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GCM の現在期間再現性を考慮したチャオプラヤ流域における将来流量予測
Application of performance metrics to climate models to project future river discharge in the Chao Phraya River basin

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Future river discharge in the Chao Phraya River basin was projected, taking into account the performance of multiple General Circulation Models (GCMs). Future hydrological simulations using outputs from multiple GCMs are important for assessing the uncertainty in the projections. In addition, consideration of the spread of GCM projections should be included in the analysis to appropriately evaluate extremes, as there can be significant differences among projections. This study, therefore, developed a bias-corrected dataset for multiple GCMs outputs and a performance metrics to evaluate each GCM in order to project future river discharge more appropriately.

To develop a bias-corrected future climate dataset, an advanced bias correction method is applied, in which the trend of variables from the reference to the projection period is preserved. Then, future river discharge was projected by the H08 hydrological model. The newly developed future climate dataset enabled us to conduct a projection that considered the spread of projection derived from multiple GCMs.

Several metrics to evaluate the performance of each GCM to reproduce monsoon precipitation were proposed to estimate performance-based projection because evaluation of GCM performance in simulating monsoon behavior is important for projecting future discharge in the Chao Phraya River basin. This study was performed to investigate the effects of performance metrics and to estimate the spread of projections derived from the differences in multiple performance metrics.

Multiple future projections using available GCM outputs were conducted in the Chao Phraya River basin and multiple weighted ensemble means were obtained using the proposed multiple metrics related to monsoon precipitation. We compared the projected results obtained and discuss the characteristics of each projection. The performance-based projections indicated that the future river discharge in September is increased by 60%?90% of the retrospective simulation. Our results highlight the importance of appropriate evaluation for the performance of GCMs.

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