

Accepted Manuscript

Research papers

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Hakan Tongal, Martijn J. Booij

PII: S0022-1694(18)30509-2

DOI: <https://doi.org/10.1016/j.jhydrol.2018.07.004>

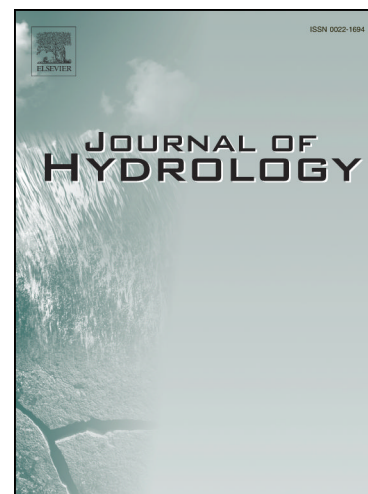
Reference: HYDROL 22936

To appear in: *Journal of Hydrology*

Received Date: 9 April 2018

Revised Date: 5 June 2018

Accepted Date: 2 July 2018



Please cite this article as: Tongal, H., Booij, M.J., Simulation and forecasting of streamflows using machine learning models coupled with base flow separation, *Journal of Hydrology* (2018), doi: <https://doi.org/10.1016/j.jhydrol.2018.07.004>

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Simulation and forecasting of streamflows using machine learning models coupled with base flow separation

Hakan Tongal^{1,*} and Martijn J. Booij²

¹Department of Civil Engineering, Engineering Faculty, Süleyman Demirel University, 32260 Isparta, Turkey

e-mail: hakantongal@sdu.edu.tr

² Department of Water Engineering and Management, Faculty of Engineering Technology, University of Twente, Enschede, the Netherlands

e-mail: m.j.booij@utwente.nl

Abstract

Efficient simulation of rainfall–runoff relationships is one of the most complex problems owing to the high number of interrelated hydrological processes. It is well-known that machine learning models could fail in simulating streamflows from only meteorological variables in the absence of antecedent streamflow values. The main reason for this could be low and lagged relationships between streamflow and meteorological variables. To overcome this inefficiency, for the first time, we developed a simulation framework by coupling a base flow separation method to three machine learning methods. It was demonstrated that separating streamflow into different components such as base flow and surface flow can be useful for improving simulation and forecasting capabilities of machine learning models. We simulated streamflow in four rivers in the United States with Support Vector Regression (SVR), Artificial Neural Networks (ANNs) and Random Forest (RF) as a function of precipitation (P), temperature (T) and potential evapotranspiration (PET). We concluded that the base flow separation method improved the simulation performances of the machine

* Correspondence to: H. Tongal (✉)

Tel.: +90 246 211 12 11

E-mail address: hakantongal@sdu.edu.tr

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