources and Environmental Engineering, Athens, Greece (lydtsiam@gmail.com), (2) National Technical University of Athens, School of Mining and Metallurgical Engineering, Athens, Greece (kallioras@metal.ntua.gr)

For more than two decades, the use of artificial neural networks (ANNs) in hydrology has become an effective and efficient alternative against traditional modeling approaches, i.e. physically-based or conceptual. These can take advantage of any type of available information to predict the hydrological response of complex systems, with missing data and limited knowledge about the transformation mechanisms. A promising area of application is the real-time prediction of flood propagation, which is essential element of early warning and early notification systems. In this work we focus to flash floods, considering as areas of application two medium-scale catchments in Greece with substantially different characteristics. The first one is the highly urbanized river basin of Kephissos (380 km2), which is the main drainage channel of the Athens Metropolitan area, while the second is the rural catchment of Nedontas, SW Greece (120 km2). Both areas have been recently equipped with automatic hydrometric stations, while online rainfall data are also available at a representative number of meteorological stations. For the two case studies we investigate several setups of ANNs, in order to predict the river stage at the catchment outlet for several lead times, using different combinations of input sets, by means of upstream stage and point rainfall data.