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Modeling Study on the Mechanism of Near-shore Intensification of Tropical Cyclone Vongfone (2002)

YAN JINGHUA[1], DING WEIYU[1] and CHEN ZITONG[1]
[1]*Guangzhou Institute of Tropical & Oceanic Meteorology, China, 510080*

Taking the target tropical cyclone (TC) Vongfone of 2002' Chinese Landfall Typoon Experiments (CLATEX) as object, the process and mechanism of the near shore intensification of the TC, affected by the cold surge, are analyzed in detail, under the successful modeling of the process, and by conjointly using of the modeling and observed data. And the result is also interpreted by the moist potential vorticity theory. In addition, a group of control numerical experiments are carried out, concerning the impacts of latent heating, terrain, land sea distribution, β effects and SST respectively, on the TC intensification. The results show that, firstly the strong convective latent heating is crucial for the near shore intensification of the TC. Secondly the process that the weak cold surge intruded into the TC from the west quadrant via the lower atmosphere to form a relevant thermal/dynamical condition favorable for development of convection, is the key mechanism for the TC intensification. Thirdly the existence of terrain in west part of South China is important for the southward invasion of weak cold surge, being another important factor for the TC intensification. Fourthly the existence of warm sea surface with 28-29°C temperature enables intense development of convection, being the necessary condition for the near shore intensification. And finally the β effects, shifting the TC path and convection (precipitation) to the west without remarkably changing the total heating amount, do not essentially influence the TC intensification process.