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Plain Language Summary: In the Baiu frontal zone, storms with vigorous convection form repeatedly over the East China Sea. Accurate forecasting of these storms is crucial, as they can bring heavy rainfalls in Kyushu and the Nansei Islands. However, the key to reliable forecasting has not been fully elucidated. In this study, we attempt to improve forecasting of the two storms that occurred on 19 June 2022 by two methods: one is to slightly change the initial atmospheric conditions, and the other is to utilize hourly upper atmospheric observations by three research vessels deployed over the East China Sea. Of the two storms, the first storm developed within a low pressure system was accurately predicted and sensitive to small changes in atmospheric conditions. In contrast, the second storm was much more difficult to predict, as it was driven by the warm Kuroshio current and developed without surrounding disturbances. In conclusion, the Baiu storms are affected by both the atmosphere and ocean, and it is important to consider their variations to predict these storms more accurately.

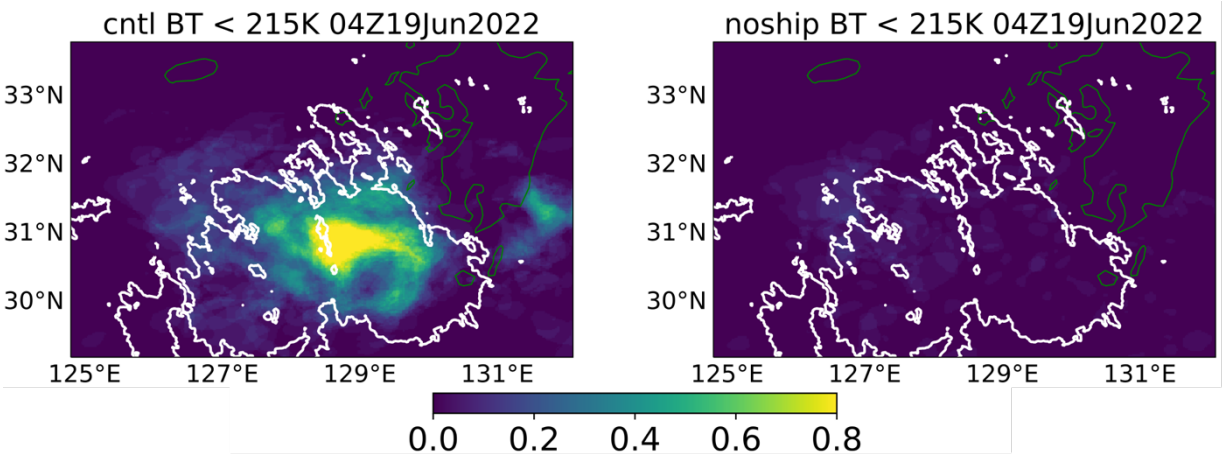

Figure 1. Probability of active convection at 0400 UTC, on 19 June in the ensemble forecasts (a) with and (b) without vessel observations. Color shades indicate the ratio of the number of members whose simulated brightness temperature (BT) is less than 215 K to the ensemble size. White contours show the observed BT of 215 K.

- The predictability of two MCSes observed in the intensive observations over the Eastern China Sea on 19 June 2022 depends on their development mechanisms.
- The reproduction of the meso-β-scale cyclone and the frontal structure with deep moist unstable layers are important for the better representation of the first MCS.
- The second MCS is less predictable than the first, but significantly correlated to the enhanced surface heat flux in the SST frontal zone.
- The additional information from upper-air soundings by the research vessels significantly improves the representation of the first MCS, while has little impact on the second MCS probably due to the underestimation of the boundary layer moistening.