Numerical modeling of tsunami inundation using subgrid scale urban roughness parameterization

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The importance of accurate numerical modeling of tsunami inundation in an urban area has clearly realized due to the devastating damage from 2011 Tohoku Earthquake Tsunami. Although, numerical inundation simulations using high resolution topography data (O(1m)), the medium resolution tsunami inundation model (O(10m)-O(100m)) needs and useful for tsunami hazard assessment. This study develops and validates a numerical model of tsunami inundation using upscaled urban roughness parameterization: Drag Force Model (DFM) which deals with the effect of structures as drag force acting on flow based on physical modeling. The validation of the DFM reveals that the DFM can express the effect of the flow direction and inundation ratio. However, the estimation of the drag coefficient and mesh size dependency are challenges.

Keywords: tsunami, inundation, upscaling, drag force