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WRF-Hydro Modeling of Semi-Arid Regions Using Multiple Sources of Rainfall Data: The Case Study of Faria Catchment, West Bank, Palestine

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In arid and semi-arid regions, the quantitative understanding of the processes of runoff generation and prediction of the flow hydrographs and their transmission to the outlet are among the most basic challenges of hydrology. To address these challenges, hydrological modeling has been used to improve the understanding of the water systems and to provide the required inputs needed for water resources management. Furthermore, coupling hydrological models with atmospheric models provides even more understanding of the influence of the atmospheric parameters on hydrological processes and systems, and hence on runoff generation mechanism. In this research, WRF-Hydro (the Weather Research Forecasting model coupled with the Distributed Hydrologic Modeling System) is used for streamflow forecasting in Faria catchment. Faria (320 km2), located in the north-eastern part of the West Bank, Palestine, has a unique topography (ranging from 900 m above mean sea level to 350 below mean sea level) which adds more challenges to hydrological modeling in the catchment. Rainfall fields over the entire catchment have been generated based on a data set from 1) tipping buckets at 16 different locations, 2) from ERA5 dataset produced by the European Centre for Medium-Range Weather Forecasts (ECMWF), and 3) additionally from path-averaged rain rates estimated using 7 commercial microwave links data of the cellular communication company JAWWAL. Preliminary results of the WRF-Hydro stand alone model runs have shown promising prediction capabilities of the model, but the model is still under development and the performance is expected to further enhance.