Development of a short-term river flood forecasting method based on wavelet analysis

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The development of short-term river flood forecasting models has been an active area of research in water resources engineering and hydrology in the last few decades. In this study, a new method of stand-alone data-based short-term river flood forecasting was developed based on wavelet and cross wavelet analysis. In the study, the newly developed wavelet forecasting method was compared to multiple linear regression analysis (MLR), autoregressive integrated moving average analysis (ARIMA), and artificial neural network analysis (ANN) for forecasting daily stream flows with lead-times equal to one, three, and seven days using data from the Rideau River watershed in Canada. Numerical analysis was performed on daily maximum stream flow data from the river station and on meteorological data from the corresponding weather station. Data from 1970 to 1997 was used to train the models while data from 1998 to 2001 was used to test the models. The most significant overall finding of this research was that it was demonstrated that the proposed wavelet forecasting method can be used with great accuracy as a stand-alone forecasting method for 1 and 3 days lead-time river flood forecasting, and as such is recommended for further exploration and potential operational testing. It was also shown that the proposed wavelet forecasting method is not particularly accurate for longer lead-time forecasting such as 7 days, with the ANN method providing more accurate results.