

Role of Tropical Waves in Tropical Cyclone Genesis over the Western North Pacific

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The present study investigates the relationship between the tropical waves and the tropical cyclone (TC) genesis over the western North Pacific (WNP) for the period 1979-2011. Five wave types are considered in this study. It is shown that the TC genesis is strongly related to enhanced low-level vorticity and convection of tropical wave in all wave types but with significant difference in the TC modulation between wave dynamic and thermodynamic components. More TCs tend to form in regions of each wave with overlapping cyclonic vorticity and active convection. About 83.2% of TCs form within active phase of tropical waves, mainly in either one or two wave types. Each wave type accounts for about 30% of all TC geneses except for the Kelvin waves that account for only 25.2% of TC geneses. The number of each wave type-related TC genesis consistently varies seasonally with peak in the TC season (July-November), which is attributed to the combined effect of both active wave probability and intensity change. The interannual variation of the TC genesis is well reproduced by the tropical wave-related TC genesis, especially in the region to east of 150°E. An eastward extension of the enhanced monsoon trough coincides with increased tropical wave activity by accelerated wave-mean flow interaction.