

## **Daily rainfall simulations and return period calculations for Malaysian monsoons**

Nur Shazwani Muhammad and Pierre Y. Julien

Department of Civil and Environmental Engineering, Colorado State University

**Abstract.** Multi-day rainfall precipitation during monsoons is the main causes of flooding in Malaysia. For example, the devastating Kota Tinggi flood in December 2006 was caused by 5 consecutive rainy days totaling 350 mm of precipitation. Discrete autoregressive models are tested to simulate the rainfall precipitation with daily rainfall data from 1960 to 2011 at Subang Airport, in the state of Selangor. Two discrete autocorrelation models, namely the Discrete Auto Regressive (DAR(1)) and Discrete Auto Regressive and Moving Average (DARMA(1,1)) were considered. The DAR(1) model is easy to use, however, it lacks in long-term persistence. Therefore, it is not adequate to simulate the long sequence of daily rainfall in tropical and monsoon-affected areas. DARMA(1,1) is best suited in tropical and monsoon areas because the model has a long-term persistence, therefore it can overcome the problem represented by DAR(1). The return periods are calculated using the joint probability of rainfall amount and duration. Higher return periods were observed for one rainy day with the rainfall amount of more than 13 mm, as compared to the multi-day events.

**Keywords:** daily precipitation, discrete autoregressive models, return period, monsoon precipitation