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New insights into the variability of water resources in the Jordan River Catchment

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In the Middle East the temporal and spatial variability of rainfall is pronounced, which has always led to water scarcity and severe drought events. This fact puts a challenge on assessments of available water resources, since those are normally based on long term averages. In this study we focus on the variability of rainfall and aim to investigate how this signal is amplified in the hydrological cycle in the arid and semi arid parts of the Lower Jordan River basin. Moreover we show how different rainfall characteristics affect dominating runoff generation processes. We use volume scanning rainfall radar to provide highly resoluted, 5 minute precipitation data for entire seasons and use them as input to process-based hydrological modelling. To include the full range of present rainfall variability one average and two extreme seasons are studied. For calibration purposes the seasonal radar data set is separated into events up to several days long. These events are analysed for spatial characteristics, intensity distribution and prevailing direction of the moving rainfall cells. The hydrological models (TRAIN-ZIN) are first applied to two focus catchments. The 320 km2 Faria catchment is located in the northeastern part of the West Bank. Topographic relief is accentuated resulting in a strong rainfall gradient. Simulations show that the water balance of single events strongly depends on rainfall characteristics which affect the dominating runoff generation processes (infiltration- versus saturation excess runoff). Seasonal simulations confirm that relatively small changes in rainfall may lead to considerable changes in generated runoff and percolating soil water available for groundwater

recharge. The 170 km^2 Harod catchment, situated 25 km south of Lake Tiberias, is relatively flat and heavily used by agriculture. Also here rainfall characteristics dominate runoff generation processes and alter hydrological effects of landuse changes (e.g. urbanization). While during a wet season a series of runoff events was generated, the river remained entirely dry during the drought season of 1998/99. Simulated evapotranspiration and soil water percolation provides interesting insights into green and blue water variability. In a final step focus catchment knowledge is extrapolated to simulations of the entire Lower Jordan River Basin which serve as guidelines for regional water management.