全球暖化程度 2℃
對臺灣降雨與流量之衝擊分析

Impact analysis of rainfall and runoff in Taiwan under the global warming level of 2℃

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摘　要

因人為排放溫室氣體而導致的氣候變遷，已對自然環境及人類社會造成廣泛的衝擊，其中部分負面影響無法逆轉。各國研究人員針對氣候變遷造成之不同暖化情境，模擬暖化情境下之溫度與雨量，本研究假設 2040 年至 2060 年間，全球溫度升溫 2℃（相較於 1850 年至 1900 年），於此暖化情境下，探討臺灣本島 39 個集水區之雨量、流量之變化。本研究使用「臺灣氣候變遷推估資訊與調適知識平台計畫」之網格化情境資料與網格化歷史資料，代入修正型 HBV（Hydrologiska Byrans Vattenbalansavdelning）水文模式，進行各集水區之降雨逕流模擬，對暖化情境之雨量、流量衝擊進行分析。分析結果顯示升溫 2℃情境下，臺灣北部、中部、東部於豐水期之雨量及流量有較大可能性增加，於枯水期之雨量及流量有較大可能性減少；而臺灣南部於豐水期之雨量、流量增加可能性與減少可能性大致相同，於枯水期之雨量、流量增加可能性與減少可能性亦大致相同。此外，升溫 2℃情境下，全臺灣的每年連續不降雨日數及每年低流量日數均有高機率增加。

關鍵詞：氣候變遷、HBV 水文模式、降雨逕流模擬、衝擊分析、升溫 2℃情境

Abstract

Climate change caused by human greenhouse gas emissions has had widespread impacts on the natural environment and human society, with some negative effects being irreversible. Researchers worldwide have simulated temperature and rainfall scenarios under different warming conditions caused by climate change. This study adopted the scenario of a global temperature increase of 2℃ between 2040 and 2060 (relative to 1850 to 1900). Under this warming scenario, the study examined changes in rainfall and runoff in 39 watersheds in Taiwan. This study used gridded scenario data and historical data from the “Taiwan Climate Change Projection Information and Adaptation Knowledge Platform” and employed the

modified HBV (Hydrologiska Byrans Vattenbalansavdelning) hydrological model to simulate rainfall–runoff mechanism in each watershed and to analyze the impacts of warming on rainfall and runoff.

The analysis results indicate that, under the 2℃ warming scenario, there is a higher likelihood of increased rainfall and runoff during the wet season in northern, central, and eastern Taiwan, while there is a higher likelihood of decreased rainfall and runoff during the dry season. In southern Taiwan, the likelihood of increase and decrease in rainfall and runoff during both wet and dry seasons is roughly the same. Additionally, under the 2℃ warming scenario, there is a high probability of an increase in the number of consecutive non-rainy days and low-flow days across Taiwan.

Keywords: climate change, HBV hydrological model, rainfall–runoff simulation, impact analysis, 2℃ warming scenario