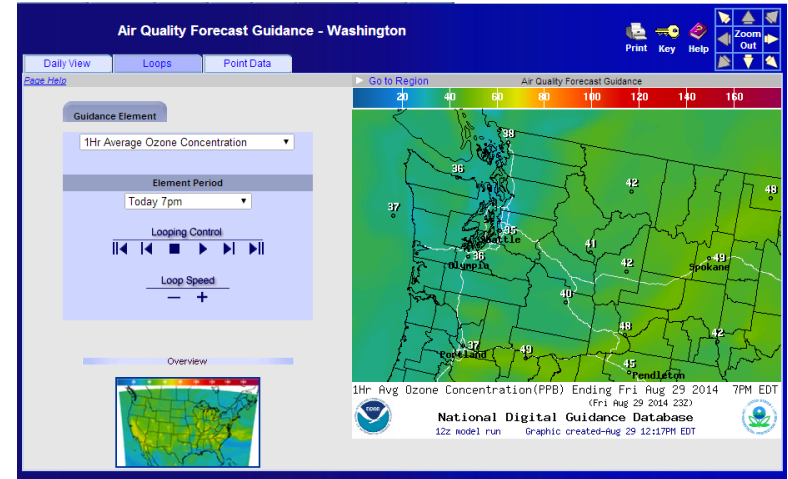
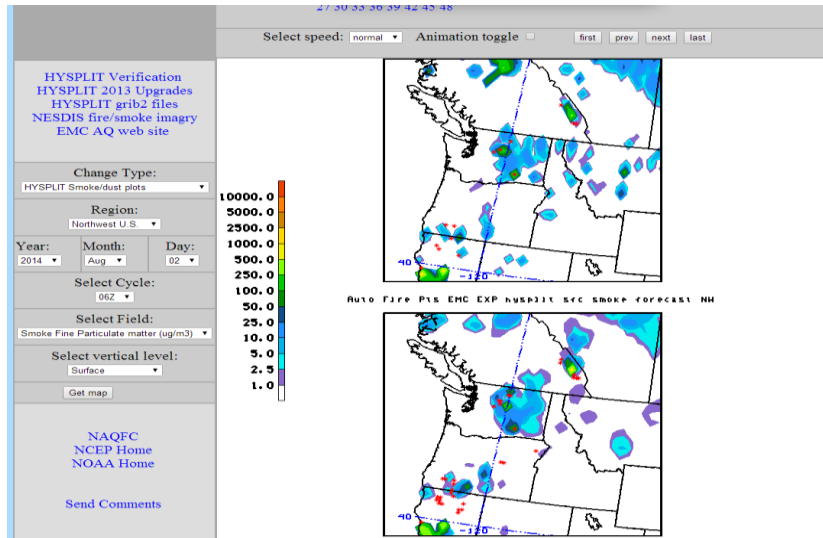
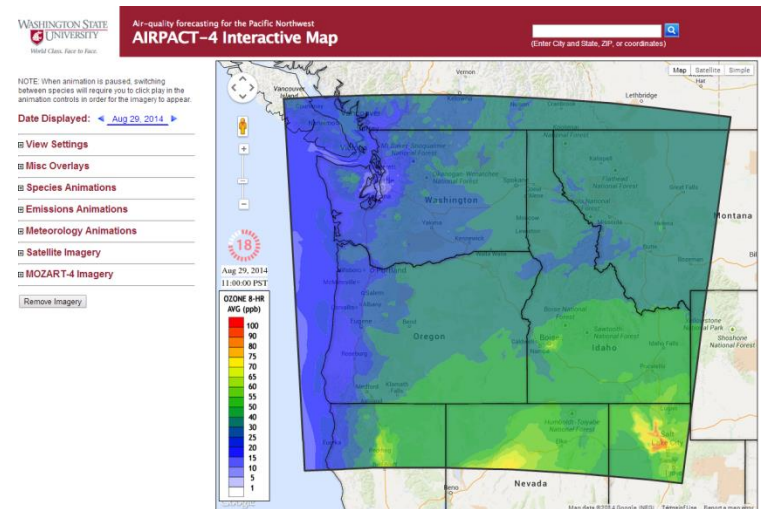


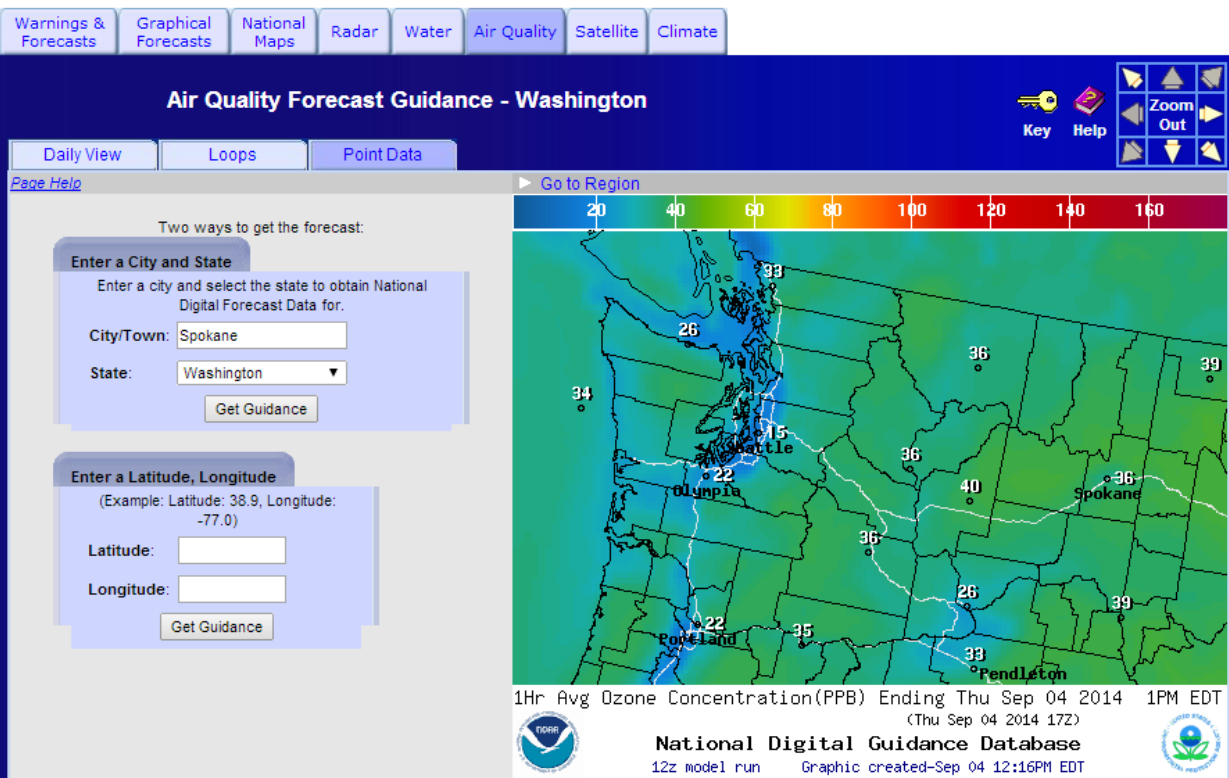
Washington State's use of NOAA AQ forecast tools



Ranil Dhammapala
Air Quality Program
Washington State Dept of Ecology
Olympia, WA
ranil.dhammapala@ecy.wa.gov
360-407-6807



- Often used as a backup or for a second opinion
- Advantages over our forecast system:
 - Provides a dust forecast (a lot of our soil is PM₁₀, not TSP so high erosion potential even with 15 mph winds)
 - Our 4km CMAQ model isn't performing as well as our now-retired 12km CMAQ model did, for Ozone.



Point forecasts

- In developmental products: get point forecast on mouse click?
- Time series of model & monitor data instead of a table? Helps scale forecast by recent model performance at that site

Warnings & Forecasts | Graphical Forecasts | National Maps | Radar | Water | Air Quality | Satellite | Climate

Air Quality Forecast Guidance - Washington

Daily View | Loops | Point Data

Two ways to get the forecast:

Enter a City and State
 Enter a city and select the state to obtain National Digital Forecast Data for.
 City/Town:
 State:

Enter a Latitude, Longitude
 (Example: Latitude: 38.9, Longitude: -77.0)
 Latitude:
 Longitude:

1Hr Avg Ozone Concentration

National 12z model

Air Quality Forecast Guidance for Spokane, WA

Displayed below are NOAA-EPA Air Quality Forecast Guidance values for latitude: 47.67 N, longitude: 117.41 W.
 Ozone concentrations are presented in parts per billion (PPB).
 Suggestions are encouraged. Page is available. information...

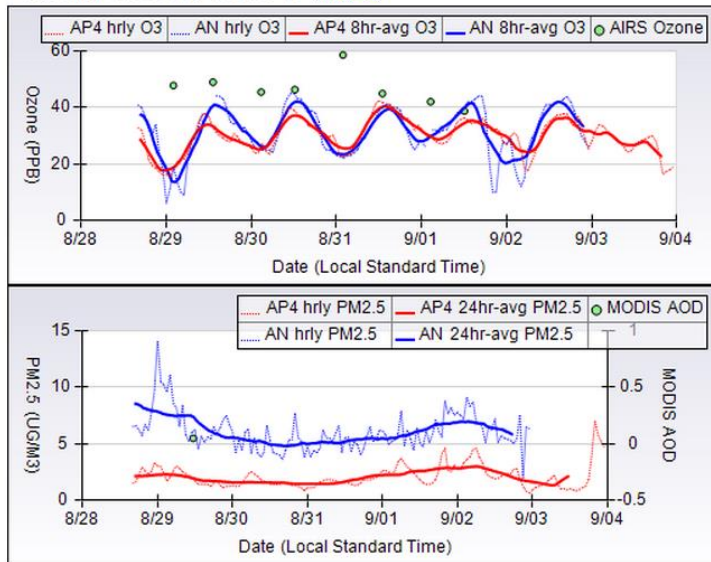
Station: Save Data → View Data

Start: August 29, 2014

End: September 5, 2014

Lat, Long: 47.6725, -117.3649 [Map It](#)

[\(Refresh Page\)](#) [\[Monthly Stats\]](#)



2014 AIRPACT-4 vs. AIRNow Performance Charts

Minimum 1 Hour Average Ozone Concentration (PPB)*	Maximum 8 Hour Average Ozone Concentration (PPB)*
51	47

*Minimum 1- and 8-hour ozone concentration values may have of the corresponding hourly ozone concentrations.

Smoke Ending Time (Local Time)	1 Hour Surface Smoke (µg/m³) 06Z Model Run	1 Hour Column-Integrated Smoke (µg/m³) 06Z Model Run
Thu, 04 Sep 10 AM	0	0
Thu, 04 Sep 11 AM	0	0
Thu, 04 Sep 12 PM	0	0
Thu, 04 Sep 01 PM	0	0
Thu, 04 Sep 02 PM	0	0
Thu, 04 Sep 03 PM	0	0
Thu, 04 Sep 04 PM	0	0
Thu, 04 Sep 05 PM	0	0
Thu, 04 Sep 06 PM	0	0

Air-quality forecasting for the Pacific Northwest

AIRPACT-4 Interactive Map

(Enter City and State, ZIP, or coordinates)

NOTE: When animation is paused, switching between species will require you to click play in the animation controls in order for the imagery to appear.

Date Displayed: ◀ Aug 11, 2014 ▶

View Settings

Misc Overlays

Species Animations

- | | | |
|--|---------------------------------------|--|
| <input type="radio"/> OZONE | <input type="radio"/> AOD | <input type="radio"/> NO _x |
| <input type="radio"/> OZONE 8hr avg | <input type="radio"/> CO | <input type="radio"/> SO ₂ |
| <input checked="" type="radio"/> PM2.5 | <input type="radio"/> HCHO | <input type="radio"/> VOCs |
| <input type="radio"/> PM2.5 24hr avg | <input type="radio"/> ISOPRENE | <input type="radio"/> AORGC |
| | <input type="radio"/> NH ₃ | <input type="radio"/> ANO ₃ |

Note: Animations available May 1, 2012 onward (AORGC and ANO₃ available beginning June 24)

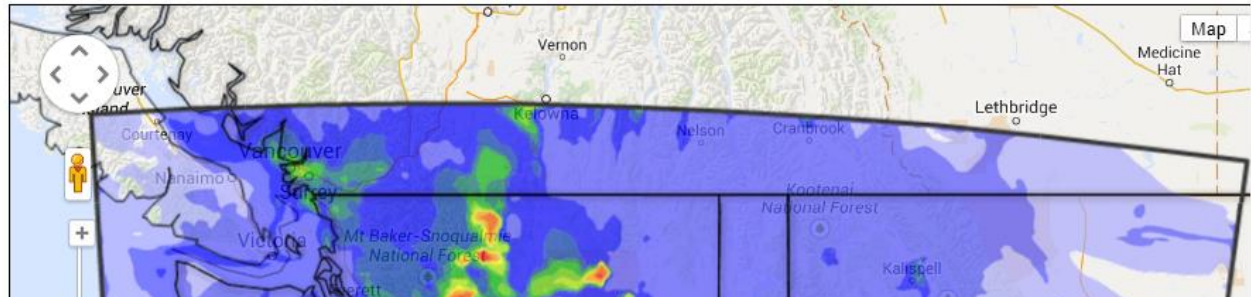
Emissions Animations

Meteorology Animations

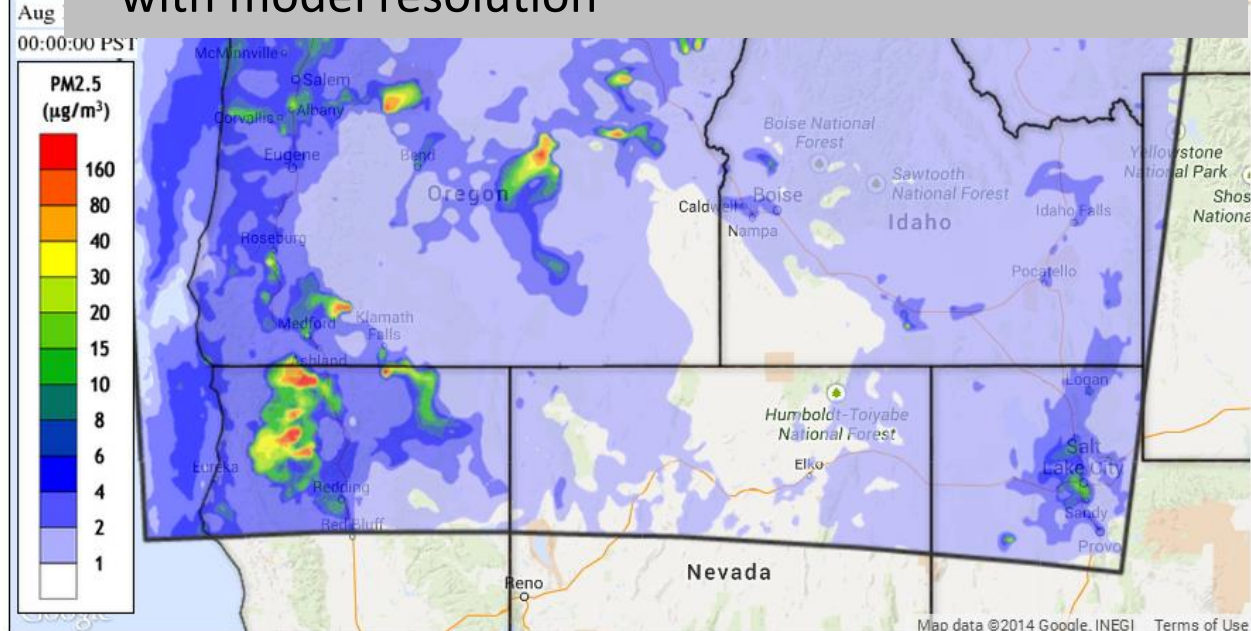
Satellite Imagery

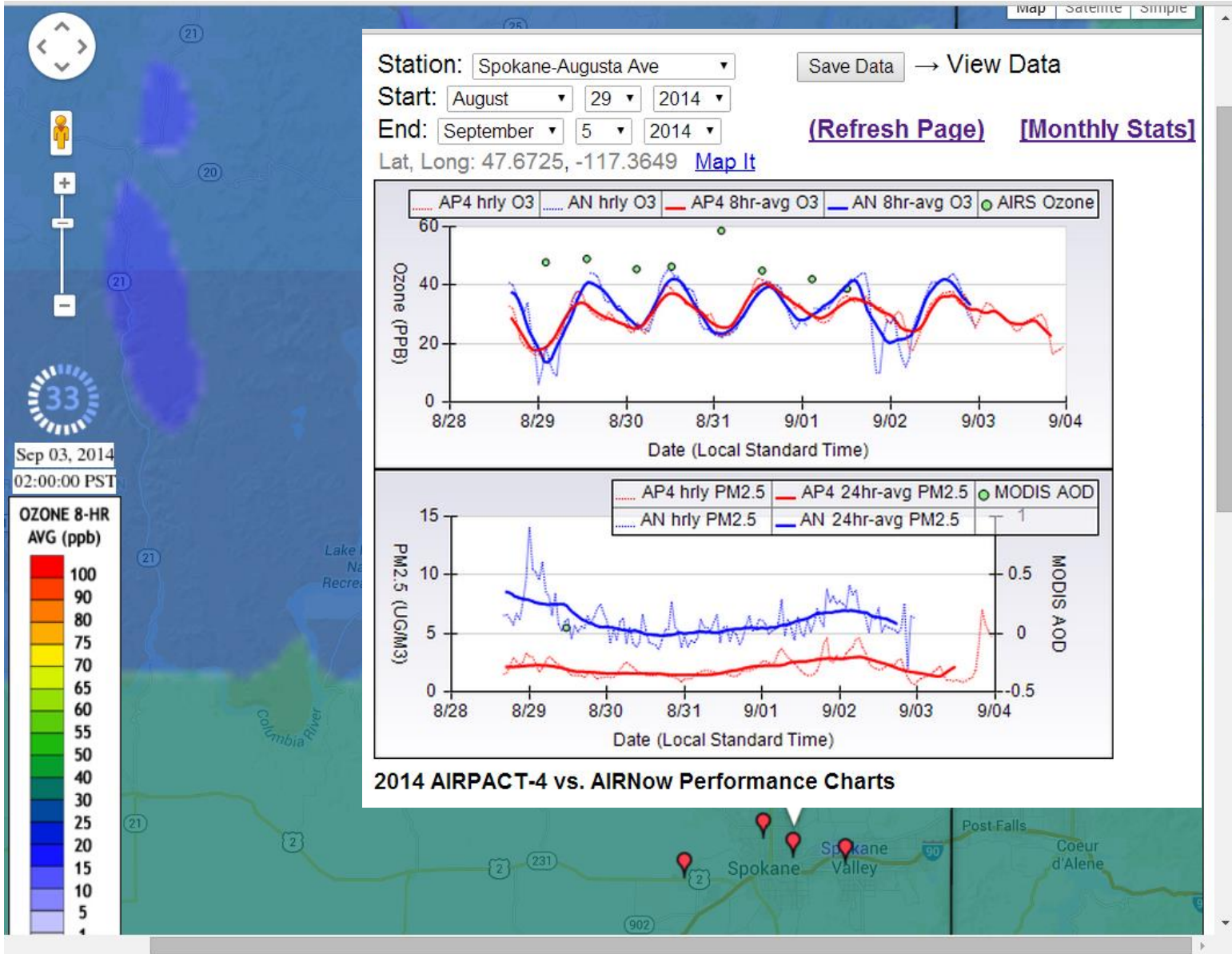
MOZART-4 Imagery

Remove Imagery



- 4km CMAQ run out to 48 hrs, driven by OZ WRF
- UW- Seattle runs WRF, WSU- Pullman runs CMAQ
- Google maps API. Max zoom must be consistent with model resolution





NWS/OST AQF Page
AQF Forecasts/Information

CMAQ regional graphics

Change FVS type:

Standard O3 Statistics

Select fields/species: O3

Select time: July

Select Run Cycle 12 UTC

Select region:

All regions PARA

Select averaged hour:

8 hr sfc average

Select forecast four:

Diurnal period

Select statistic type:

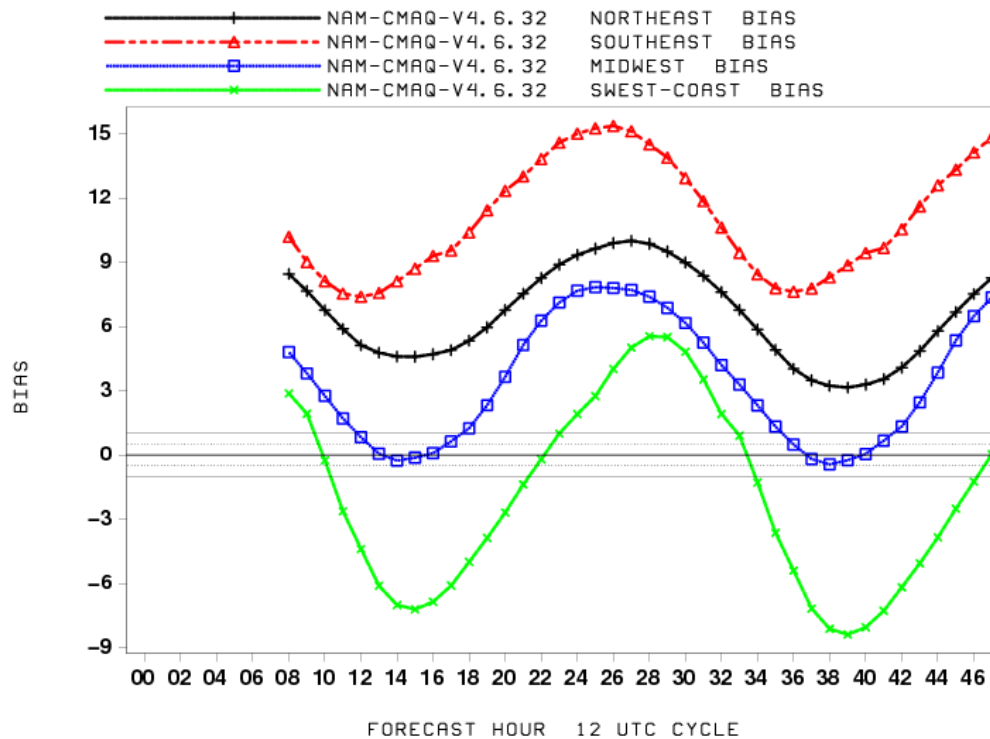
BIAS

Get map

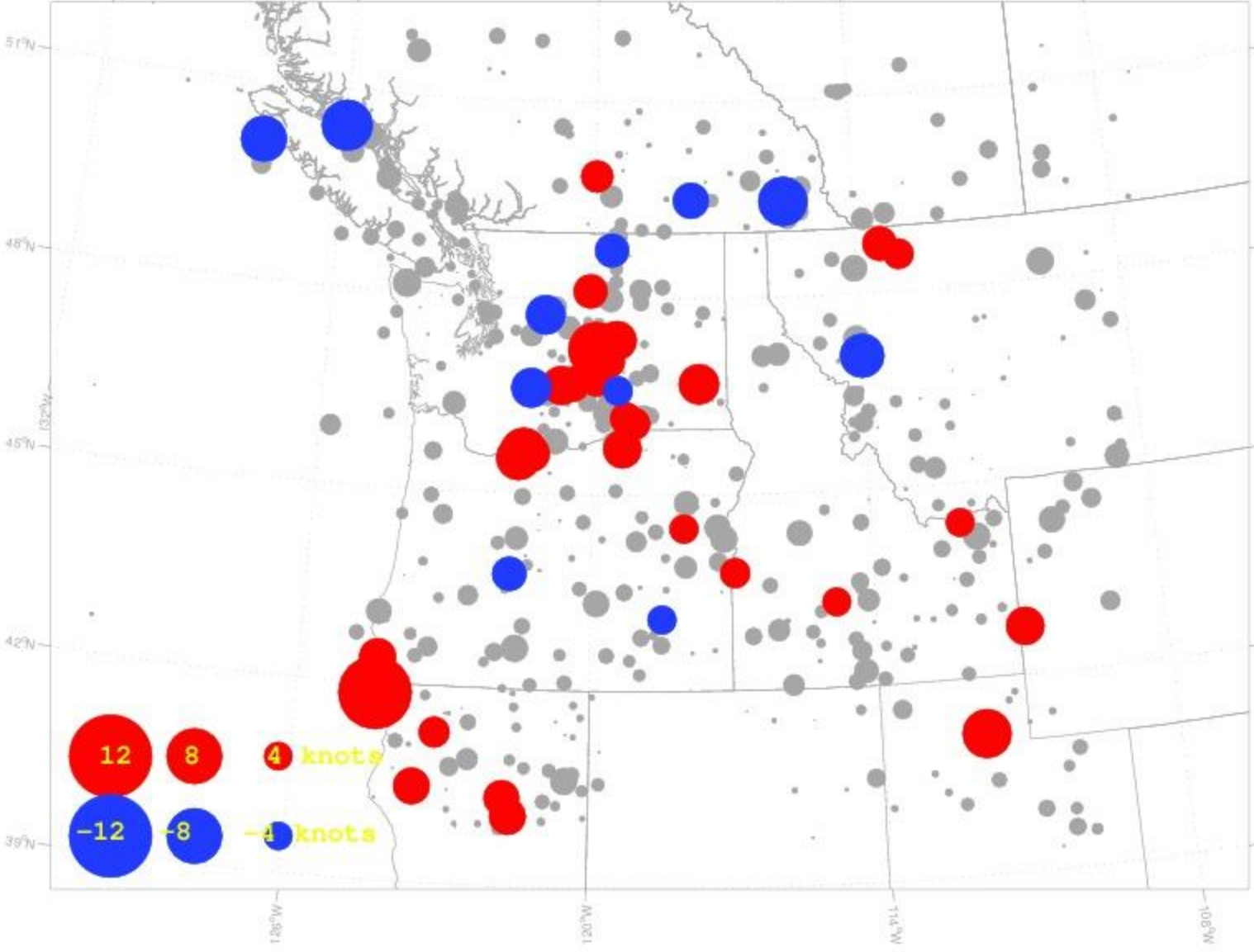
Verification Regions

Verification score definitions

OZON/8 BIAS AVGED BY FCST HRS
20140715 TO 20140809



Average MEs, 10-m Wind Speed, WRF-GFS-12km, 01-Aug-2014 - 31-Aug-2014, 12Z, fhr 24
Mean Error < -4 knots (blue)
Mean Error > 4 knots (red)

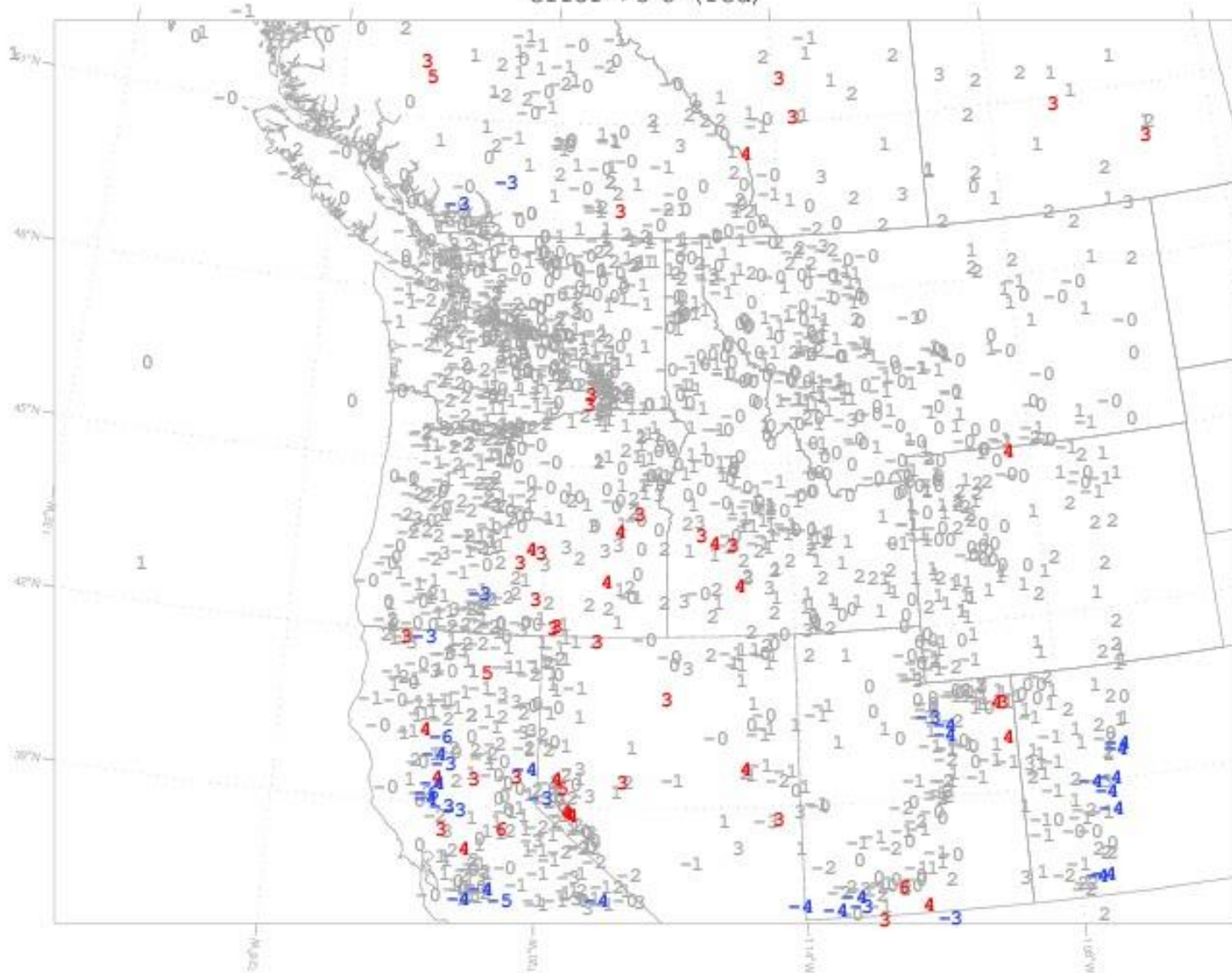


Visualizing
model
performance
by region:
monthly
aggregate

temp errors, WRF-12km, fhr36, 2014083000

error < -3°C (blue)

error > 3°C (red)



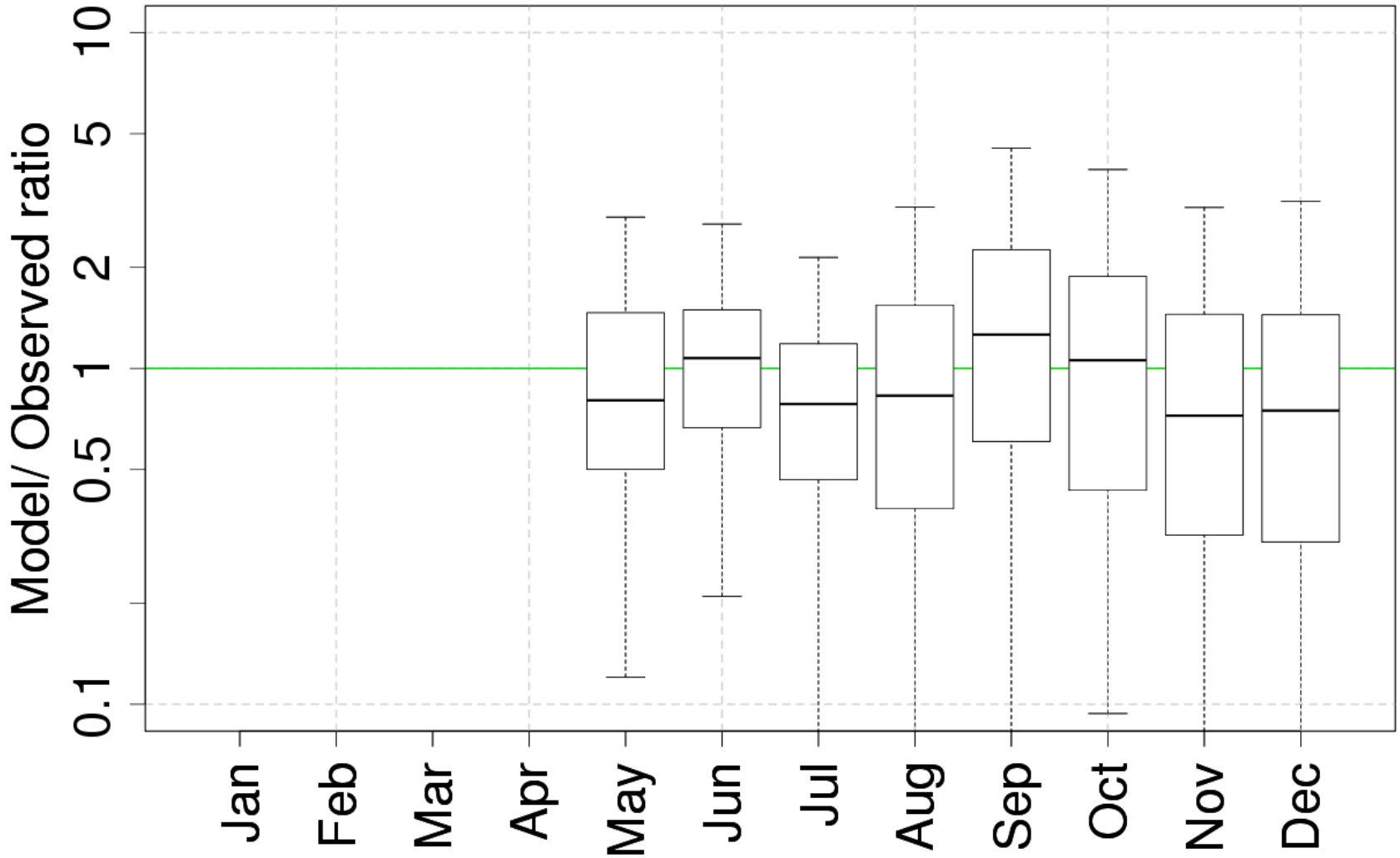
Visualizing
model
performance
by region:
daily
observations



DEPARTMENT OF
ECOLOGY
State of Washington

Consider showing the full distribution of model-monitor comparisons, not just mean bias etc

PM_{2.5} at all sites in 2013



Seasonal means of PM_{2.5} breakdown at all sites in 2014

