

Application and Verification of Extreme Weather Forecast Products of ECMWF Ensemble Prediction System in China

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The extreme weather forecast products of ECMWF ensemble prediction system (EPS) are analyzed and verified for Chinese extreme weather. The products include extreme forecast index (EFI) and “shift of tail” index (SOT) of 08-08 CST mean temperature, maximum temperature, minimum temperature and total precipitation. It is indicated that when the forecast is different from analysis mostly—the correlation between the two is low, the forecast skill of EFI and SOT is low too. The EFI and SOT are correlated to the percentile of the event according to the historical climate. It is indicated that the forecast skill of temperature EFI is similar to SOT for extreme temperature, but the precipitation SOT is better than EFI for extreme precipitation, in China. Using the last 3 years dataset, the thresholds and corresponding measures are estimated for different lead times and extreme events over different percentiles of extreme temperature and precipitation, under the criteria of threat score (TS) maximization in China. For the extreme low (high) temperature over 1% (99%) percentile, the thresholds of mean temperature EFI and SOT are about -0.85 (0.75) and 0.38 (0.00) respectively. The thresholds of maximum and minimum temperature EFI and SOT are nearly to that of mean temperature. For the extreme precipitation over 95% and 99% percentiles, the thresholds of EFI are about 0.45 and 0.7, and that of SOT are about -0.6 and 0.4. The longer the lead times, the smaller the thresholds and the lower the forecast skills are. And the extremer the events are, the larger the thresholds are. Under the criteria of TS maximization, the forecast biases are nearly 1, so these thresholds could be applied in the operation. The thresholds and forecast skill of temperature EFI and SOT show significant seasonal variation, with higher skill and thresholds in summer half year and lower in winter half year. The temporal variation of precipitation EFI and SOT is not significant. There are special variations of these thresholds and forecast skills and they are different for different indexes.