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ANNOUNCEMENT OF THE MASTER'S EXAMINATION

of

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in defense of her Master's thesis

ATMOSPHERE AND OCEAN RESPONSES TO TROPICAL CYCLONE HATO (ISANG) AND PAKHAR (JOLINA) AS OBSERVED AND SIMULATED BY A COUPLED MODEL

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Alyssa Dawn Castillo

ABSTRACT

Recent studies increasingly highlight the importance of air-sea coupled models for better representation of weather and climate systems. However, forecasts from coupled ocean-atmosphere models remain underutilized, particularly in the Philippines. In August of 2017, tropical cyclone (TC) Hato and Pakhar passed near the vicinity of Northwest Luzon, where a concurrent oceanographic cruise was being conducted to survey the Northwest Luzon Coastal Current. The response of the ocean and atmosphere due to TC passage as it passed the vicinity of the study area was thus examined using *in situ*, satellite, and Naval Research Laboratory's Coupled Ocean/Atmosphere Mesoscale Prediction System for Tropical Cyclone (COAMPS-TC) model. Specifically, this study examined whether a cold wake was formed after the passage of TC Hato and whether the cold wake could weaken the subsequent TC Pakhar. The sensitivity of COAMPS-TC's initial ocean conditions with and without Hato forcing on the Pakhar forecast was also assessed. Results show that a cold wake was formed after the passage of Hato, although the cold wake did not affect the intensity of Pakhar as the wake was found to be shallow, transient and located north of Pakhar's track. There was no weakening of this subsequent TC because the waters near the coast of NW Luzon that it passed through has relaxed back to warmer conditions. The COAMPS model was not able to capture the cold wake formation but overall showed too intense cooling after the passage of Hato. Incorporating Hato Forcing before the simulation of Pakhar showed better results for the track and intensity of Pakhar as well as the SST conditions before and after Pakhar passage. This means that the initial conditions of the ocean were important for COAMPS simulation and feedback of the ocean to the atmosphere is important to better forecast the track and intensity of TC. Some more experiments are recommended for future studies but this study shows utility of coupled atmosphere-ocean models for Philippine TC forecasts.

Keywords: Air-sea interaction, COAMPS-TC, TC, Cruise