

Performance of the NAQFC in Philadelphia during Summer 2013

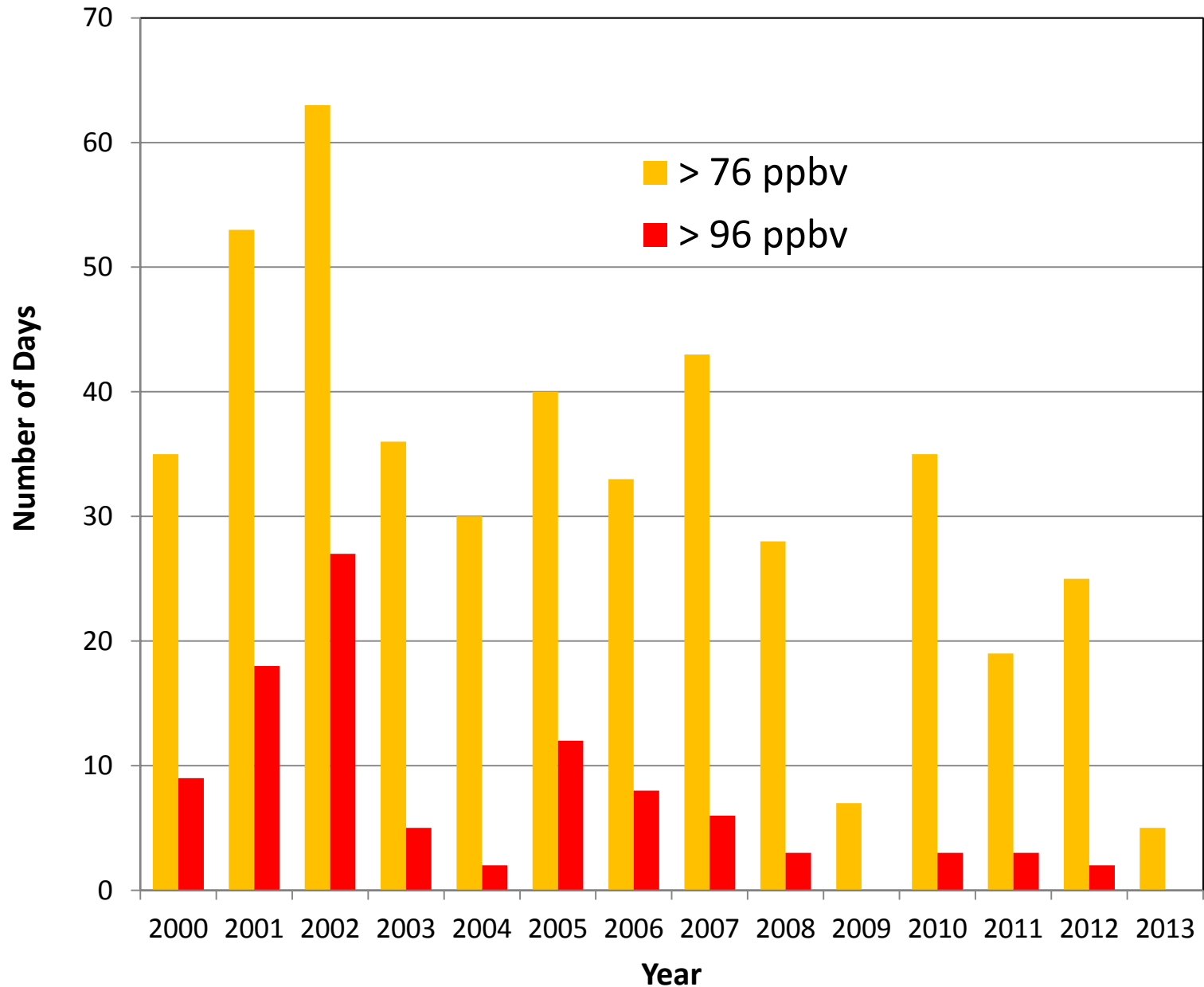
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William F. Ryan
Nathan Wiles**

**Department of Meteorology
Pennsylvania State University**

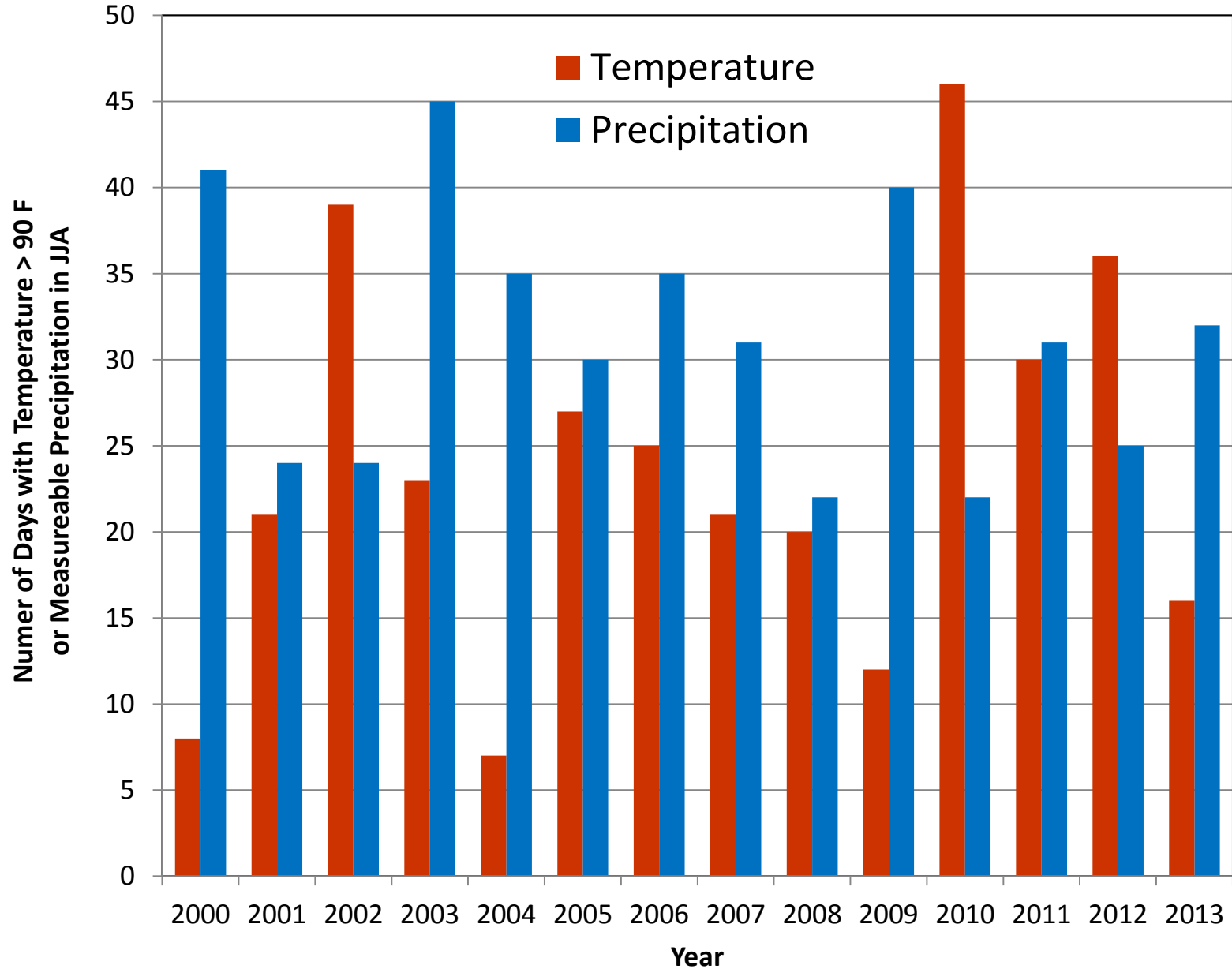


**Air Quality Forecaster Focus Group Workshop
September 26-27, 2013**

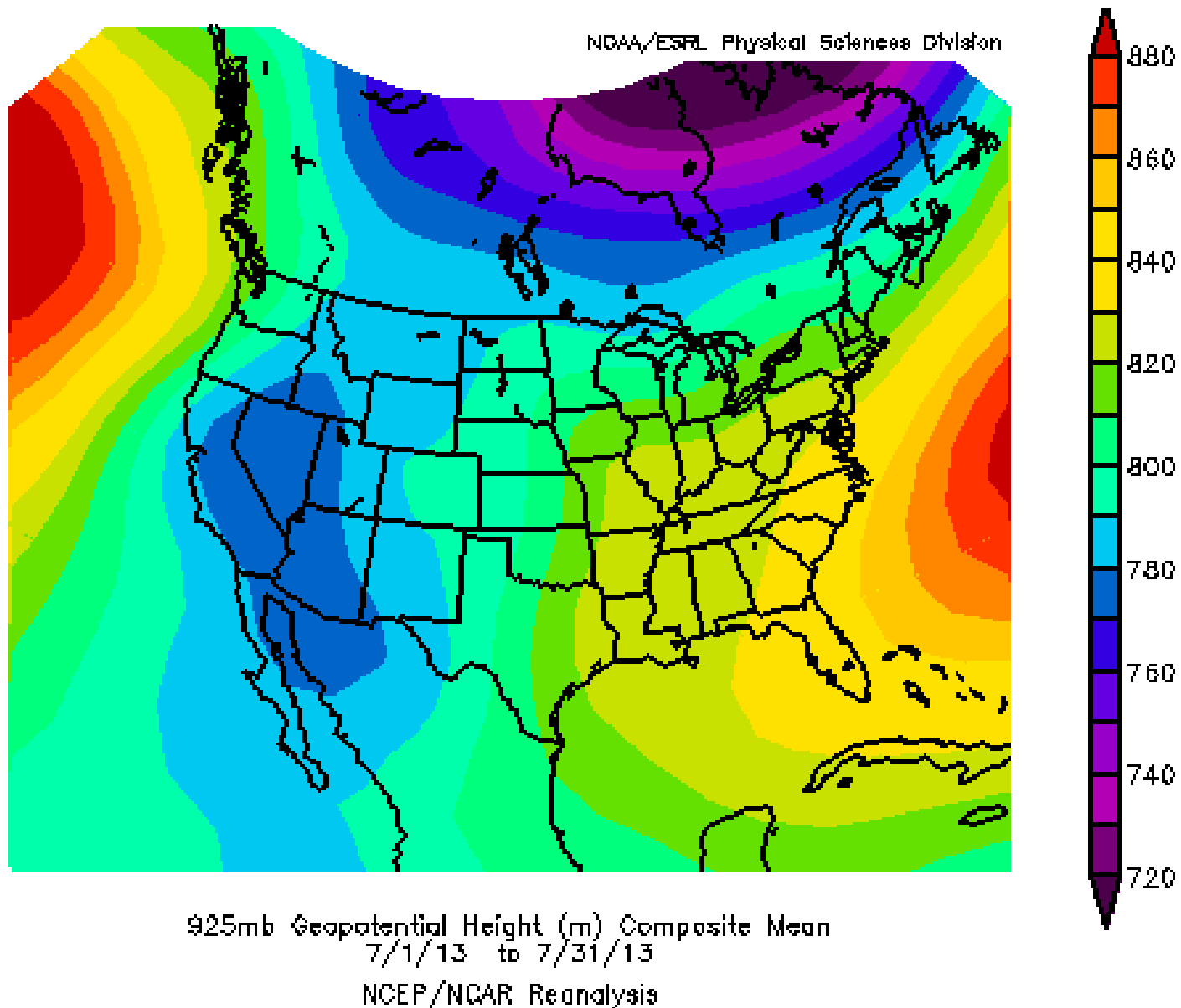
Atypically Low Ozone Season in PHL



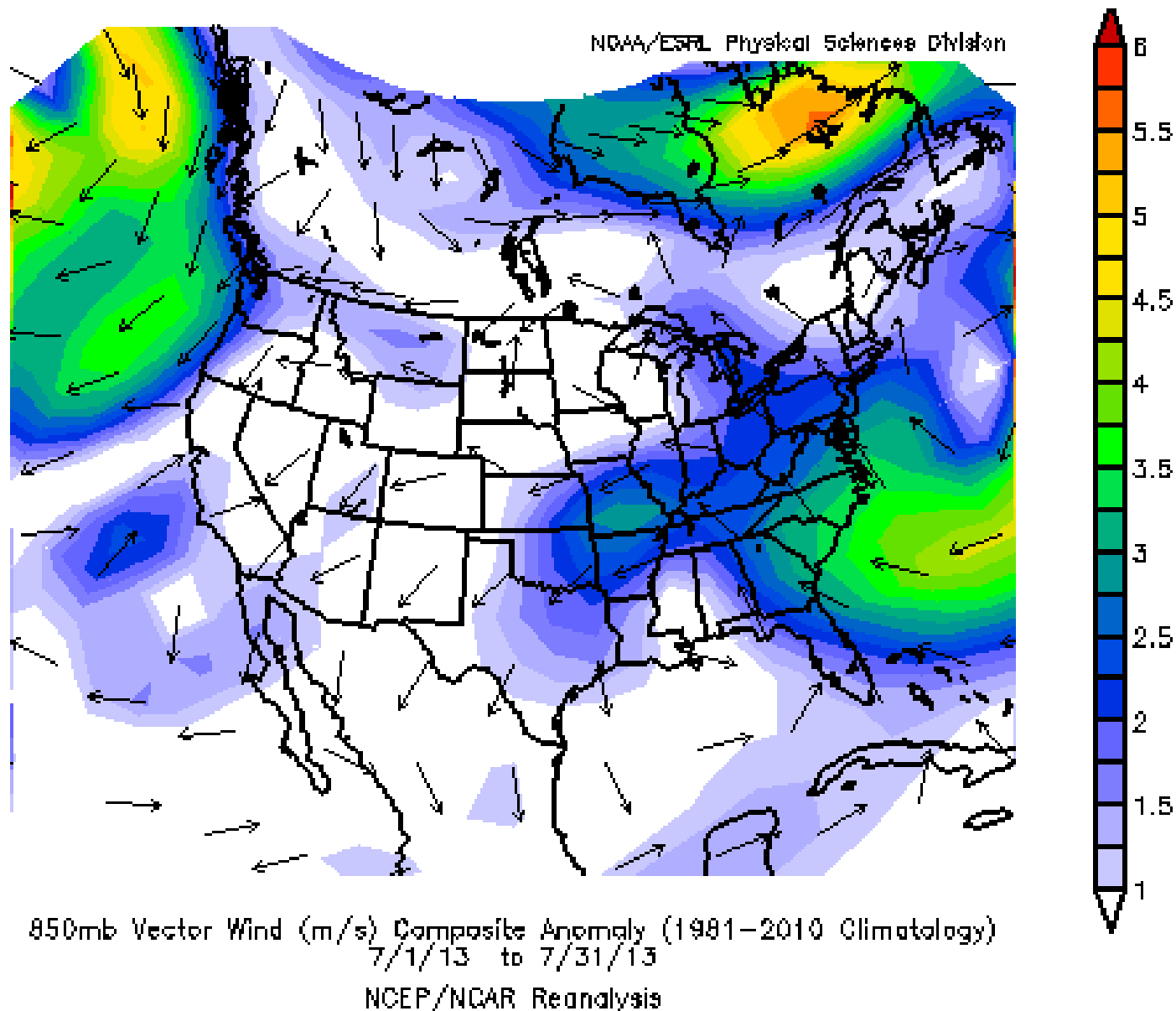
Summer (JJA) was Warm and Wet in PHL



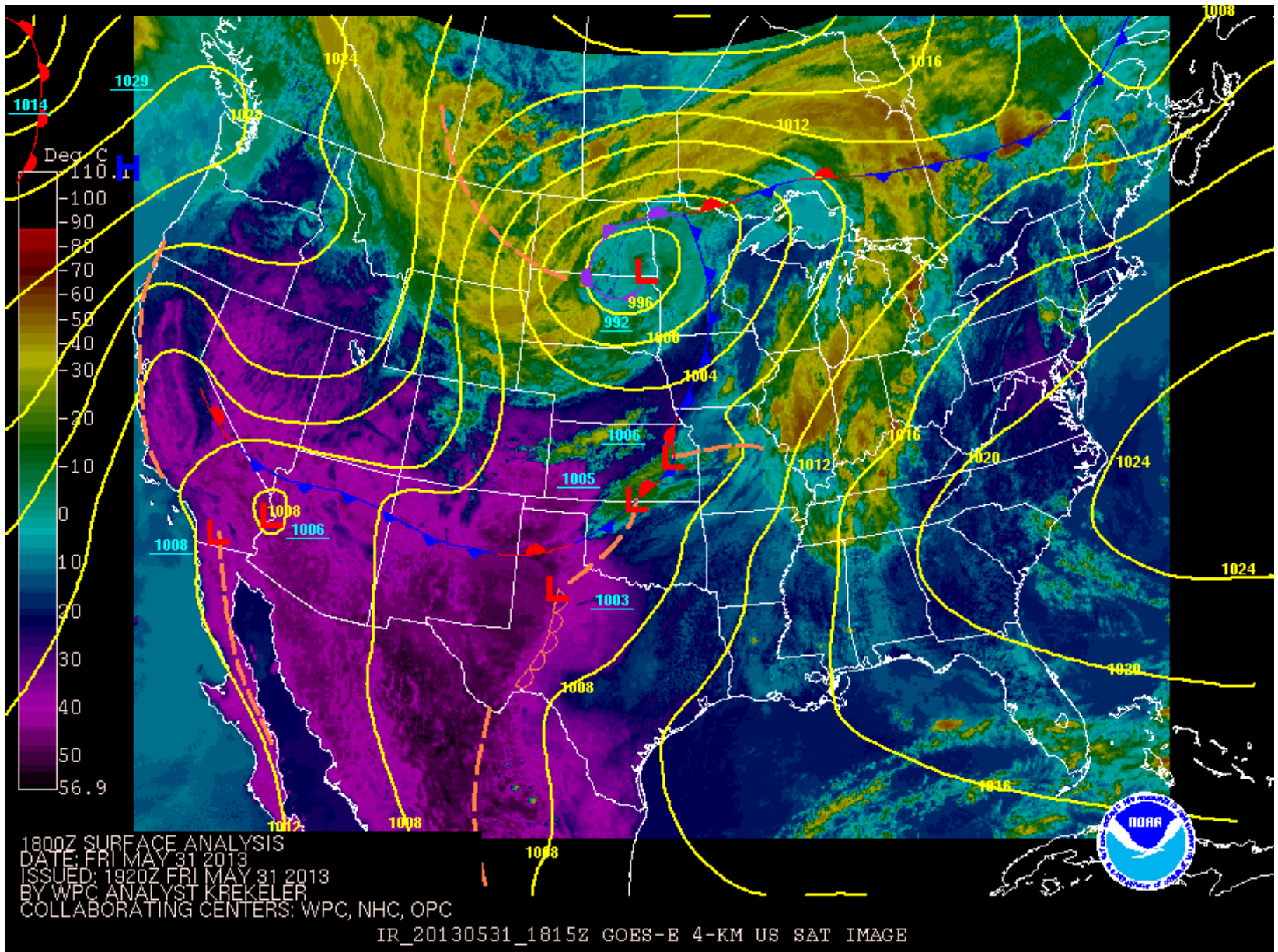
Bermuda High Did Not Extend Westward



Anomalous SE Flow – Tropical Maritime Air

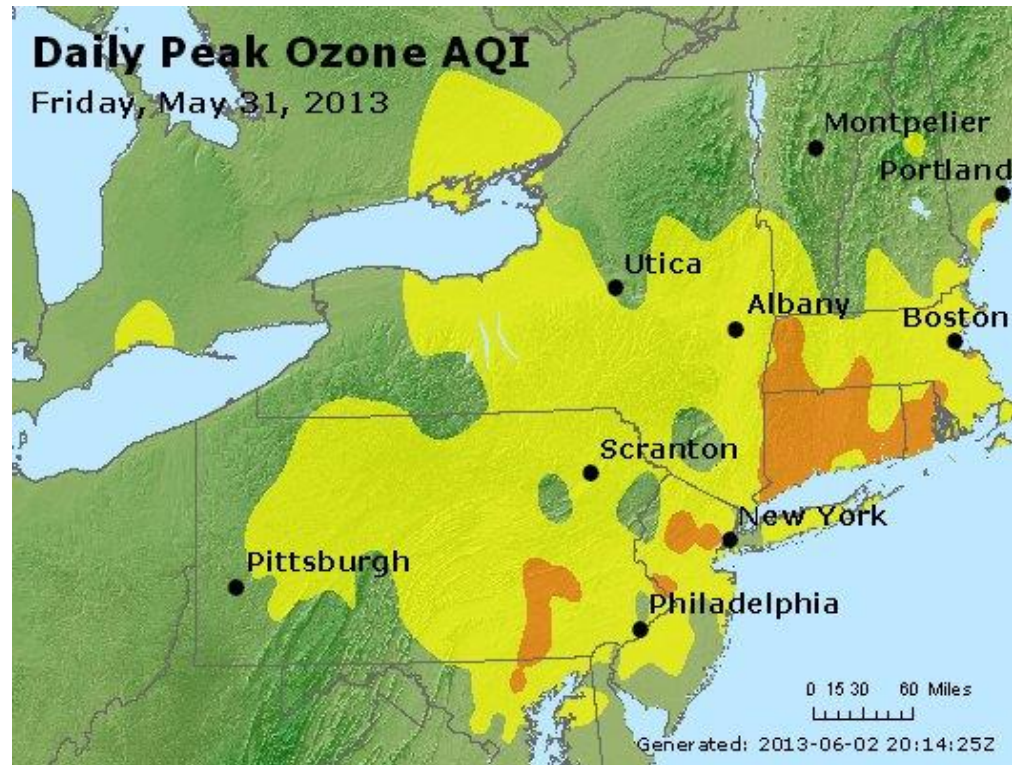
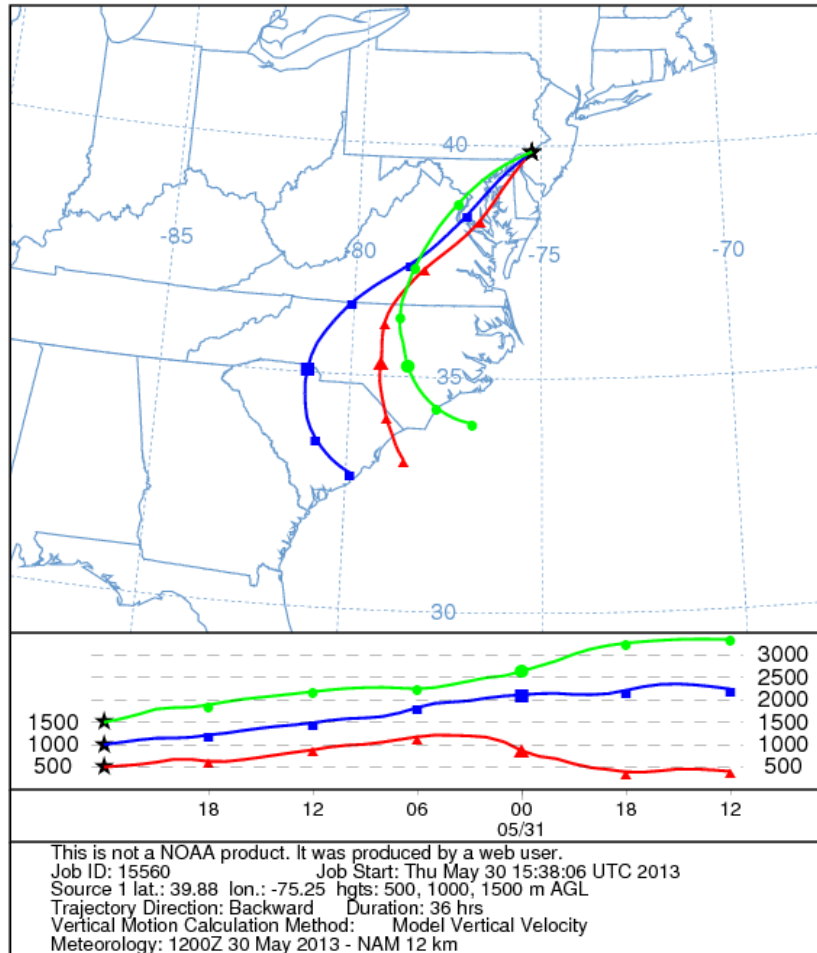


Example: Friday, May 31, 2013

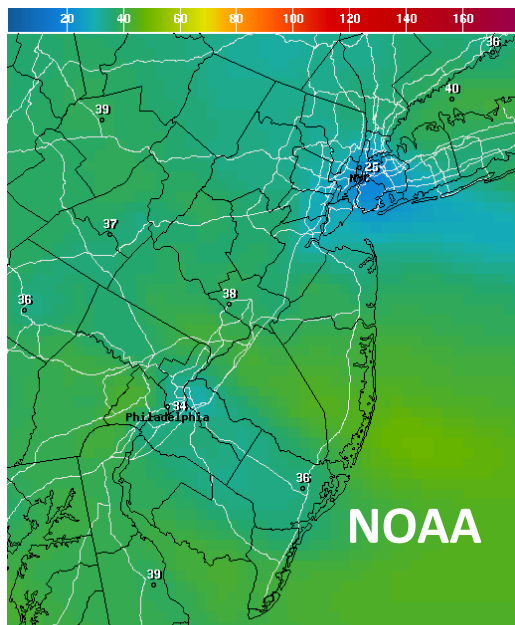


S/SE Transport Aloft → Moderate O₃ in PHL

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 01 Jun 13
12 UTC 30 May NAM Forecast Initialization



2013 AQ Model Ensemble for PHL



8Hr Avg Ozone Concentration(PPB) Ending Tue Sep 24 2013 7PM EDT
(Tue Sep 24 2013 23Z)



National Digital Guidance Database

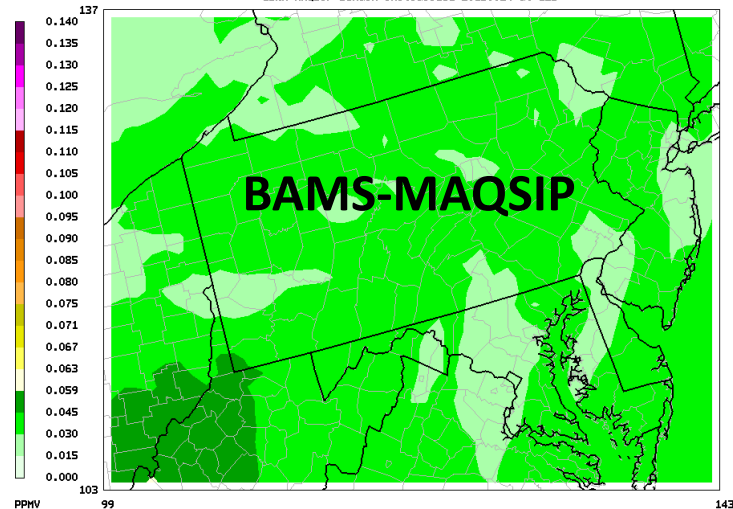
12z model run Graphic created-Sep 24 11:16AM EDT



24HR Peak 8HR-AVG Ozone -- 15km PA wndw

(c) 2013 BAMS Environmental Modeling Center

15km MAQSIP Domain Initialized 20130924 at 12Z

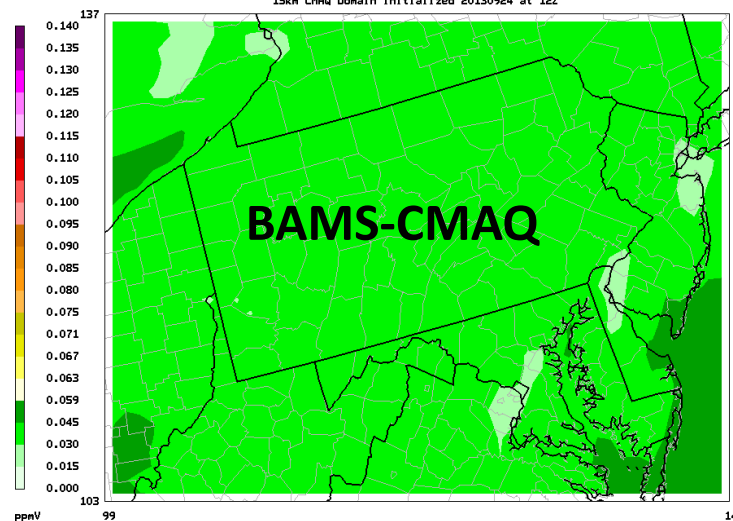


September 25, 2013 06:00:00
Min= 0.016 at (141,127), Max= 0.060 at (102,103)

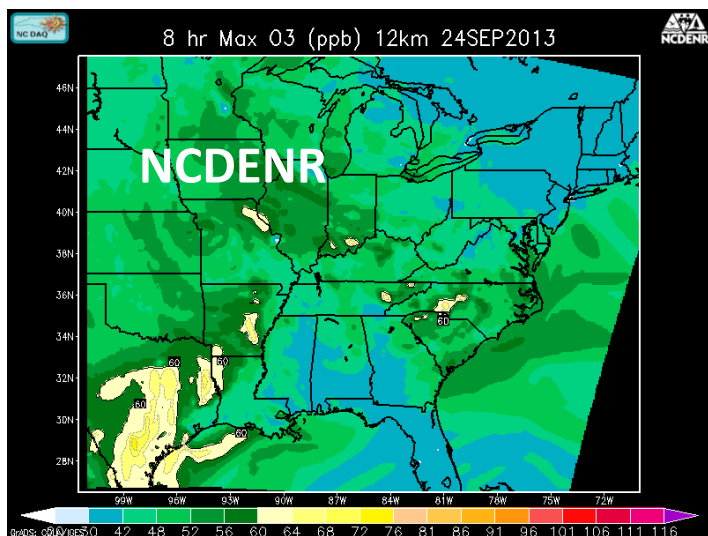
24HR Peak 8HR-AVG Ozone -- 15km PA wndw

(c) 2013 BAMS Environmental Modeling Center

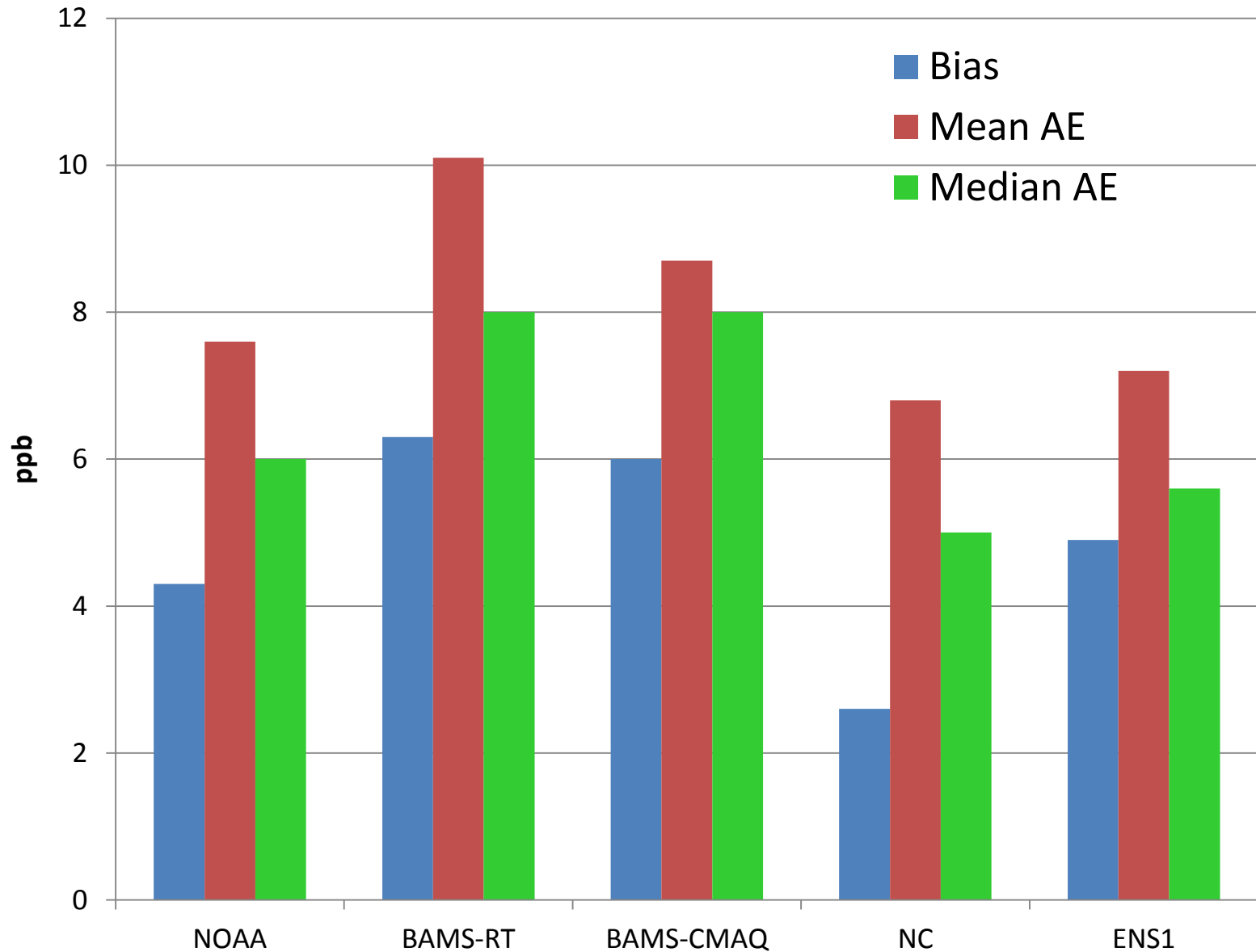
15km CMAQ Domain Initialized 20130924 at 12Z



September 25, 2013 06:00:00
Min= 0.015 at (141,127), Max= 0.055 at (143,103)

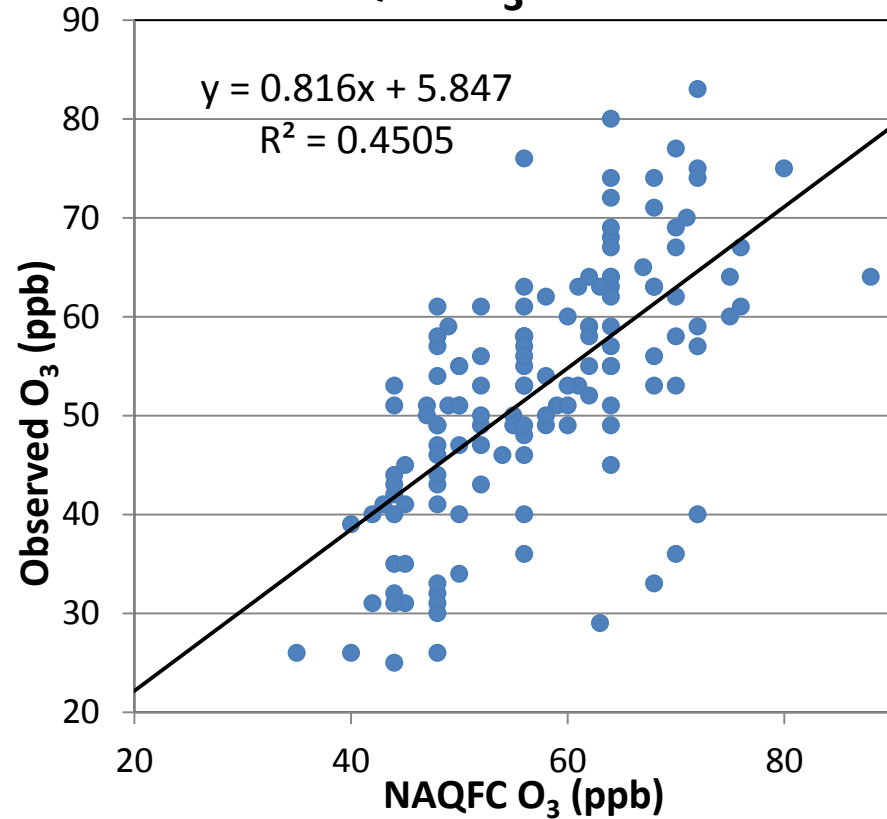


2013 AQ Model Ensemble Results

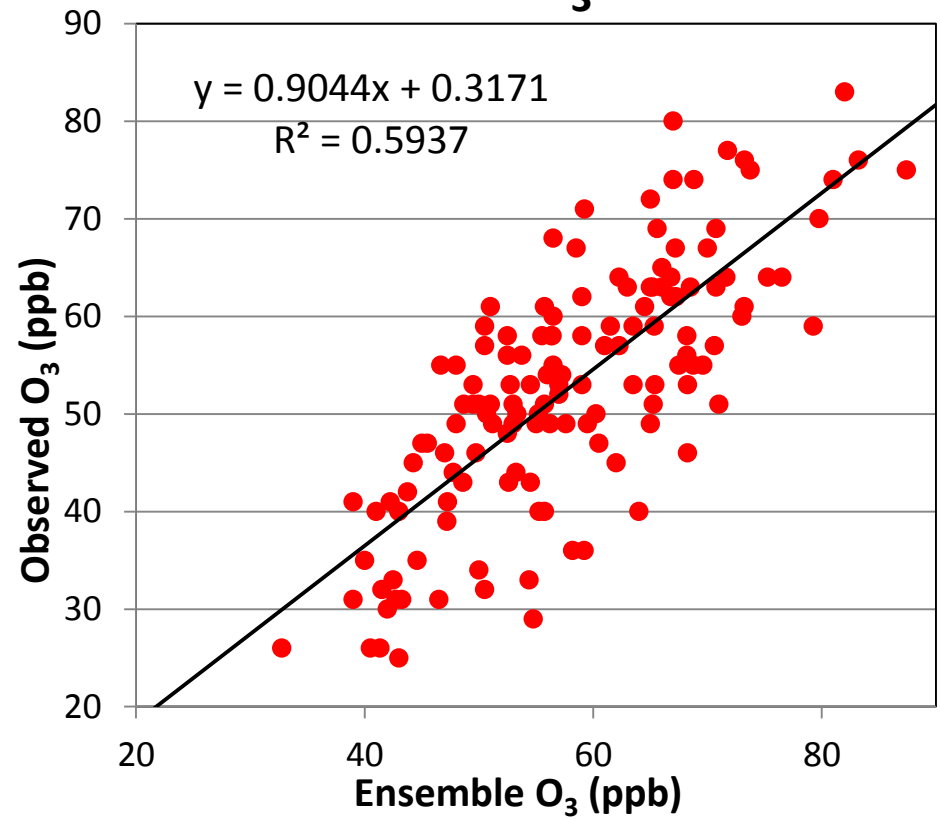


NAQFC and Ensemble Comparison

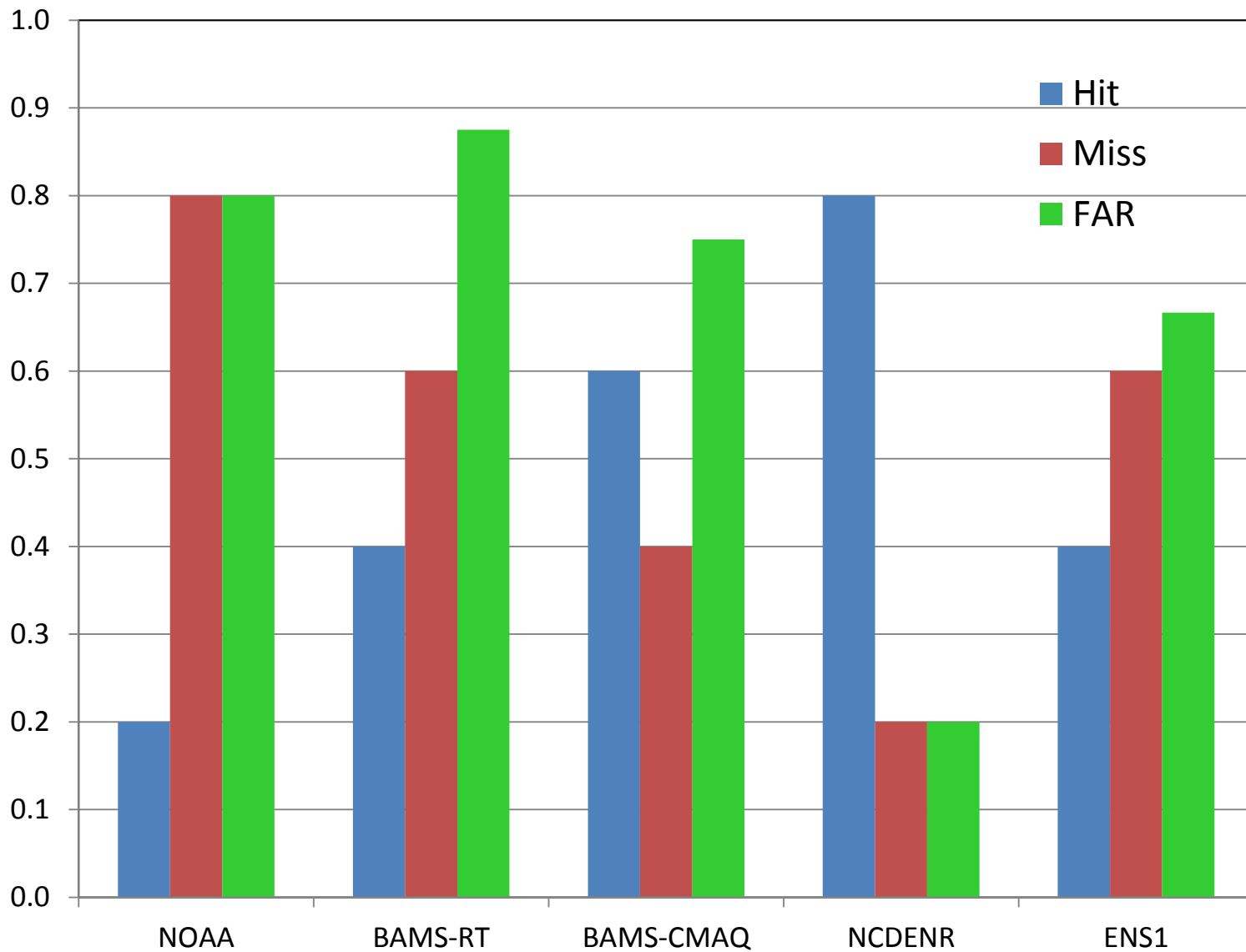
NAQFC O₃ Guidance



Ensemble O₃ Guidance

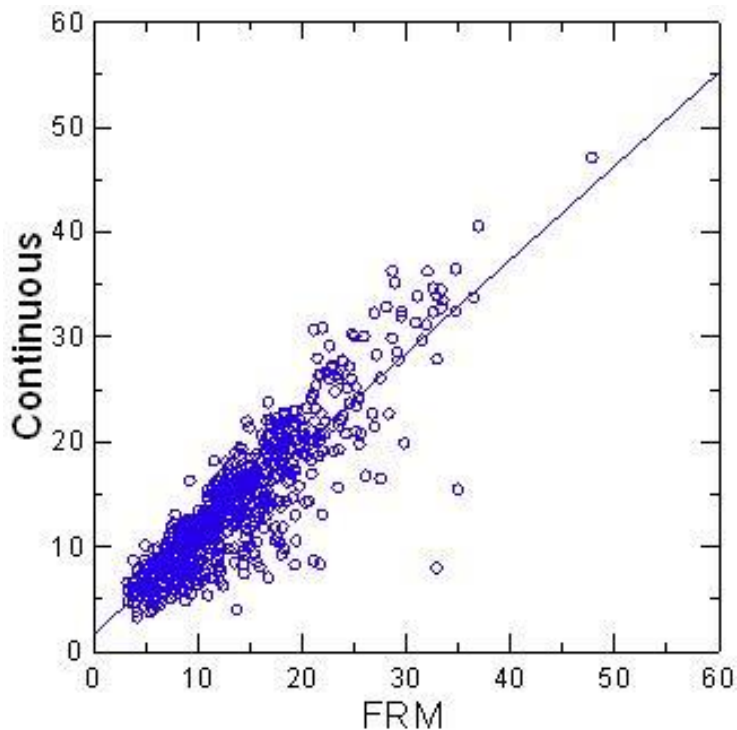


Standard Skill Score Measures

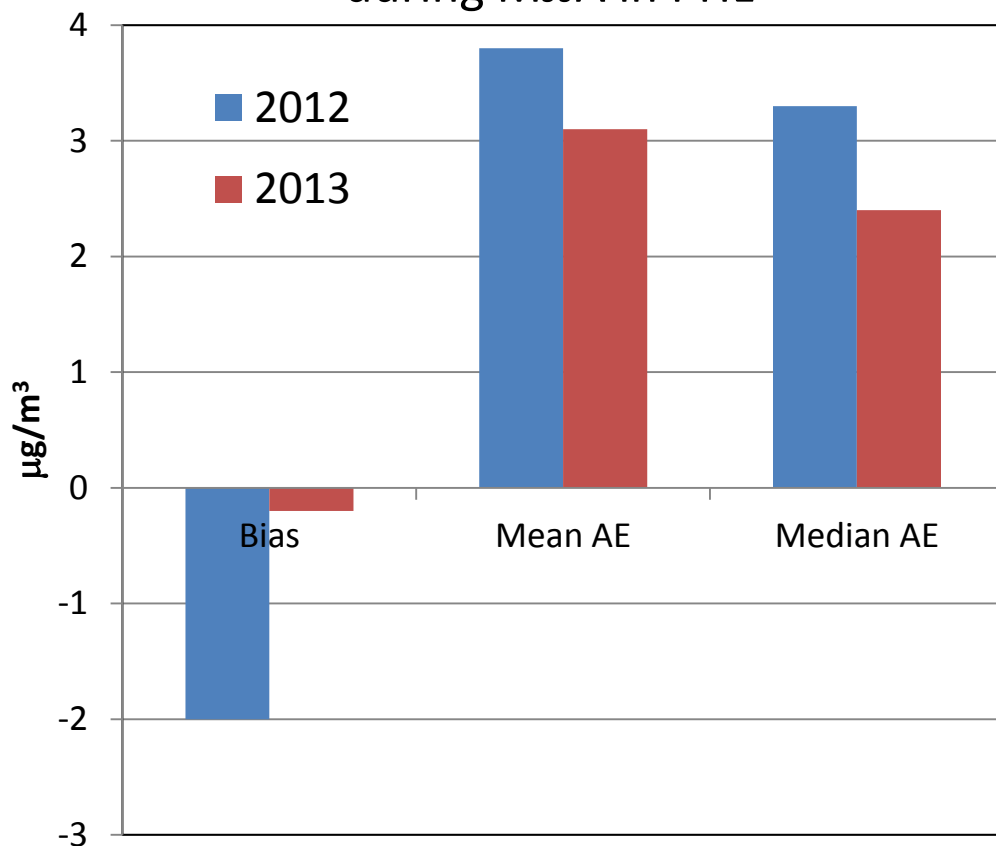


NAQFC PM_{2.5} Model Performance

Continuous vs. FRM PM_{2.5}
Monitors during MJJA in PHL,
2008-2012



NOAA PM_{2.5} Model Compared to
Continuous Monitor Observations
during MJJA in PHL



Conclusions

- The summer of 2013 was not conducive for O_3 formation
 - Plenty of hot days, but anomalous SE flow resulted in maritime tropical air mass transport
- All AQ models over-predicted peak O_3
 - Likely due to breakdown in relationship between temperature and O_3
- Use of AQ model ensemble increases forecast accuracy
- NAQFC $PM_{2.5}$ model performance increased in Summer 2013 compared to 2012

Acknowledgements

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