INFLUENCE OF MADDEN-JULIAN OSCILLATION ON RAINFALL VARIABILITY OVER MINDANAO REGION

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An Undergraduate Thesis Submitted to the Faculty of the Department of Engineering Sciences College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines
in Partial Fulfillment of the Requirements for
the Degree of

BACHELOR OF SCIENCE IN METEOROLOGY

MAY 2023

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ABSTRACT

NAVARRO, CARL JUSTINE C., and **BAGSIC, SYRUS EDGAR M.** Department of Engineering Science, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **December 2022,**
INFLUENCE OF MADDEN-JULIAN OSCILLATION ON RAINFALL VARIANCES OVER MINDANAO REGION

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Rainfall is an essential atmospheric phenomenon in the Philippines. It is the primary source of freshwater used for farming and industrial purposes. However, it may also link to natural disasters such as floods and drought that can lead to death or economic loss. To further understand the rainfall variability, this study will evaluate the modulation of the Madden-Julian Oscillation (MJO) over the Mindanao region. Five (5) year-long daily rainfall data from OLR and TRMM 3B47 v.7, a multi-satellite with in-situ station data and PAGASA synoptic weather stations, will be used to estimate the influence of the MJO on rainfall variance. The frequency-wavenumber spectral analysis will be used to filter the signals of MJO. Meanwhile, variance analysis will be performed to evaluate the spatial and temporal variability of the rainfall.

The annual OLR variance of MJO is 167.77 $(W/m^2)^2$, and the annual rainfall variance is 4.51 mm^2. The seasonal variance in OLR is found that the season of December – February has the highest variance while the lowest peak is found in September - November; the same peaks are found in TRMM rainfall variance. In the longitudinal mean, MJO shows its highest activity in January and a second peak in April. MJO brings a total of 2.73% rainfall contribution for five years, with two distinct peaks which occur during

December – February and June – August. The secondary wave of MJO is weaker the than the other one. The MJO occurs in an inconsistent period ranging from 30 – 90 days. Thus, composite analysis is used to evaluate the effect of enhanced and suppressed phases of MJO. The analysis shows that the enhanced phase has its highest rainfall contribution in December – February, which enhances the rainfall to 20.64% affecting mainly northern Mindanao. The suppressed phase shows the same peak that suppressed the rainfall by 12.06% in Southern and Central Mindanao.

Keywords: Madden-Julian Oscillation, Mindanao, Rainfall Variance, Rainfall Variability

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