Future Changes in the Intraseasonal Variability and Typhoon Activity in a Nonhydrostatic Global Atmospheric Model

*Masuo Nakano[1], Kazuyoshi Kikuchi[2], Tomoe Nasuno[1], Yohei Yamada[1], Masaki Satoh[3,1], Masato Sugi[4]

1. Japan Agency for Marine-Earth Science and Technology, 2. IPRC/University of Hawaii, 3. AORI/University of Tokyo, 4. Meteorological Research Institute

The intraseasonal variability (ISV) modulates typhoon activity in the western north Pacific. How the ISV will change in a warmer climate and how this future change will affect typhoon activity are, however, open and difficult questions. Here, we examine future changes in the ISV and its related typhoon activity using climate simulations by 14 km mesh nonhydrostatic icosahedral atmospheric model, NICAM (Kodama et al. 2015). The ISV is detected by procedure proposed by Kikuchi et al. (2012), which classify the ISV into two modes; the boreal summer intraseasonal oscillation (BSISO) mode and the Madden-Julian oscillation (MJO) mode. Because the amplitude of the ISV modes simulated in NICAM was weaker than those observed, the amplitude was calibrated by dividing by 0.52 and 0.48 for BSISO and MJO modes, respectively.

The simulation results show that the number of BSISO days will significantly decrease in the warmer climate, whereas the number of MJO days will slightly increase in future. The number of typhoons formed in BSISO day during the typhoon season (June-October) will significantly decrease in the warmer climate, whereas the typhoon formation rate for BSISO days will not change. Those results indicate that the number of typhoon formation related to BSISO in the future climate will decrease because the number of BSISO day will decrease. Considering that the predictability of typhoon formation highly rely on that of BSISO (e.g., Nakano et al. 2015), understanding typhoon formation mechanism during no BSISO days would become important to keep the accuracy of typhoon formation prediction in a warmer climate.

Keywords: BSISO, ISV, Global warming, Global model

