

氣候情境之淹水災害風險評估與不確定性分析

Flood Risk Assessment Under Climate Scenarios and its Uncertainty Analysis

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摘要

國家災害防救科技中心自 2013 年發展第一版災害風險圖(A1B 情境)，後配合 RCP8.5 情境推出，於 2015 年完成第二版淹水災害風險圖，於 2020 年更完成第三版之開發。因 2013 及 2015 年兩版都是採用的單一大氣環流模式，模式不確定性相對較高，因此第三版淹水災害風險圖，改採用統計降尺度的多模式資料進行風險評估，其相關圖資成果均已展示於氣候變遷災害風險調適平台(簡稱 Dr. A，網址連結：<https://dra.ncdr.nat.gov.tw/Frontend/AdvanceTool/TotalRiskDetail1?Kind=1>)。

本計畫採用 2°C 情境資料評估以鄉鎮與最小人口統計區尺度之空間分布下淹水災害風險圖，以行政單元呈現風險圖，可利於管理者了解未來情境下淹水災害風險空間分布變化，並進一步採取相關調適措施。針對氣候變遷淹水災害風險圖，更額外開發了圖資應用的 R 程式工具，利於使用者依據其研究及評估目的，選擇合適之圖資進行後續套疊應用。此外，相較於過去單一模式模擬，新版淹水災害風險圖採用的大氣環流模式增加至 30 多個，可進一步利用訊號比與累積機率不同百分比，評估模式間的表現，並呈現多模式的一致性與不確定性。

關鍵詞：氣候變遷，統計降尺度，淹水災害，風險圖，空間尺度

關鍵詞：氣候變遷情境、災害風險地圖、環境變遷模擬

Abstract

The National Science and Technology Center for Disaster Reduction (NCDR) developed the first version of the disaster risk map (A1B scenario) in 2013 and launched a second version of the map when RCP8.5 scenario was released. In 2020, third version of the Flood disaster risk map was successfully developed to suit the users need by using statistically downscaled multi-model data for risk assessment. Since the first two editions (2013 and 2015) both adopted a single atmospheric circulation model, the uncertainty of the result is relatively high. Therefore, the third edition of the Flood disaster risk maps utilize 33 models for analysis and all relative maps have been displayed on the Climate

Change Disaster Risk Adaptation Platform (“Dr. A” for short, website link: <https://dra.ncdr.nat.gov.tw/>).

This project uses 2°C simulation data to produce the Flood risk map based on the spatial distribution of townships and the smallest demographic area. The risk map is also presented in the scale of administrative units, which can help decision makers to understand the changes in the spatial distribution of Flood risk in future scenarios while considering further response measures. For climate change and Flood disaster risk maps, an additional R program tool has been developed, which is helpful for users to select appropriate map data for subsequent applications according to their research and evaluation purposes. In addition, compared with previous single-model simulations, the new version of the Flood disaster risk map uses more than 30 atmospheric circulation models, which can further analyze the signal to noise ratios (SNR) and the difference in the cumulative probabilities to evaluate the performance of each model and present the consistency index of multiple models to explain uncertainty.

Keywords : Climate change scenarios, Disaster Risk Map, Environmental Change Simulation