VERIFICATION OF THE NOAA-EPA AIR QUALITY FORECASTS FOR SUMMER 2005

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AIR QUALITY FORECAST VERIFICATION 2005: 5x, 5x3 and 3x Comparisons

- We compared the performance of two models with different configurations. The developmental model was subject to change.
The experimental model was more stable.

- (5x) 5x developmental tests to provide feedback for possible model configuration changes, on conterminous U.S. (CONUS).

- (5x3) 5x developmental tests on the 3x domain which allowed comparisons in performance to the 3x model predictions.

- (3x) 3x Experimental tests on the eastern U.S. to assist in the validation of 3x verification provided by NCEP. A graphic of the 2005 3x domain is given in Fig. 2.

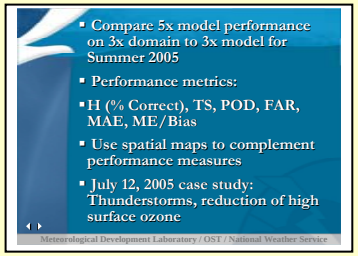

Fig. 1. Introduction: Objectives, Air Quality Verification, Summer 2005.

Fig. 2. 3x grid over the eastern U.S., 935 stations, 2005.

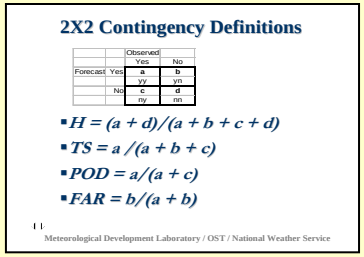

Fig. 3. Definition of H, TS, POD, FAR.

Table 1. Monthly contingency results for June - September, 2005. Data gaps may have affected June results.

200506	5x, 8-h	5x3, 8-h	3x, 8-h
a	171	114	59
b	978	271	371
c	391	241	162
d	25358	12887	11255
H	0.949	0.962	0.955
TS	0.111	0.182	0.100
POD	0.304	0.321	0.267
FAR	0.851	0.704	0.863

200508	5x, 8-h	5x3, 8-h	3x, 8-h
a	230	204	197
b	872	689	818
c	474	230	238
d	31006	23118	24668
H	0.959	0.962	0.959
TS	0.146	0.182	0.157
POD	0.327	0.470	0.453
FAR	0.791	0.772	0.806

200507	5x, 8-h	5x3, 8-h	3x, 8-h
a	252	136	124
b	1272	684	716
c	707	255	237
d	32591	24963	24113
H	0.943	0.964	0.962
TS	0.113	0.127	0.115
POD	0.263	0.348	0.343
FAR	0.835	0.834	0.852

200509	5x, 8-h	5x3, 8-h	3x, 8-h
a	84	60	53
b	382	333	318
c	244	93	81
d	29507	15267	11999
H	0.979	0.973	0.968
TS	0.119	0.124	0.117
POD	0.256	0.392	0.396
FAR	0.826	0.847	0.857

Table 2. Contingency results for the 2005 season, lower 5x POD from under-prediction in California.

2005	5x, 8-h	5x3, 8-h	3x, 8-h
a	737	573	433
b	3505	2189	2223
c	1816	924	718
d	118462	89319	72035
H	0.957	0.967	0.961
TS	0.122	0.155	0.128
POD	0.289	0.383	0.376
FAR	0.826	0.793	0.837

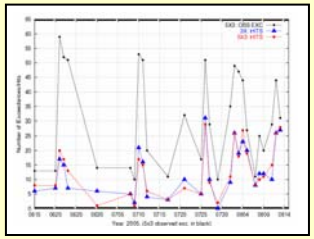

Fig. 4. 8-h 5x3 vs. 3x, correctly predicted/ observed events, June 15 – August 13, 2005. Similar performance after July 8.

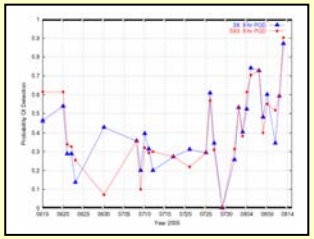

Fig. 5. 8 hour 5x3 vs. 3x, POD, June 30 results (cold start).

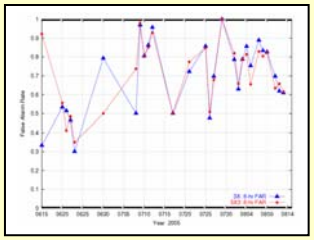

Fig. 6. 8 hour 5x3 vs. 3x, FAR, June 15 – August 13, 2005.

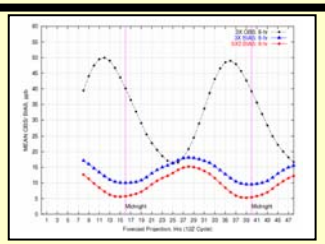

Fig. 7. Bias, 8 hour 5x3 vs. 3x, August 1 - 15, 2005 (3x obs in black).

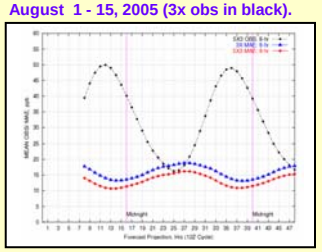

Fig. 8. MAE, 8 hour 5x3 vs. 3x, August 1 - 15, 2005 (5x obs in black).

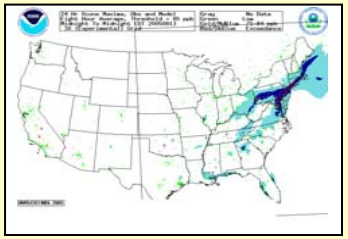

Fig. 9. 8-h 3x ozone predictions with observations, August 13, 2005.

Fig. 10. 8-h 5x ozone predictions with observations, August 13, 2005, similar to 3x.
Note: 5x under-prediction in California.

CASE STUDY, JULY 12, 2005, SURFACE OZONE REDUCTION ASSOCIATED WITH THUNDERSTORMS

- We examined the observations recorded at four stations located in the narrow band of predicted exceedances for July 11 - 12. Hits are correct predictions > 85 ppb.

- Table 3 shows verified hits over Delaware, Ohio, and Michigan, but not over Pittsburgh, PA, for day 2 (July 12).

- Pittsburgh, PA, reported a thunderstorm in the area at 2300 UTC, July 12, 2005.

- The 5x prediction for Pittsburgh, PA, would not have included the thunderstorms.

- Given the elevated ozone recorded in nearby areas without thunderstorms, the Pittsburgh observations are likely to have more closely matched the predicted values, had thundershowers not occurred in the area during the verification period.

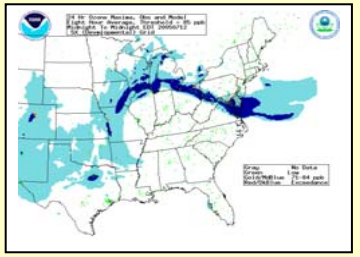

Fig. 11. 8-h 5x predictions and observations, July 12, 2005.

Table 3. 8-h observations for four stations, July 11 - 12, 2005.

Time	2200	2300	2400	0100	0200	0300	0400
PA, July 11	83	94	98	98	93	83	69
PA, July 12	54	58	58	55	47	40	33
DE, July 11	81	86	89	91	92	91	89
DE, July 12	102	107	110	111	111	109	105
OH, July 11	92	97	98	95	90	84	76
OH, July 12	93	95	95	93	88	82	74
MI, July 11	81	87	91	94	95	93	90
MI, July 12	78	83	85	85	84	82	78

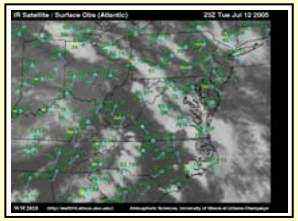

Fig. 12. Surface observations for July 12, 2005, 2300 UTC.

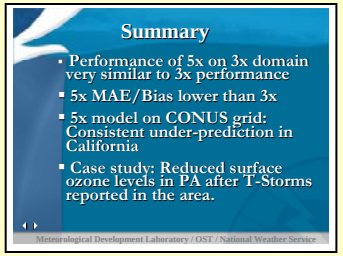

Fig. 13. Summary, Summer 2005.