



ASTER-DEM Derived Flood Inundation Map Using 1D-2D Flood Modeller Pro in Kuantan River Basin

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Abstract:

A topography dataset in the form of digital elevation model (DEM) is required to derive flood prone areas. However, there are different types of DEM for flood inundation mapping. Besides this, flood is one of the most destructive natural hazards which frequently occur in Malaysia. Flood is the cause for loss of life and damage to the people's properties and urban infrastructure. To mitigate damages, it would be useful to generate a flood extent map as a guideline for local authorities mainly for urban development and flood mitigation purposes. It is always difficult to find elevation datasets in many places. In addition, the accuracy of flood inundation is highly dependent on the source of elevation data. There are several sources of global free elevation data which can be used for flood modeling. Many researchers have shown the performance of public domain free available DEM in different countries. However, research on this issue in flat urban river basins in Malaysia is still rare. This research aims to investigate the suitability of Advanced Space Borne Thermal Emission and Reflection Radiometer Global Digital Elevation Model (ASTER-GDEM) for 1D/2D flood inundation modeling in the Kuantan River Basin. The methodology is based on the integration of ASTER-GDEM and Flood Modeller Pro (FMP) to delineate flood inundation areas in the Kuantan River Basin (KRB). The river cross-sections are generated from ASTER-DEM. The results are shown as flood-affected areas according to time-based dynamic changes. Flood-affected areas can be categorized into stages like highest risk, high risk, moderate risk, and low risk for clear visualization by reclassification methods. Based on the map, the urban area was prone to the highest risk zone due to its location near the main river. There are also some areas under the highest risk zone. The obtained results conclude that a 30m resolution ASTER-DEM can serve as an input to detailed 2D hydrodynamic modeling in data-scarce regions. In this study, the 1D channel model and 2D floodplain model are well presented by using FMP. Flood inundation maps are beneficial and important to all local authorities for flood management purposes and urbanization, such as building construction. Good maintenance can be conducted based on the results produced so that the risk of damage will decrease. According to the results obtained, ASTER-GDEM can be used as one alternative for flood inundation maps. However, it seems ASTER-GDEM does not provide good enough details in flat urban areas.

Keywords: 1D-2D Model, ASTER-GDEM, FMP
