

Comparing Forecast Skills on Seasonal Climate Conditions From Normal to Relatively Extreme

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Relatively extreme climate events could have much profound impacts on both human society and the natural environment. Although providing useful forecast skill for anomalous seasonal precipitation is still a challenge to many operational centers, it is of interests to learn whether the relative rarity of an seasonal event would affect forecast skill systematically. One can speculate that the out of ordinary condition would be even harder to capture than simple above climatic mean condition. But the rare events could be triggered by much stronger forcing and therefore easier for the climate model to simulate.

Using the data archive from EU DEMETER multi-model ensemble dynamical seasonal forecast system, we investigated this problem by changing the threshold of seasonal prediction categories for probabilistic forecast. Forecast skill verification is based on the cross-validated hindcast runs from 1980 to 2001. There are seven coupled global circulation models (developed by ECMWF, LODYC, CNRM, CERFACS, INGV, MPI, UKMO) used in the DEMETER forecast system. There are 9 ensemble members in each model run. For the category forecast, the forecast skill are evaluated with equitable threat score (ETS). For the probabilistic forecast, the forecast skill are evaluated using relative operating characteristics (ROC) score, reliability and sharpness diagrams, Brier skill score, and rank probability skill score. The dependence of hindcast skill scores on the range of extreme categories of seasonal precipitation will be discussed. The sensitivity of such dependence on annual cycle will also be explored.