Geophysical Research Abstracts
Vol. 18, EGU2016-14027, 2016
EGU General Assembly 2016

Urban topography for flood modeling by fusion of OpenStreetMap, SRTM and local knowledge

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Topography data is essential for understanding and modeling of urban flood hazard. Within urban areas, much of the topography is defined by highly localized man-made features such as roads, channels, ditches, culverts and buildings. This results in the requirement that urban flood models require high resolution topography, and water conveying connections within the topography are considered. In recent years, more and more topography information is collected through LIDAR surveys however there are still many cities in the world where high resolution topography data is not available. Furthermore, information on connectivity is required for flood modelling, even when LIDAR data are used.

In this contribution, we demonstrate how high resolution terrain data can be synthesized using a fusion between features in OpenStreetMap (OSM) data (including roads, culverts, channels and buildings) and existing low resolution and noisy SRTM elevation data using the Google Earth Engine platform. Our method uses typical existing OSM properties to estimate heights and topology associated with the features, and uses these to correct noise and burn features on top of the existing low resolution SRTM elevation data. The method has been setup in the Google Earth Engine platform so that local stakeholders and mapping teams can on-the-fly propose, include and visualize the effect of additional features and properties of features, which are deemed important for topography and water conveyance. These features can be included in a workshop environment. We pilot our tool over Dar Es Salaam.