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High resolution simulation of streamflow, water table depth and continental groundwater and surface water discharge across the European continent

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Continental-scale hydrological research is becoming more important as climate variability and change, and anthropogenic impacts are increasing, which can take effect over large spacial and temporal scales. Accurate predictions of hydrological states and fluxes are essential for effective water resource management leading to the need for physics-based high resolution large scale hydrological models. We present a high resolution (3km) hydrological model of continental Europe using ParFlow, a physics-based 3D parallel hydrologic model simulating surface and subsurface flow. Results of streamflow, water table depth and continental groundwater and surface water discharge are presented. In the simulations and analyses special focus is placed on representing the spatial continuity of alluvial valley deposits, which influences the aforementioned variables and continental drainage. This study also demonstrates the added advantage of using a 3D parallel integrated hydrologic model to produce large scale processes such as lateral groundwater flow.