

ABSTRACT

The Philippine archipelago is highly exposed to tropical cyclones (TCs) and their associated hazards, which have already caused disasters of numerous casualties and extensive economic damages. Improving the accuracy of TC forecasts from Numerical Weather Prediction models, such as the Weather Research and Forecasting (WRF) model, has been an increasingly important endeavor.

Temperature at the sea surface (SST) and within the mixed layer underneath has significant effects on the formation and intensification of TCs. This study determined the sensitivity of the WRF model to different SST input data and ocean model options by simulating TCs that have affected the Philippines. Experimental runs of three TCs were performed with varying SST and ocean mixed layer model (OMLM) initialization and update options in WRF. Sensitivity of TC track and intensity to the use of SST update were seen only in some cases as differences were seen only after the simulated typhoons made landfall, while all cases exhibited very low sensitivity to the OMLM. The results indicated slight sensitivity of TC size to the SST update and OMLM options and low sensitivity of TC tracks to the SST data set used. Rainfall was found to be sensitive to the use of SST update but not to the OMLM or the varying SST input data. Results showed that the SST simulations tend to produce more intense rainfall than the other runs. Surface heat and moisture fluxes displayed very high sensitivity to the SST update option, but only slight sensitivity to the SST data set. TC-induced deepening of the mixed layer was seen in the OMLM runs, but not enough SST cooling to result into significant differences in the surface fluxes and the TC characteristics. Other large-scale factors that influence TCs showed very low sensitivity to the SST update and OMLM options.