**Improving seasonal forecast skill of surface temperature**

時間 : 2019/05/17

地點 : S1-713

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**Abstract**

In this study, we develop a novel forecast post-processing method to improve multi-model mean (MME) seasonal forecast skill of surface temperature. Briefly speaking, this method effectively uses variable transformation and Markov model to bring individual model’s forecasts closer toward observations to improve forecast skill. We applied this method to monthly mean 2m temperature (t2m) hindcast data from the multi-system seasonal forecast service of the Copernicus Climate Change Service (C3S). K-fold cross-validation forecasts using this post-processing method were performed on Niño indices and 10×10 global surface temperature field. Forecast skills were evaluated using correlation coefficient and root-mean-square error (RMSE) between forecasts and observations.

Results from Niño indices forecasts show that use only EOF1 is better and the most of system bias were corrected. And $α=cor$ is better than $α=1$, but we need more discuss about the weighting($α)$.

Results from global surface temperature forecasts show that the improved area where the annual cycle signal is relatively weak and improvement skill is better over the ocean than the land, because the ocean have more strong persistence.

 Results indicated that, this method not only improve correlation coefficient effectively on each regions and lead-time, but also for RMSE. Furthermore, we want to extend this way on global grid points to discuss the effectiveness in the future.

**Keyword**

Linear Markov Model