

防災淹水機率圖資產製及應用服務系統精進

Stochastic Flood Inundation Mapping Program and Its Decision-Making Support Services

主管單位：經濟部水利署

張倉榮^{1,2}

鄭克聲^{1,3}

王嘉和²

Chang, Tsang-Jung^{1,2}

Cheng, Ke-Sheng²

Wang, Chia-Ho²

¹ 國立臺灣大學生物環境系統工程學系

² 國立臺灣大學氣候變遷與永續發展研究中心

³ 國立臺灣大學水工試驗所

摘要

颱風水利署去年完成第三代淹水潛勢圖資的審議與公開作業，提供防災規劃使用，但淹水潛勢圖資的設計雨型係採 Horner 雨型且在空間上分布均一，與實際降雨情形不同，導致與實際淹水情形產生落差。

為補足災前階段防救災人員對於各地區發生淹水的決策判斷支援能力，本計畫選擇臺北市與基隆市地區作為研究區域，以颱風類型降雨為研究對象，蒐集歷史降雨資料分析時空間的分布特性，建立暴雨事件大數據資料庫以及暴雨序率模擬模式，據此繁衍出大量符合歷史降雨時空間分布特性的模擬降雨事件共 83,000 場，並根據降雨量值大小分為 4 組模擬情境，分別為 24 小時降雨 125~275 毫米、275~425 毫米、425~575 毫米、575 毫米以上，對應於淹水潛勢圖的 24 小時 200、350、500 及 650 毫米情境，從中依照雨量大小區間分別隨機挑選 2,662 場使用 NTU-CAFIM(Cellular Automaton Flood Inundation Model)快速淹水模式進行臺北市與基隆市的淹水模擬。根據淹水模擬的結果，能夠在每個網格點統計不同積淹水深度的發生機率，繪製成防災淹水機率圖資，呈現各種降雨量情境下的易積淹水位置，並能夠根據淹水的發生機率評估救災的優先程度。

防災淹水機率圖資將匯入水災潛勢風險圖資應用服務系統，提供指定降雨情境查詢圖資的功能，搭配系統介接的中央氣象局的預報降雨量，根據雨量值即時挑選防災淹水機率圖資進行展示，提供災中預警及決策支援之充足資訊。此外，本計畫亦持續維運精進水災風險圖資應用服務系統，優化各項服務功能，俾供颱風期間災害應變情資研判之用。

關鍵詞：暴雨序率模式、淹水機率、淹水潛勢圖、快速淹水模式

Abstract

In 2017, the Water Resources Agency has revealed the third version of potential inundation maps for flood disaster prevention. The designed storm pattern is derived by using Horner formula and is assumed to be spatially homogeneous, which is inconsistent with actual rainfall. Thus, the corresponding simulated flood maps may have some inconsistencies with actual flood maps.

In order to support the disaster relief personnel during flood in various regions, the Storm Rainfall Spatiotemporal model was developed to analyze the temporal and spatial distribution of various storms in this project. By using this model, 83,000 rainfall data were simulated and divided into 4 groups, which are respectively 125~275 mm, 275~425 mm, 425~575 mm and over 575 mm precipitation in 24 hours, corresponding to the designed conditions of Flood Potential Maps with are 200 mm, 350 mm, 500 mm, and 650 mm precipitation in 24 hours. Taipei City and Keelung City were regarded as the target area, randomly selected 2,662 rainfalls to perform flooding simulation by Cellular-Automaton Inundation Model. According to the results, flooding frequency on every mesh was counted and 4 flood probability maps were obtained. Additionally, based on the forecast data offered by the Central Weather Bureau, the developed model could provide a better estimation for flood.

The flood probability maps are imported to the service system for flood potential estimation. Therefore, the query service for a specific rainfall has completed. In addition, this system will show the real-time flood probability maps with the forecast data from the Central Weather Bureau involved. Through this project, the service system for flood potential estimation could be improved to achieve more accurate estimations and decisions.

Keywords : flooding disasters, inundation potential maps, vulnerability, risk.