Spatiotemporal distribution of downscaled hourly precipitation for RCP scenarios over South Korea and its hydrological responses

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Abstract

Global Climate Model (GCM) is too coarse to apply at a basin scale. The spatial downcsaling is needed to used to permit the assessment of the hydrological changes of a basin. Furthermore, temporal downscaling is required to obtain hourly precipitation to analyze a small or medium basin because only few or several hours are used to determine the peak flows after it rains. In the current study, the spariotemporal distribution of downscaled hourly precipitation for RCP4.5 and RCP8.5 scenarios over South Korea is presented as well as its implications over hydrologica responses. Mean hourly precipitation significantly increases over the southern part of South Korea, especially during the morning time, and its increase becomes lower at later times of day in the RCP8.5 scenario. However, this increase cannot be propagated to the mainland due to the mountainous areas in the southern part of the country. Furthermore, the hydrological responses employing a distributed rainfall-runoff model show that there is a significant increase in the peak flow for the RCP8.5 scenario with a slight decrease for the RCP4.5 scenario. The current study concludes that the employed temporal downscaling method is suitable for obtaining the hourly precipitation data from daily GCM scenarios. In addition, the rainfall runoff simulation through the downscaled hourly precipitation is useful for investigating variations in the hydrological responses as related to future scenarios.

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Key words : Climate Change, Extreme Events, Hourly Precipitation, RCP, Temporal Downscaling, Runoff

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