

Systematic Error Analysis and Calibration for the NCEP GEFS Reforecast of SubX Project

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EMC/NCEP generated an 18-year (1999-2016) subseasonal (weeks 3&4) reforecast to support the CPC's operational mission. The SubX version of the Global Ensemble Forecast System (GEFS) was run weekly initialized at 0000 UTC with 11 members. The Climate Forecast System Reanalysis (CFSR) and Global Data Assimilation System (GDAS) were served as an initial analysis for 1999-2010 and 2011-2016 respectively. The analysis of 2-m temperature error characteristics demonstrated that the model has a strong warm bias in the Northern Hemisphere (NH) and North America (NA) warm season. During the winter, the 2-m temperature errors in NA exhibit a large inter-annual and inter-seasonal variability. For NA and the NH, Weeks 3&4 errors are mostly saturated with a negligible impact of initial condition to forecast and week 2 errors (day-11) also reach to ~88.6% and 86.6% of their saturation levels.

In this work, the 1999–2015 reforecast biases were used to calibrate the 2-m temperature forecasts in 2016, which reduces (increases) the systematic errors (forecast skills) for NA, the NH, Southern Hemisphere and Tropics with a maximum benefit for the NA warm season. Overall, analysis adjustment for the CFSR period makes bias characteristics more consistent with the GDAS period over the NH and Tropics and substantially improves the corresponding skills. The calibration using week-2 bias gives a very similar skill to using week 3&4 bias, promising the feasibility of using week 2's bias to calibrate weeks 3&4's forecast. This is particularly beneficial considering limited computation resource. Our results also demonstrate 10-yr reforecasts are an optimal training period.