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High-resolution DEM Creation using a UAV for Flood Inundation Hydrodynamic Modeling- A Case of Rel River Flood, Gujarat, India

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Catastrophic flood leads to a major disaster in developing countries. It loses a life and significant valuable properties, therefore its assessment is a prime requirement to identify the risk and vulnerable area in a flood-prone region. Many hydrodynamic models are providing a solution to identify the flood inundation area, flood arrival time, and velocity of flow in flood susceptible area, however, due to the low resolution of DEM, it can't assess the actual flooding condition. To overcome this limitation, the present study describes the creation of high resolution (3 cm gridded) DEM for Dhanera city, Rel river catchment in Gujarat where it was affected by the catastrophic flood in the year of 2015 and 2017. Phantom 4 Pro RTK, DGPS and Pix4 software are used for creation of high-resolution DEM. The entire 10 km² area of Dhanera city is divided into 4 blocks and each block is mapped by Phantom 4 pro-RTK Unmanned Aerial Vehicle (UAV) at 80 % image overlaps. A total of 9222 images are captured and post-processed using Pix 4 software. Ground Control Points were marked for rectification in the geo-location of aerial images using DGPS (RTK). The aerial images collected during the survey have a spatial resolution of 3 cm with geo-location. The data collected is put for post-processing using Pix4D mapper software. 3D classified point cloud, DTM and DSM of 3 cm spatial resolution, orthomosaic of 3 cm spatial resolution are produced after the processing. Generated High-resolution DEM (DTM & DSM) will be utilized for hydrodynamic modeling to produce precise flood inundation maps.

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