

The statistical characteristics of nearby typhoons and high/low

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Typhoon intensity changes are influenced not only by oceanic fields such as SST but also by atmospheric fields. Kitabatake et al. (2020) discussed the influence of typhoon on the development of cyclones in the mid-latitudes. However, the studies on the interaction between the atmosphere and typhoons are mostly case studies due to the diversity of typhoons, and there is no universal understanding of the interaction. In this study, we focus on the typhoon intensity and examine multiple cases to elucidate the generality.

In this study, we chose the cases which the distance between the typhoon and the high/low is within 1000km in the surface weather charts of Japan from 1999 to 2019. Exceptions are the followings; 1. The cases which there are multiple highs/lows within 1000km from a typhoon. 2. The typhoon has already landed. 3. The cases which a typhoon is nearby a tropical cyclone. Note that the time variation of typhoons and highs/lows are not included the number of cases, but is treated as the same. We ran numerical experiments using the domain meteorological model WRF ver.3.4.1 to look at the interaction. The calculation period was from 00Z 26th October 2009 to 12Z 27th October 2009. We compared the results which was removed the typhoon (MOD) and the results without the removal (CTL).

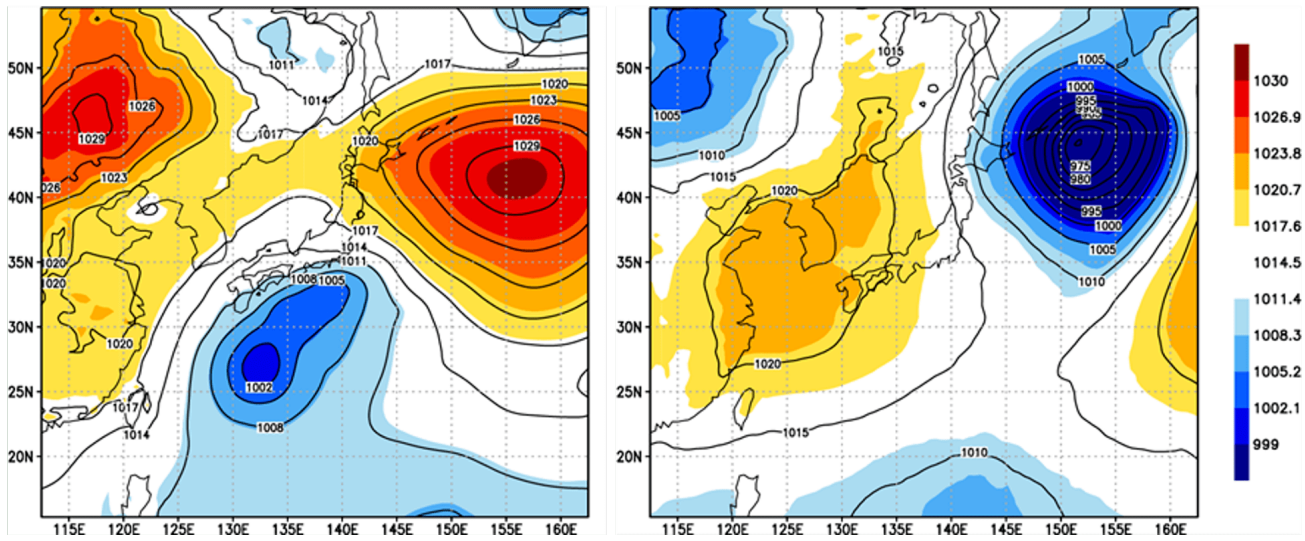
The chosen cases consisted of 8 cases which highs were nearby typhoons and 13 cases which lows were nearby typhoons. The highs and lows were located on north side of the center of typhoons, and highs tended to be farther away from the typhoon than the lows. The size of the chosen typhoon was classified as “small” or “medium”, and the max wind speed that 80% of all cases was smaller than one of the “strong” typhoons defined by JMA.

Fig.1 show the time variation of sea level pressure of CTL and MOD. At 12Z 27th October 2009, the central pressure of CTL was 975hPa, while that of MOD was 985hPa. This result suggests that the influence of the typhoon on the development of low.

In the future, we would like to run numerical experiments with difference locations of typhoons and highs/lows to find the something in common. In addition, we need to search for cases in reanalysis data to make an objective analysis.

Keywords: Typhoon, high/low, Weather Research and Forecasting Model

CTL run



MOD run

