**Motivation:** Accurate, reliable wind forecasts are needed so utility companies can effectively use wind generated electricity on the power grid without the high cost of standby generators.

**WRF Version 3.1**
- New Planetary Boundary Layer Schemes.
- New Surface Layer Schemes.
- Potential Change from Code Fixes.

Above, initialization data (RUC) apparently provided low wind speeds.
- As model progressed, forecasts were high.
- Below, error increased over time for some schemes but remained almost flat for others.
- Time period was Dec 20, 2008 to Mar 20, 2009 using 396 forecasts at varying times of day.

**Grid Variations**
- Standard model had three square domains: 52 X 52, 36 X 36, and 30 X 30 cells.
- Extended model: 92 X 92, 72 X 72, 48 X 48.
- Cell sizes were 9 km, 3 km, and 1 km.
- “Two Domains” was run with innermost domain removed.
- “Middle Data” was run with three domains but speeds were taken from middle domain.

Lean domains similar to expanded domain.
- Better results using data from 3 km domain, and inner nest did not help middle domain.
- Below, same tests but error was first corrected for identified bias. More realistic, minor help.
- Test based on 198 forecasts, WRF 3.0.1.1
- Same time period previously mentioned.

**WRF and Initialization Data**
- WRF run using standard grids, MYJ/ETA.
- RUC and NAM was run through WPS, then metgrid files were interpolated to Sodar location.

**Equipment and Location**
- Picture below is the Triton sodar, made by Second Wind Inc, and was used for verification.
- Data from WRF was bilinearly interpolated to sodar location within innermost domain.
- Sodar recorded wind speeds at 10 heights from 40 to 200 meters, but all data shown is from 80 meters, which is the turbine hub height.
- WRF source code was customized to accumulate wind speeds from all time steps for creation of periodic averages at fixed heights.

- Sodar and wind farm are located in south Idaho on the Snake River Plain.
- Terrain is farmland, grassland, and shrubland. Moderately complex.
- The background image is of the actual wind farm and surrounding area used in this research.

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