Transactions in GIS

Geographic information system data considerations in the context of the enhanced bathtub model for coastal inundation

Williams, LL; Lück-Vogel, Melanie

Abstract:
This study determines input data appropriateness for geographic information system-based enhanced bathtub model (eBTM) modeling of coastal inundation in an urban setting. Various tests were conducted concerning digital surface models (DSMs) to determine: (a) the highest appropriate resolution achievable from available LiDAR data and consider variations between derived sub-meter DSMs; (b) optimal DSM horizontal resolution for coastal inundation modeling based on “out-the-box” solutions; and (c) mechanisms to address the challenge presented by DSMs regarding overhanging structures for a study site in False Bay, South Africa. Results showed that while sub-meter DSMs are achievable, low point cloud densities may result in the misrepresentation of structures, which affects the inundation extents. High horizontal resolution DSMs are required for inundation modeling in an urban setting to account for narrow thoroughfares. Challenges posed by first return LiDAR depicting bridges as solid structures could be circumvented by modifying the input water source for the eBTM processing.