



The middle range verification of numerical model performance for heavy rainfall in North China

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The heavy rainfall forecast in North China is the focus and difficulty in middle range numerical weather forecast. 70 typical heavy precipitation cases in North China in summer from 2010 to 2016 are selected, which are divided into vortex type, the west trough and shear line type according to the atmospheric circulation. Based on ECMWF model and the Chinese operational model T639, a spatial verification method MODE is used, the middle range precipitation forecast abilities for heavy rain in summer in North China are evaluated according to contrast the difference of centroidal distance, axis angel and aspect ratios.

It is found that the ECMWF model and the T639 model all show weak predictive ability for the low-vortex-type heavy rainfall in Northern China from all the similarities. When the area of rainfall is larger, the precipitation patterns of the two models are mostly northeast-southwest. It is consistent with the actual situation. For a large area of precipitation area, both models predict the precipitation area aspect ratio is less than 1. It shows that precipitation drop area is long and narrow, and the forecast is also consistent with the actual situation. However, as far as T639 and ECMWF models are concerned, there are systematic deviations in the precipitation area, and the predicted precipitation area is located on the southwestern side of the field. For smaller/larger areas of precipitation, the predicted precipitation area is larger/smaller than the actual situation.

In addition, a sensitive test for the regional heavy precipitation process in North China (such as Huanghuai and other regions) from July 18 to 20, 2016 is also done and the results show that each numerical model of the process prediction is not successful. Therefore, further research is needed on the future correction of systematic bias of numerical models of regional heavy precipitation in medium-term forecasters.