Supplementary Materials

**Text S1.** ACARS data, which were accessed from the MADIS database, were used to assess the model performance throughout the atmospheric boundary layer. The comparison between the different configurations revealed similar tendencies to those seen in the 2-m air temperature comparison. The PBL temperature errors (Fig. S2) were of a similar magnitude to the 2-m temperature errors. All model configurations had a cold bias in the morning to early afternoon hours, with biases as high as -1 K in the 0m - 200m layer of the atmosphere, regardless of season. For the summertime period, the late afternoon and early evening produced smaller errors in the boundary layer (maximum warm bias of 0.6 K); however, the wintertime simulations produced larger errors that started in the late morning to early afternoon period and persisted into the late afternoon and evening.