

EGU2020-519, updated on 25 Oct 2021

<https://doi.org/10.5194/egusphere-egu2020-519>

EGU General Assembly 2020

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Evaluation of a Hydro-Meteorological Model System for Flood Forecasting of a Mediterranean Basin in Turkey

Berina M. Kilicarslan¹, Eren Duzenli¹, Heves Pilatin², Ismail Yucel¹, and M. Tugrul Yilmaz¹

¹Middle East Technical University, Department of Civil Engineering, Water Resources Laboratory, Turkey

(kilicarslan.berina@metu.edu.tr)

²Middle East Technical University, Graduate School of Natural and Applied Sciences, Earth System Science, Turkey

Floods, which are considered as one of the most destructive extreme weather events, are being more severe issues with changing climate, and they are threatening both human life and property. To address flood hazard issues, this study evaluates the application of a hydro-meteorological model system as an early warning system approach. The Weather Research and Forecasting Hydrological model system (WRF-Hydro), a fully-distributed, multi-physics, multi-scale hydrologic model, has the capability of accurately capturing the flood hydrographs in terms of shape and peak time corresponding to storm precipitation. WRF-Hydro model system is implemented with meteorological forcing data obtained from the Weather Research and Forecasting (WRF) atmospheric model. WRF/WRF-Hydro model system is operated in uncoupled mode. The study area is the Oymapinar Basin in Southern Turkey has complex topographic characteristics, and in the upstream basin area, the river network originates from mountainous region. Five heavy rainfall events occurred between January 2015 and May 2015 in the basin selected to assess the model performance of simulating flood hydrograph. The model calibration process is performed by covering three heavy rainfall events, while two of them are used for validation of the model system. This study provides an initial evaluation for possible coupled atmospheric-hydrological model simulations between WRF and WRF-Hydro model systems for future applications.