

UNC H12_8HB

Emphasis on Model Performance Evaluation

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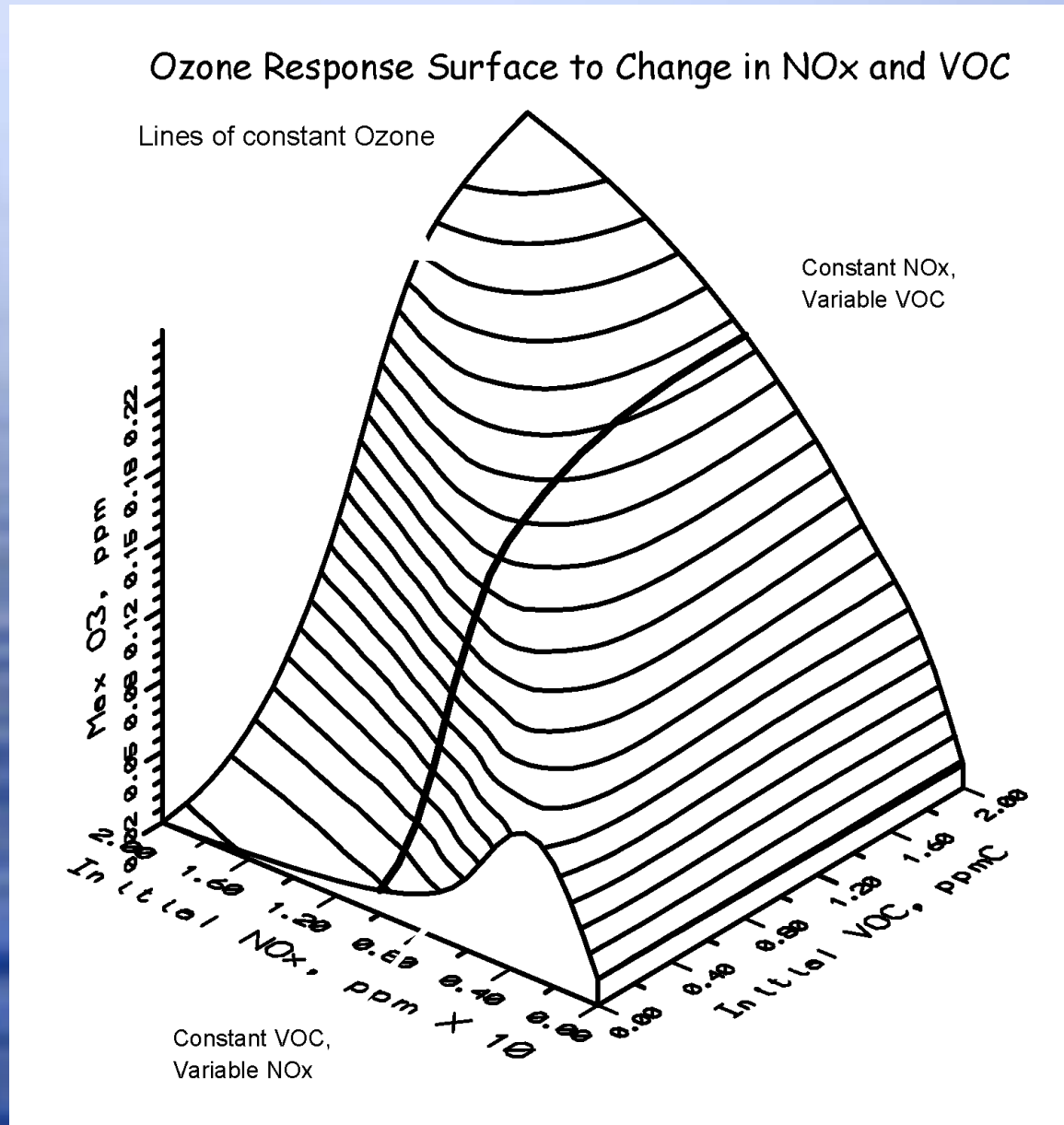
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Carolina Environmental Program, Envr. Modeling for Policy Decisions

June 1, 2005, HARC SAC Meeting

Precursors
Must be
Accurate

Many
Precursors,
Same
Ozone

Different
Responses



Environmental Model Evaluation*

- ◆ Is the model's formulation or construction adequate for the task?
- ◆ Does the model's behavior approximate well that observed in respect to the real thing? (history matching)
- ◆ Does the model work, i.e., fulfill its designed task or met its intended purpose? (fit for aiding in a decision)

History Matching

- ◆ Monitor site by monitor site, day by day
- ◆ Met and species concentrations
- ◆ Precursors and products
- ◆ Summary statistics only meaningful after spatial and temporal analysis
- ◆ History matching at observed locations; inferences at areas away from observations

Met Monitoring for Regulatory Modeling Applications*

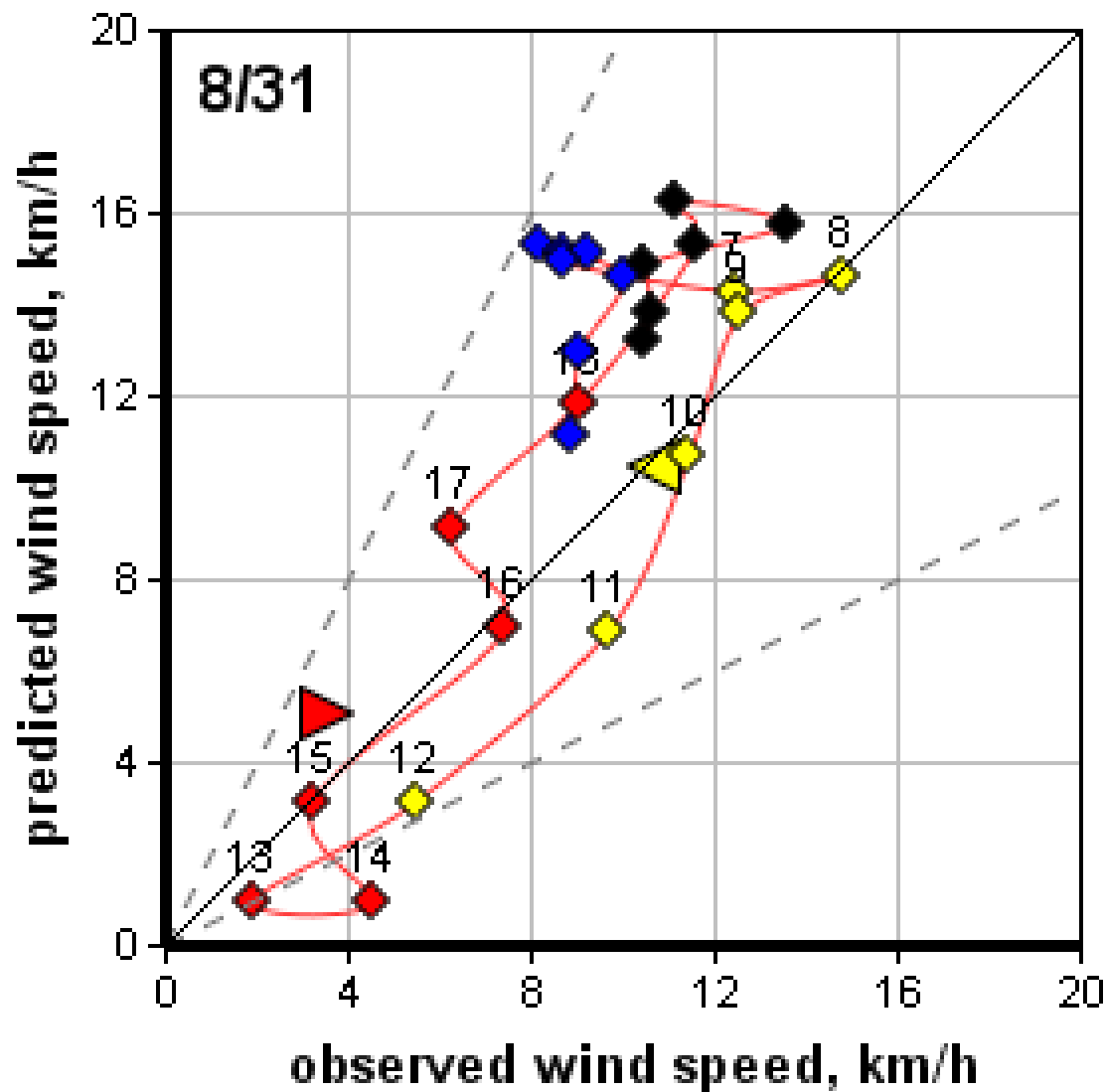
- ◆ WS and WD starting speed of 1.8 km/h
- ◆ WS accuracy of (0.72 km/h+5%)
- ◆ WD accuracy of +/- 5 degrees

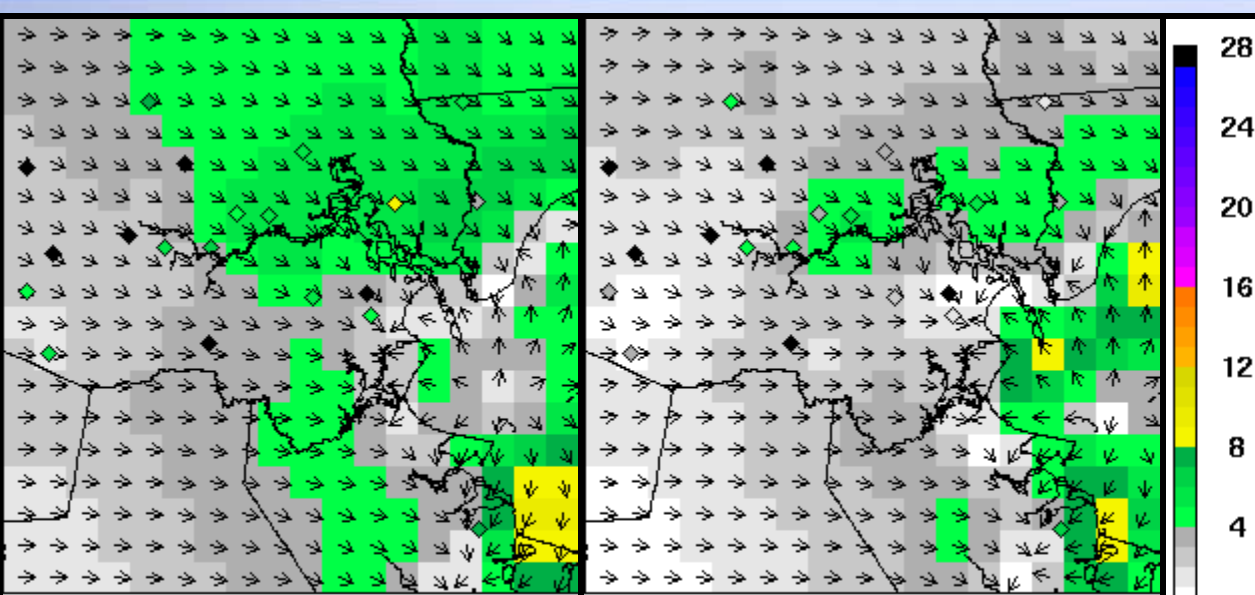
- ◆ Plots show 2:1 and 0.5:1 WS; outside these considered serious flaws in history matching; good agreement +/- 50 %
- ◆ Plots show 30 deg (1/3 quad); outside 60 degs considered serious flaws in history matching; good agreement +/- 30 deg

LaPorte Wind Speed

H08H, La Porte, HRM-8, C608

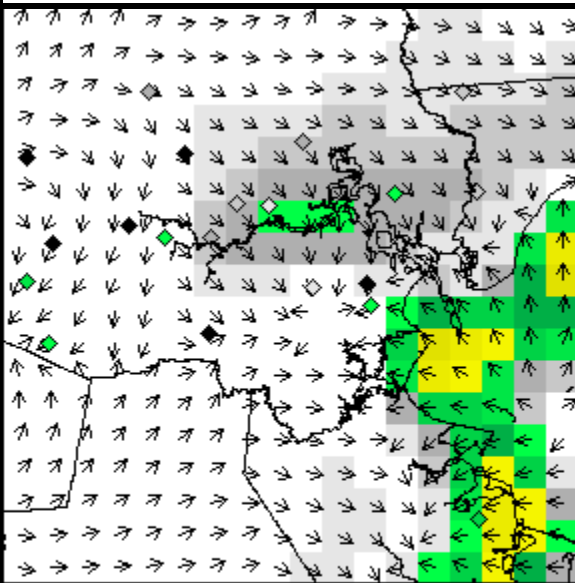
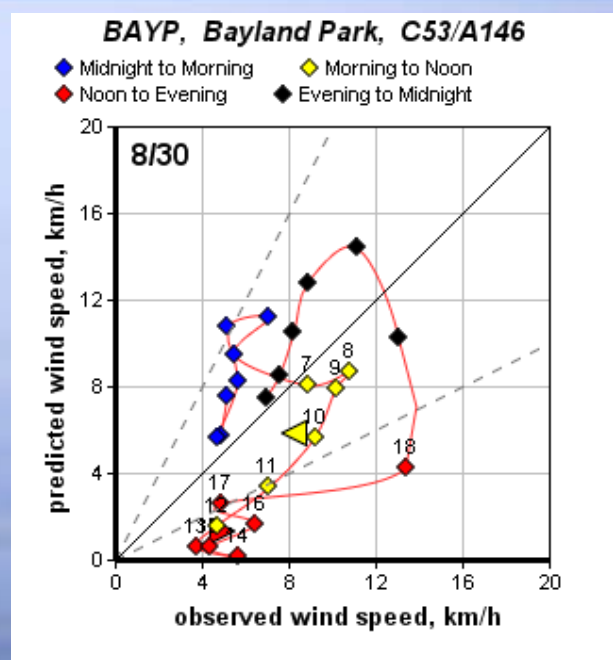
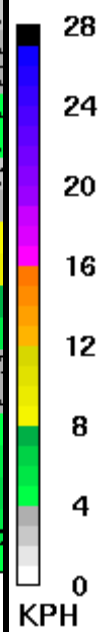
- ◆ Midnight to Morning
- ◆ Morning to Noon
- ◆ Noon to Evening
- ◆ Evening to Midnight



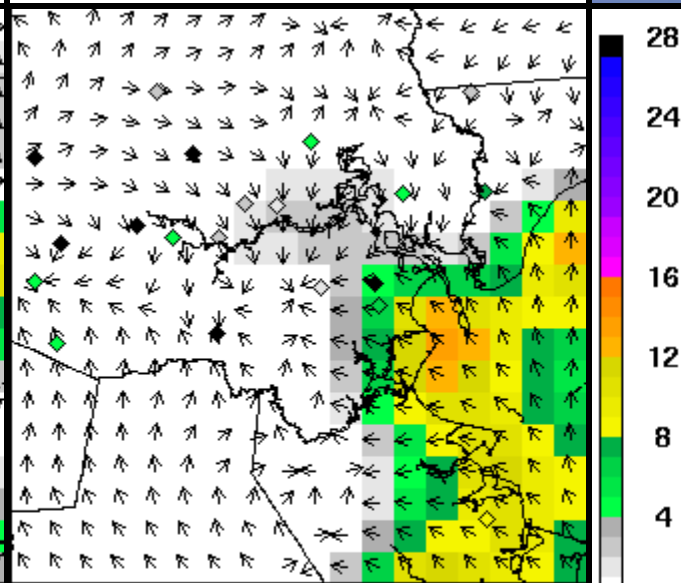


20
August 30,2000 12:00:00
 Min= 1 at (35,29), Max= 9 at (36,22)

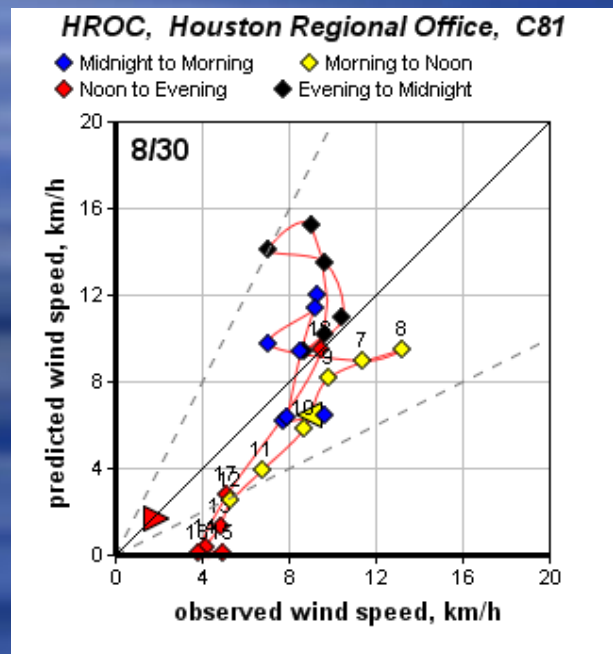
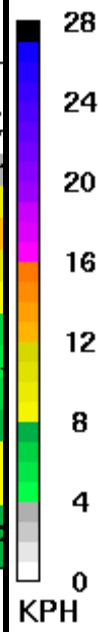
20
August 30,2000 13:00:00
 Min= 0 at (33,20), Max= 10 at (37,29)



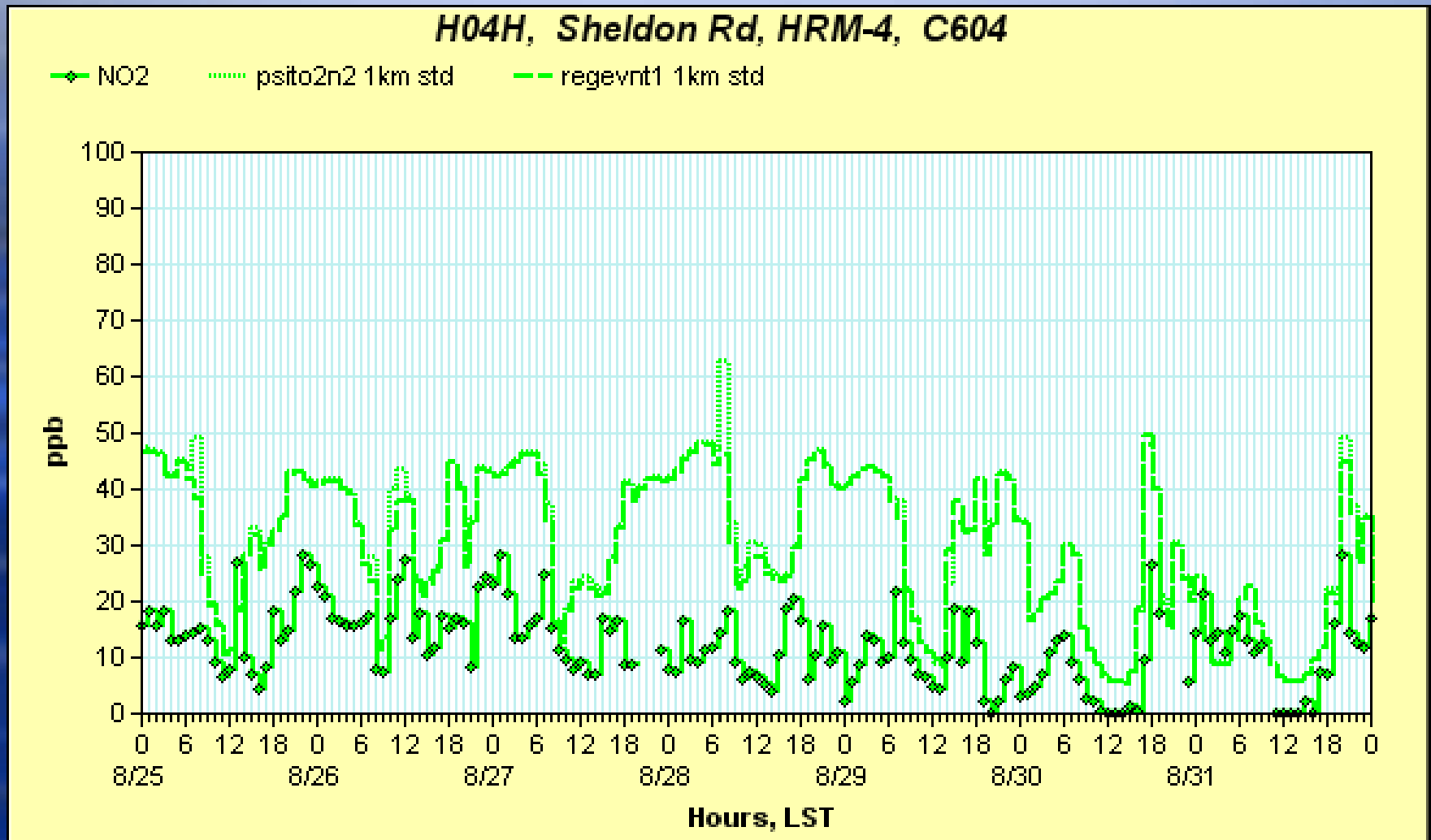
20
August 30,2000 14:00:00
 Min= 0 at (20,27), Max= 10 at (33,27)



20
August 30,2000 15:00:00
 Min= 0 at (30,37), Max= 14 at (33,27)

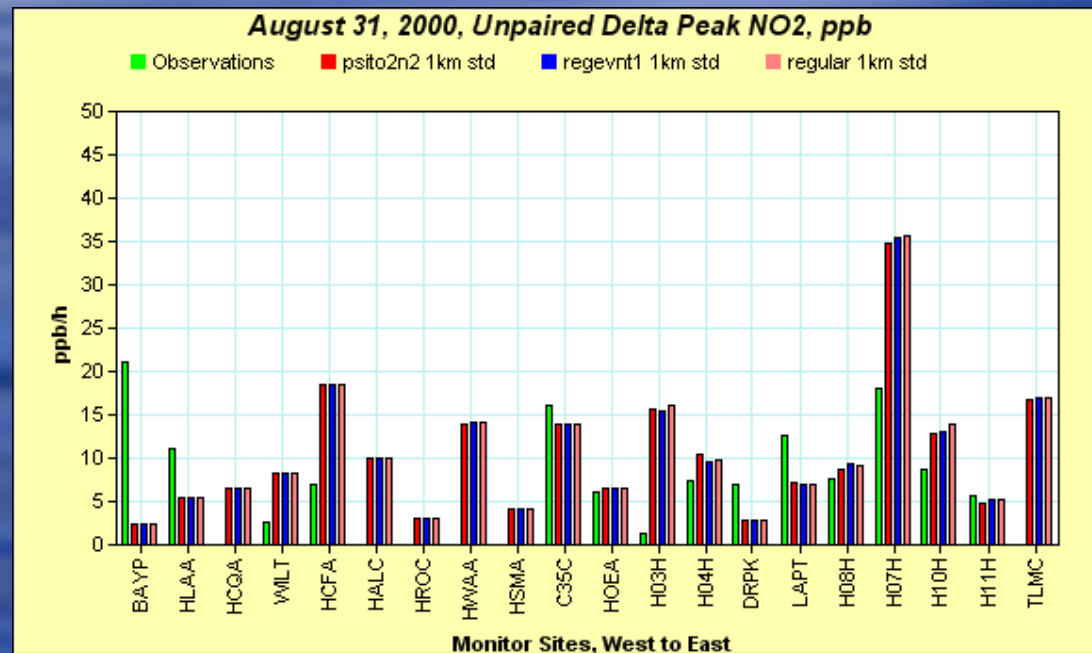
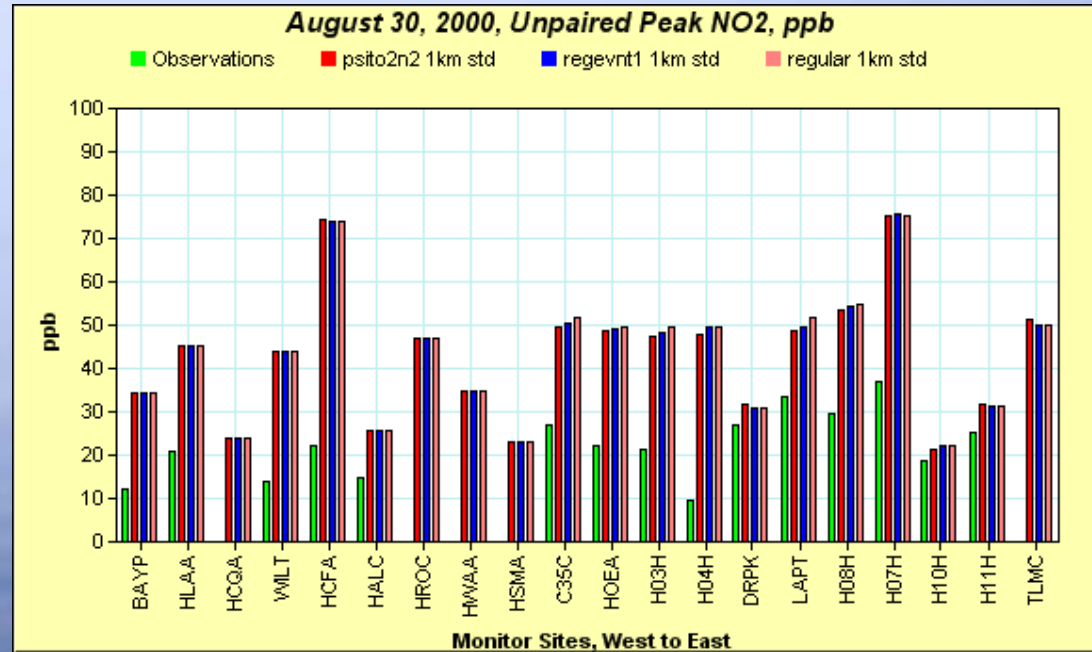


All NO₂ Sites Timeseries



Daytime Peak NO₂

Base Cases



Daytime Peak NO₂

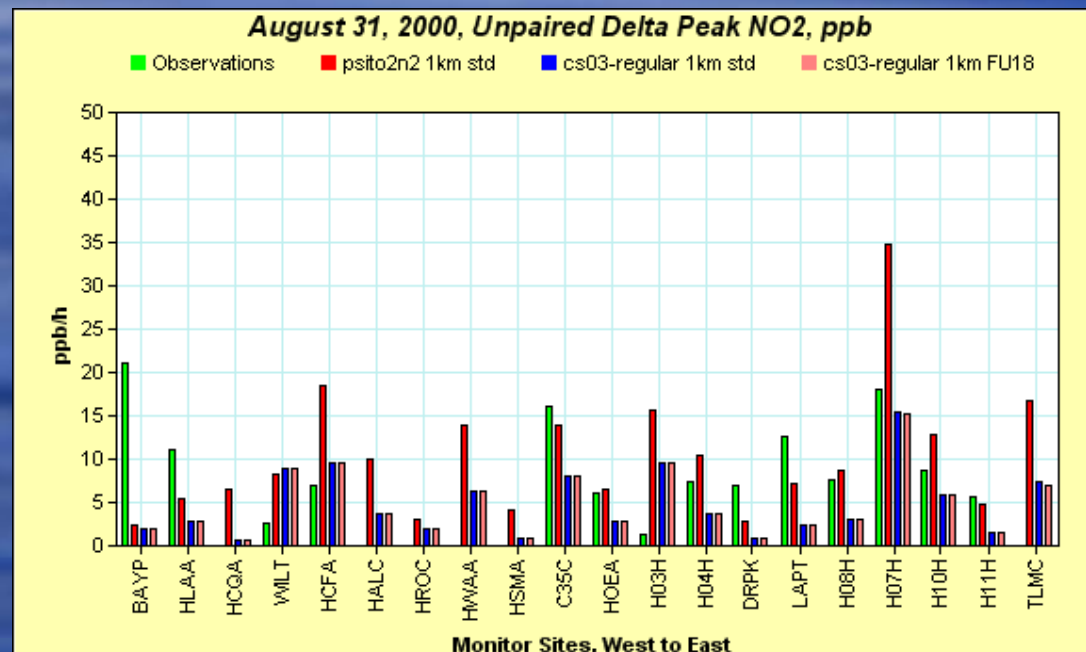
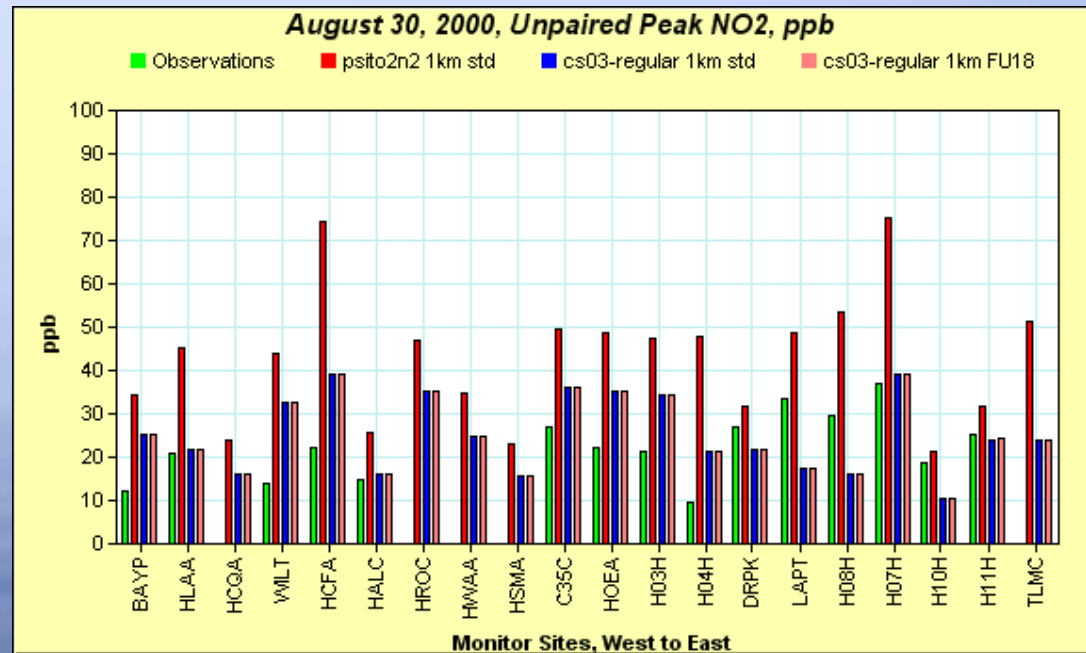
Base & Future Cases

8/25 :: 10/14 sites over

8/29 :: 11/14 sites over

8/30 :: 8/13 sites over

8/31 :: 6/13 sites over



Model Biases Confound Future Responses to Controls

- ◆ Biogenic VOC are 2 to 5 times higher than surface observations at monitors
- ◆ NO_x is biased high at many locations
- ◆ HRVOCs are biased high at many surface locations but are biased low at certain times and locations.
- ◆ Do not understand the model's "operating point" for base or future cases.