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COMPARING THE PERFORMANCE OF WGEN AND CLIMGEN IN THE GENERATION OF TEMPERATURE AND SOLAR RADIATION

Weather data generation is often used as input to computer programs such as hydrological and crop simulation models. For data generation, one of the most commonly used programs is WGEN. This weather generator produces daily maximum and minimum temperatures and solar radiation data based on serial and cross-correlation matrices with a fixed set of annual coefficients determined using data from U.S. locations that include a wide range of climatic conditions. The generator ClimGen is based on principles similar to those in WGEN, but has two unique features: (1) the generation matrices are calculated for each location of interest, and (2) to calculate daily weather generation parameters from monthly statistics, ClimGen uses spline functions instead of Fourier series. The performance of WGEN and ClimGen in the generation of long-term series of daily maximum (Tx) and minimum (Tn) temperatures and solar radiation (Rs) was compared using seven sites selected to represent a wide range of climates. In addition, Priestley-Taylor potential evapotranspiration (P-T ET_o) series calculated using actual and generated weather were compared. While temperature monthly means tended to be better replicated by WGEN, ClimGen was better at reproducing their daily variability. In the case of solar radiation, ClimGen better replicated both the means and variances. Comparisons of actual and generated cumulative distribution functions (CDF) of Tx, Tn, Rs, and P-T ET_o indicated that both ClimGen and WGEN were unable to replicate the actual distributions over the entire range of values. However, the lower percentage of Kolmogorov-Smirnov tests rejected and the higher threshold values at which the tests started to fall into the rejection region indicated that ClimGen tended to provide generated series that were more realistic than WGEN. While the results show that these generators produce generated data that depart statistically from actual data for a fraction of the generated period, the impact of this shortcoming will depend on the specific application of interest.

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