ASSESSMENT OF POTENTIAL FUTURE CHANGES IN TROPICAL CYCLONE ACTIVITY IN THE PHILIPPINES UNDER DIFFERENT ENSO PHASES USING CMIP6 HIGHRESMIP GCMS

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ABSTRACT

Tropical cyclones (TCs) pose a constant threat to the lives and livelihoods of every Filipino. However, the accelerating pace of anthropogenic climate change- particularly rising global temperatures -has raised concerns about possible changes in these extreme weather events. This underscores the urgent need to understand how natural climate variability, such as the El Niño–Southern Oscillation (ENSO), will influence TC activity, and how such activity might evolve in the future. Although global circulation models (GCMs) have advanced, many still operate at coarse resolutions that limit their ability to accurately simulate TCs and the complex processes that drive them. With that, this study will employ high-resolution models from the CMIP6 High Resolution Model Intercomparison Project (HighResMIP) to assess potential changes in TC activity under different ENSO phases in a warming climate. The analysis will utilize both atmospheric and coupled global circulation models (AGCMs and CGCMs) for the near-future period (2015–2050, SSP5-8.5), with TCs detected and tracked through the TRACK and TempestExtremes algorithms. Observed TC data will be obtained from IBTrACS and PAGASA, and ENSO phases will be identified using the Oceanic Niño Index (ONI). In addition, composite and correlation analyses will be applied to evaluate model performance, investigate ENSO–TC relationships, and identify projected changes in TC activity using a selected set of CMIP6 HighResMIP GCMs.

The results of this study are expected to provide future projections of TC activity such as genesis, intensity, and frequency under different ENSO phases in a warming climate. Moreover, the expected outcomes include an improved understanding of how ENSO warming patterns will modulate future TC activity that may improve the country's early warning and prediction capabilities and climate resilience strategies.

Keywords: "TCs", "ENSO", "Anthropogenic Climate Change", "CMIP6 HighResMIP"