P38 Effects of numerical grid spacing on nocturnal low-level jets reproduced with the WRF model

Smith, Elizabeth, Jeremy Gibbs, Evgeni Fedorovich, and Timothy Bonin*, University of Oklahoma*

In association with the Plains Elevated Convection at Night (PECAN) field campaign (June-July 2015), the ability of WRF to accurately resolve the nocturnal low-level jet (NLLJ) was investigated. WRF-modeled NLLJs were compared to high-resolution observations collected during phase one of the Lower Atmospheric Boundary Layer Experiment (LABLE) at the Southern Great Plains (SGP) Atmospheric Radiation Measurement (ARM) site. In an initial effort, six LABLE-observed NLLJ cases were simulated with different grid spacings. Both WRF model setups used 2-kilometer horizontal spacing, but one used the default stretched vertical grid while the other used uniform 20-meter vertical spacing. Percent error analysis in the initial investigation suggests that more vertical levels do not necessarily improve modeled NLLJ wind profile, especially above the level of jet maximum. In order to further investigate this preliminary finding, more grid spacing setups were analyzed. Seeking the grid spacing that most accurately reproduces the observed NLLJ at a reasonable computational expense, additional model runs were performed with various horizontal and vertical spacings. Data from WRF model runs with the default vertical spacing and 4-, 2-, and 1-kilometer horizontal spacings and were evaluated in order to identify the optimal horizontal spacing for NLLJ modeling. Then, using the optimal horizontal spacing, four vertical spacing options were evaluated.