

Impact of Madden-Julian Oscillation on winter rainfall in the Philippines

ABSTRACT

Madden-Julian Oscillation (MJO) is a large-scale, intraseasonal convective disturbance which propagates eastward across the equatorial Indian Ocean and Western-Central Pacific at a rate of 5 ms^{-1} . MJO's influence on global weather and climate is evident. Studies have shown that MJO influences rainfall variability in China, Indonesia, India, and other areas in the Tropics. A study has shown that MJO contributed to extreme winter rainfall in the Philippines. However, it was only done during 2007-08 boreal winter.

This study aims to investigate the impact of MJO on the winter rainfall in the Philippines using composite maps of daily mean anomalies of rainfall and other parameters such as geopotential height, wind, and specific humidity. Rainfall data will be obtained from the 56 PAGASA synoptic stations from 1980-2010. National Centers for Environmental Prediction/National Center for Atmospheric Research (NCEP/NCAR) sea level pressure, specific humidity, and geopotential height daily reanalysis data and Radiosonde data from upper air station in the Philippines from 1980-2010 will be used to determine the underlying mechanism of MJO in the Philippines. MJO events will be based on the Wheeler and Hendon MJO index with their RMM1 and RMM2 plotted to determine the 8 MJO phases.

Composite maps are projected to show significant variations in rainfall all over the Philippines. Philippines is expected to experience lower than normal rainfall when the convective envelope is in the equatorial Indian Ocean during phases 2 and 3 while a greater than normal rainfall is expected during phases 6 and 7 when the MJO convective envelope is in the equatorial Pacific. The strong vertical motion anomalies in the upper tropospheric jet and moisture supply in the lower troposphere is hypothesized to modulate the MJO in the Philippines.

Keywords: MJO, Rainfall, RMM