Air Quality Forecast for the South Coast Air Basin

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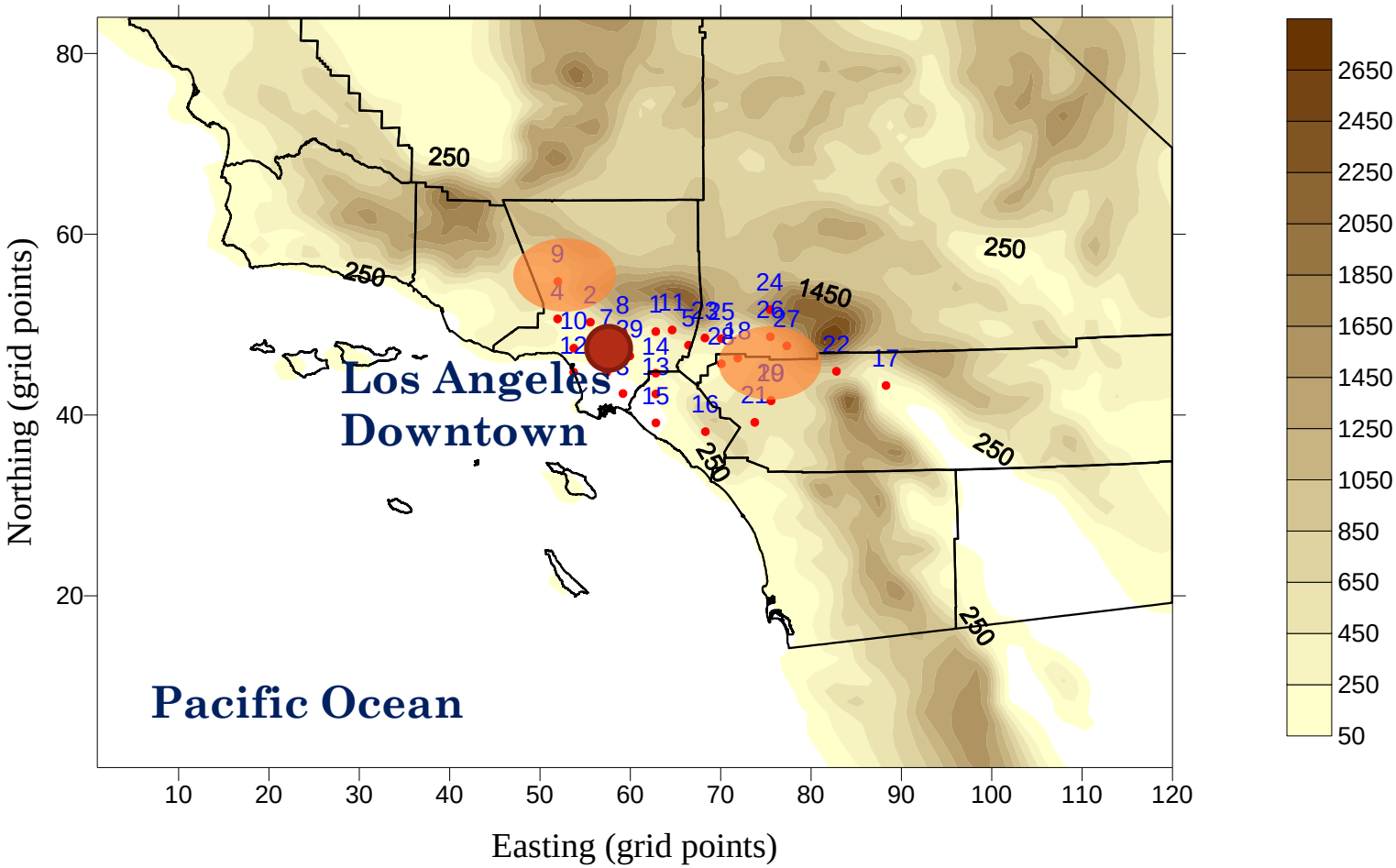
Outline

- Evaluation for NOAA AQ Forecast
  - Year 2010 Ozone Season
  - Long-term trend in the past three years
- South Coast Air Quality Management District's real-time prognostic modeling system

South Coast Air Basin



(One grid length = 5 km)

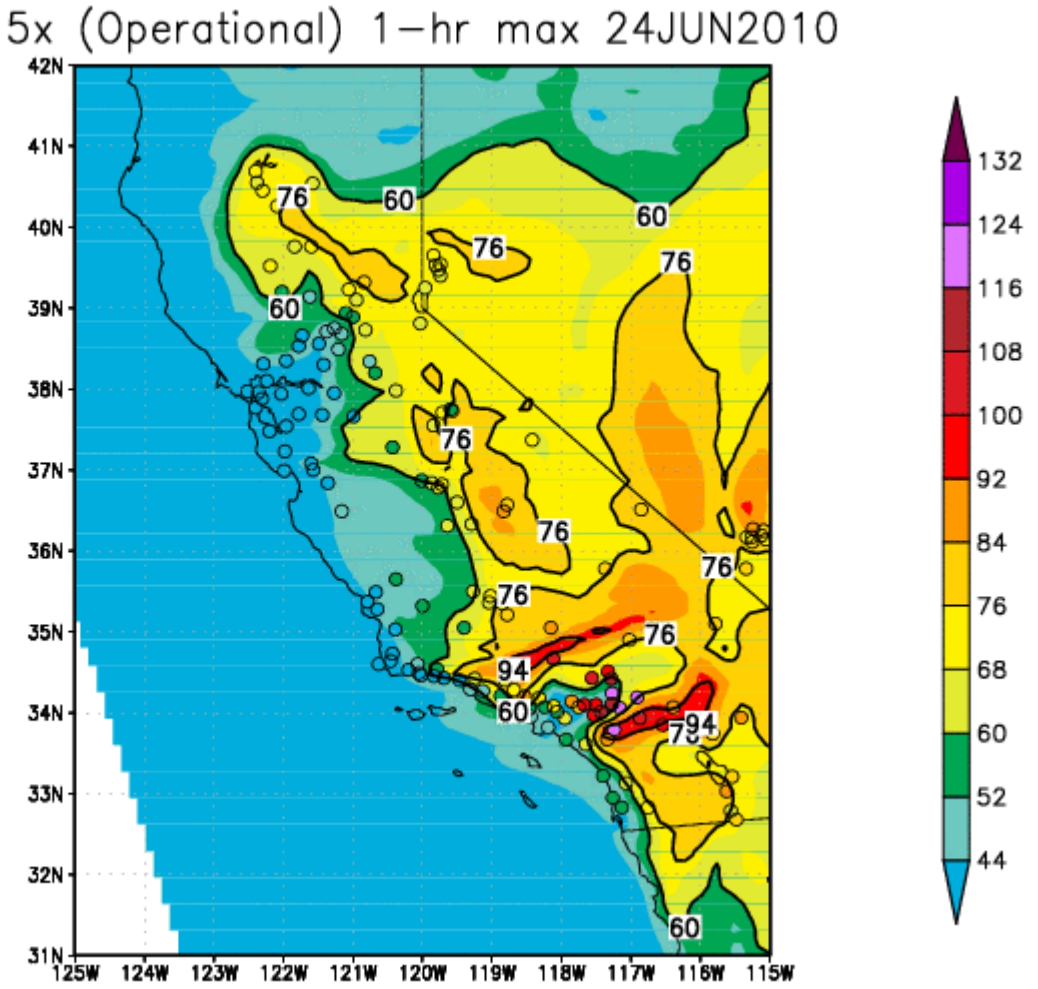
2010 Ozone Season

- 5X Operational products with 12Z initialization
- June to August

Recap: year 2008 summer ozone season

- Low bias in the middle of the Basin: over titration by NOx
- Reasonably good agreement near the edge of the Basin
- Elevated Ozone plumes in Salton Sea air basin and Ventura County

NOAA: Excess NO_X titration in the middle basin



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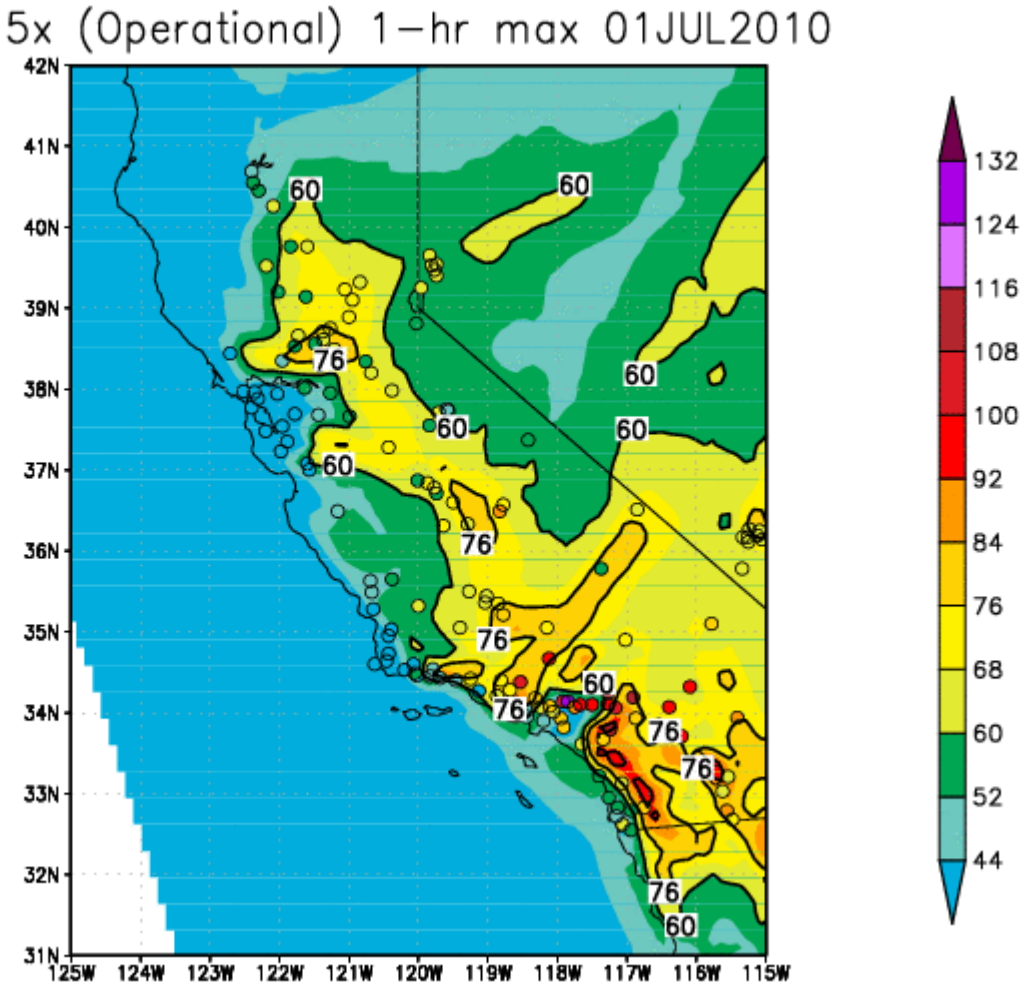
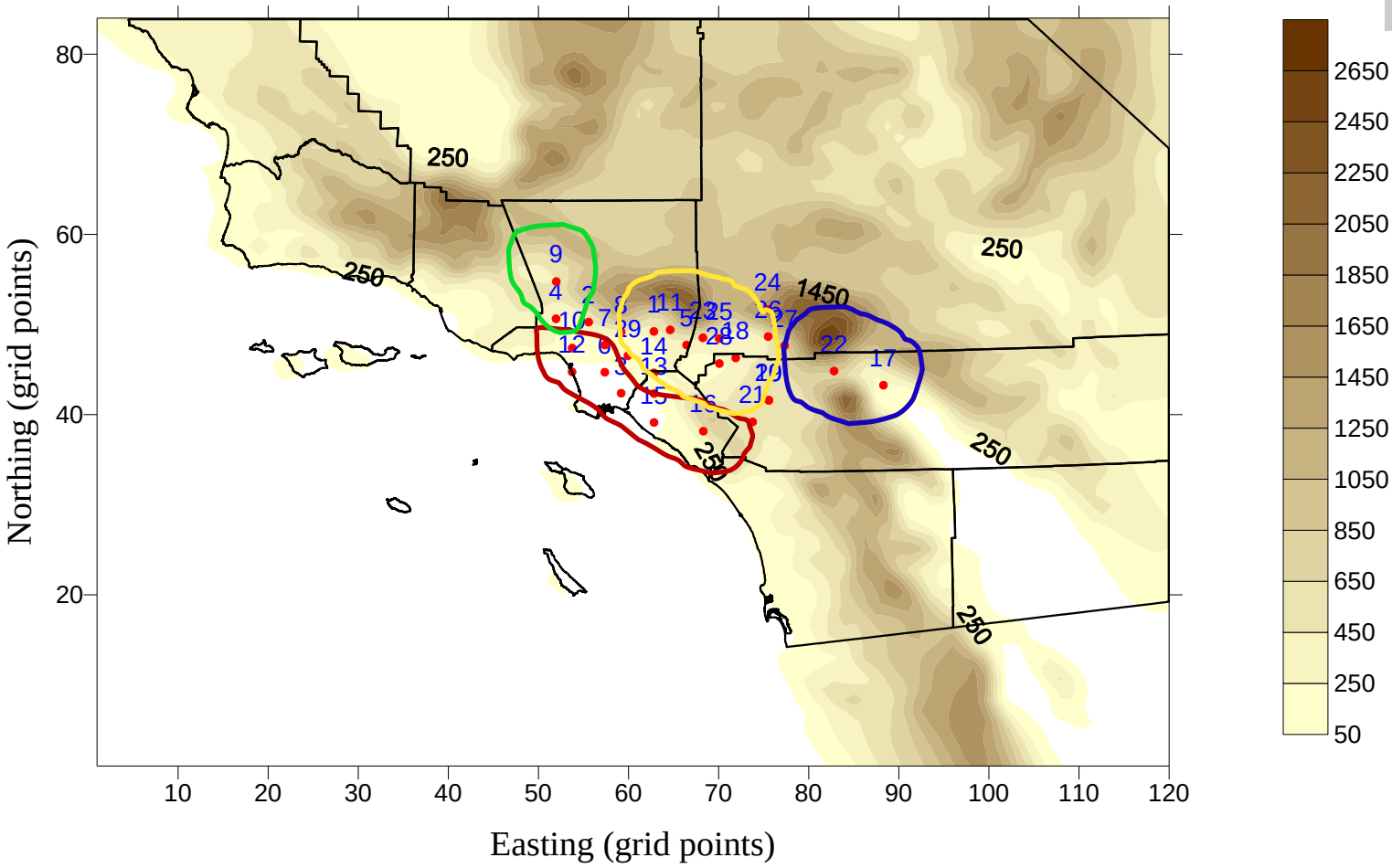
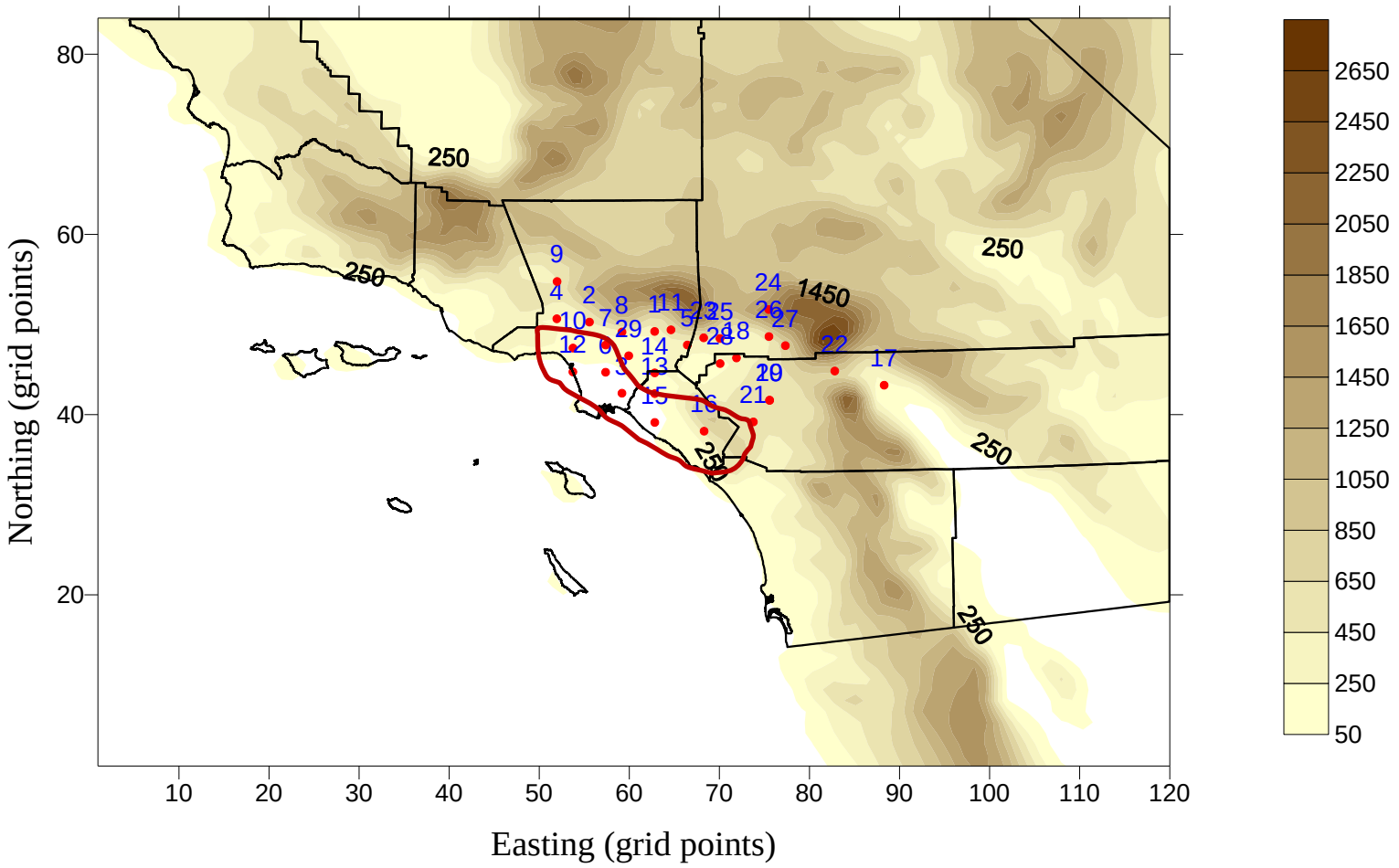


Topography and Monitoring stations within the Basin

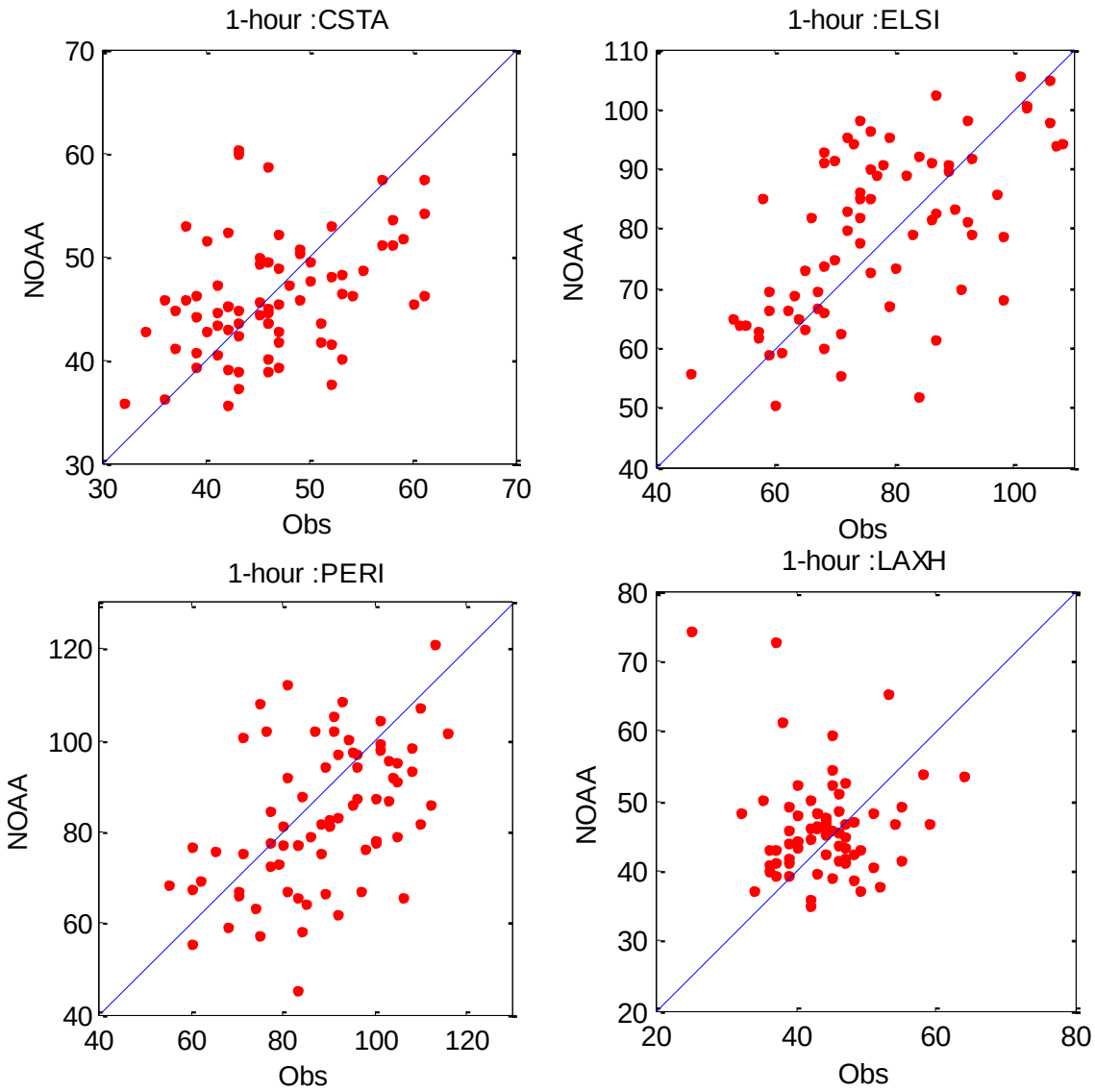


No	Station Names
1	AZUS
2	BURK
3	LGBH
4	RESE
5	POMA
6	LYNN
7	CELA
8	PASA
9	SCLR
10	WSLA
11	GLEN
12	LAXH
13	ANAH
14	LAHB
15	CSTA
16	MSVJ
17	PLSP
18	RIVR
19	PERI
20	INDI
21	ELSI
22	BNAP
23	UPLA
24	CRES
25	FONT
26	SNBO
27	RDLD
28	MLOM
29	PICO

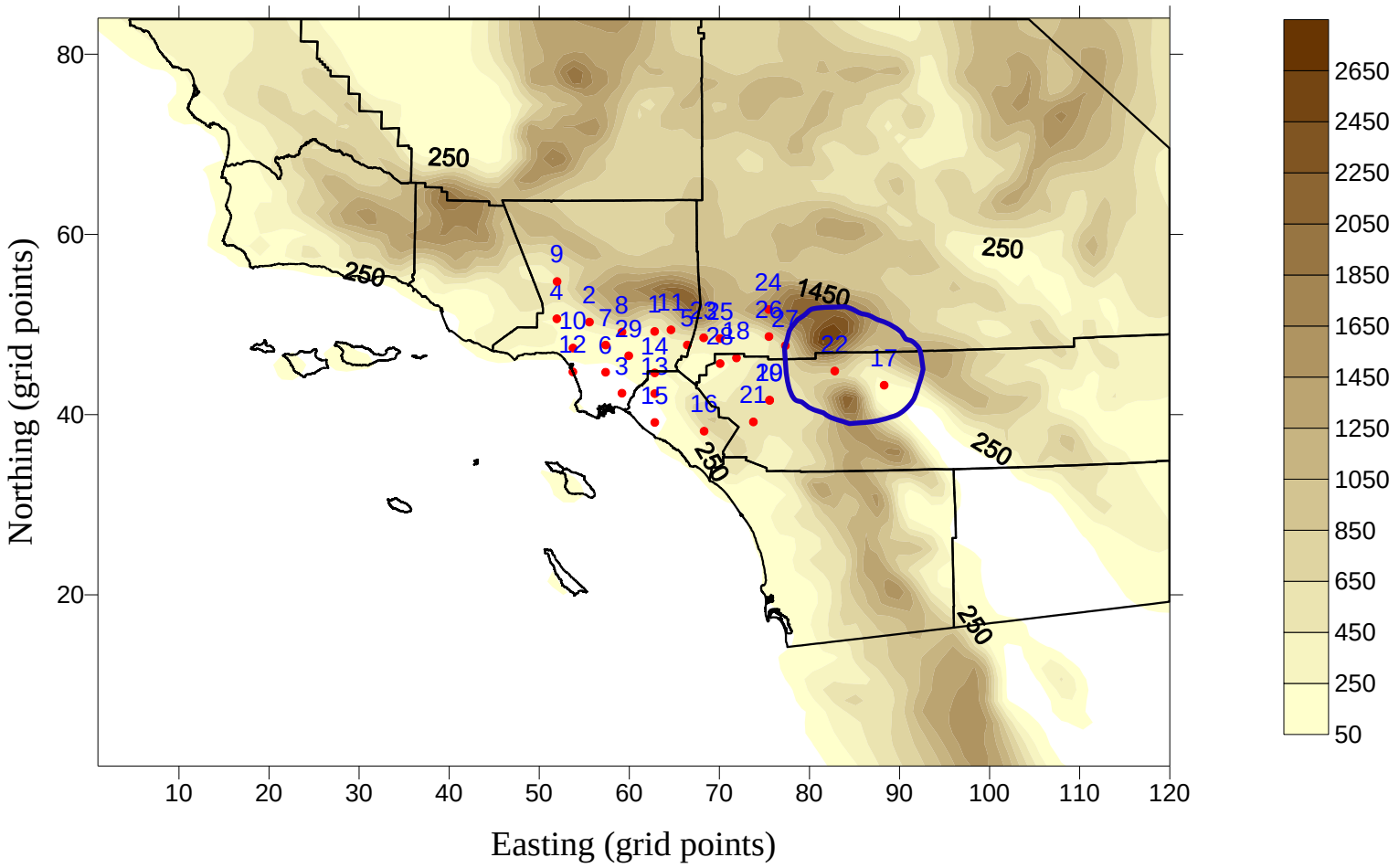
Coastal Area



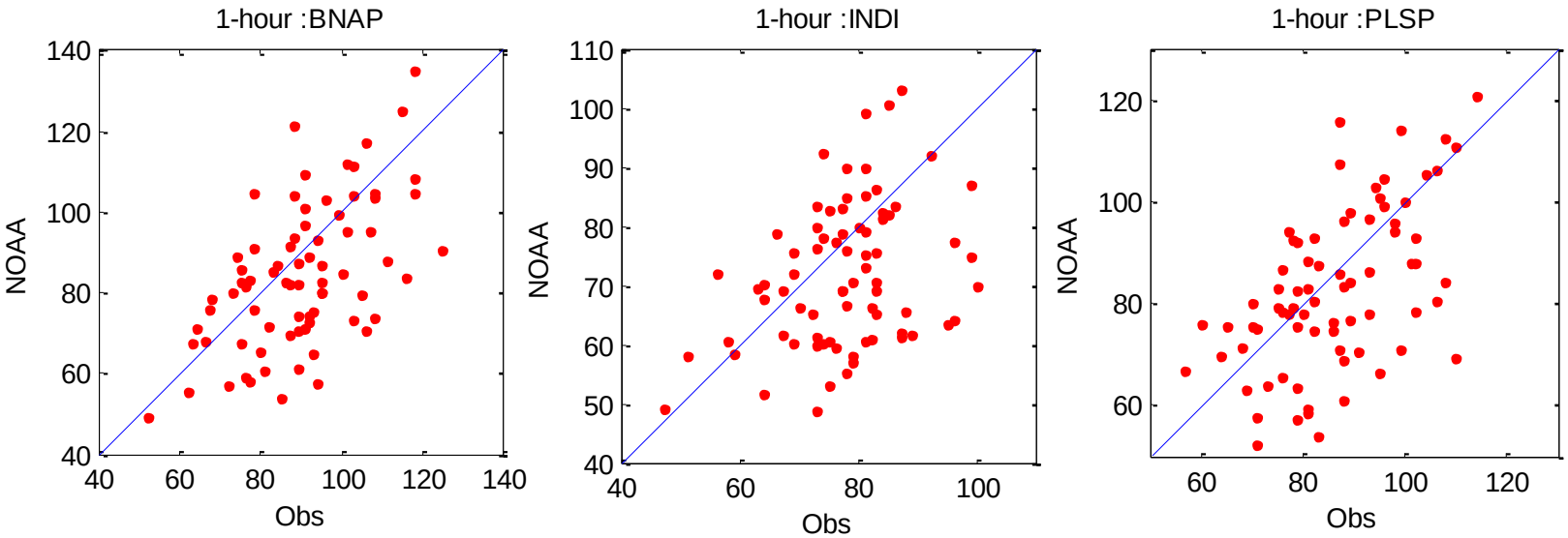
1-hr Daily Max Ozone



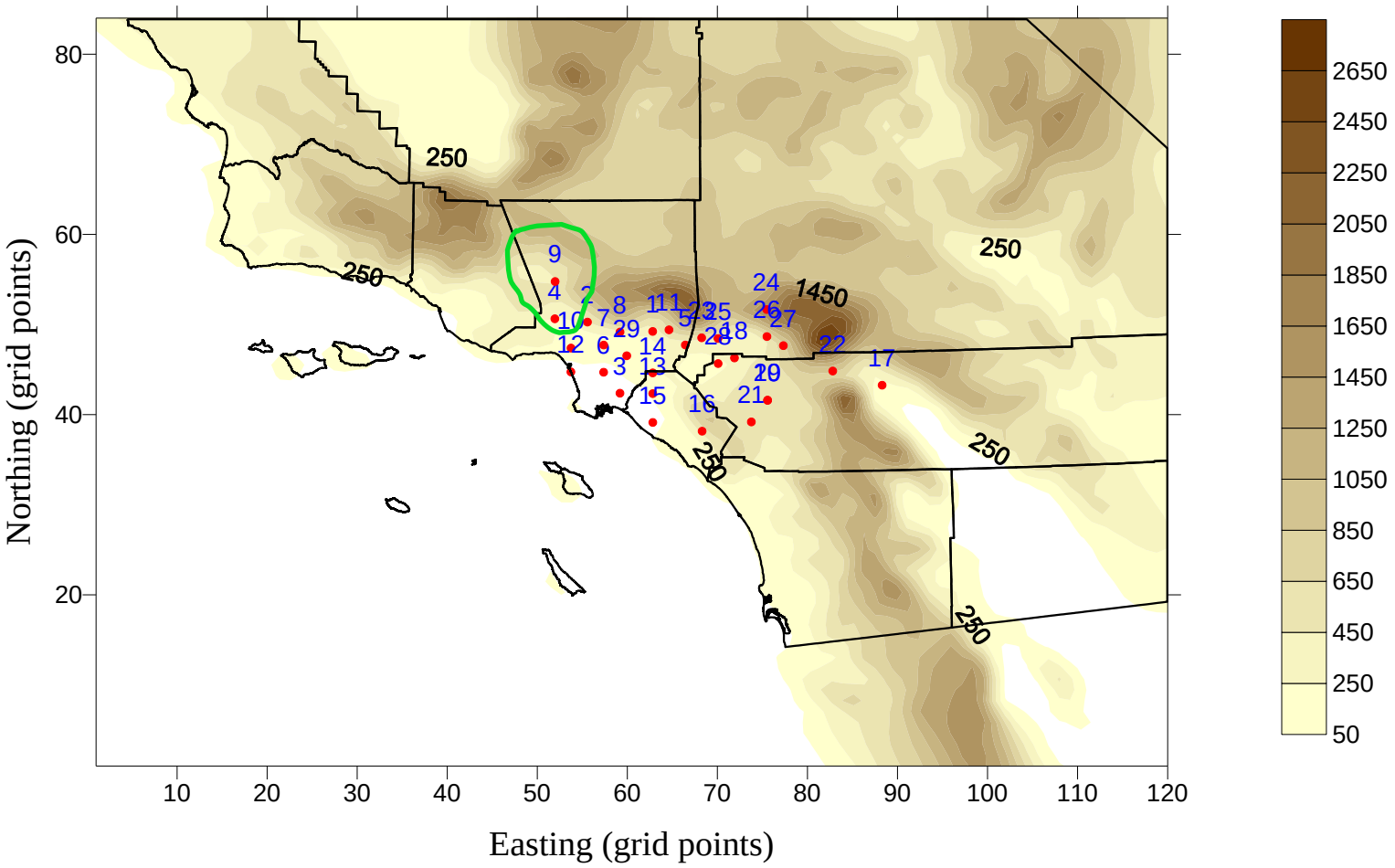
Coachella Valley



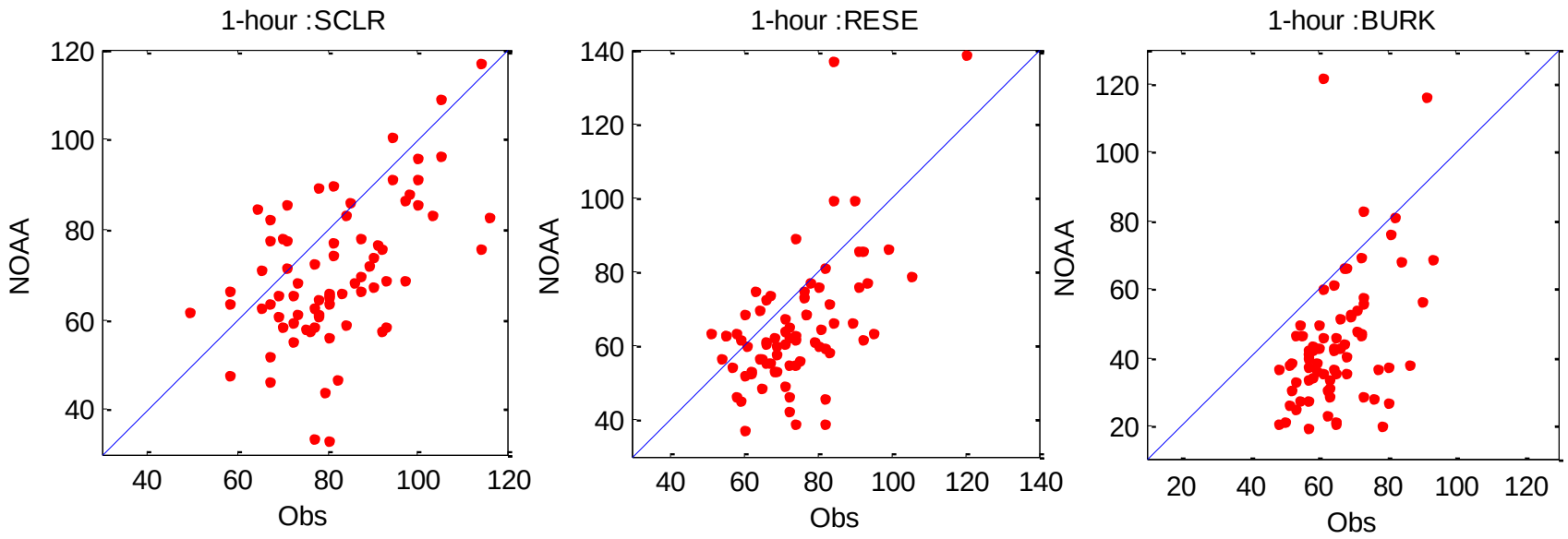
1-hr Daily Max Ozone



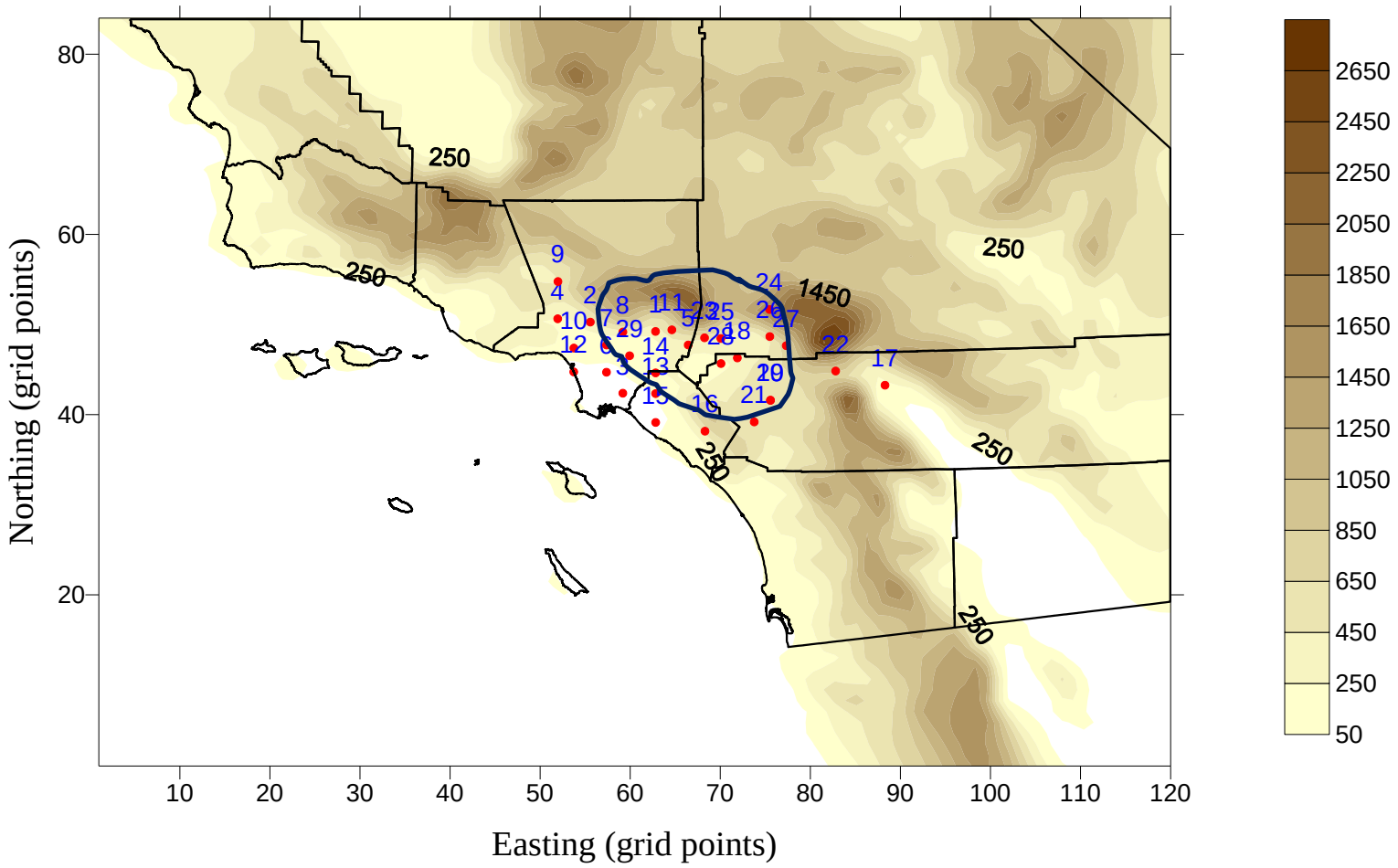
Santa Clarita Valley



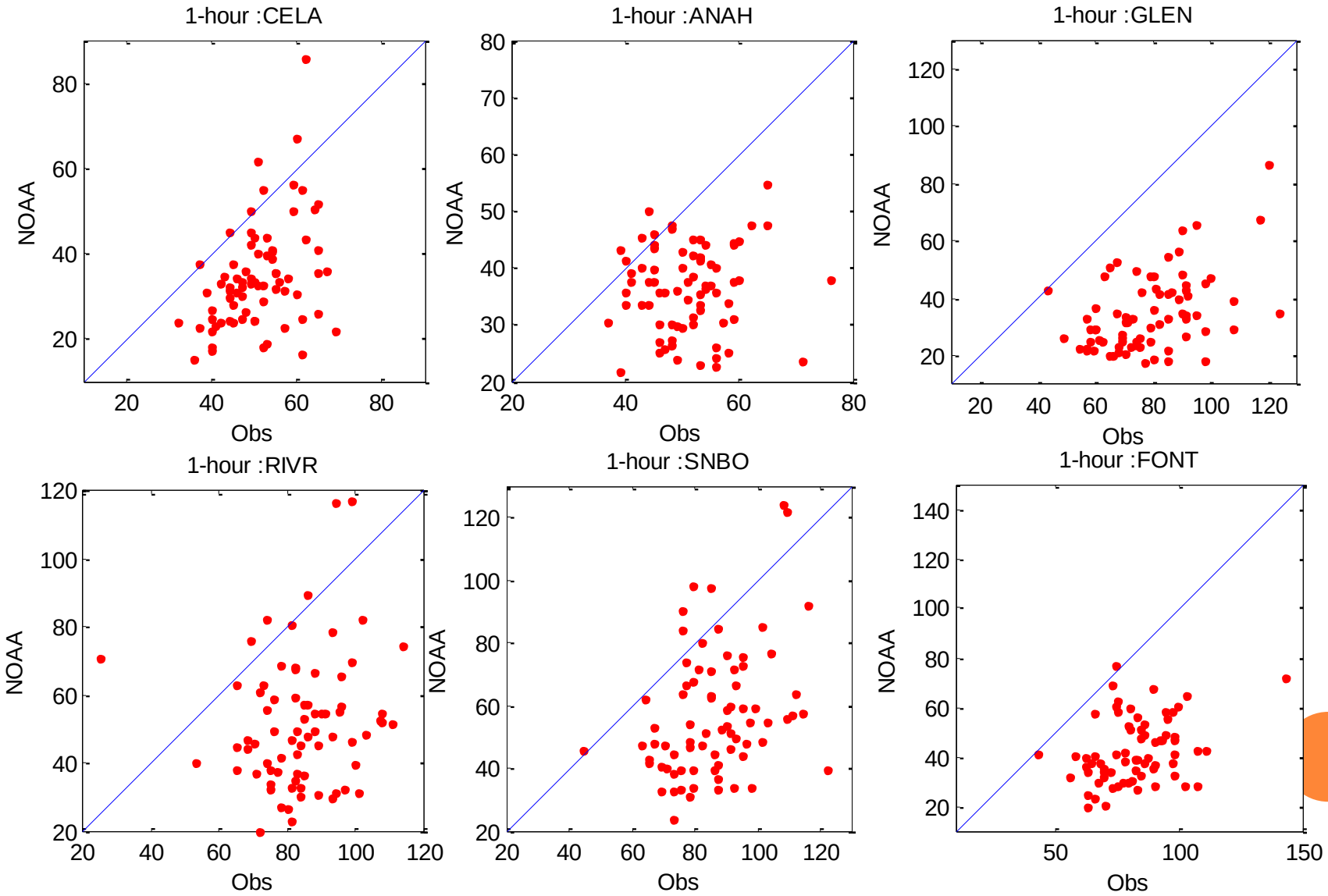
1-hr Daily Max Ozone



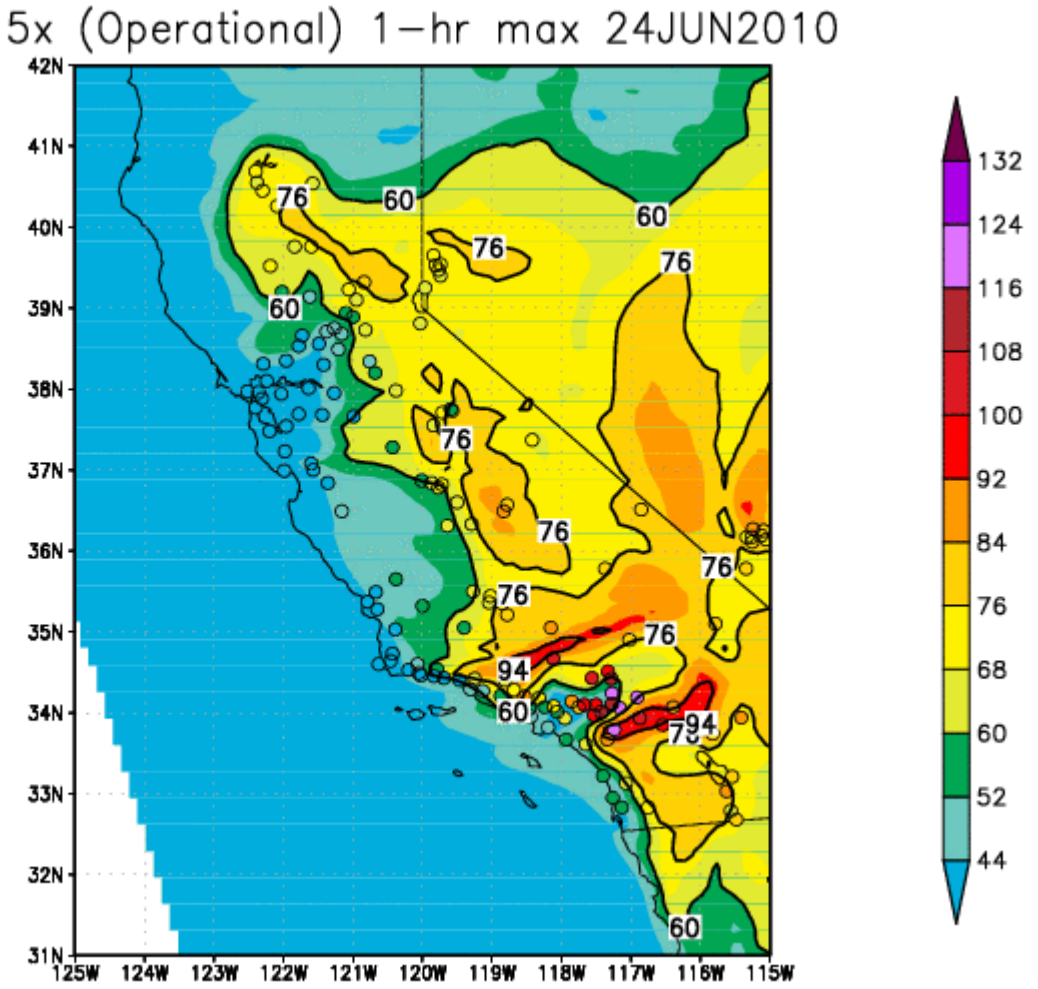
Inland Area


Northing (grid points)
Easting (grid points)
80
60
40
20
10
20
30
40
50
60
70
80
90
100
110
120
250
1450
2650
2450
2250
2050
1850
1650
1450
1250
1050
850
650
450
250
50

1-hr Daily Max Ozone

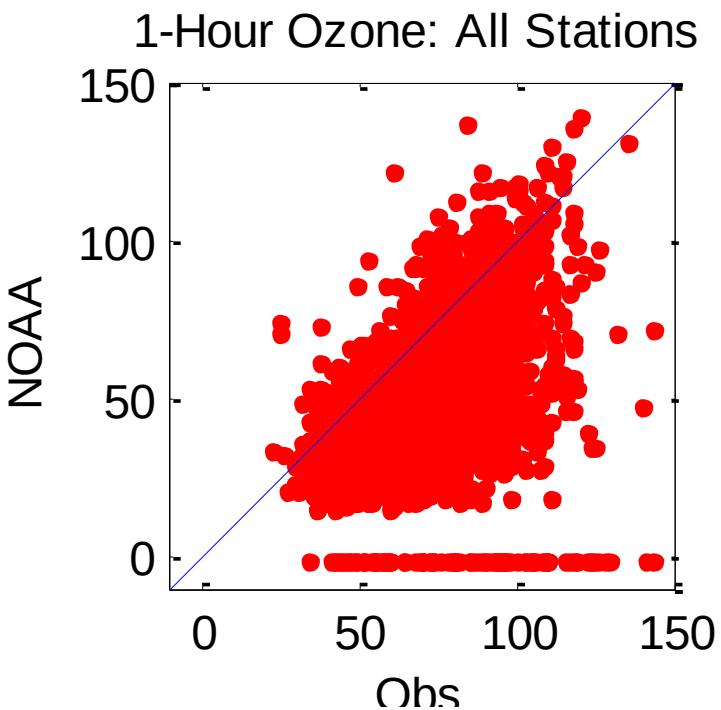


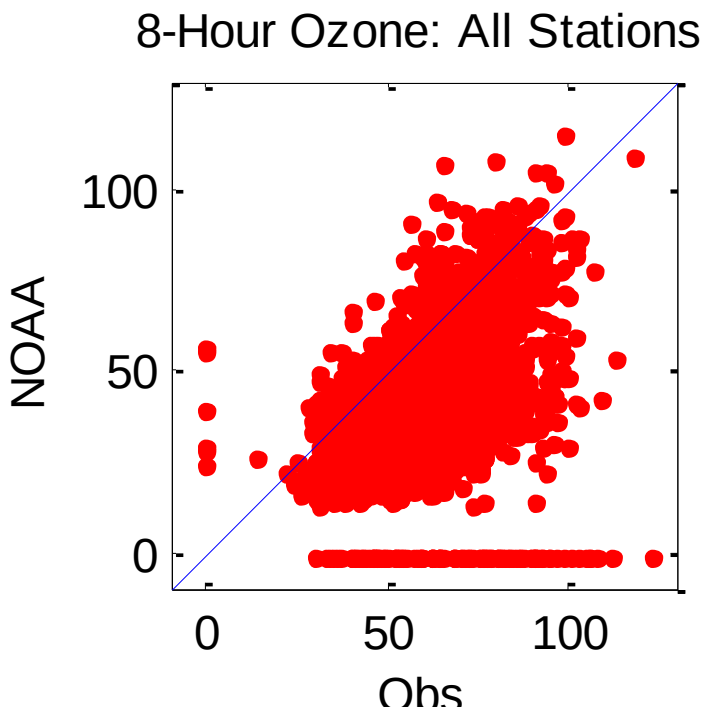
NOAA: Excess NO_X titration in the middle basin



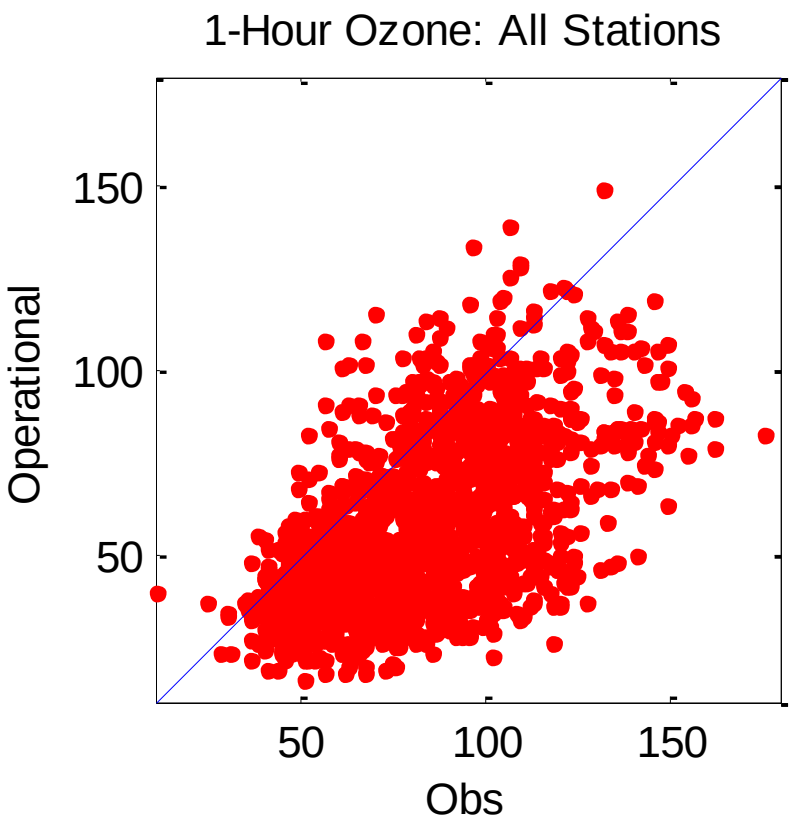
Year to Year Variation

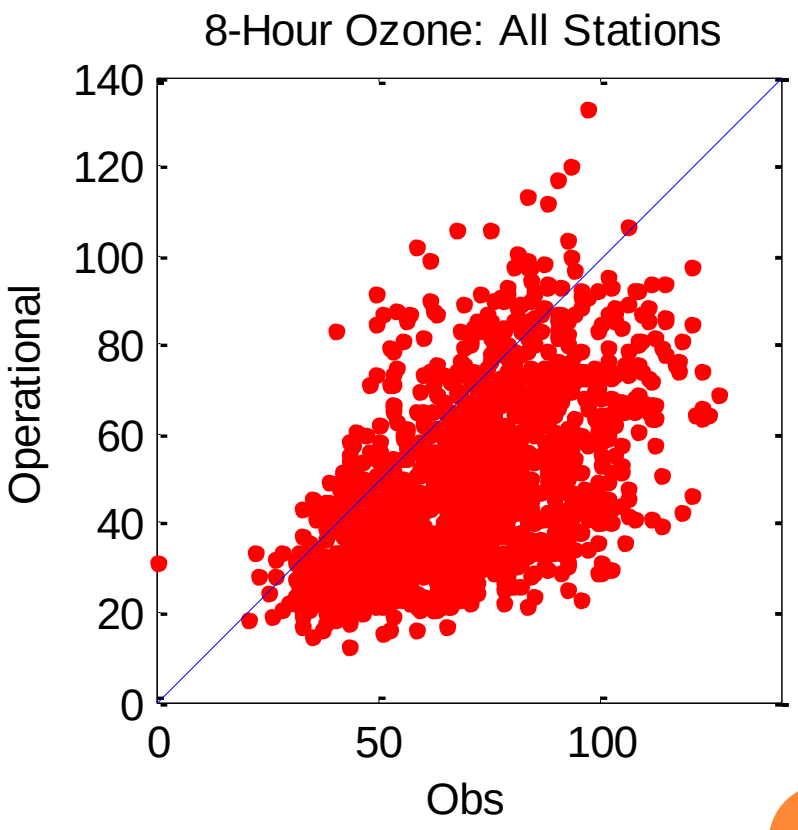
June to August of Year 2010





June and July of Year 2008





Performance of 1hr O3 Forecast

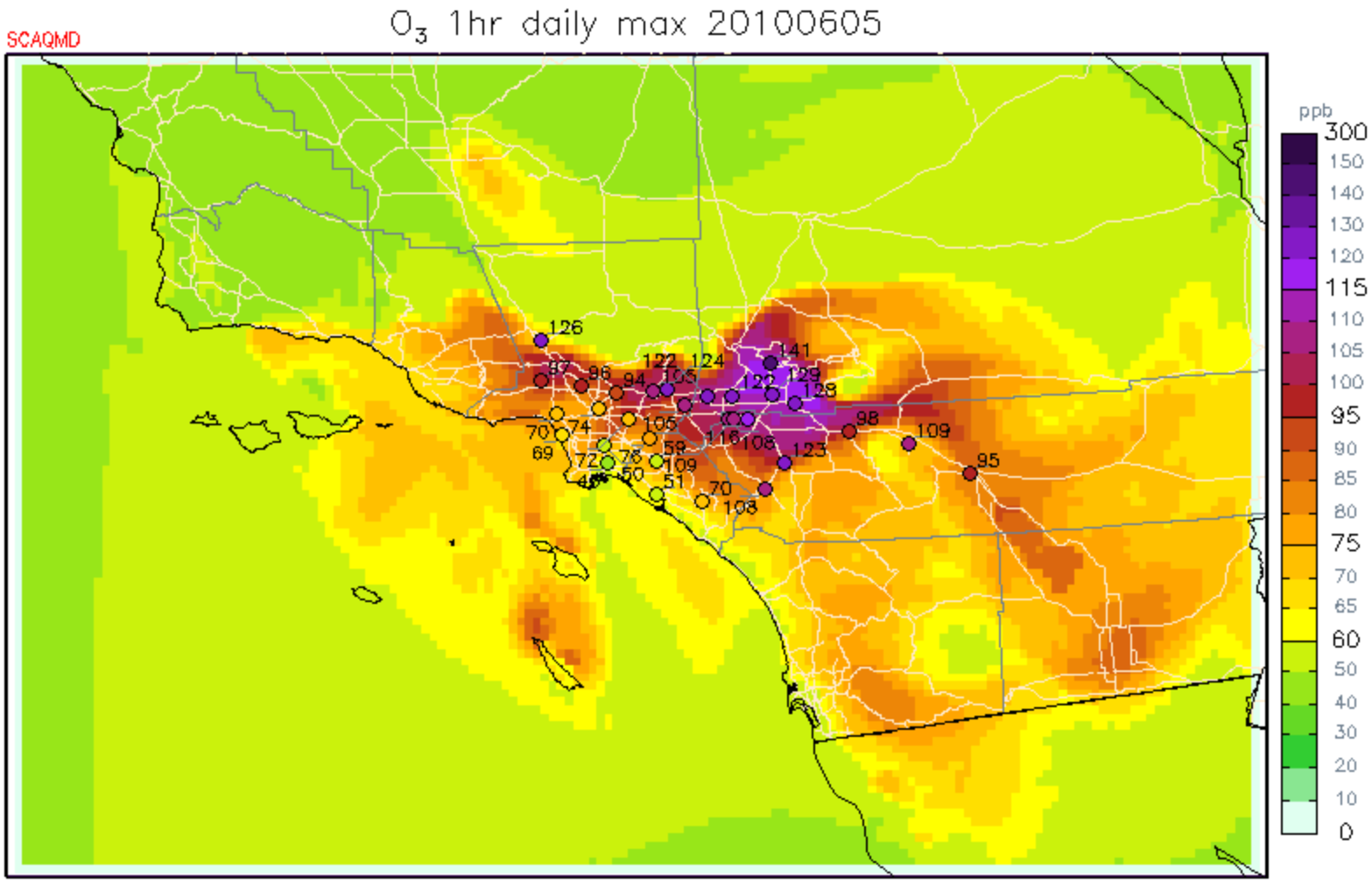
Year	2008	2009	2010
# of data	1470 30stnX48day	2484 27stnX92day	2106 27stnX78day
Obs Mean	82.2	70.8	69.6
Obs Standard Deviation	25.5	26.0	20.5
Mean	58.1	51.7	51.6
Standard Deviation	23.0	22.7	22.6
Mean Normalized Bias	-27.1	-22.4	-24.4
Mean Normalized Gross Error	31.6	31.5	30.1

South Coast AQMD Prognostic Modeling System

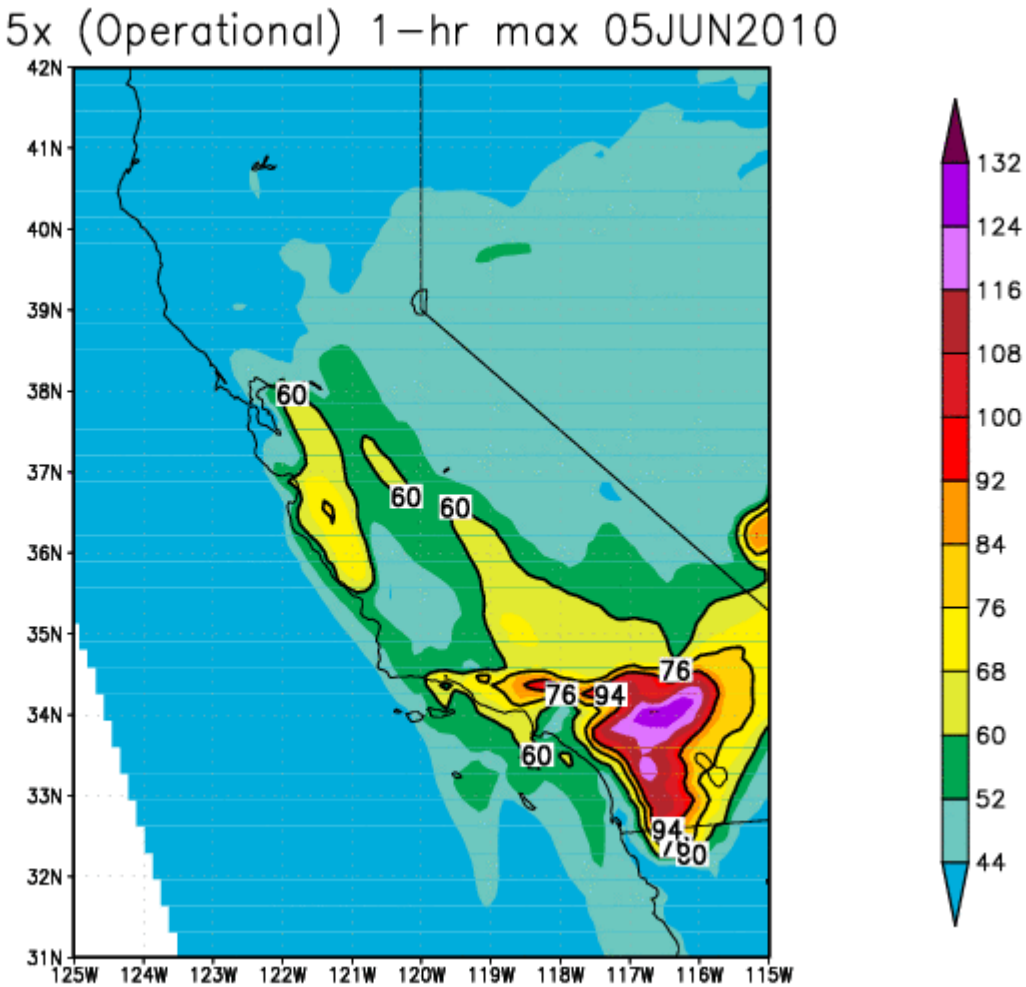
SCAQMD Prognostic Modeling System

NWS data download	• NAM 00Z 40Km GRIB data
MM5 meteorology	• Updated Land Use • Pure Prognostic mode with no FDDA
Emission	• Day-of-a-week Based Emission Scenarios developed for 2007 AQMP/SIP
CAMx Air Quality	• SAPRC99 chemical mechanism • Bimodal Aerosol option under test
Post-Processing	• Real-time evaluation using real-time observations & internet uploading

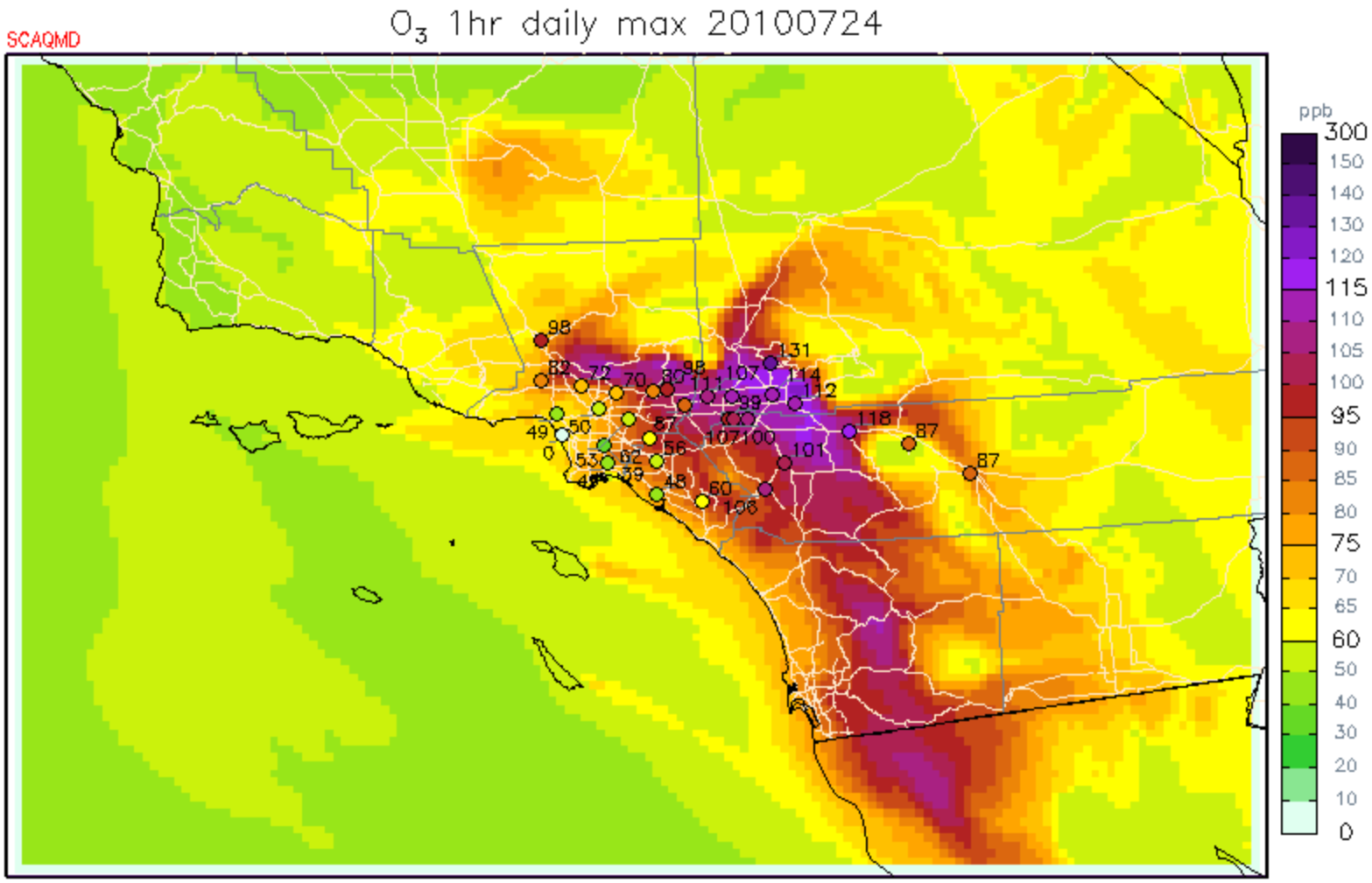
June 5: 1h-O3 max = 141 ppb @ Crestline



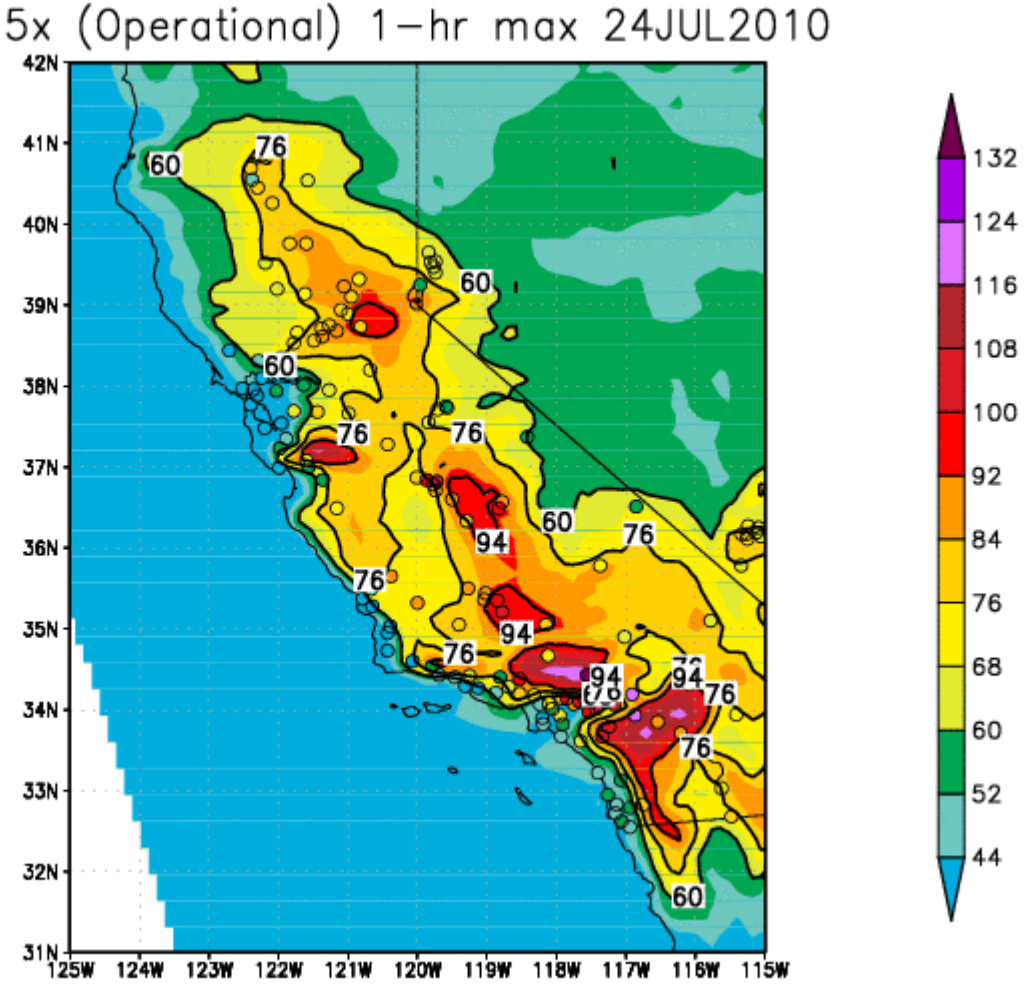
June 5: 1h-O3 max = 141 ppb @ CRES



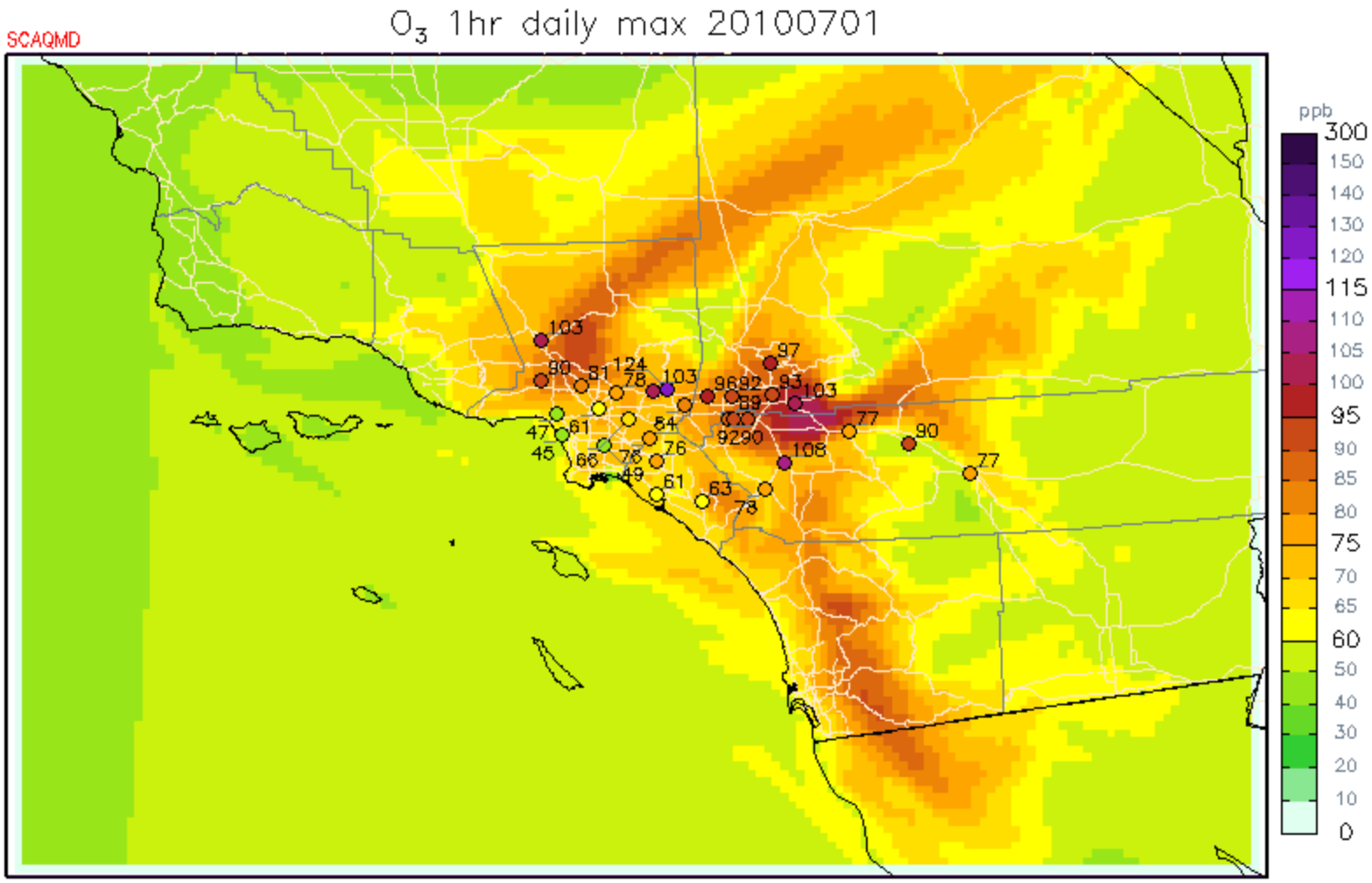
July 24: 1h-O3 Max = 131 ppb @ Crestline



July 24: 1h-O3 Max = 131 ppb @ CRES



July 1: 124 ppb at Glendora



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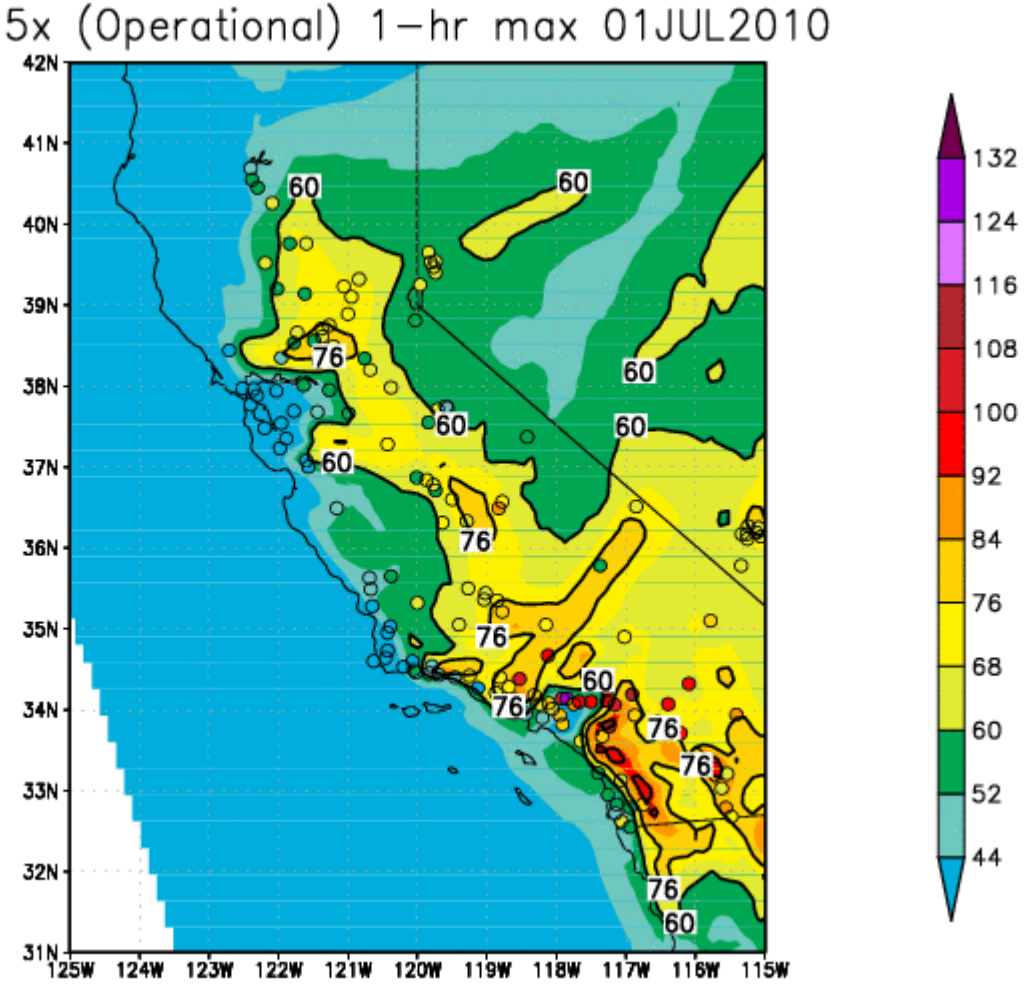
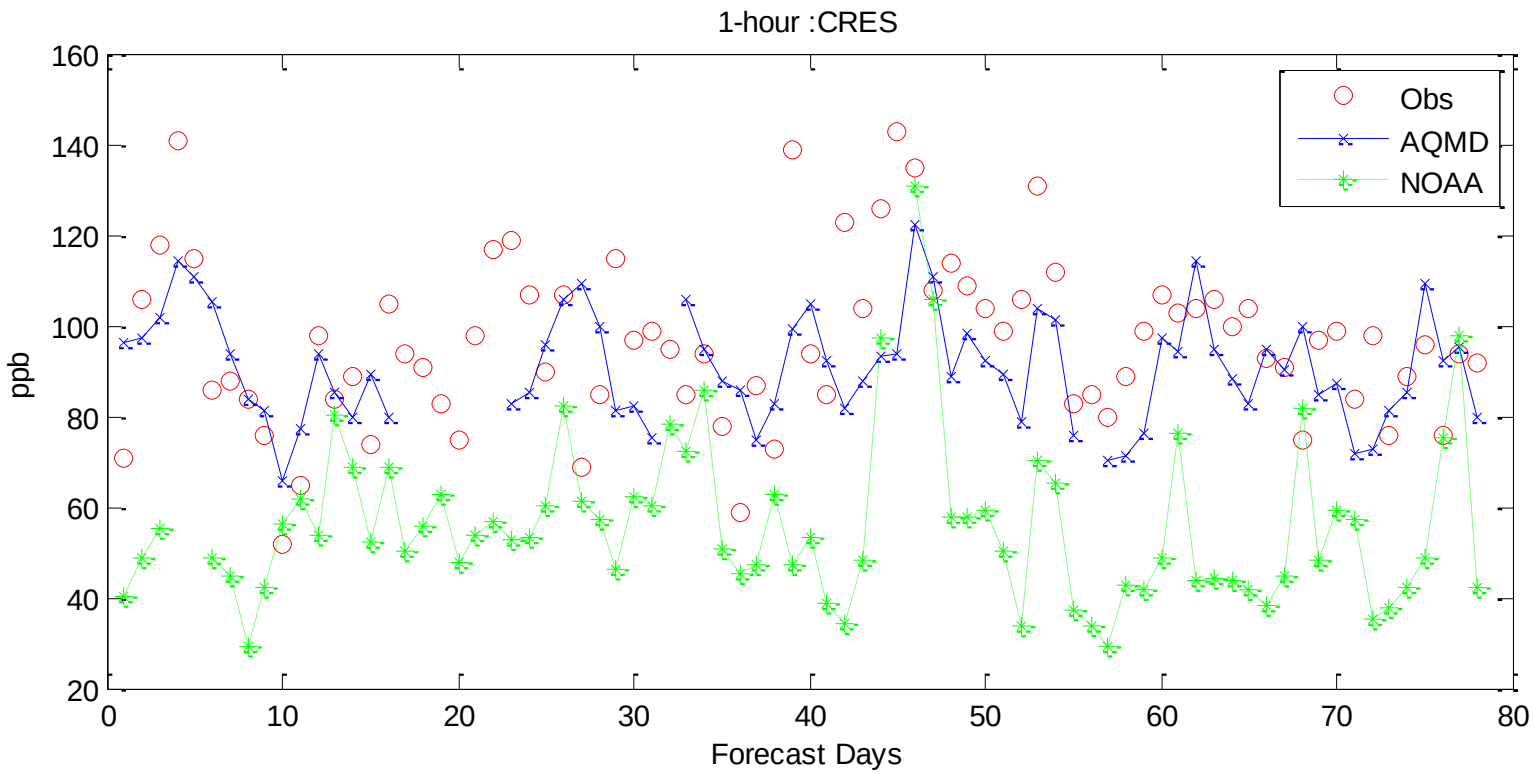
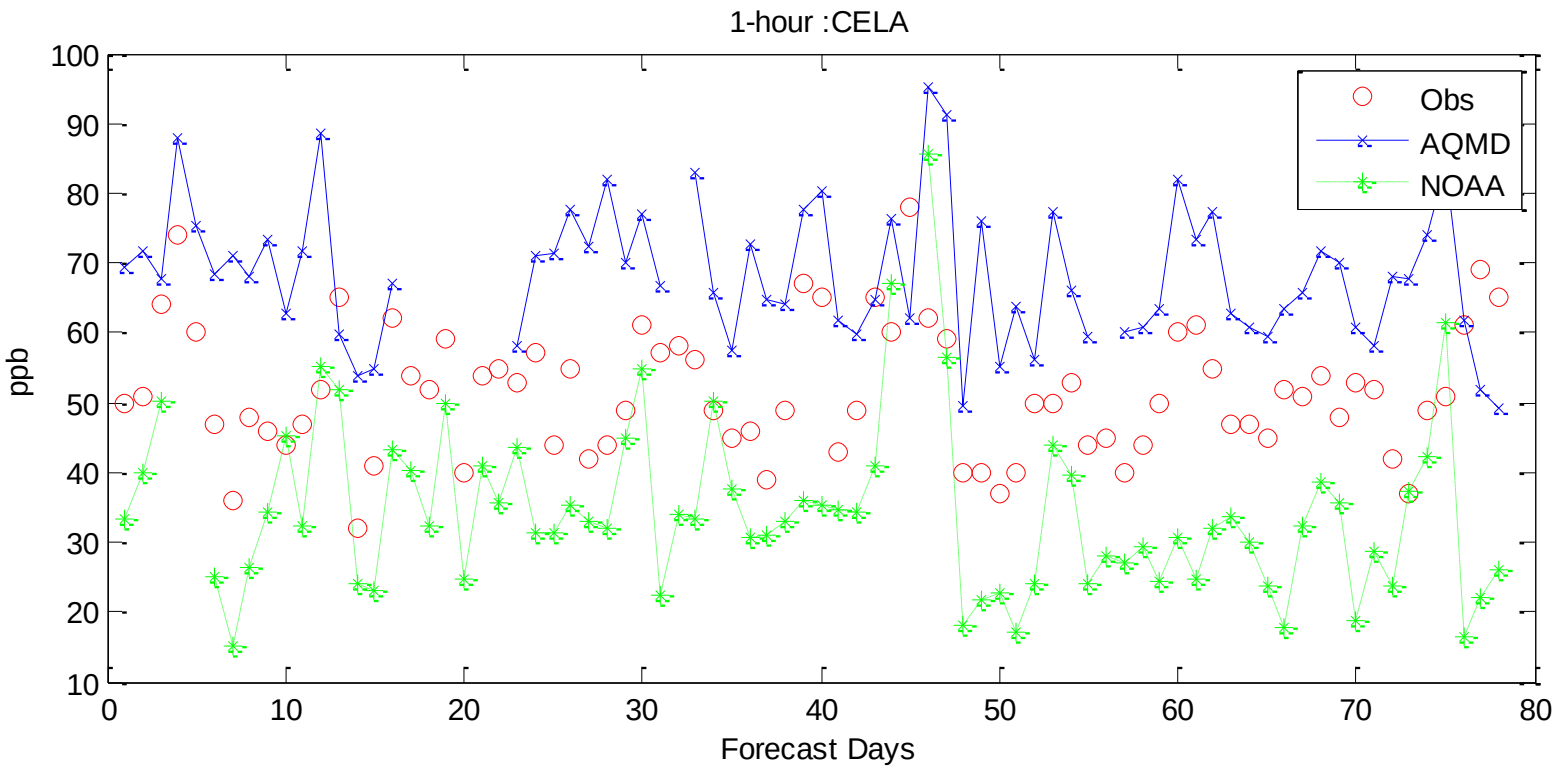


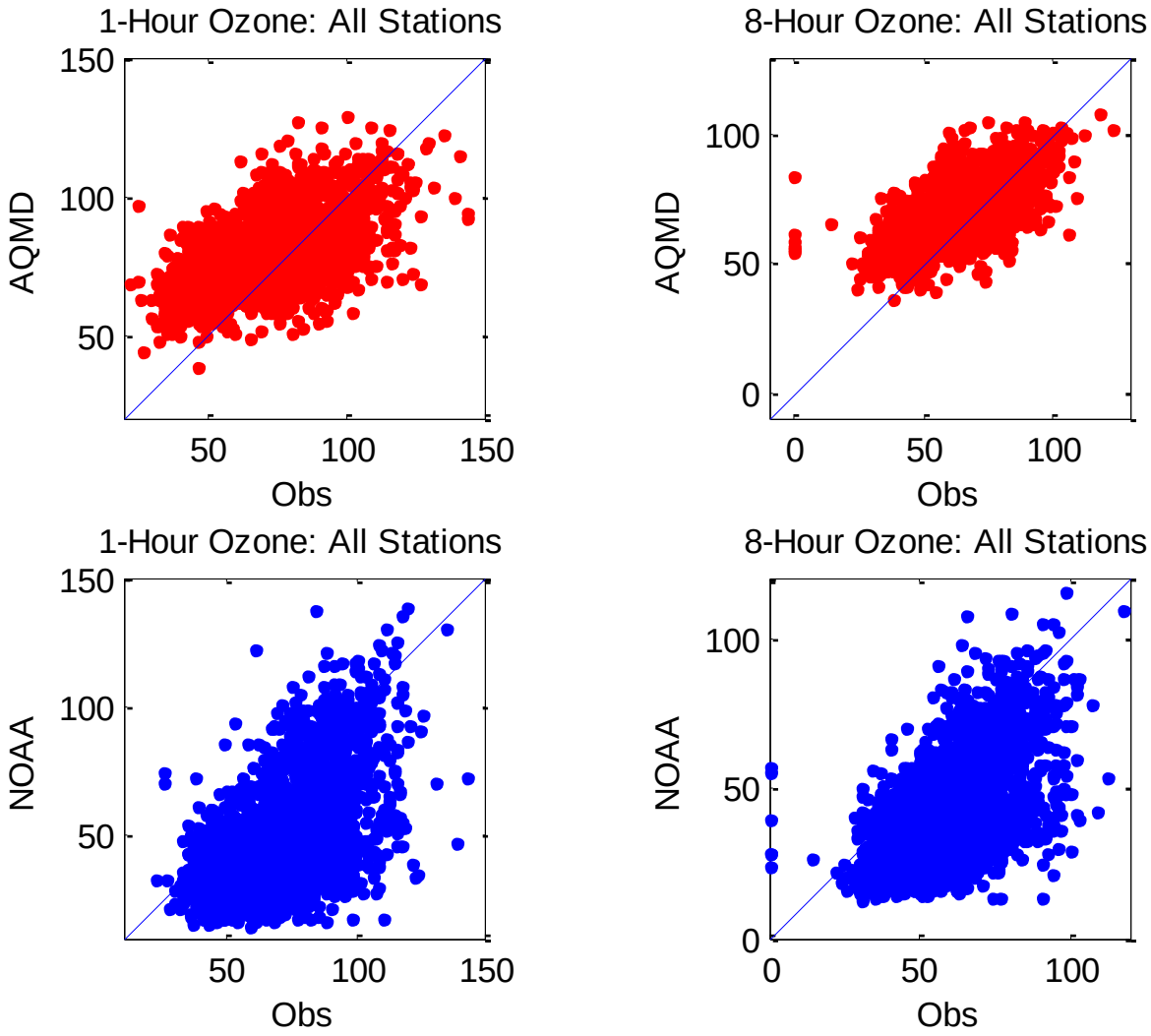
Time Series of Max 1h-O3 at Crestline



Time Series of Max 1h-O3 @ Central LA



Scatter Plots



Performance Measures

		Mean	Standard Deviation	Mean Normalized Bias	Mean Normalized Gross Error
1-hr O3	Observation	69.6	20.5	-	-
	NOAA	51.6	22.6	-24.4	30.1
	AQMD	79.0	14.2	19.3	27.0
8-hr O3	Observation	58.9	17.0	-	-
	NOAA	42.9	18.5	-26.2	30.7
	AQMD	67.8	12.1	20.5	26.3

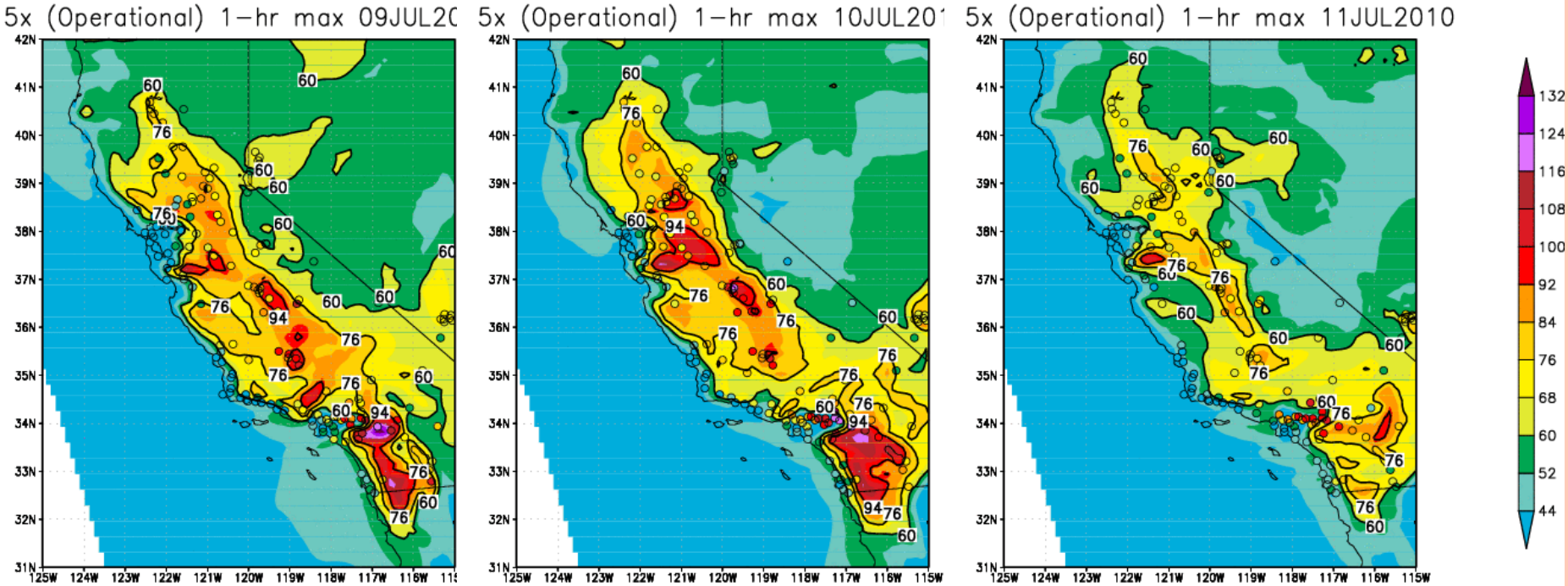
SCAQMD vs. NOAA

- Horizontal Resolution: 4 km vs 12 km
- Update Land Use Land Cover
- SAPRC99 chemical mechanism vs CB04
- SCAQMD Emission over-projected

SUMMARY

- NOAA products still show low bias in the middle of the Basin, which probably due to NOx over titration
- Over the last three year period, the forecast performances improved
- South Coast Air Quality Management District runs real-time prognostic modeling using MM5-CAMx, which showed better performance in O3 forecast.

The Effect of Meteorology?

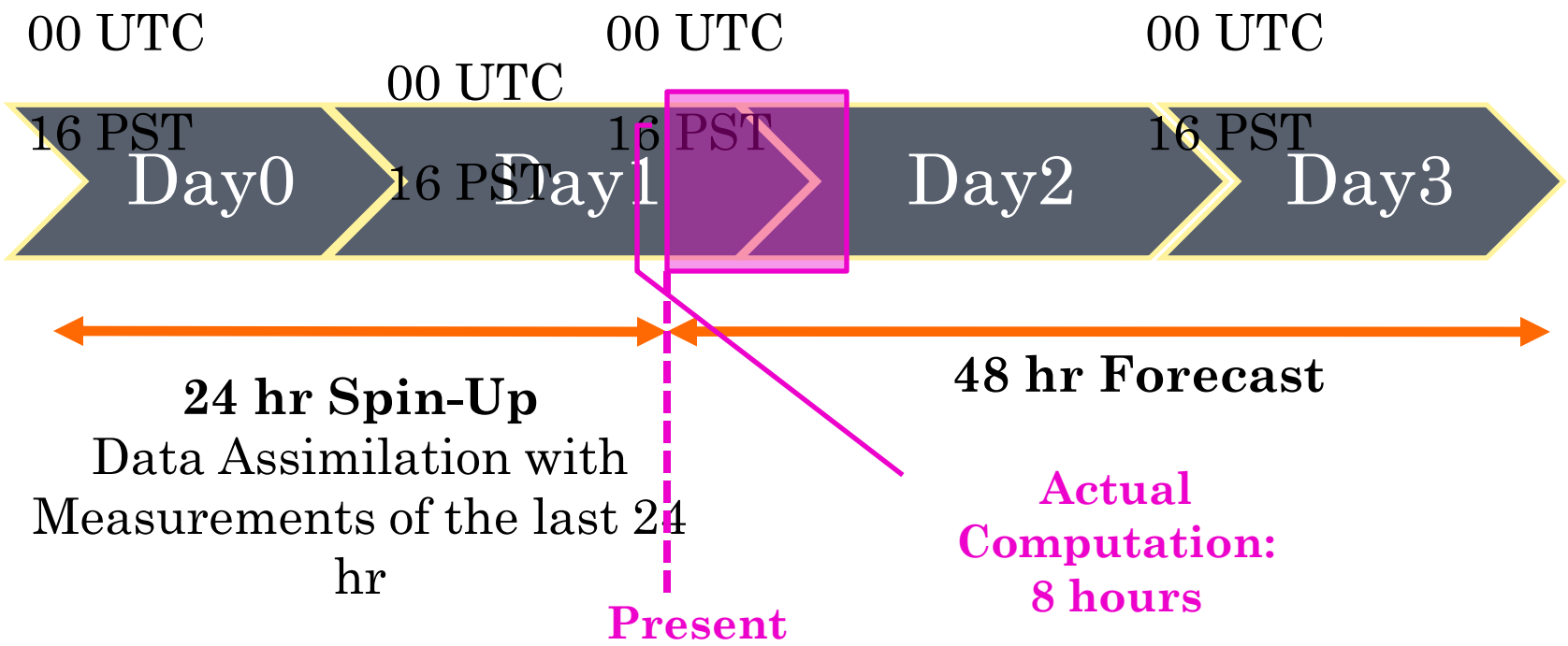


NOAA:	7/9 135 ppb	7/10 111 ppb	7/11 87 ppb
Obs Max:	7/9 118 ppb	7/10 139 ppb	7/11 101 ppb

8HR O3 PERFORMANCE STATISTICS

Year	2008	2009	2010
# of data	1470 30stnX48day	2484 27stnX92day	2106 27stnX78day
Obs Mean	68.4	58.6	58.9
Obs Standard Deviation	20.3	20.0	17.0
Mean	48.8	42.9	42.9
Standard Deviation	19.5	19.0	18.5
Mean Normalized Bias	-26.8	-23.0	-26.2
Mean Normalized Gross Error	31.6	31.8	30.7

Real-Time Modeling System



- Starting at 16 PST on Day 1
- Perform 24 hour Spin-up & 48 hour Forecast
- Results will be on internet by 00 PST of Day2