Uncertainty Analysis based on LENS-GRM

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Abstract

Recently, the frequency of abnormal weather due to complex factors such as global warming is increasing frequently. From the past rainfall patterns, it is evident that climate change is causing irregular rainfall patterns. This phenomenon causes difficulty in predicting rainfall and makes it difficult to prevent and cope with natural disasters, casuing human and property damages. Therefore, accurate rainfall estimation and rainfall occurrence time prediction could be one of the ways to prevent and mitigate damage caused by flood and drought disasters. However, rainfall prediction has a lot of uncertainty, so it is necessary to understand and reduce this uncertainty. In addition, when accurate rainfall prediction is applied to the rainfall-runoff model, the accuracy of the runoff prediction can be improved.

In this regard, this study aims to increase the reliability of rainfall prediction by analyzing the uncertainty of the Korean rainfall ensemble prediction data and the outflow analysis model using the Limited Area ENsemble (LENS) and the Grid based Rainfall-runoff Model (GRM) models. First, the possibility of improving rainfall prediction ability is reviewed using the QM (Quantile Mapping) technique among the bias correction techniques. Then, the GRM parameter calibration was performed twice, and the likelihood-parameter applicability evaluation and uncertainty analysis were performed using R^2, NSE, PBIAS, and Log-normal. The rainfall prediction data were applied to the rainfall-runoff model and evaluated before and after calibration. It is expected that more reliable flood prediction will be possible by reducing uncertainty in rainfall ensemble data when applying to the runoff model in selecting behavioral models for user uncertainty analysis. Also, it can be used as a basis of flood prediction research by integrating other parameters such as geological characteristics and rainfall events.

Keywords : LENS-GRM, Flood prediction, Rainfall-Runoff, Uncertainty

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