IAHS2017-86
IAHS Scientific Assembly 2017

Design of drainage systems for extreme rainfalls using a CDS - IUH approach

Dan Rosbjerg (1) and Henrik Madsen (2)

(1) Technical University of Denmark, DTU Environment, Kongens Lyngby, Denmark (daro@env.dtu.dk), (2) DHI, Hørsholm, Denmark (hem@dhigroup.com)

Due to extreme rainfall incidents in recent years many large cities are considering construction of drainage systems for design rainfalls in the order of 100-year events. To facilitate initial design a procedure based on utilisation of CDS rainstorms in combination with areal reduction factors and a procedure for systematic inclusion of sub-catchments belonging to the total drainage area has been developed. Using extreme rainfalls from a dense network of recording pluviographs in Copenhagen, areal reduction factors have been developed as function of rainfall duration and area. These reduction factors have been implemented in the generation of CDS T-year storms, i.e. artificial storms that include T-year intensities for sub-durations within the storm. For each sub-catchment an instantaneous unit hydrograph has been estimated based of catchment characteristics. Combining the modified CDS rains with the unit hydrographs using convolution integrals then leads to inflow hydrographs to the drainage system. First each sub-catchment is loaded individually by a T-year CDS storm corresponding to the catchment area. Then the upper sub-catchment is combined with the next sub-catchment, and a T-year CDS storm for the combined area is applied. This procedure is continued until the most downstream sub-catchment has been included. Finally, by using maxima of the inflow hydrographs, the drainage canal/tunnel can be preliminarily designed.