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Evaluation and Application of the ECMWF Ensemble Prediction System on Heat Wave Process in July 2017

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In the forecast of disastrous weather process, public focus on the following indexes : the duration, intensity, impacted region and the peak time and location of the process. The ECMWF ensemble prediction system (ENS) is capable of showing the signal of disastrous weather events, but questions such as how to quantify the above forecasting issues, and the reliability of the predicted time, location, and intensity is still not clear. In this research , we evaluated the performance of several ENS products on a heat wave process in July 2017, which hit East China and proceeded new record high temperature in Jianghuai Region. The products include ENS ensemble mean maximum temperature, 90% percentile 2m temperature, and extreme forecast index (EFI). Our result show that EFI exceeded 0.8 when the heat wave dominated Anhui Province during July 23-27. The ensemble mean and 90% percentile temperature could capture the peak of the heat wave on July 27, but both of them tend to underestimate the maximum temperature to the south of Haihe River, and the bias also varies with region and lead time. Based on the probability distribution analysis, we proposed a bias correction index, which is a function of region and lead time, to reduce the bias. After calibration, the accuracy of the maximum temperature could achieve 80%.