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# Integrating Neural Networks and Conceptual Modelling for Flood Forecasting on the Tiber River

G. Napolitano (1), L. See (1), and F. Savi (2)

(1) University of Leeds, School of Geography, Leeds, United Kingdom (g.napolitano@leeds.ac.uk, +44 113 34 33308), (2) Dept. of Hydraulic Transportation and Highways, University of Rome "La Sapienza", Italy

The Tiber River has a catchment area of approximately 17,000 km2. The river crosses 6 regions and is about 300 km in length. This study is focused on the bottom part of the catchment, between Rome and the Corbara dam, which is located approximately 150 km north of Rome, with a reservoir active storage of 165 hm3. The area from Corbara dam (11,000 km2) can be subdivided into 37 ungauged and 3 gauged sub-basins. At the bottom of the basin is the city of Rome, which is at risk from flooding when extreme events with a return period of about 200 years occur. Both conceptual modeling and Artificial Neural Networks (ANNS) have already been applied individually to forecasting historical floods for the city of Rome. The results of both models are promising but each one has different strengths. This study considers how hybrid techniques can be applied to the integration of both conceptual and ANN models to improve their performance further. Integration of the individual models using different techniques from the field of data fusion is investigated. Models are developed to predict hourly water levels at Ripetta gauging station in Rome for a lead time of 12 and 18 hours. Model performance is assessed using a series of absolute and relative performance measures as well as a visual inspection of the hydrograph.

Keywords: real-time forecasting, flooding, rainfall-runoff modelling, Artificial Neural Networks.