Abstract

Characteristics of the Philippine Monsoon Seasons and its Relationship with the El Niño Southern Oscillation based on the ERA5 Dataset

Raymond Jess G. Goliat
MS Meteorology

Adviser:
Bernard Alan B. Racoma, Ph.D.

The Philippine monsoon seasons are key drivers of the country's rainfall variability and distribution. Heavy rainfall events, or HRE, usually occur over the western (eastern) portion of the country during the southwest monsoon (northeast monsoon). These events often result to rain-driven disasters such as floods and landslides or a lack thereof like dry spells, and droughts. These HREs result in significant amounts of losses in agriculture, infrastructure, commerce, and casualty. Monsoon characteristics are further modulated by the El Niño Southern Oscillation (ENSO), with intensified wet seasons during La Niña and drier dry seasons during El Niño, amplifying the impacts. Key information on monsoon patterns and characteristics proves to be critical for the country's disaster management and economic development. This would aide in the planning the approach and action of the country on the impacts of monsoons in the different sectors.

This study aims to characterize the southwest and northeast monsoon seasons using different physical parameters and to evaluate the influence of ENSO phases on monsoon duration and intensity. Atmospheric convection, circulation, and instabilities will be analyzed using correlation and regression using the ERA5 Dataset. Support Vector Regression will map the relationship between physical parameters and rainfall, capturing non-linear dynamics. Climatological values over the 1951-2020 period will detail the SWM and NEM patterns, and the ONI data from NOAA-CPC will identify the variability in between ENSO Phases to examine the monsoon responses to ENSO modulation.

Results from this study are expected provide key characteristics of the SWM and NEM seasons such as onset, peak, decay, and duration in relation to atmospheric circulation, convection, instability, and rainfall patterns. Moreover, the influence of ENSO on the key features of monsoon – such as early or delayed onset and decay, and variations I peak intensity – may be quantified. This may boost the capabilities of the country in monitoring, assessment, mitigation, and planning on the impacts of monsoon.