PERFORMANCE OF THE NATIONAL AIR QUALITY FORECAST CAPABILITY
URBAN VS. RURAL AND OTHER COMPARISONS

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Experimental 8-h Ozone Prediction

Developmental 1-h Aerosol Prediction

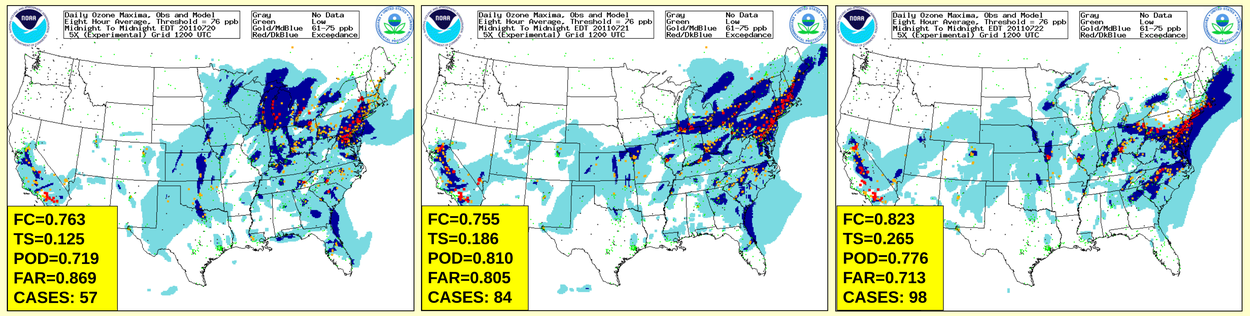

Fig. 1. Daily maximum 8-h ozone predictions and observations, July 20 - 22, 2011. The predicted above threshold are shown in dark blue and the observed above threshold as red points, threshold > 75 ppb.

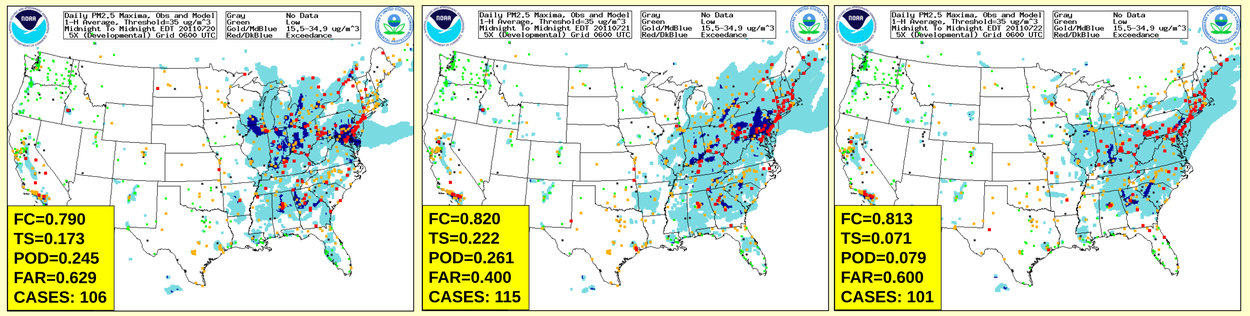

Fig. 2. Daily maximum 1-h aerosol predictions and observations, July 20 - 22, 2011. The predicted above threshold are shown in dark blue and the observed above threshold as red points, threshold > 35 ug/m^3.

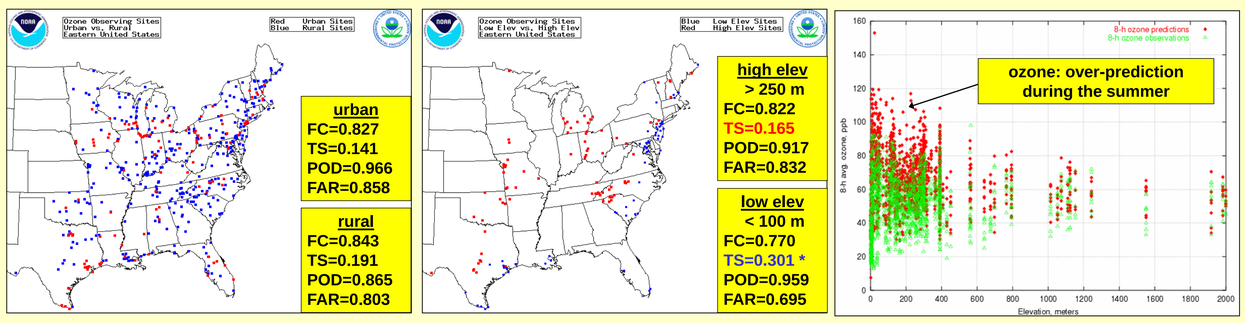

Fig. 3. Urban vs. rural and high vs. low elevation comparisons for 8-h ozone predictions, July 17 – 24, 2011. Similar performance for urban vs. rural, better performance for low elevation vs. high elevation.

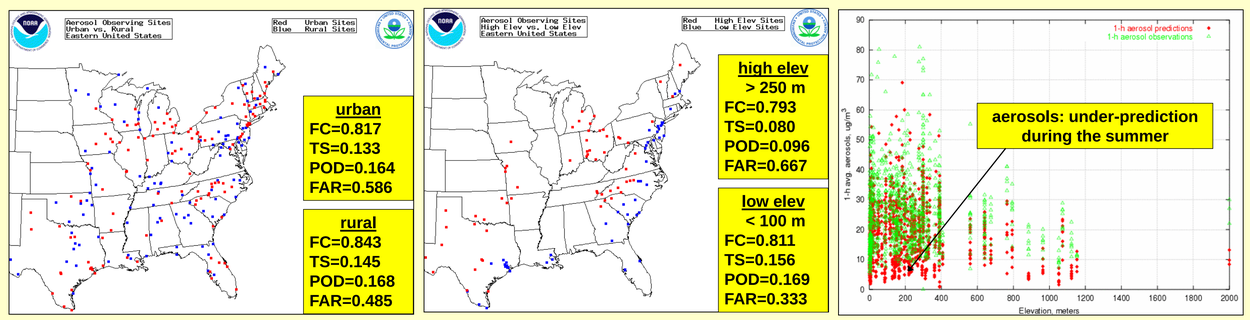

Fig. 4. Urban vs. rural and high vs. low elevation comparisons for 1-h aerosol predictions, July 17 – 24, 2011. Similar performance for both urban vs. rural and high vs. low elevation comparisons

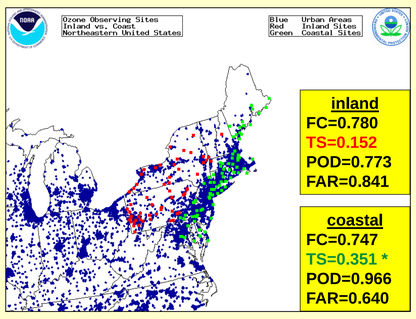

Fig. 5. Inland (red) vs. coastal (green), 8-h ozone predictions, July 17 – 24, 2011, North East region. Better performance for coastal vs. inland.

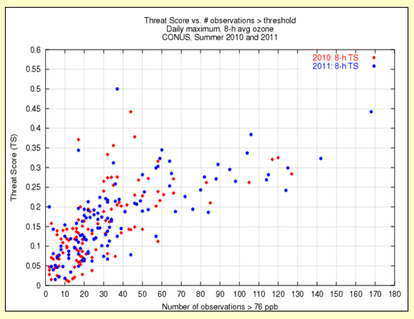

Fig. 6. Threat Score (TS) vs. number of cases above threshold, 2010 and 2011. Better performance on active days may explain better performance for coastal sites vs. inland.

8-h Ozone Regions: (LM, UM, NE, SE) TS and POD, Four different time periods

Urban vs. Rural	one week	two weeks	one month	two months	# sites
	Jul 17-24 '11	Jul 17-31 '11	Jul 1-31 '11	Jun 1 - Jul 31 '11	
Rural TS	0.191	0.162	0.163	0.187	136
Urban TS	0.141	0.117	0.151	0.186	329
Urban POD	0.966	0.917	0.708	0.661	
Rural POD	0.865	0.878	0.743	0.607	

Low vs. High Elev	Jul 17-24 '11	Jul 17-31 '11	Jul 1-31 '11	Jun 1 - Jul 31 '11	
Low Elev TS	0.301	0.256	0.223	0.279	69
High Elev TS	0.165	0.145	0.163	0.174	87
Low Elev POD	0.959	0.949	0.830	0.799	
High Elev POD	0.917	0.871	0.697	0.534	

*Coast vs. *Inland	Jul 17-24 '11	Jul 17-31 '11	Jul 1-31 '11	Jun 1 - Jul 31 '11	
Coastal TS	0.351	0.293	0.270	0.316	84
Inland TS	0.152	0.131	0.109	0.145	60
Coastal POD	0.935	0.922	0.792	0.758	
Inland POD	0.773	0.773	0.500	0.524	

*NE region only

Table 1. 8-h ozone comparisons using four different time periods. We see consistently better performance for low elevation and costal sites.

1-h Aerosols Regions: (LM, UM, NE, SE) TS and POD, Four different time periods

Urban vs. Rural	one week	two weeks	one month	two months	# sites
	Jul 16-23 '11	Jul 16-31 '11	Jul 1-31 '11	Jun 1-Jul 31 '11	
Rural TS	0.145	0.122	0.085	0.084	105
Urban TS	0.133	0.111	0.117	0.107	138
Rural POD	0.168	0.142	0.100	0.099	
Urban POD	0.164	0.150	0.151	0.140	

Low vs. High Elev	Jul 16-23 '11	Jul 16-31 '11	Jul 1-31 '11	Jun 1-Jul 31 '11	
Low Elev TS	0.156	0.140	0.083	0.078	52
High Elev TS	0.080	0.063	0.124	0.106	62
Low Elev POD	0.169	0.160	0.096	0.096	
High Elev POD	0.096	0.078	0.145	0.124	

Table 2. 1-h aerosol comparisons using four different time periods. We see similar performance for urban vs. rural and high vs. low elevation.

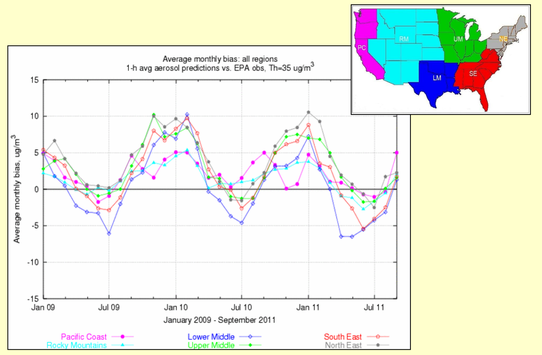

Fig. 7. Regional monthly bias of 1-h aerosols, Jan. 2009 – Aug. 2011. We see consistent summer under-prediction and winter over-prediction.

Summary

Ozone: Similar performance for urban vs. rural comparison.
Better performance for low vs. high elevation and coastal vs. inland sites.

Aerosols: Similar performance for urban vs. rural and high vs. low elevation comparisons.

Legend for performance metrics

Fraction Correct (FC)
Threat Score (TS)
Probability Of Detection (POD)
False Alarm Ratio (FAR)

National Air Quality Forecasting Capability (NAQFC)

Congress directed NWS to develop, test and implement into operations a National Air Quality Forecast Capability (NAQFC), beginning in FY 2003. NOAA is building this capability in partnership with EPA and state and local air quality forecasters. In September 2004, NWS implemented an initial operational ozone forecast capability for the northeastern U.S. In the initial capability, the NWS/National Centers for Environmental Prediction (NCEP) NAM model was used to drive the EPA Community Multi-scale Air Quality (CMAQ) model to produce next-day ozone predictions at 12 km grid resolution. The NAQFC was expanded via a program of phased development and testing with implementations of ozone predictions over the entire eastern U.S. in 2005, and to the lower 48 states (CONUS) in 2007. Further goals for the NAQFC include providing quantitative Particulate Matter (PM) predictions, which together with ozone are the two leading causes of poor air quality in the U.S. As a step toward building PM prediction capabilities, NOAA is testing a version of the CMAQ model that includes an aerosol prediction module that incorporates contributions to PM from the EPA's National Emissions Inventory.