

## ABSTRACT

Downscaling seasonal rainfall predictions to daily time-scale, for crop yield simulation for instance, can be performed using stochastic generators (SGs). The spatial interpolation of the SG parameters is required to generate rainfall time-series at ungauged places. A methodology is defined which makes use of topography to interpolate these parameters, in a region with a rugged terrain covering Kenya and north-eastern Tanzania. A first-order Markov chain was used to model rainfall occurrence, and a gamma distribution was used to model amounts. The 2 parameters of the Markov models,  $p_{01}$  and  $p_{11}$ , and the 2 parameters of the gamma distribution are computed at 121 stations. The Kolmogorov-Smirnov test for goodness-of-fit shows that 88% (99%) of the stations and months have their dry (wet) spell frequencies successfully reproduced by first-order Markov chains, and two-third of the stations have their daily amounts satisfactorily fitted by the gamma distribution. Local regression, using elevation as the predictor and weighting stations according to distance from the target pixel and to environmental variables, is used to interpolate the 4 SG parameters. Cross-validation indicates that distance-weighted regression provides good estimates, but the inclusion of topographical variables (aspect in particular) improves the results further. The final maps show a strong orographic control of both the Markov and gamma parameters. However, while elevation has an effect on rainfall occurrence, rainfall intensity is more strongly related to local slope aspect, with eastward to southeastward oriented foothills and coastlines displaying the highest gamma scale values. These results suggest that a statistical disaggregation of daily rainfall is improved by taking explicitly into account topography through its effect on the spatial distribution of SG parameters.