

Basin-wide Regionalization of Large-scale Model Output using the Artificial Neural Network Algorithm

Boosik Kang

Department of Civil and Environmental Engineering, Dankook University, Yongin-si Gyeonggi-do, Republic of Korea

Bonggi Lee

Surotech Inc., #126-1 Pyeongchon-dong Dongan-gu Anyang-si Gyeonggi-do, Republic of Korea

Abstract. This study carried out the prediction of basin-wide climate change using GCM(Global Climate Model) climate change outlook scenario. To regionalize the original GCM scenario, the Artificial Neural Network (ANN) model was used. The 22 GCM output variables including precipitation flux, air pressure at sea level, near-surface daily-mean air temperature, surface upward latent heat flux etc, were used for potential predictor variables. The precipitation and temperature variables were used for predictands. The original GCM data is the CGCM3.1/T63 20C3M scenario (reference scenario) provided by CCCma (Canadian Centre for Climate Modeling and Analysis).

The ANN learning process was performed from January 1997 to December 2000. The suggested ANN has a 3-layer perceptron (multi-layer perceptron; MLP) and back-propagation learning algorithm. The ANN predictors selected through the sensitivity analysis were utilized for final ANN model of Soyang and Chungju dam basin. Daily temperature and precipitation trend from 2001 to 2100 were suggested. The basin-wide prediction data of climate change scenario can be served as input data of long-term runoff model and give estimate of future available water resources.

Keywords: Artificial Neural Network, Global Climate Model, multi-layer perceptron