

The development and assessment of a regionalised daily rainfall disaggregation model for South Africa

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Abstract

The temporal distribution of rainfall, viz. the distribution of rainfall intensity during a storm, is an important factor affecting the timing and magnitude of peak flow from a catchment and hence the flood-generating potential of rainfall events. Rainfall intensity is also one of the primary inputs into hydrological models used for the design of hydraulic structures. In the absence of continuously recorded rainfall data, one method of estimating the temporal distribution of rainfall is to disaggregate coarser-scale data into a finer resolution, e.g. from daily data into hourly rainfall information. In this study, a daily to hourly disaggregation model developed in Australia, and modified for application in South Africa, is used. However, this model requires input obtained from short-duration data at the desired location. Owing to the paucity of short-duration data in South Africa, the methodology is regionalised to enable the application of the model at a national scale, particularly at locations where only daily data are available. The regionalised model was independently tested at 15 locations in differing climatic regions in South Africa. At each location, observed hourly data were aggregated to yield daily values and were then disaggregated using the methodology. Results show that the regionalised model is capable of replicating the results obtained when 'at-site' short duration rainfall data are used as input to the disaggregation model, and is able to retain the daily totals and the statistical characteristics of the hourly rainfall.

Keywords: temporal rainfall disaggregation, regionalisation, South Africa