Geophysical Research Abstracts
Vol. 21, EGU2019-4885, 2019
EGU General Assembly 2019

Predictions in (nearly) ungauged urban basins (PUUB)

Thomas Skaugen, Rengifo Zenon Ortega, and Deborah Lawrence
Norwegian Water Resources and Energy Directorate, Hydrology, Oslo, Norway (ths@nve.no)

Understanding the urban hydrology of Oslo, Norway, is hampered considerably by a paucity of reliable data describing the urban runoff response to rainfall under varying degrees of urbanisation in different areas within the city. This knowledge is nevertheless critical for quantifying the potential benefits of low-impact flood mitigation measures, such as green roofs and rain beds. The modelling approach needed is akin to Predictions in Ungauged Basins in that parameter parsimonious models adaptable to local conditions are required and model 'calibration' involves the use of alternative data sources for building the hydrological model. In the SURF (Sustainable URban Flood management) project, we are applying a parsimonious rainfall-runoff model, DDD (Distance Distribution Dynamics), to quantify the water balance and runoff response in two contrasting urban catchments. One catchment is a typical residential area with detached houses and gardens, whereas the other is situated in an older part of Oslo, and is densely populated with blocks of flats and a park. The fraction of impermeable area (defined as roofs and roads) is 17% and 42%, respectively for the two catchments. In the DDD model, the distribution of distances from points in the catchment to the river network is an essential factor describing the runoff dynamics. As the natural drainage network is disrupted by urbanisation in both catchments, a GIS-derived surface flow network, with areal support such that it resembles the road network, serves as a proxy for estimating the distance distribution for the model. Runoff data for a partial calibration of the response to precipitation is derived from flow data from points within the combined sewer systems within the catchments. As information on sub-daily water usage is not available for the sewer points, a novel signal processing technique has been used to extract the wastewater flow from the runoff series. Preliminary modelling results indicate that the DDD model can successfully reproduce the residual runoff using these data sources, together with an hourly rainfall series, in a model calibration. The primary goal of the project is to identify the minimum level of data required for producing hydrological simulations useful for municipal authorities and planners.