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Nile Basin Rainfall Scenarios for Climate Impacts Investigation

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A statistical downscaling model (SDM) is developed and tested with rainfall data from the Blue Nile Basin. The SDM allows daily rainfall to be generated at a 20km x 20km resolution from monthly 2.5^o x 3.75^o GCM output. In a departure from traditional approaches, the statistical downscaling methodology uses the GCM-simulated rainfall as a predictor of the statistical properties of small-scale rainfall. Daily rainfall fields are generated using a stochastic generator that replicates the spatial and temporal correlation structure of the observed data. Three GCMs are employed in the study; (i) the Canadian Climate Model CGCM2 (ii) the climate model developed at the German Max Planck Institute ECHAM4 and (iii) the UK Hadley Centre model HadCM3. The statistics of the SDM generated rainfall over a baseline period compare well with observational data. Once calibrated, ensemble runs of the SDM are used to produce multiple traces of future daily rainfall over the Blue Nile Basin until the end of the century. These rainfall scenarios are fed into an operational distributed hydrological model to assess the sensitivity of Blue Nile flows to climate change.