

An Approach to Realistic Modeling Pressure and Wind Fields of Typhoon Around Taiwan

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Life and infrastructure in coastal areas can be severely damaged by storm surges. Storm surge predictions and risk management require accurate forecasts of the pressure and wind fields of typhoons. When only track and intensity are available for a typhoon forecast, parameterized models are commonly used as boundary inputs to storm surge models. However, the conventional parameter models describe the pressure and wind fields by idealized mathematical equations without accounting for topographic details, resulting in unrealistic conditions when a mountain impedes the typhoon.

The paper presents a statistical method for generating the weather field based on the location and intensity of the typhoon. ERA-5 reanalysis data from the European Centre for Medium-Range Weather Forecasts (ECMWF) was used to compile the database of weather forces. In contrast, the typhoon tracks center pressure, maximum wind speed, and radius were obtained from Central Weather Bureau (CWB) in Taiwan, and the model formula was then constructed. As compared to conventional parameterized models, significant improvements can be seen when the typhoon passes over the Central Mountain in Taiwan in terms of the pressure field, wind field, and storm surge field simulated by the COMCOT-SS storm surge model.

Keywords: ERA-5, COMCOT-SS, Storm Surge, Taiwan, Holland parameterized model