Relation of convective bursts to changes in the intensity of typhoon Lionrock (2016) simulated by an atmosphere-wave-ocean coupled model

*和田 章義[1]、小山 亮[1]
*Akiyoshi Wada[1], Ryo OYAMA[1]

1. 気象研究所台風研究部
1. Typhoon Research Department Meteorological Research Institute

Typhoon Lionrock (2016) made landfall in northern Japan for the first time since the start of statistics in 1951. One of interesting events was occurrence of consecutive deep convections (convective bursts: CBs) before making landfall on 31 August. Lionrock could maintain its intensity although storm-induced sea surface cooling (SSC) was induced by Lionrock along the track. To examine the role of CBs in changes in the intensity of Lionrock under the condition of the occurrence of SSC, numerical simulations were conducted with a 3-km-mesh coupled atmosphere-wave-ocean model. CBs were defined as upward vertical velocity greater than 7 m/s in the mid-to-upper troposphere. The coupled model successively simulated CBs occurred in the northern side of the near-surface convergence area, which was formed by the confluent of near-surface spiral inflow due to surface friction with tangential winds while keeping relatively fast translation and a asymmetric structure. Lower tropospheric horizontal and upward moisture fluxes became locally enhanced around the convergence area although storm-induced SSC reduced air-sea latent heat in the inner core of the storm. The upward moisture fluxes led to increases in condensational heating on the upstream (moving direction) side in the mid-to-upper troposphere by active CBs. This resulted in increases of pressure gradient forces on the upstream side in the lower troposphere. This helped maintain maximum wind speeds and central pressure even under the condition of the occurrence of SSC during the decay phase. From sensitivity experiments, an asymmetric storm with a relatively fast translation in mid-latitude is expected to rapidly increase maximum wind speed near the sea surface on the upstream side under a favorable oceanic condition because vertical moisture fluxes and the number of CBs could increase around a surface frictional convergence area. The number and distribution of CBs are sensitive to oceanic environmental conditions and are considered to play an important role in the storm-track simulation as well as the maximum surface winds.

キーワード：対流バースト、台風、大気波浪海洋結合モデル
Keywords: Convective burst, Typhoon, Atmosphere-wave-ocean coupled model