

## ABSTRACT

This study assesses the capability of the ADCIRC and coupled ADCIRC+SWAN models in simulating typhoon-induced storm surge and significant wave heights along the coast of Taiwan. Three typhoon events in 2024, Gaemi, Kongrey, and Krathon, were selected based on their different tracks and wind characteristics. The simulations were evaluated using observed tide gauge data from four stations (Taipei, Taichung, Kaohsiung, and Hualien) and buoy data from Fuguei Cape, Taichung, Xiaoliuqiu, and Hualien. ADCIRC-only simulations were able to capture the general pattern of tidal and surge behavior at most stations, with the best agreement found at Taipei and Taichung. Slight underestimations of peak surge heights were observed at Kaohsiung and Hualien, likely due to unresolved wind gradients and the absence of wave effects in standalone ADCIRC runs.

The addition of SWAN improved model performance in simulating significant wave height, particularly the timing and buildup of storm waves. The coupled ADCIRC+SWAN model captured wave evolution well at Taichung and Fuguei Cape but tended to underestimate peak wave heights at more exposed stations such as Hualien and Xiaoliuqiu. These discrepancies point to the need for better calibration of dissipation parameters and higher-resolution wind inputs. Overall, the study confirms that ADCIRC and ADCIRC+SWAN are suitable tools for coastal hazard modeling in Taiwan when properly calibrated. The findings support their application in early warning systems, coastal infrastructure planning, and flood risk reduction strategies.

**Keywords:** ADCIRC, SWAN, storm surge, wave height, Taiwan.