Impact of the boreal summer intraseasonal oscillation on typhoon tracks in the western North Pacific

*Masuo Nakano[1], Frederic Vitart[2], Kazuyoshi Kikuchi[3]

1. JAMSTEC Japan Agency for Marine-Earth Science and Technology, 2. ECMWF, 3. IPRC / University of Hawaii

It is widely accepted that the intraseasonal oscillation (ISO) has a strong influence on tropical cyclone (TC) genesis. For example, more TCs form in convective enhanced phases of the boreal summer ISO (BSISO) in the western North Pacific (WNP). However, little is known about its impact on TC tracks. Here, we examined how TC tracks in the WNP are modified by the BSISO for each month of the TC season (June-October) using IBTrACS (v03r09) and how it is reproduced in the ECMWF S2S reforecast data. TCs in the reforecast are tracked by the method developed by Vitart et al. (1997). In this study, TCs formed south of 25N with lifetime of longer than 2 days and the maximum surface wind speed of higher than 25 kt are regarded to tropical storms in nature. We compared track density of TCs that formed in convectively enhanced (5-8) and suppressed (1-4) phases of the BSISO in the WNP (based on the index developed by Kikuchi et al., 2012).

It is found that TC tracks are significantly influenced by the state of the BSISO and the way the BSISO affects TC tracks shows regional and seasonal variations. For instance, normalized TC track density (i.e., normalized by TC number) in the enhanced phases in the adjacent seas of the northern Philippines tends to be significantly higher over the course of the season. In contrast, the track density around Japan displays a pronounced seasonal dependence: it is significantly lower in September, while it is higher in October. Biases in TC track density simulated in the model is likely influenced by biases both in TC genesis location and steering flow.

To examine which biases (e.g., TC genesis location/steering flow) are more influence on biases in normalized TC track density, sensitivity experiments using beta advection model are performed. The model reasonably reproduced observed and simulated changes in TC track density except for October. The experiments with observed TC genesis location and simulated steering flow showed better performance than the experiments with simulated TC genesis location and observed steering flow. These results suggest that improvement in TC genesis location leads to more accurate representation of impact of the BSISO on TC track density.

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