

Assessing Future Changes of Extreme Surface Temperatures over the southern United States

Ze Yang¹, Rong Fu¹, Nelun Fernando^{1,2,3}
yang.ze@utexas.edu

1. Jackson School of Geosciences, The University of Texas at Austin, Austin, TX

2. University Corporation for Atmospheric Research, Boulder, Colorado

3. Water Science and Conservation, Texas Water Development Board, Austin, Texas

CMIP5 models have projected a strong increase of occurrence of high surface temperature (>90F and 100 F, respectively) over the southern Great and Central Plains in future. However, we do not know how reliable these projections are. We have evaluated the performance of nine selected CMIP5 (Coupled Model Intercomparison Project Phase-5) models in representing extreme regional surface climate, such as the length of top 5% of the consecutive dry days (CDD), number of days of daily maximum temperature greater than 100°F and 90°F, days of minimum temperature less than 0°C in the historical simulations of each model for the periods of 1950-1977 and 1978-2005, respectively, and found that most models have wet and cold biases over the SC US, which underestimate the occurrence of T>90°F and have large but inconsistent uncertainties in the occurrence of T>100°F. These biases are consistent with the too weak middle tropospheric ridge over the south-central US in summer. Most of these models also cannot adequately capture the tele-connection pattern associated with ENSO. Because regional decision makers are most interested in changes of extreme surface temperature in the next several decades, we will evaluate the decadal hindcasts and determine whether they will provide an improved the statistical distributions of extreme surface temperatures over the southern US. Finally, we will discuss implications of the models' biases to the projections and predictions of the extreme surface temperature.

Keywords: CMIP5, extreme temperature,