Plinius Conference Abstracts,
Vol. 11, Plinius11-3, 2009
11th Plinius Conference on Mediterranean Storms

Rainfall-runoff modeling in a small hyper-arid catchment

E. Morin, Y. Bahat, T. Grodek, and J. Lekach

Hebrew University of Jerusalem, Geography, Jerusalem, Israel (msmorin@mscc.huji.ac.il)

Quantitatively estimating rainfall-runoff relations in extremely arid regions is a challenging task, mainly because of lack of in-situ data. For the past 40 years, rain and floods have been monitored in the Nahal Yael catchment (0.5 km^2) in southern Israel, providing a unique data set of runoff hydrographs and rainfall in a hyper-arid region. Here we present an exploratory study focusing on rainfall-runoff modeling issues for a small (0.05 km^2) sub-catchment of Nahal Yael. The event-based model includes the computation of rainfall excess, hillslope and channel routing. Two model parameters of the infiltration process were found by calibration. A resampling methodology of calibration group composition is suggested to derive optimal model parameters and their uncertainty range. Log-based objective functions were found to be more robust and less sensitive than non-log functions to calibration group composition. The fit achieved between observed and computed runoff hydrographs for the calibration and validation events is considered good relative to other modeling studies in arid and semi-arid regions. The study indicates that, under the calibration scheme used, a lumped model performs better than a model representing the catchment division into three sub-catchments. In addition, the use of rain data from several gauges improves runoff prediction as compared to input from a single gauge. It was found that rainfall uncertainty dominates uncertainties in runoff prediction while parameter uncertainties have only a minor effect.