Model Physics Development in the RAP/HRRR to Improve Low-Level Winds over Complex Terrain during the Wind Forecast Improvement Project 2

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The Rapid Refresh (RAP) and High-Resolution Rapid Refresh (HRRR) are NOAA real-time operational hourly updating forecast systems run at 13- and 3-km grid spacing, respectively. Both systems use the Advanced Research version of the Weather Research and Forecasting (WRF-ARW) as the model component of the forecast system. During the second installment of the Wind Forecast Improvement Project (WFIP 2), the RAP/HRRR have been targeted for the improvement of low-level wind forecasts in the complex terrain within the Columbia River Basin (CRB), which requires much finer grid spacing to resolve important topographic features in/near the CRB. Therefore, this project provides a unique opportunity to test and develop the RAP/HRRR physics suite within a very high-resolution nest (Δx = 750 m) over the northwestern US. Special effort is made to incorporate scale-adaptive flexibility into the RAP/HRRR physics suite, with emphasis on the representation of subgrid-scale boundary layer and orographic drag processes.

Many wind profiling and scanning instruments have been deployed in the CRB in support the WFIP 2 field project, which spanned 01 October 2015 to 31 March 2017. During the project, several forecast error modes were identified, such as: (1) too-shallow cold pools during the cool season, which can mix-out more frequently than observed and (2) the low wind speed bias in thermal trough-induced gap flows during the warm season. Development has been focused on improving these common forecast failure modes with the criteria of achieving at least neutral impacts in all other operational forecast objectives. This presentation will highlight the testing and development of various model components, showing the improvements over original RAP/HRRR physics. Examples of case studies and retrospective periods will be presented to illustrate the improvements. Ongoing and future challenges in RAP/HRRR physics development will be touched upon.

This seminar will be webcast live at:
http://ucarconnect.ucar.edu/live
Recorded seminar link can be viewed here:
https://www.mmm.ucar.edu/events/seminars

Thursday, 30 November 2017, 3:30 PM
Refreshments 3:15 PM
NCAR-Foothills Laboratory
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