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# Assessing the applicability of a Bias-Correction and Stochastic Analog method (BCSA) to downscale daily GCM precipitation predictions for South Korea

Syewoon Hwang (1) and Jaepil Cho (2)

(1) Associate Professor, Gyeongsang National University, Jnju, South Korea (swhwang@gnu.ac.kr), (2) Senior Researcher, Research Department, APEC Climate Center, Busan, South Korea (jpcho89@apcc21.org)

There are a number of statistical techniques that downscale coarse climate information from general circulation models (GCMs). However, many of them do not reproduce the small-scale spatial variability of precipitation exhibited by the observed meteorological data, which is an important factor for predicting hydrologic response to climatic forcing. Recently Bias-Correction and Stochastic Analog method (BCSA) was developed to produce stochastic realizations of bias-corrected daily GCM precipitation fields that preserve both the spatial autocorrelation structure of observed daily precipitation sequences and the observed temporal frequency distribution of daily rainfall over space. The BCSA has been proven to be a superior method to spatially-downscale the coarse precipitation information for rainfall-dominated watersheds, where reproducing small-scale spatiotemporal precipitation variability is important.
This study applied the BCSA method to downscale 29 daily GCM precipitation predictions over South Korea to assess the applicability for the mountainous regions with high spatial-variability of precipitation events, and finally producted the ensemble of spatially distributed future precipitation time series for South Korea.
The study evaluated ensembles in reproducing spatio-temporal statistics, such as, transition probabilities, wet/dry spell lengths, spatial correlation indices, and variograms for wet (June through September) and dry (October through May) seasons for each GCM output. Results demonstrated that the BCSA replicated observed spatio-temporal statistics for both the wet and dry seasons for South Korea. Additionally several challenging issues needed to improve the method were also found and will be further worked out.

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