Quick overview on RAPv2 temp/ dewpoint verification

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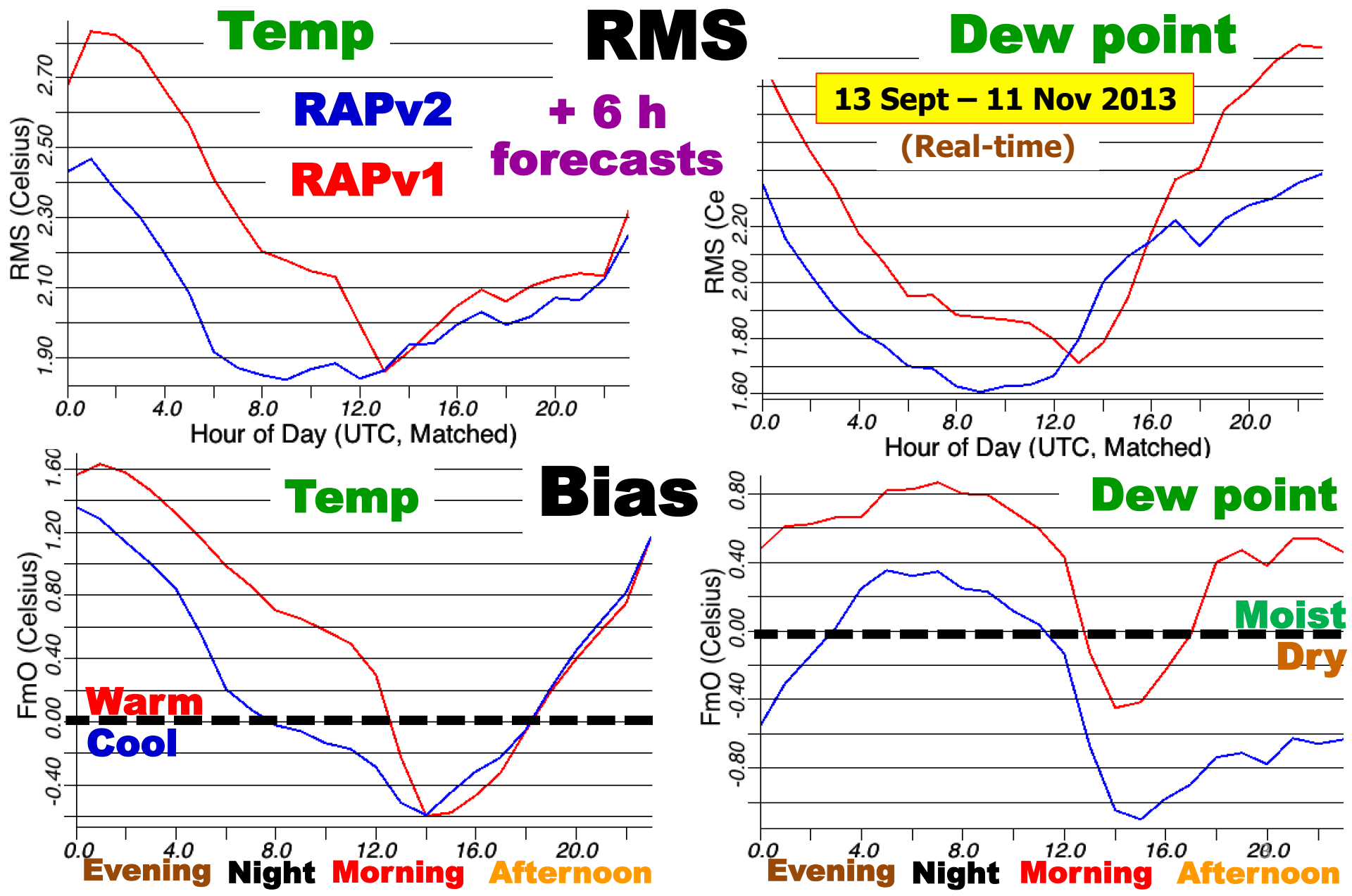
15 April 2014

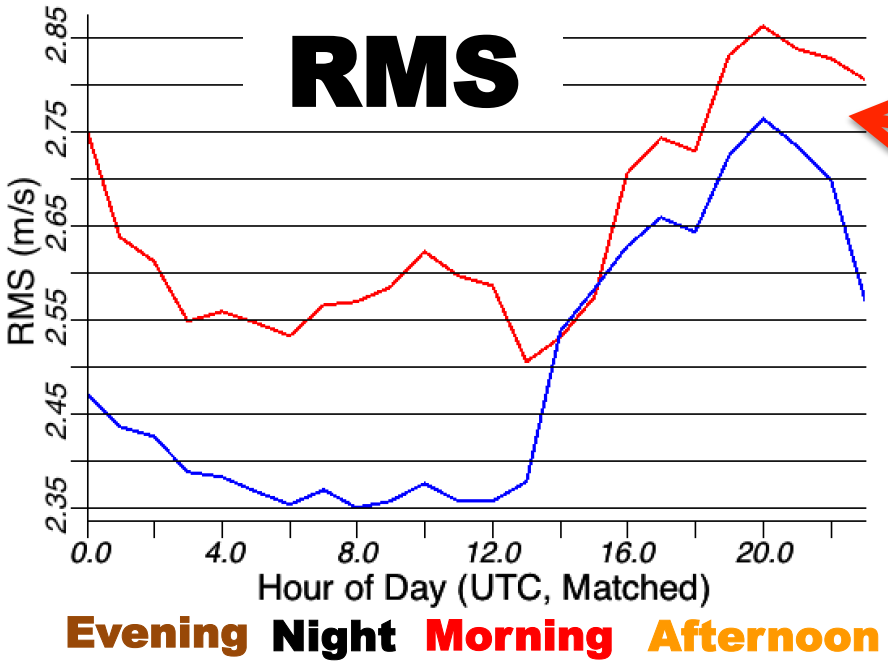
First, some retrospective runs from spring 2013 and fall 2013 for RAPv2 vs. RAPv1

- Extracted from NWS RAPv2 webinar http://ruc.noaa.gov/pdf/RAPv2-NWSwebinar-18feb2014-FINAL.pdf
- 2m temp –
  - RMS error – RAPv2 better, esp. at night
  - Bias – RAPv2 better but still warm bias in day
- 2m dewpoint
  - RMS error – RAPv2 better at all times of day
  - Bias – mixed results, more dry bias from RAPv2 apparent in daytime but (not shown) predominantly in clear conditions
- 10m wind
  - RAPv2 better for RMS vector error and speed bias

2m T and Td: RAPv2 vs. oper RAPv1

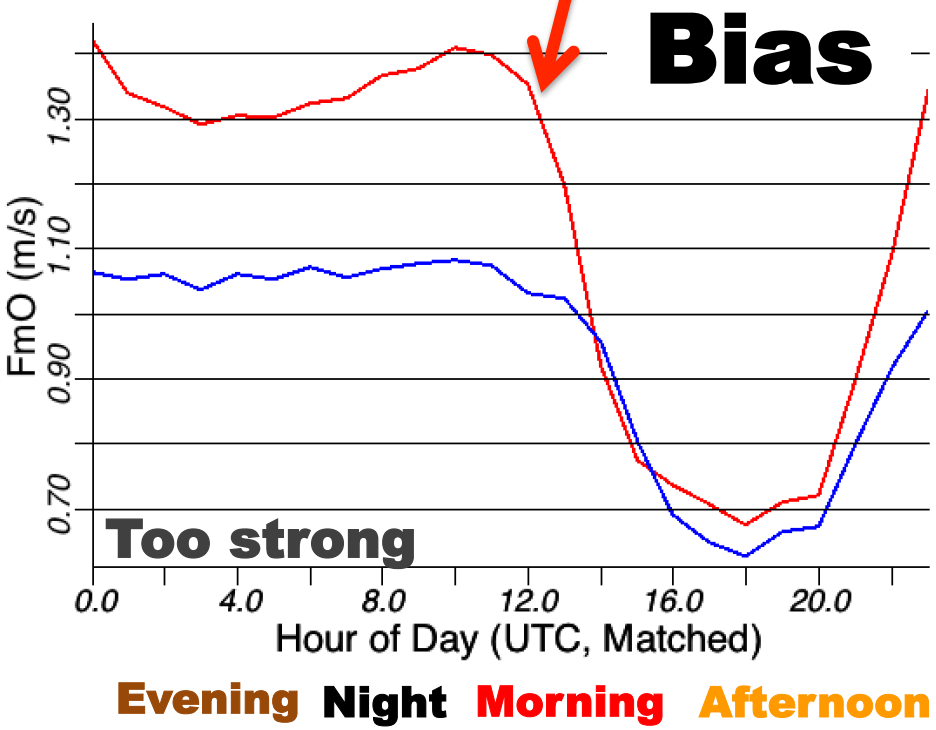


10m winds: RAPv2 vs. oper RAPv1

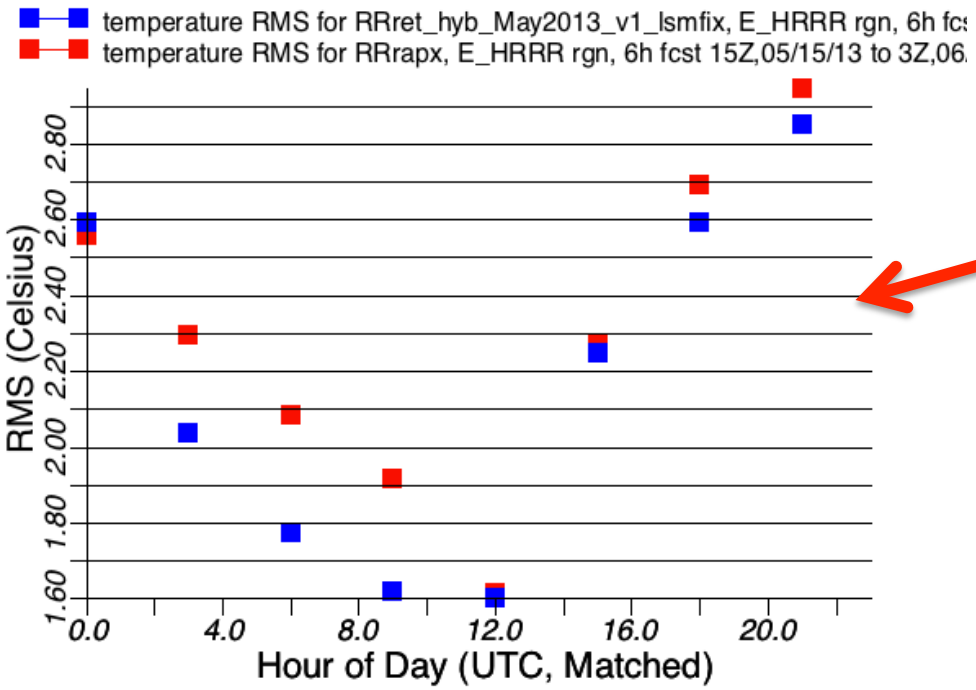


RAPv2 has lower **RMS** vector 10m wind errors than RAPv1 at all times of day.

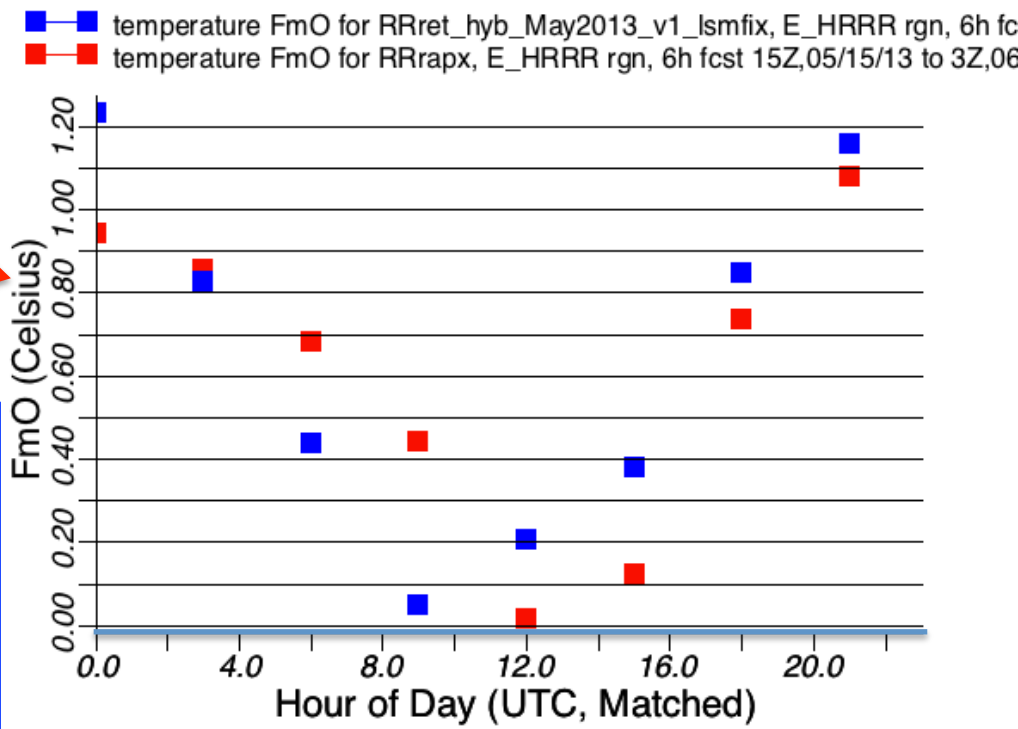
RAPv2 has lower (better) positive 10m wind speed **bias (F-O)** than RAPv1 at all times of day



6h <u>10m wind</u> forecasts
Eastern/Central US
12 Sept – 11 Nov 2013
RAPv1 vs. **RAPv2**

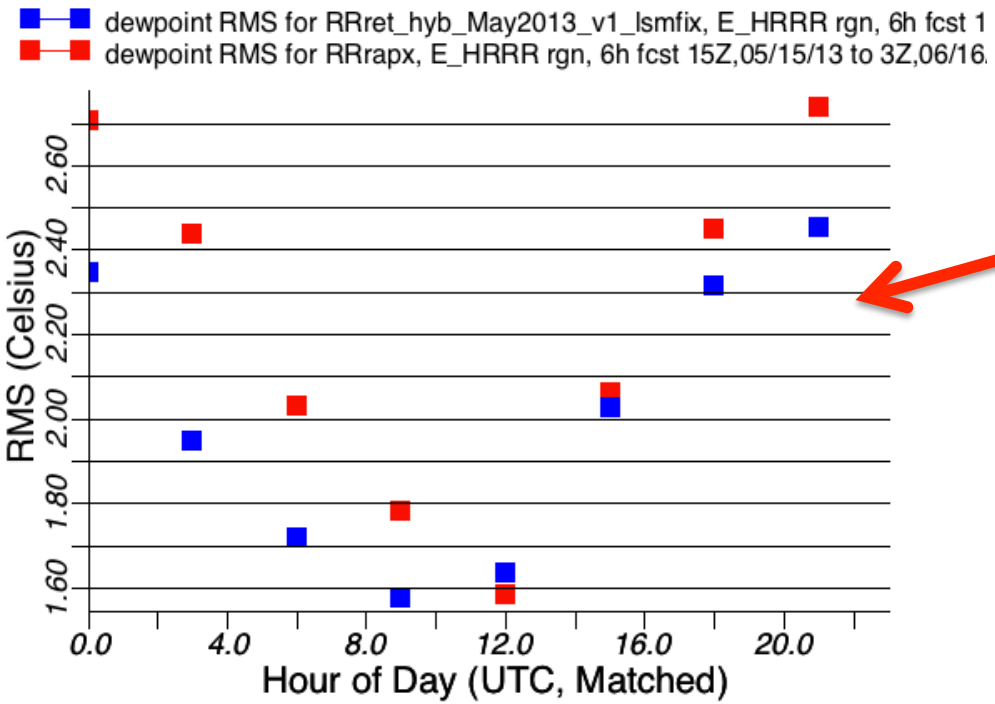


RAPv2 has lower **RMS** 2m temp errors than RAPv1 all times of day, esp. at night



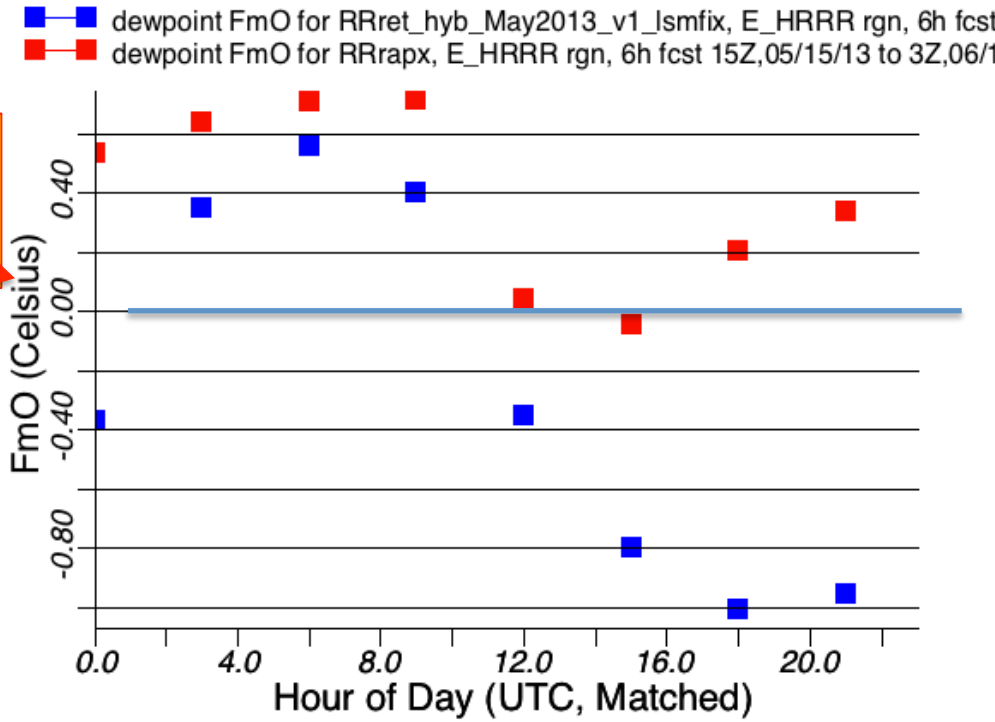
RAPv2 has less warm nighttime 2mT **bias (F-O)** than RAPv1, similar in day (but more at 00z)

6h <u>2m Temp</u> forecasts
Eastern/Central US
15 May – 15 June 2013
RAPv1 vs. **RAPv2**

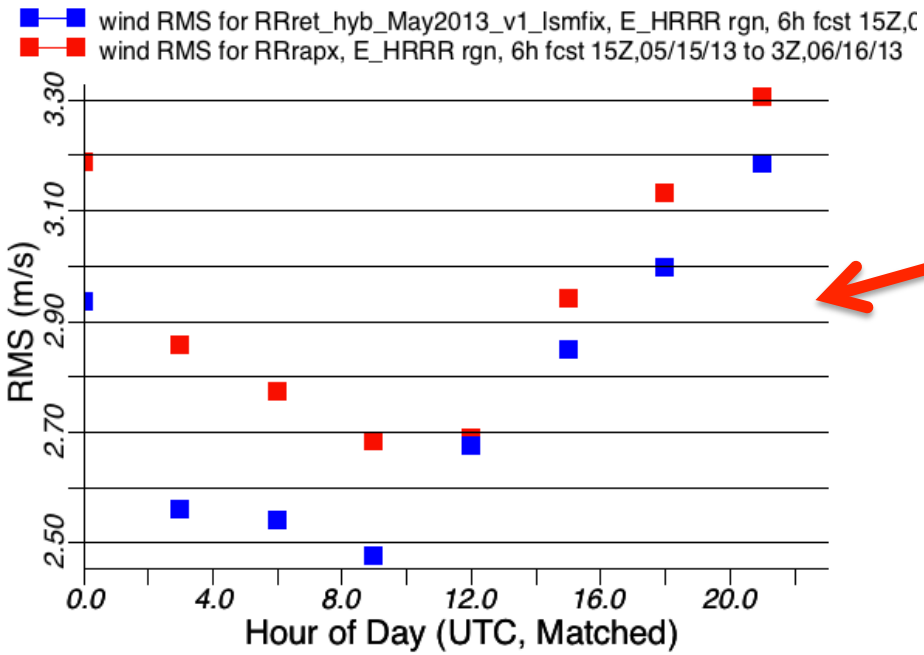


RAPv2 has lower **RMS** 2m dewpoint errors than RAPv1 all times of day

RAPv2 has drier 2m Td **bias (F-O)** than RAPv1. Better RMS Td in moist regions, less cancellation results in overall drier bias

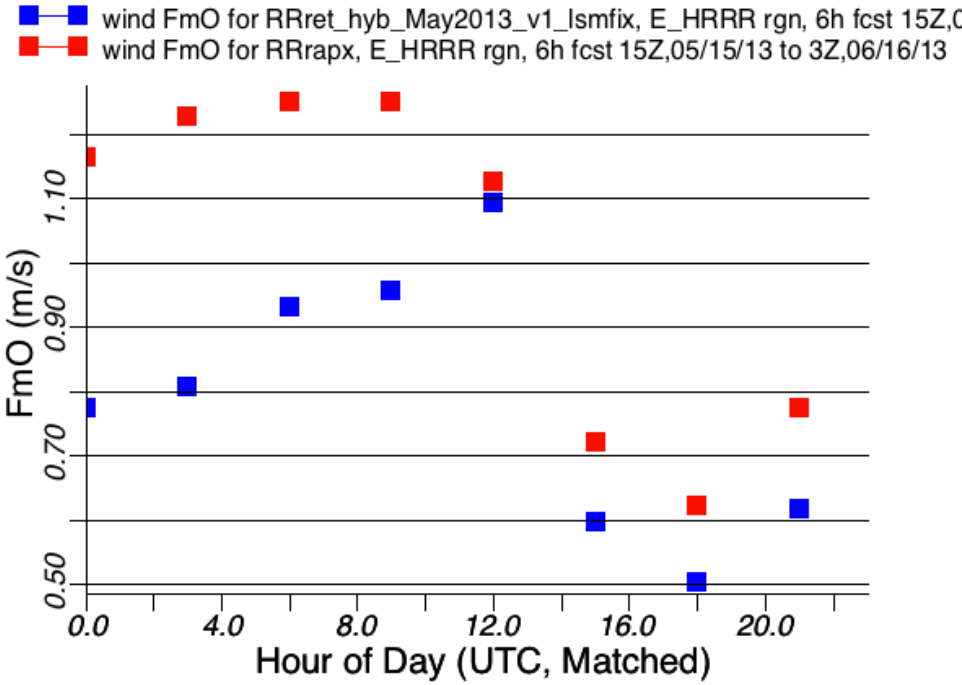


6h <u>2m Dewpoint</u> forecasts
Eastern/Central US
15 May – 15 June 2013
RAPv1 vs. **RAPv2**



RAPv2 has lower **RMS** 10m wind vector errors than RAPv1 all times of day

RAPv2 has less 10m wind speed **bias (F-O)** than RAPv1 at all times of day, especially at night.

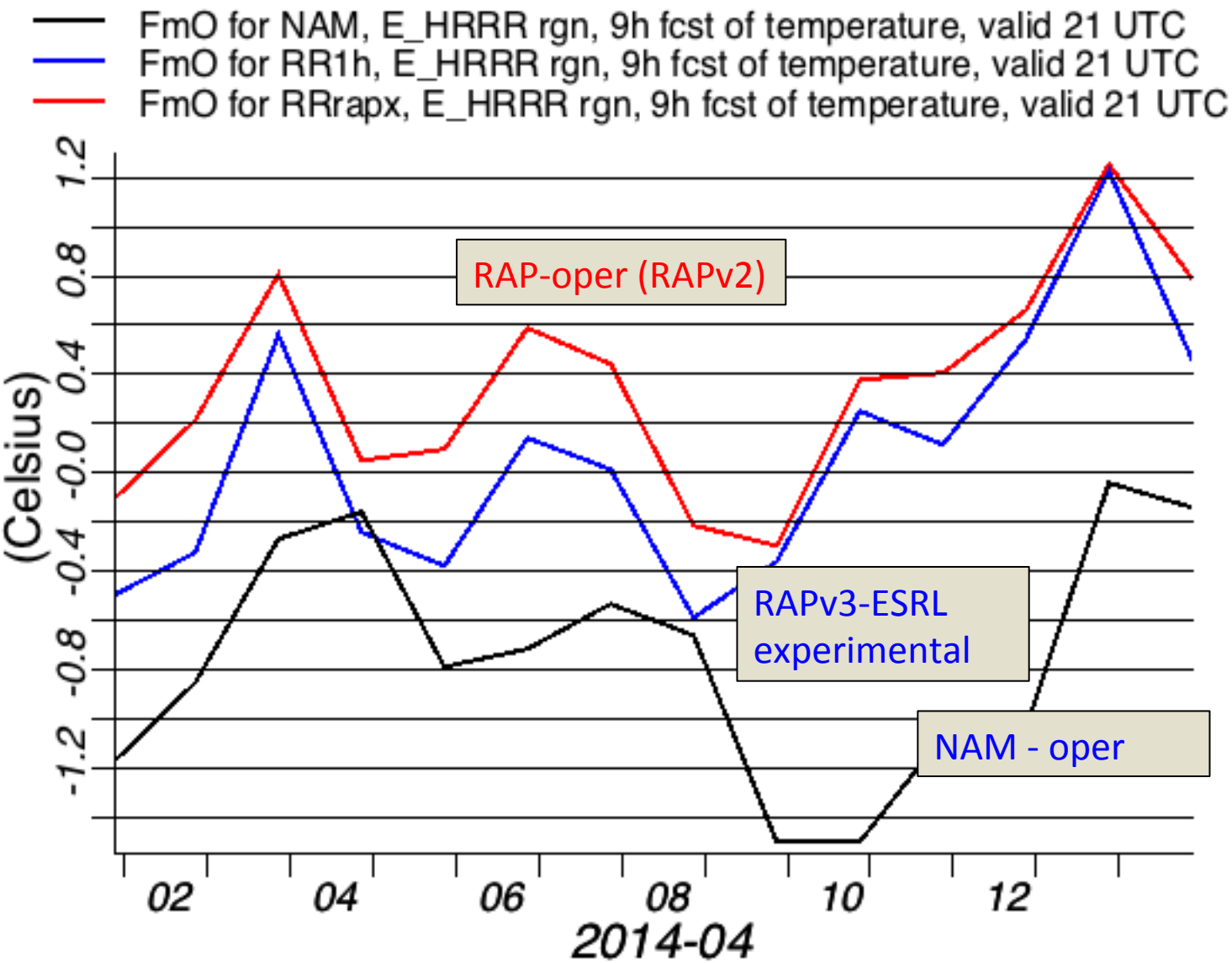


6h <u>10m wind</u> forecasts
Eastern/Central US
15 May – 15 June 2013
RAPv1 vs. **RAPv2**

Next, some results from April 2014

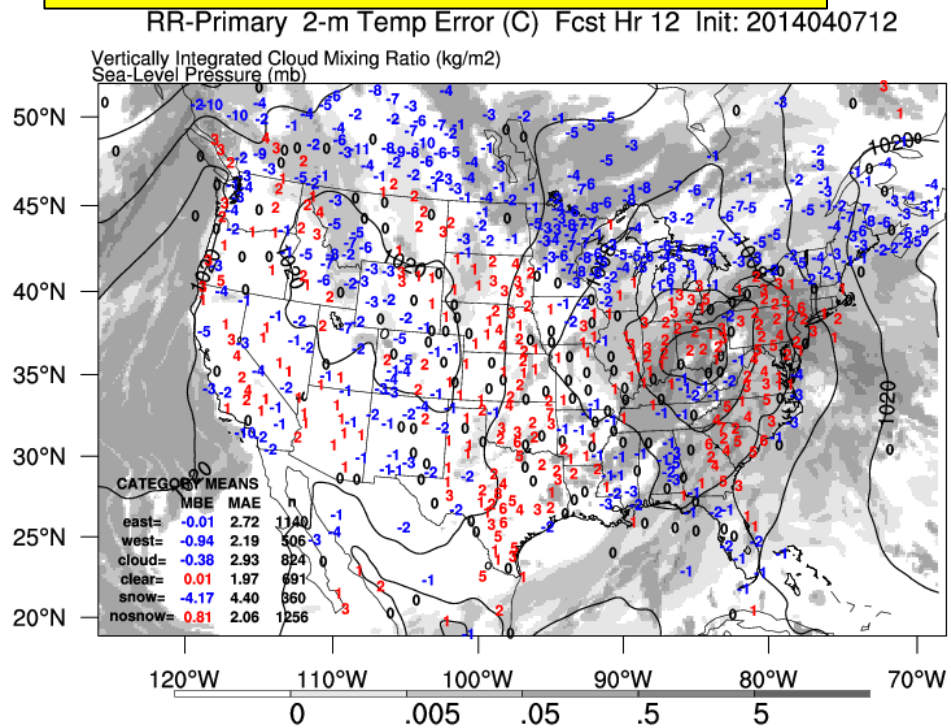
- RAPv2 results (now running operationally at NCEP)
- RAPv3 – running experimentally at ESRL, planned for implementation at NCEP in 2015.

2m Temperature bias (fcst minus obs) – 9h forecasts valid at 21z for April 2014

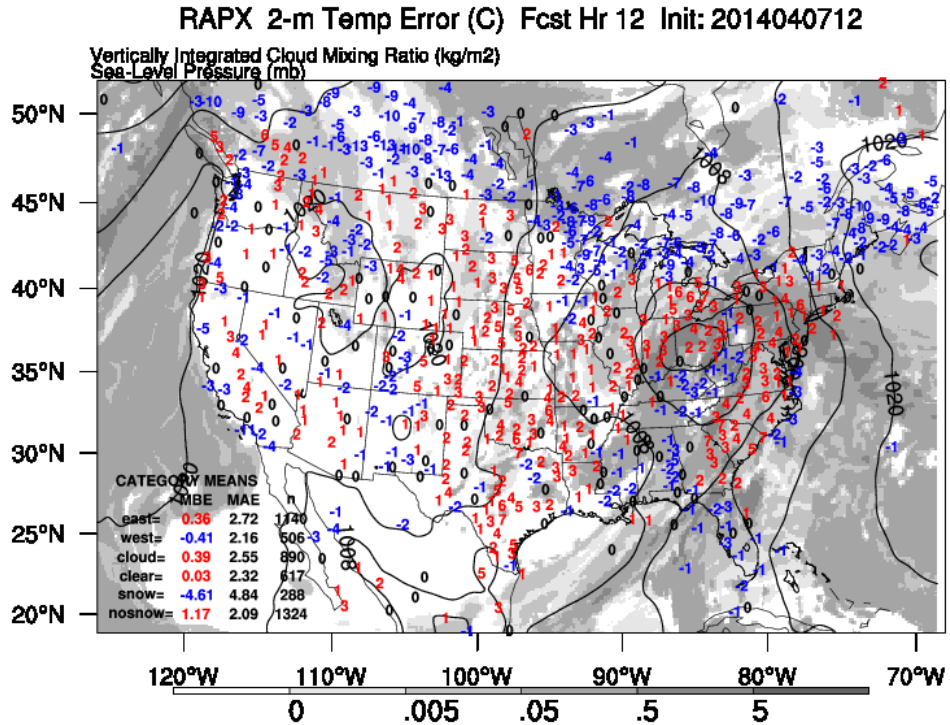


Comment: Some warm temp bias for 9h forecast during daytime for RAPv2 oper, slightly better for RAPv3. Varies from day to day.

RAP – ESRL (RAPv3 since 1 April 2014)



RAP – oper /NCEP (RAPv2)

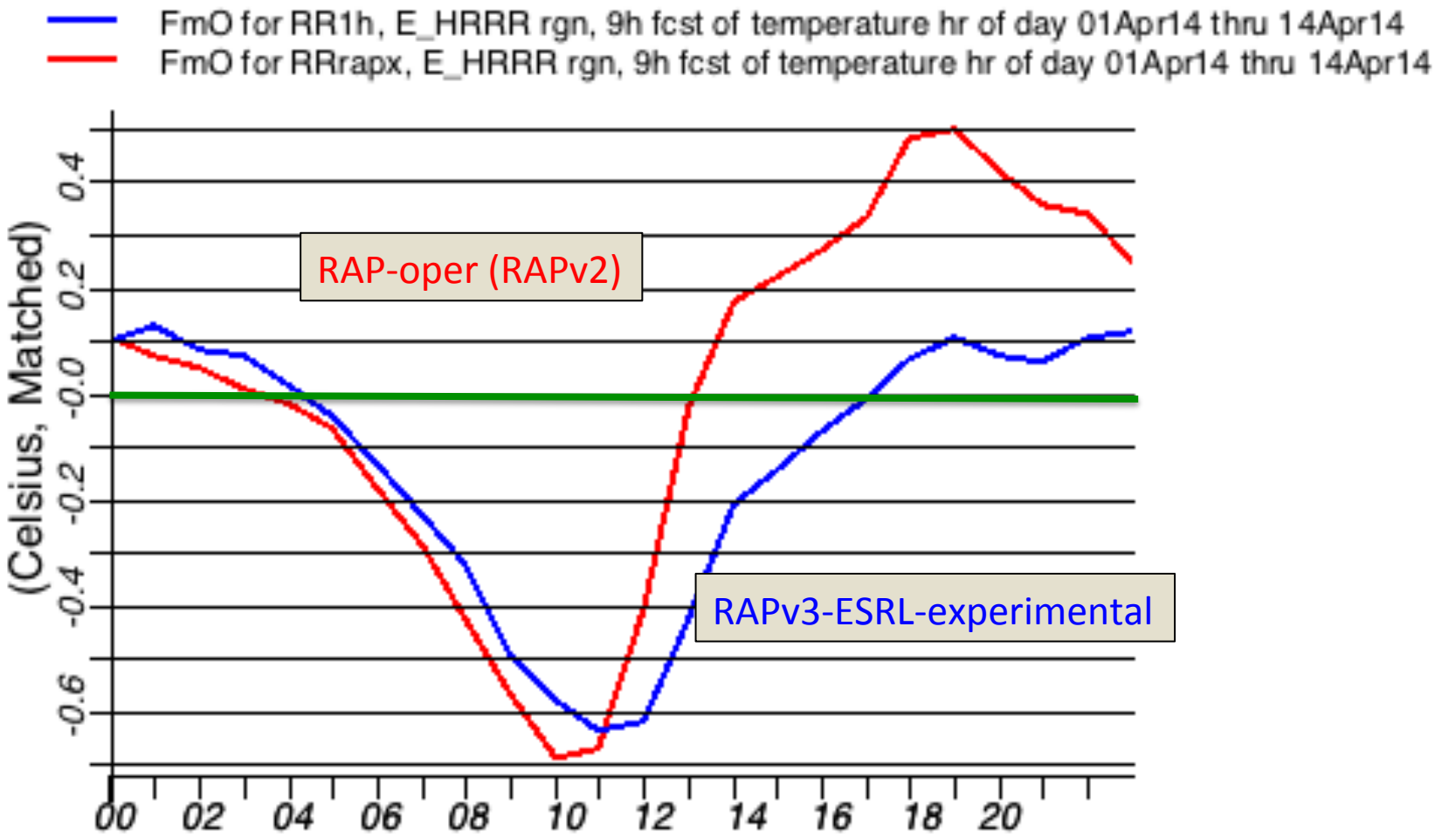


12h forecast verification against METARs valid 00z 8 April 2014

This verification tool is available for users to look at to compare RAP versions and other models against METAR obs.

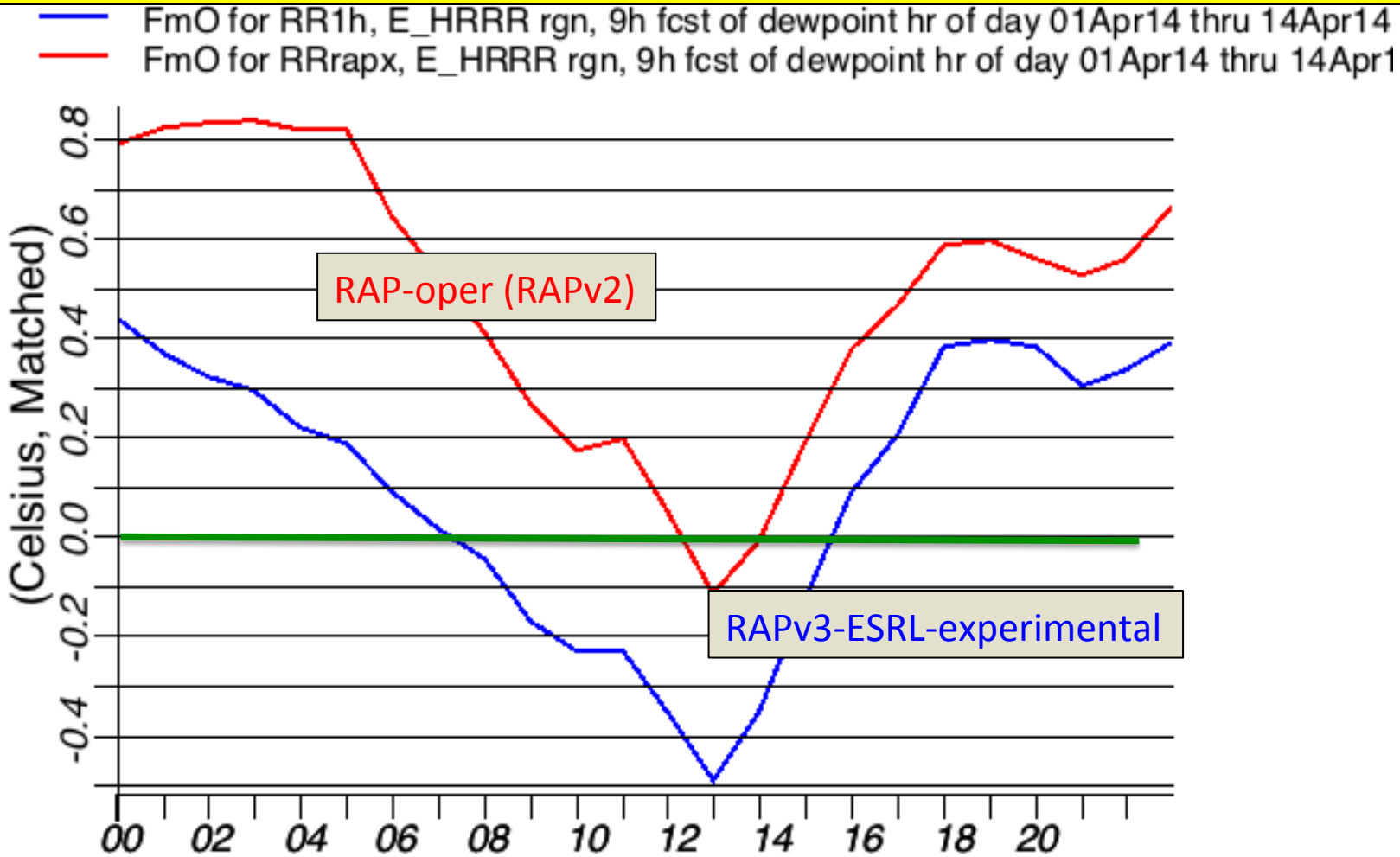
http://rapidrefresh.noaa.gov/verify/Welcome.cgi

9h fcst 2m Temperature bias (fcst minus obs) by valid time of day (UTC) for April 2014 Eastern US (east of 100 deg W)



Comment: Some warm temp bias for 9h forecast during daytime for RAPv2 oper, less so for upcoming RAPv3.

9h fcst - 2m dewpoint bias (fcst minus obs) by valid time of day (UTC) for April 2014
Eastern US – east of 100 deg W



Comment: Some moist dewpoint bias for 9h forecast during daytime and early evening for RAPv2 oper, less so for upcoming RAPv3.

Verification tools for surface forecasts for individual days for RAP and other models

- http://rapidrefresh.noaa.gov/verify/Welcome.cgi
  - From NOAA/GSD/RAP development group
- http://www.meteor.iastate.edu/~ckarsten/bufkit/image_loader.phtml?site=klan&nam=on&nam_mos=on&namm=on&gfs_mos=on&gfs=on&gfsm_mos=on&gfsm=on&nws=on&rap=on&obs=on&nam4km=on&con=on&ratio=0&cobb=on&mean_mt=on
  - Courtesy of Iowa State and user Rob Dale
  - Set here for KLAN – Lansing, Michigan, but can be reset for other stations