Science and Technology Infusion Climate Bulletin
NOAA's National Weather Service
39th NOAA Annual Climate Diagnostics and Prediction Workshop
St. Louis, MO, 20-23 October 2014

Influence of ENSO SSTs on the Spread of the Probability Density Function for Precipitation and Surface Temperature

Mingyue Chen, and Arun Kumar

Climate Prediction Center, NCEP/NWS/NOAA

ABSTRACT

The impact of the interannual variations in ENSO SSTs on the spread of probability density function (PDF) for the seasonal mean of variables of societal relevance are analyzed based on a large set of the hindcasts from NCEP CFSv2. The study is focused on the analysis of rainfall and 2-meter temperature (T2m) for December-January-February (DJF) seasonal mean.

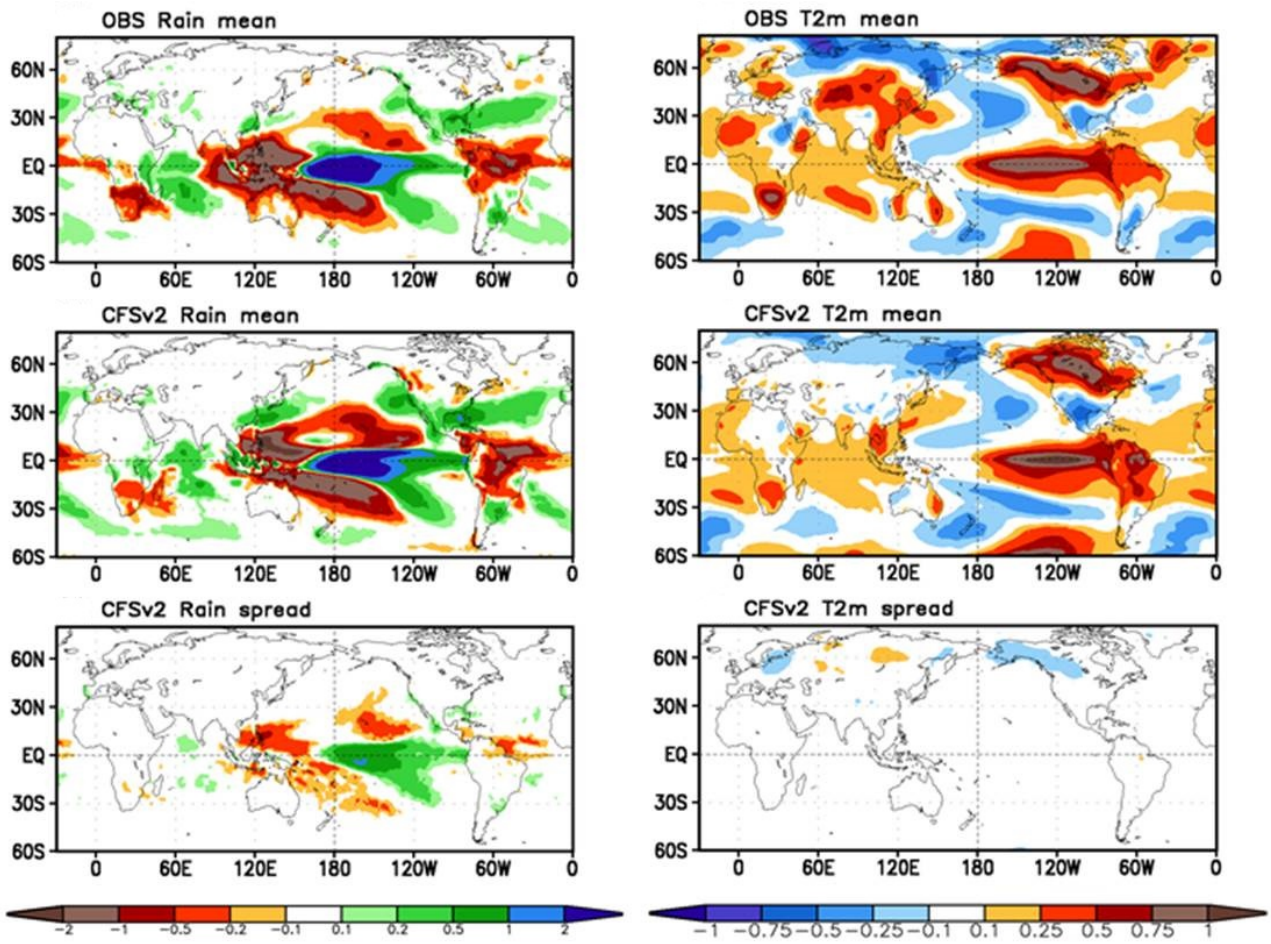

Fig. 1 Left column: Spatial patterns of the linear regression between Niño 3.4 SST index and the DJF seasonal mean rainfall from observation (top), the model forecasted ensemble mean (middle), and the model forecasted ensemble spread (bottom). The unit is mm/day per degree K of Niño 3.4 SST. Right column: The same as the left column but for T2m. The unit is degree K per degree K of the Niño 3.4 SST index.

Correspondence to: Mingyue Chen, Climate Prediction Center, NCEP/NWS/NOAA, 5830 University Research Court, College Park, MD 20740-3818; Email: Mingyue.Chen@noaa.gov

For rainfall, the spatial distribution of the ENSO SSTs induced changes on the spread of PDF strongly resembles changes in the mean but with smaller amplitude. Over the central-eastern equatorial Pacific, changes in the spread lead to a reduction in signal-to-noise ratio (SNR) during El Niño years while to an increase in the SNR during La Niña years. Over extratropics, year to year changes in the spread are relatively small. For T2m, the changes in spread have little systematic dependence on the ENSO SSTs and the amplitudes of the changes in spread are much smaller than corresponding changes in the ensemble mean.

The results demonstrate small systematic year to year variations in the PDF spread, for example over extratropics for rainfall and over most of global areas for T2m, and indicate that it might be a good practice in seasonal predictions to assume that the spread of seasonal means from year to year is constant and the skill in seasonal forecast information resides primarily in the shift of the first moment of the seasonal mean of the PDF.

This work has been published in Climate Dynamics in 2014.

References

Chen M, and A. Kumar, 2014: Influence of ENSO SSTs on the spread of the probability density function for precipitation and land surface temperature. *Clim Dyn.*, doi: 10.1007/s00382-014-2336-9.