

WRF-MMIF-AERMET Model Performance Evaluation in support of a PSD permit application

Jay
McAlpine
EPA R10



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Test Sands and

RAMBOLL

Ranil
Dhammapala
WA Dept of
Ecology

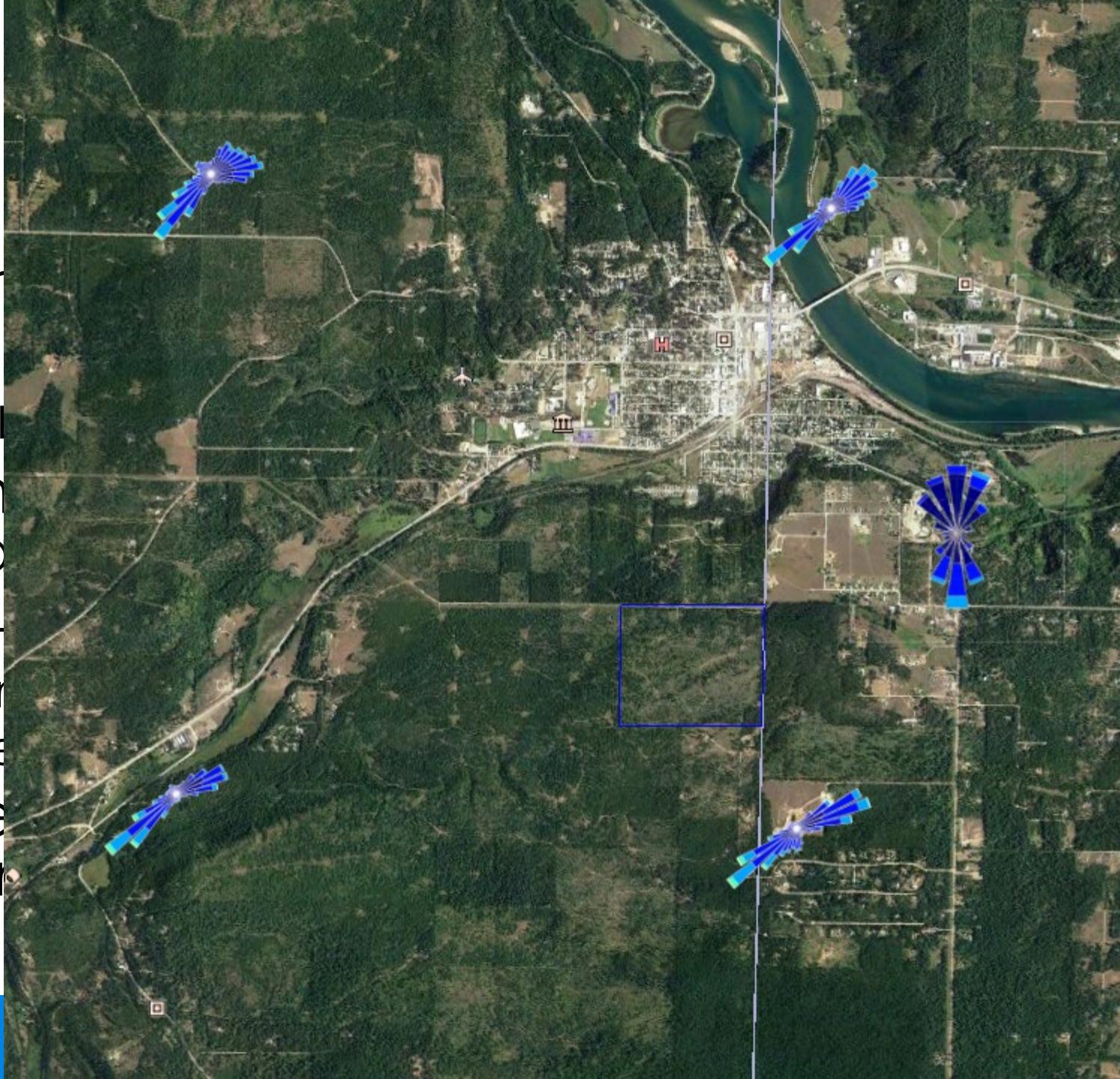


Project basics

- Silica smelter with > 500 tpy SO₂ & >900 tpy NO_x proposed in Newport, WA
- No representative met data nearby (IDT site not QC'd)
- UW 4km WRF forecast archives have continuous verification stats online
- But f12-23 performance at ASOS sites was poor
 - Worse than EPA 12km CONUS WRF!
 - Forecast vs hindcast?
- Decided on analysis-nudged hindcast 4km & 1.33km WRF runs



- Silica sand proposal
- No repudiation
- UW 4km verification
- But f12-
 - Worsening
 - Forecast
- Decided to do WRF run



O_x
not QC'd)
ous
or
 $\times 1.33\text{km}$



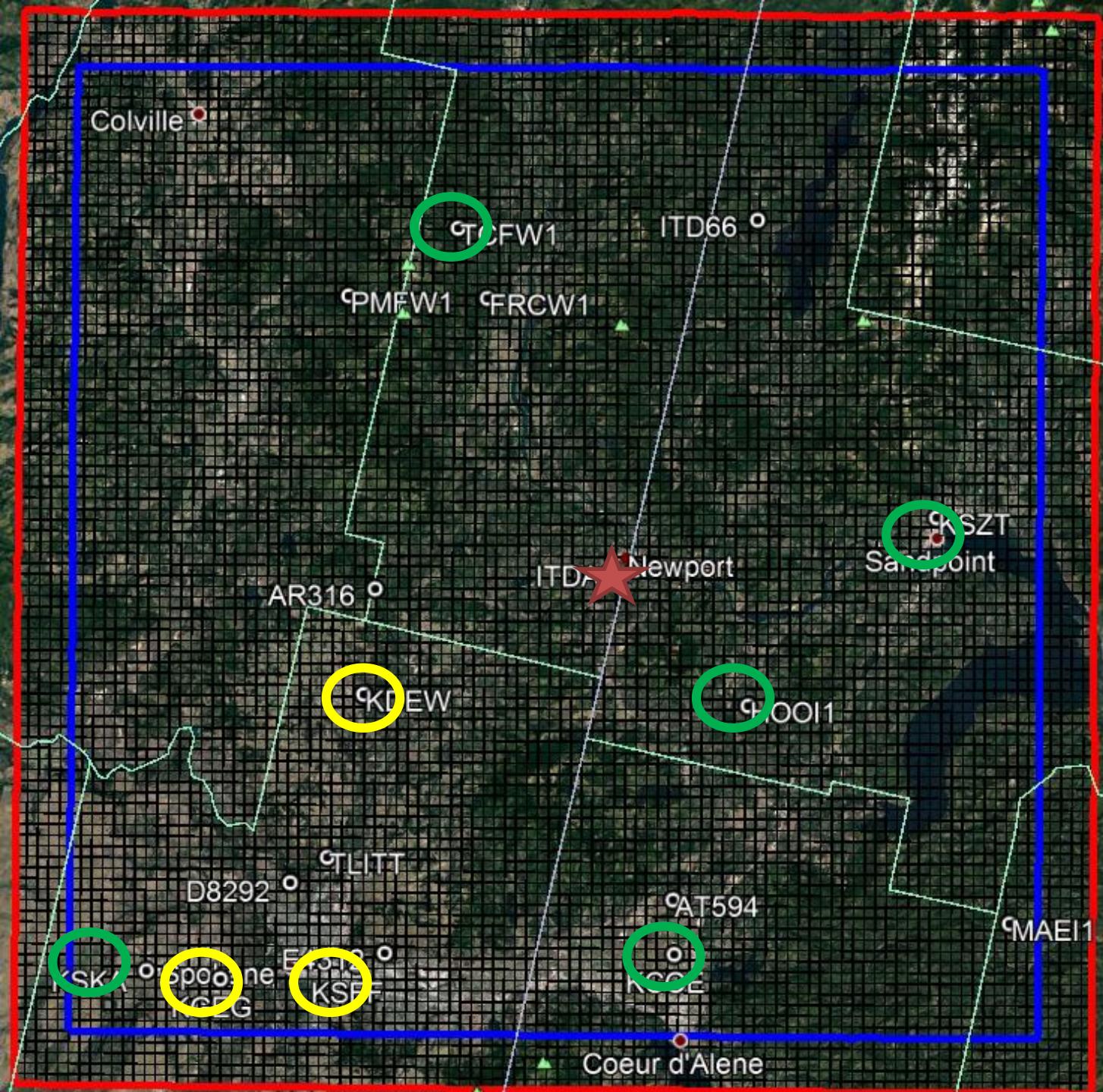


Model Performance Evaluation



Also used
in eval

1 min
ASOS

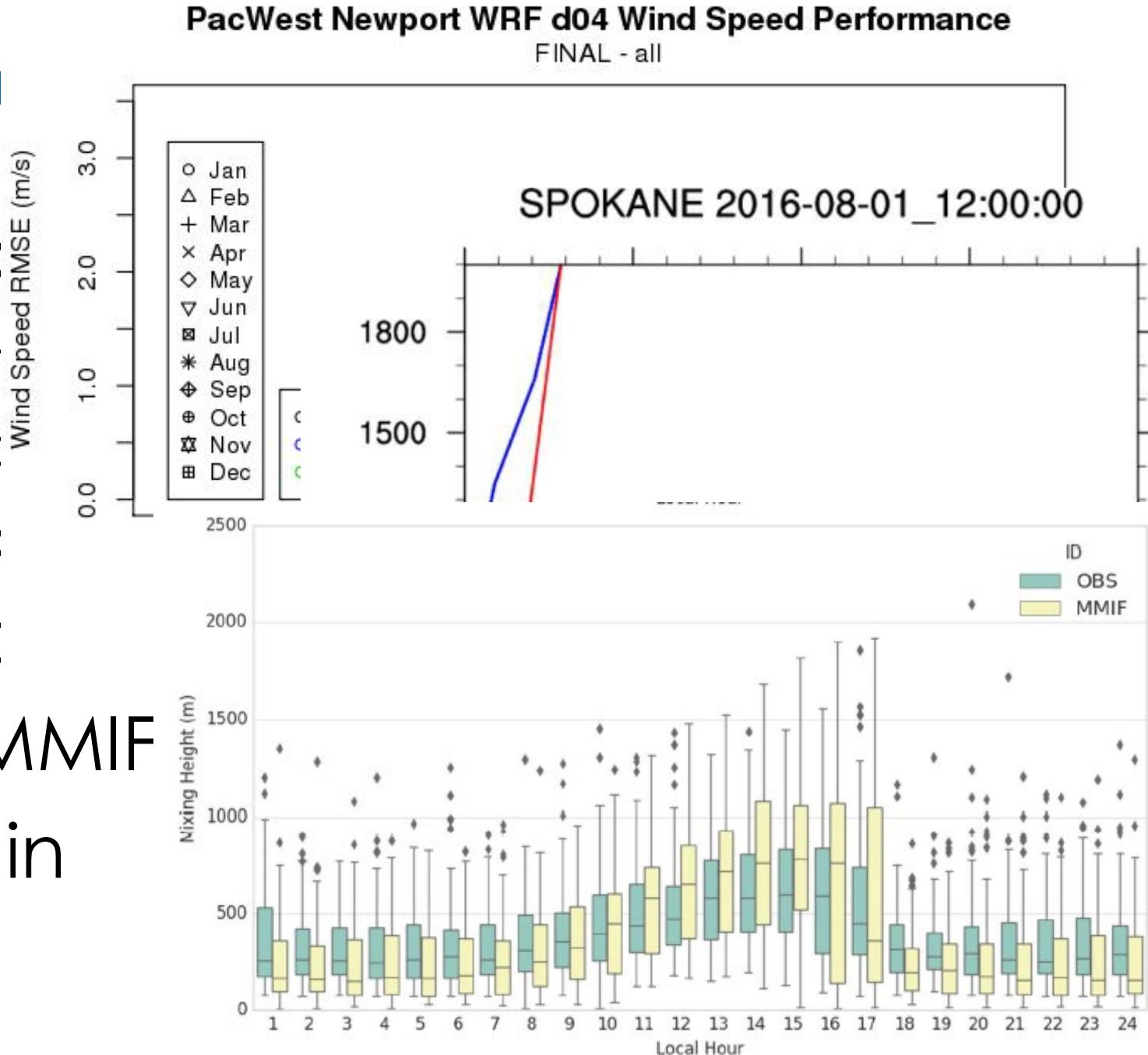


1.33km
domain
(133km x
133km)



Comp

- METSTAT soccer plots
 - Domainwide & site-specific
- WRF vs PRISM precipitation
 - Interpolated obs data
- Vertical T & WS profiles
- AERMET PBL from MMIF
- Windroses on terrain



AERMOD results: MMIF vs onsite

- AERMET with on-site vs MMIF at same location
 - Check if prognostic data leads to lower DVs than obs
 - AERMET calculates mixing heights, not WRF or MMIF
 - Used hypothetical sources
 - Q-Q & boxplots, Robust High Concentration
- Overall, MMIF more conservative
 - WRF predicted more stable and unstable hours and less neutral hours compared to observations
 - WRF's persistence of WDs at low speeds generally results in more conservative concentrations



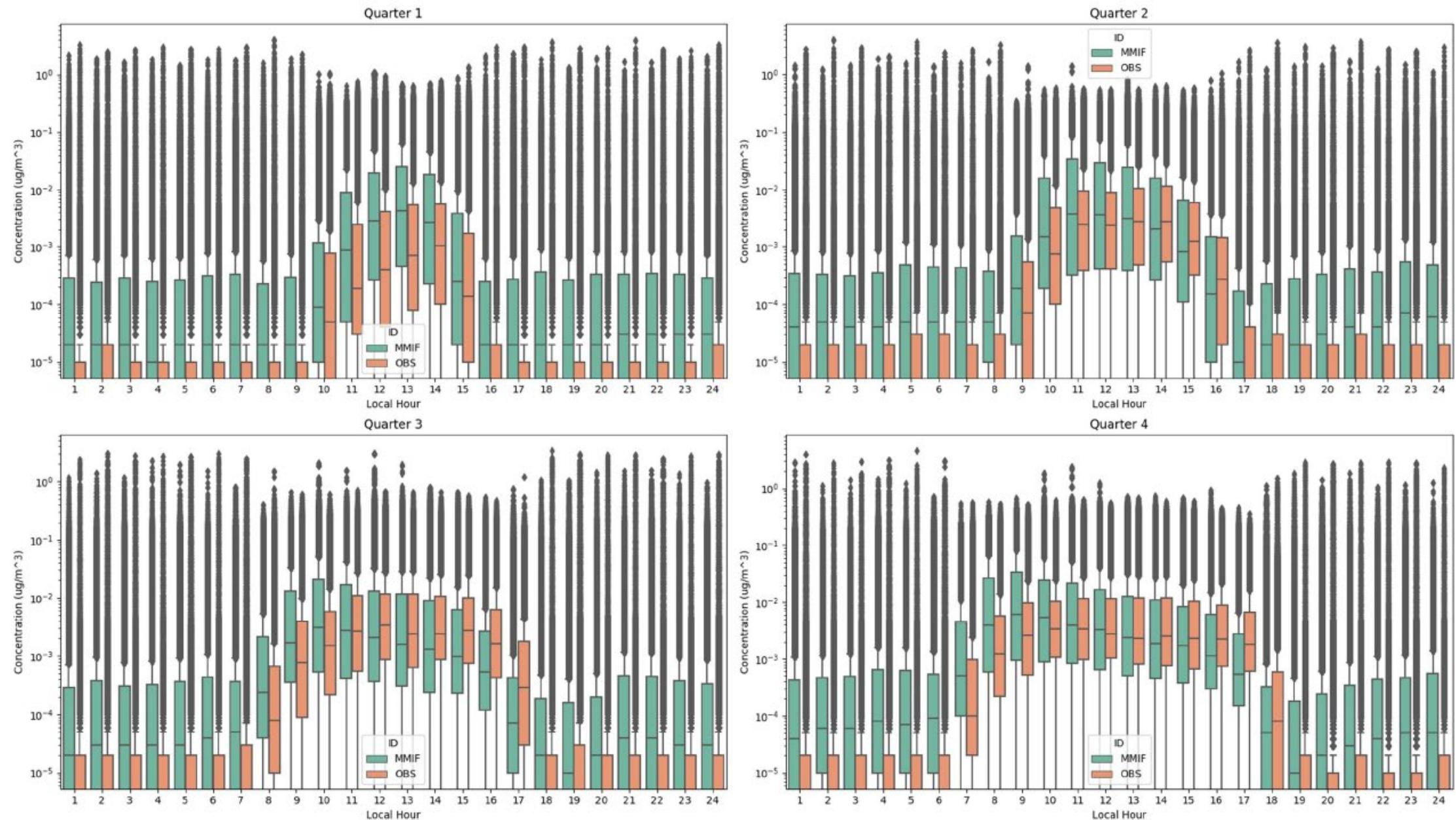


Figure 7-23. Distribution of Concentrations from 45-m Stack at HOOI1 - Observed vs. Modeled Meteorology (2014 - 2016)

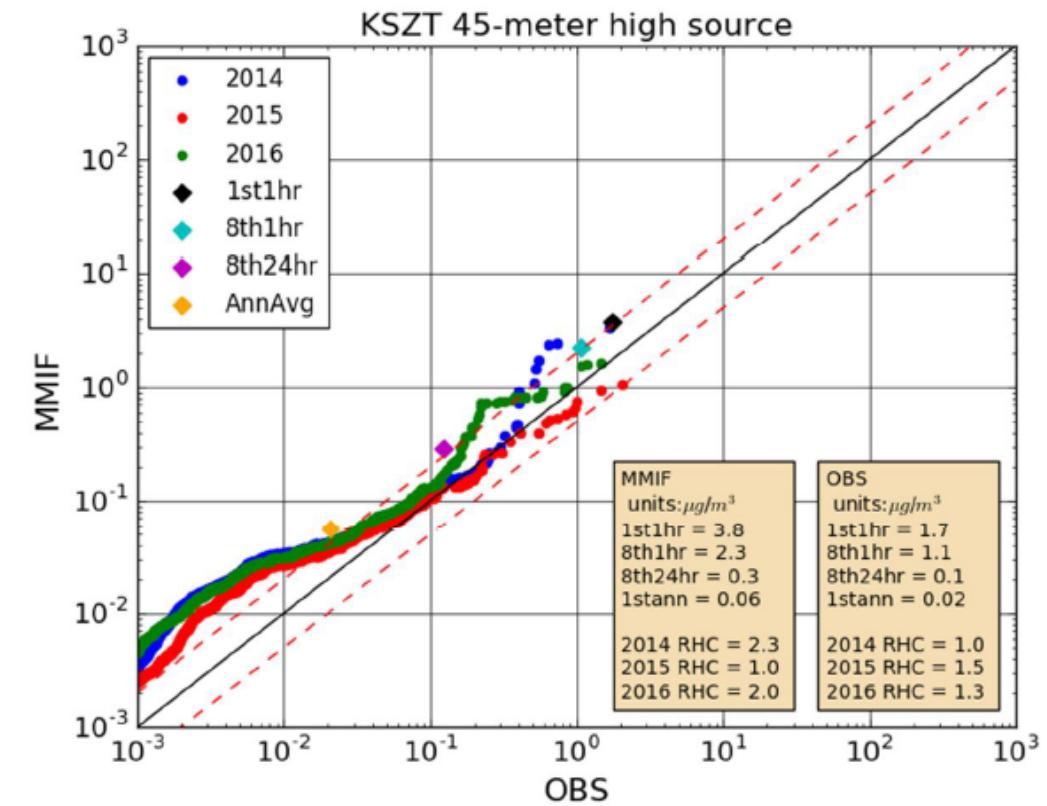
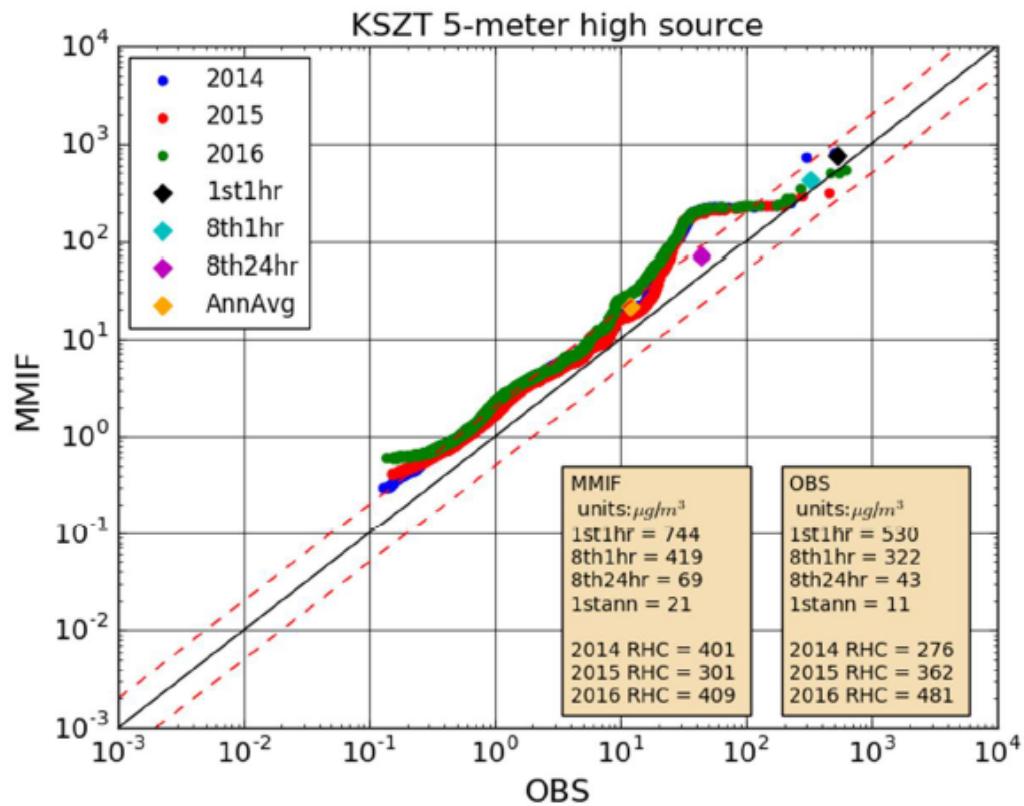


Figure 7-18. KSZT hourly AERMOD Concentrations - 5-m source (left) and 45-m source (right)



Q&A

Jay McAlpine, PhD
Meteorologist, Regional Modeling Contact
206.553.0094
McAlpine.Jay@epa.gov

Ranil Dhammapala, PhD
Atmospheric Scientist
360-407-6807
ranil.dhammapala@ecy.wa.gov

