

NOUS41 KWBC 301620
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Technical Implementation Notice 12-24
National Weather Service Headquarters Washington DC
1220 PM EDT Mon Apr 30 2012

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From: Timothy McClung
Chief, Science Plans Branch
Office of Science and Technology

Subject: Changes to the Surface Wind Gust Speed Calculation in
the NAM and DGEX: Effective May 30, 2012

Effective Wednesday, May 30, 2012, beginning with the 1200 Coordinated Universal Time (UTC) run, the National Centers for Environmental Prediction (NCEP) will make a modification to the surface wind gust speed algorithm in the North American Mesoscale (NAM) Analysis and Forecast System and the Downscaled GFS by NAM Extension (DGEX).

To compute wind gust speed, the NAM/DGEX post-processing code determines the height of the top of the planetary boundary layer (PBL). It then determines the wind speed at the top of the PBL and computes the difference between this wind speed and the speed at the surface. A fraction of the wind speed difference is mixed down to the surface and is added to the surface wind speed to give the wind gust speed.

In the NAM/DGEX, the wind gust algorithm uses a PBL height based on a critical value of turbulent kinetic energy (TKE). This form of PBL height has been generated in all NAM versions going back through WRF-NMM and the Eta Model before it. Recent comparisons to observations have found this TKE-based PBL height is generally too high. Examination of the wind gust fields have shown that the wind speed gusts are generally too high as well because wind speeds generally increase with height and the higher PBL height is causing stronger wind speeds to be mixed down. To correct this bias, the NAM/DGEX algorithm is being changed to use PBL height based on a critical value of the bulk Richardson number (added to NAM output in October 2011). This method produces generally lower PBL heights and hence generally lower wind gust speeds.

This change will affect all NAM/DGEX products which contain the surface wind gust speed.

NCEP urges all users to ensure their decoders can handle changes in content order, changes in the scaling factor component within the product definition section (PDS) of the GRIB files, and volume changes. These elements may change with future NCEP model implementations. NCEP will make every attempt to alert users to these changes before implementation.

For questions regarding this change, please contact:

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