Statistical Downscaling using Hybrid Model of Multi-Site Artificial Neural Network and Random Cascade Scheme

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Abstract. Major issues in using Global Climate Model output for future climate projection are uncertainty problem and incomplete modeling subgrid-scale hydrologic extremes due to local convective storms or tropical cyclone, etc. Among the GCM variables the precipitation variable attracts hydrologists' greatest interests, but shows relatively highest uncertainty at the same time. To raise the predictability we synthesize the precipitation using Principle Component Score (PCS) applied to the GCM climate model output and Multisite Artificial Neural Network (MANN) which is based on the 3-layer perceptron back-propagation algorithm. The higher training performance could be obtained using the predictand variable set disregarding the rainfall occurred due to typhoon events. Also, The Stochastic Spatial-Temporal Random Cascade Model (SST-RCM) of sub-grid scale was applied. The main advantage of the SST-RCM is that it reproduces the spatial clustering, intermittency and self-similarity features, the spatial geometric gradient within clusters, and the inter-scale correlation structure of observed precipitation with a relatively low computational burden. This research calculated self-similarity variable Beta in April, July 2009~2010 and the comparable result of rainy fraction of original rainfall field and calculated from beta the errors were small about each scale.

Key words: Statistical downscaling, Multi-site Artificial Neural Network, SST-RCM

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