ABSTRACT

MODULATION OF PHILIPPINE RAINFALL BY CONVECTIVELY COUPLED EQUATORIAL WAVES

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Rainfall is the most prominent climatic event in the Philippines. In this study, the influence of convectively coupled equatorial waves (CCEWs) to rainfall in the Philippines was investigated and quantified using 18-year long daily Outgoing Longwave Radiation (OLR) and rainfall from Tropical Rainfall Measuring Mission (TRMM) from year 1998-2015. Wavenumber-frequency filtering method was employed to isolate and filter the band signal of each CCEWs for a domain covering the Philippines, from 110oE to 130oE and 5oN to 20oN. Variance analysis was used to determine the contributions of CCEWs to rainfall variability for Philippine domain, and for the northern, central, and southern region. Also, the relationship between CCEWs events and ground-based rainfall from Philippine Atmospheric, Geophysical, and Astronomical Service Administration (PAGASA) synoptic station was analyzed for the year 2016. Kelvin, equatorial Rossby (ER), and mixed Rossby gravity (MRG) wave modulated Philippine rainfall variance by 3.36%, 4.19%, and 1.92%, respectively. Kelvin waves dominated the southern Philippines contributing about 3.9% of the total rainfall variance. It has two distinct peaks which occur during May – June, and December – January. The secondary peak of Kelvin waves was weaker compared to the primary peak. On the other hand, ER waves prevailed in the central Philippines with 4.6% of the total rainfall variance. ER waves were relatively active throughout the year except for months of September – October. During July – August, the signals of ER waves were shifted to the northern Philippines. Similar to Kelvin waves, MRG waves also had its maximum modulation in southern Philippines with about 2.2% of the total rainfall variance. It also has two distinct peaks which occur during July and November. MRG waves peak during July was extended to northern Philippines. Ground-based data showed rainfall correlating with the OLR signals of the CCEWS. Rain occurred mostly during the passage of waves (i.e, 0 or no lag) particularly Kelvin waves and MRG waves. Active events of ER waves caused a lead to the rainfall in the northern Philippines and a delay in the southern Philippines. This study shows that CCEWs modulated the rainfall variance in the Philippines, with ER (MRG) waves showing greatest (least) influence and with southern Philippines being the most affected collectively by all three studied CCEWs during boreal winter.

Keywords: *Convectively coupled equatorial waves, rainfall, Philippines*