Urban flood forecast based on raingauge networks

N. Simões[1,2,*], L. Wang[1], S. Ochoa[1], J. P. Leitão[3], R. Pina[4], A. Sá Marques[2], C. Maksimovic[1], R.F. Carvalho[2], L. David[3]

[1] *Department of Civil and Environmental Engineering, Imperial College London, Skempton building, South Kensington Campus, London, SW7 2AZ, United Kingdom*
[2] *Department of Civil Engineering, University of Coimbra, Rua Luís Reis Santos, 3030-788 Coimbra, Portugal.*
[3] *Laboratório Nacional de Engenharia Civil (LNEC), Av. do Brasil 101, 1700-066 Lisboa, Portugal.*
[4] *AC, Águas de Coimbra, E.E.M., Rua da Alegria n8 111, 3000-018 Coimbra, Portugal*
Corresponding author (nsimoes@imperial.ac.uk, nunocs@dec.uc.pt)

ABSTRACT

For reliable prediction of urban pluvial flooding it is essential to have reliable spatial and temporal rainfall prediction at an appropriate scale. Radar data are considered to be the most reliable. However, many urban catchments do not have access to radar data. This paper presents a new methodology for rainfall forecasting based on a network of raingauges. The methodology predicts rainfall at each raingauge location based on the Support Vector Machine (SVM) technique improved with Singular Spectrum Analysis (SSA). The prediction of the spatial distribution of rainfall is based on interpolation techniques. The forecasted rainfall fields are then used as inputs for simulation of drainage systems to obtain a short-term flood prediction. The proposed methodology is tested using real data from a case study in Coimbra, Portugal and the results obtained showed that it is possible to predict the water level 30 minutes in advance when using this methodology.

KEYWORDS

Pluvial flooding, flood modelling, rainfall forecasting, raingauges network