Quantification of future climate uncertainty over South Korea using eather generator and GCM

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Abstract

To interpret the climate projections for the future as well as present, recognition of the consequences of the climate internal variability and quantification its uncertainty play a vital role. The Korean Peninsula belongs to the Far East Asian Monsoon region and its rainfall characteristics are very complex from time and space perspective. Its internal variability is expected to be large, but this variability has not been completely investigated to date especially using models of high temporal resolutions. Due to coarse spatial and temporal resolutions of General Circulation Models (GCM) projections, several studies adopted dynamic and statistical downscaling approaches to infer meterological forcing from climate change projections at local spatial scales and fine temporal resolutions. In this study, stochastic downscaling methodology was adopted to downscale daily GCM resolutions to hourly time scale using an hourly weather generator, the Advanced WEather GENerator (AWE-GEN). After extracting factors of change from the GCM realizations, these were applied to the climatic statistics inferred from historical observations to re-evaluate parameters of the weather generator. The re-parameterized generator yields hourly time series which can be considered to be representative of future climate conditions. Further, 30 ensemble members of hourly precipitation were generated for each selected station to quantify uncertainty. Spatial map was generated to visualize as separated zones formed through K-means cluster algorithm which region is more inconsistent as compared to the climatological norm or in which region the probability of occurrence of the extremes event is high. The results showed that the stations located near the coastal regions are more uncertain as compared to inland regions. Such information will be ultimately helpful for planning future adaptation and mitigation measures against extreme events.

Keywords : Climate variability, Stochastic downscaling, Uncertainty, AWE-GEN

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