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Title: Meteorological Drivers of Storm Surge Events in the Ilocos Region

ABSTRACT

The coastal regions in the Philippines are more exposed to TC-induced coastal hazards such as storm surges as the country is frequently hit by tropical cyclones, or TCs. This study aims to identify storm surge events (SSE) that happened in the Ilocos Region from 2008 to 2022 by utilizing data from Currimao (CM) and San Fernando (SF) tide gauge stations. An SSE identification process that detects outliers that exceed the mean by at least three times the standard deviation was applied to the calculated residual sea level (RSL) and low pass filtered RSL to determine unusual increases during TC events. Fourteen SSEs were found to have occurred in the region, of which 13 were detected in CM, 4 in SF, and 3 in both. The highest storm surge in CM is 64.8 cm while 49.8 cm in SF. These SSEs were confined from May through November, with October having the highest number of seven SSEs.

We investigated the individual relationships between the storm surge heights (SSH) and factors including wind direction, wind speed, mean sea level pressure (MSLP), tides, and TC characteristics such as forward speed, intensity, minimum SLP, size, track angle, and distance from the tide station. Overall, R^2 values were very low ranging from 0 to 0.266, indicating that the linear models do not provide a good fit to the data. Despite this, the wind direction and the TC track angle were determined to be statistically significant factors influencing SSHs in both stations. Additionally in CM, SSHs were also influenced by MSLP, tides, and forward speed, while in SF, significant factors included TC intensity, minimum SLP, and distance from the tide gauge.