

Characterization of Northeast Monsoon's Diurnal Precipitation Cycle along the Eastern Philippines

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ABSTRACT

The Northeast Monsoon (NEM), locally known as Amihan, is a seasonal wind pattern that forms part of the Philippine climate system. It brings large amounts of precipitation from December to February (DJF) at the eastern portion of the Philippine archipelago which results in meteorological hazards that affects the socio-economic activities in the country. While previous studies focused on the characteristics and effects of the monsoon system in the interannual to daily scales, there is limited literature on the diurnal rain cycle during the NEM season. This study aims to characterize the diurnal precipitation cycle during NEM active months along the eastern Philippines from 1996 to 2025 by analyzing the spatial-temporal distribution of NEM rainfall in terms of key rainfall metrics such as frequency, intensity, and duration by utilizing synoptic data from PAGASA and automatic weather station data from DOST-ASTI in the sub-daily time scale. The study will separately analyze the diurnal rainfall cycle metrics of Tropical Cyclone (TC)-induced (within 500 km radius from TC center; at least Tropical Depression category) and Non-TC extreme rainfall events (R95p). Lastly, the influence of climate oscillations such as the El-Niño Southern Oscillation using the Relative Oceanic Niño Index and Madden-Julian Oscillation on the variability of the diurnal rainfall on different phases will be investigated. The potential findings of this study are expected to enhance the understanding of diurnal rainfall variability associated with the Northeast Monsoon and its interaction with synoptic and large-scale climate drivers. Such insights may contribute to improved short-term forecasting and risk assessment of heavy rainfall events in the eastern Philippines.

Keywords: Northeast Monsoon, Diurnal Precipitation, Rainfall Metrics, TC-induced rain, ENSO, MJO