

# **Simulating storm surge and inundation along the coast of Taiwan during Typhoon Fanapi in 2010 and Soulik in 2013**

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## **Abstract**

Taiwan is subjected to significant storm surges, waves, and coastal inundation during frequent tropical cyclones. Along the west coast with gentler bathymetric slopes, storm surges often cause significant coastal inundation. Along the east coast with steep bathymetric slopes, waves can contribute significantly to the storm surge in the form of wave setup. To examine the importance of waves on storm surges and to quantify the significance of coastal inundation, this paper presents numerical simulations of storm surge and coastal inundation during two major typhoons, Fanapi in 2010 and Soulik in 2013, which impacted the southwest and northeast coasts of Taiwan, respectively. The simulations are conducted with an integrated surge-wave modeling system using a large coastal model domain wrapped around the island of Taiwan, with a grid resolution of 50-300 m. During Fanapi, the simulated storm surge and coastal inundation near Kaohsiung are not as accurate as those obtained using a smaller coastal domain with finer resolution (40-150 m). During Soulik, model simulations show that wave setup contributed significantly (up to 20%) to the peak storm surge along the northeast coast of Taiwan. 3D model simulations yield more accurate water level results and significant vertical variation of horizontal velocity at stations where wave-surge interaction is more pronounced. The simulated storm surge generally agreed well with observed data at nearly 40 stations.

Key word: Storm Surge, Coastal Inundation, Numerical Simulation, Fanapi, Soulik, Taiwan