A Preliminary Observational Analysis of Rainfall Characteristics and Convective Organization Associated with the Interaction between Different Tropical Waves

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Different types of convectively-coupled tropical waves often interact with each other, but the modulation of convective organization [e.g., the activity of mesoscale convective systems (MCS) and tropical cyclone formation] by these interaction events still needs further investigation, which is critical to a comprehensive understanding linking large-scale dynamics and mesoscale weather extremes. We analyzed rainfall characteristics and convective organization under the influence of tropical waves interaction events (TWIEs) during April−June and July−September in the South China Sea and the western North Pacific. A space-time bandpass filter following Wheeler and Kiladis (1999) was applied to an outgoing long-wave radiation (OLR) dataset for identifying four types of convectively-coupled tropical waves: intraseasonal oscillation (ISO), Kelvin wave (KW), Equatorial Rossby wave (ER), and mixed Rossby-gravity wave and tropical depression type disturbance (MRG-TD). Subsequently, various types of interaction events were selected according to the magnitudes of the filtered OLR anomalies of these waves. Furthermore, we applied an objective method using both infrared satellite images and micro-wave rain rate data to represent the status of convective organization in the region of interest. Preliminary results highlighted that the interaction between ER and KW waves contributes to significant and non-linear enhancement in rain rates and MCS activity. This enhancement is presumably related to the establishment of cross-equatorial flows. The presentation will also address the ongoing works of investigating the relationship between a TWIE and the synoptic environment and examining their modulation on mesoscale conditions for convective organization.

Key words: Equatorial waves, Convective organization, Tropical rainfall

Reference

Wheeler, M., and G. N. Kiladis, 1999: Convectively coupled equatorial waves: Analysis of clouds and temperature in the wavenumber frequency domain. J. Atmos. Sci., 56, 374-399.