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## Near-real-time flood forecasting for an urban coastal catchment: An approach in combination of numerical weather and 3-way coupled hydrodynamic flood modelling

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The rapid increase in heavy precipitation flooding events highlights the need for efficient flood forecasting techniques to facilitate flood hydrological research and effective flood management by civic bodies. The current study aims to develop a near-real-time flood forecasting framework by integrating a 3-way coupled hydrodynamic flood model framework with numerical weather modelling based rainfall forecasts. The proposed framework has been demonstrated over Mumbai city in India, which is subjected to flooding every year during the monsoon months. A fine-resolution atmospheric simulation with the Weather Research and Forecasting (WRF) model has been performed for rainfall forecasts, which serve as an input to the flood model. To access the impact of urbanization on rainfall extremes, three scenarios are considered in the WRF simulations, i.e., WRF model: (1) without Urban canopy model (WRF-NoUCM), (2) coupled with a single-layer Urban canopy model (WRF-SUCM), and (3) coupled with a multi-layer Urban canopy model (WRF-MUCM). Further, a three-way coupled flood model has been developed where the MIKE 11 model (streamflow) with the drainage network (stormwater drains) and the MIKE 21 model (overland flow) have been considered for flood inundation and subsequently hazard mapping. In addition, the tidal elevation is provided along the coastline in the model setup. The flood maps developed by three WRF forecasted rainfall scenarios have been compared with that of the maps developed with observed rainfall. The extent to which the scenarios have been able to imitate the pattern and extent of flooding generated by observed rainfall has been investigated to decide the best scenario to be adapted in the comprehensive flood forecasting network. This state-of-art flood forecasting approach may be implemented in other flood-prone coastal regions as a major non-structural flood management strategy to reduce flood risk and vulnerabilities for the people dwelling in those regions.