Reply

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1. Introduction

Wilson et al. (2009, published concurrently in this issue, and hereafter referred to as WV09) offered valuable comments to our recent paper (McCollor and Stull 2008, hereafter referred to as MS08) on postprocessing numerical weather forecasts for hydrometeorological applications in complex terrain. First, the clarification of the dataset employed in MS08 (both observed and forecast values), as suggested in WV09, is an important component for readers. Hydrologic models of interest to us invariably require forecasts of daily minimum and maximum temperatures; however, daily minimum and maximum temperatures were not available as direct model output (DMO) from Canadian Meteorological Centre (CMC) operational numerical forecasts. Spot DMO forecasts were available at 3-h intervals, so we chose 1200 UTC forecast temperatures to indicate daily minimum temperatures (corresponding to 0400 local standard time) and 0000 UTC forecast temperatures to indicate daily maximum temperatures (corresponding to 1600 local standard time). The corresponding observations were daily minimum and maximum point temperatures.

2. Comments

As stated in WV09, the temperature at any particular time during the day will be greater than or equal to the minimum temperature, and less than or equal to the maximum temperature; so by the nature of these choices of forecast and observed temperatures, a positive (negative) bias will be introduced into the minimum (maximum) temperature results, unfairly compromising the DMO and CMC Updateable Model Output Statistics (UMOS) forecasts.

We appreciate WV09 recomputing the UMOS bias and mean absolute error (MAE) to compare these forecasts against the 1200 and 0000 UTC spot observations instead of the daily minimum and maximum temperatures, showing that UMOS can be favorably compared to the other postprocessing methods in MS08. As stated in WV09, a heterogeneous mix of minimum–maximum versus spot temperature predictand verification results does not allow for meaningful comparisons among different postprocessing methodologies. A more homogeneous comparison could be achieved by the removal of the observed difference between the spot temperature observations and the corresponding minimum and maximum temperature observations, thus allowing a more definitive comparison of the relative accuracy between the methods described in MS08 and WV09.

Further clarification is also required regarding the degree of overhead costs associated with the development and maintenance of a regular, updateable MOS postprocessing system. All of the temperature forecast postprocessing methods described in MS08 (except for the Kalman filter) are, for all intents and purposes, basic UMOS systems with specifically defined predictands (daily minimum and maximum temperature) and a single model variable chosen as a predictor (1200 and 0000 UTC DMO forecast spot temperatures, respectively). The training period described in MS08 is relatively short (14 days) and updating is accomplished daily. As more model variables are included as predictors, overhead costs would gradually increase and the additional variables

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would add incrementally to the explained variance. We suggest that a more thorough investigation of the UMOS methodology would be to begin with DMO forecast spot temperatures as a sole predictor, and incrementally include more predictors, in order of variance explained, measuring forecast accuracy as more and more predictors are included. In this way a trade-off between overhead (defined as the number of model variables retrieved and stored) and forecast usefulness (defined as accuracy or skill) could be developed. This trade-off may be useful to independent agencies or user groups designing a forecast system for their own use.

REFERENCES

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