EMS Annual Meeting Abstracts
Vol. 16, EMS2019-228-1, 2019

Characteristics of Low-Level Wind Fields Associated with Tropical Cyclones over Hainan Island Region of China

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Using the tropical cyclone best track dataset from the Joint Typhoon Warning Center (JTWC) and the ERA-Interim reanalysis data on global $0.5^\circ \times 0.5^\circ$ grids from 1979 to 2015, the characteristics of low-level wind fields related to tropical cyclones (TCs) over Hainan Island region (15.5–23.5°N,106–116°E) are statistically analyzed. Results show that (1) There were 204 tropical cyclones moving westward into Hainan region from April to December during 1979 to 2015. On average, there are 5.5 TCs occurring in the study region annually. (2) The TC low-level wind distributions present various asymmetric features when TC centers are located in different quadrants of Hainan region. The percentage of occurrence frequency of strong wind at 10-m height is the biggest when TC centers are located in the island, while it is the smallest when TC centers are located on the northwest or northeast quadrant of the region based on $0.5^\circ \times 0.5^\circ$ ERA-Interim reanalysis data. (3) Radiuses of the maximum wind (RMW) of TCs over Hainan region are within the range of 9 –185 km with an averaged value of 58.3 km according to JTWC best track data. The mean RMW is biggest when TC centers situated on the island, while it is the smallest when TC centers situated on the northwest quadrant. (4) The maximum wind speeds near TC centers sharply decrease from the ocean to the land for all TCs. Its bigger value regions are located on the west and east sides of Leizhou Peninsula, where is between the island and mainland of China. (5) The Radiuses of specific 34-kts wind circle on TC eastern semi-circle are larger than that on TC western semi-circle. And the stronger the TC is, the more remarkable the difference of radiuses will be. Note that TC will deform to a certain degree when it enters Hainan Island region. (5) On average, when the TCs are located in the southwest (southeast) of the region, its wind circle experiences the largest (least) deformation.