



Texas Commission on Environmental Quality

HGB Modeling Update

SETPMTC
May 23, 2006



8-Hour Guidance on MPE

- In addition to evaluating the model's ability to reproduce base case ozone & precursors, new 8-hour guidance includes evaluation of model response to emission changes.
- Four approaches are recommended:
 - Observation-based models
 - Probing tools
 - Alternative base cases
 - Retrospective analysis

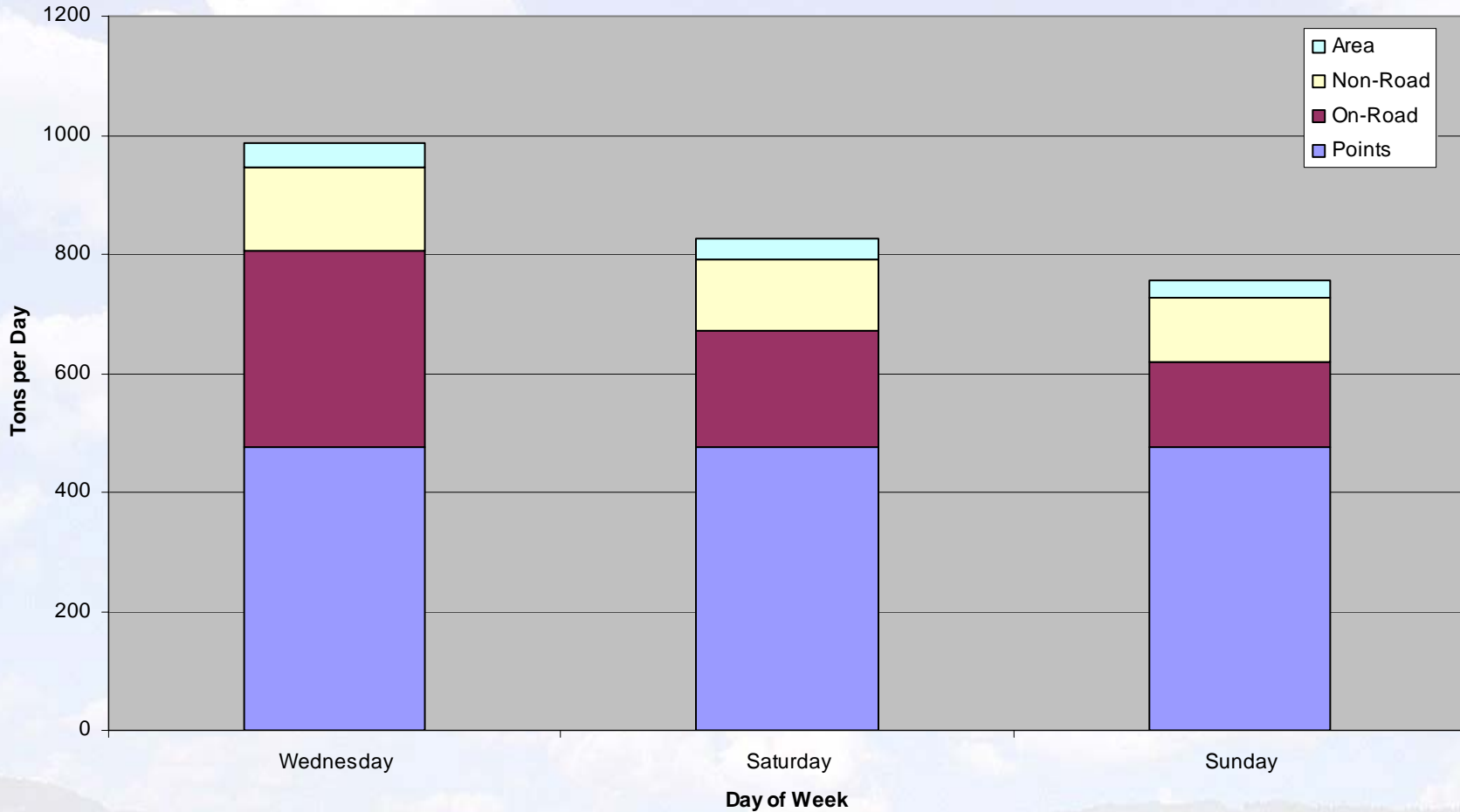


Weekday-Weekend analysis

- Weekday/weekend analysis forms a natural observation-based model for testing the model's response to emission changes.
- At most locations, NO_x emissions decrease from weekdays to Saturday through Sunday, while VOC emissions are highest on Saturday, lowest on Sunday.

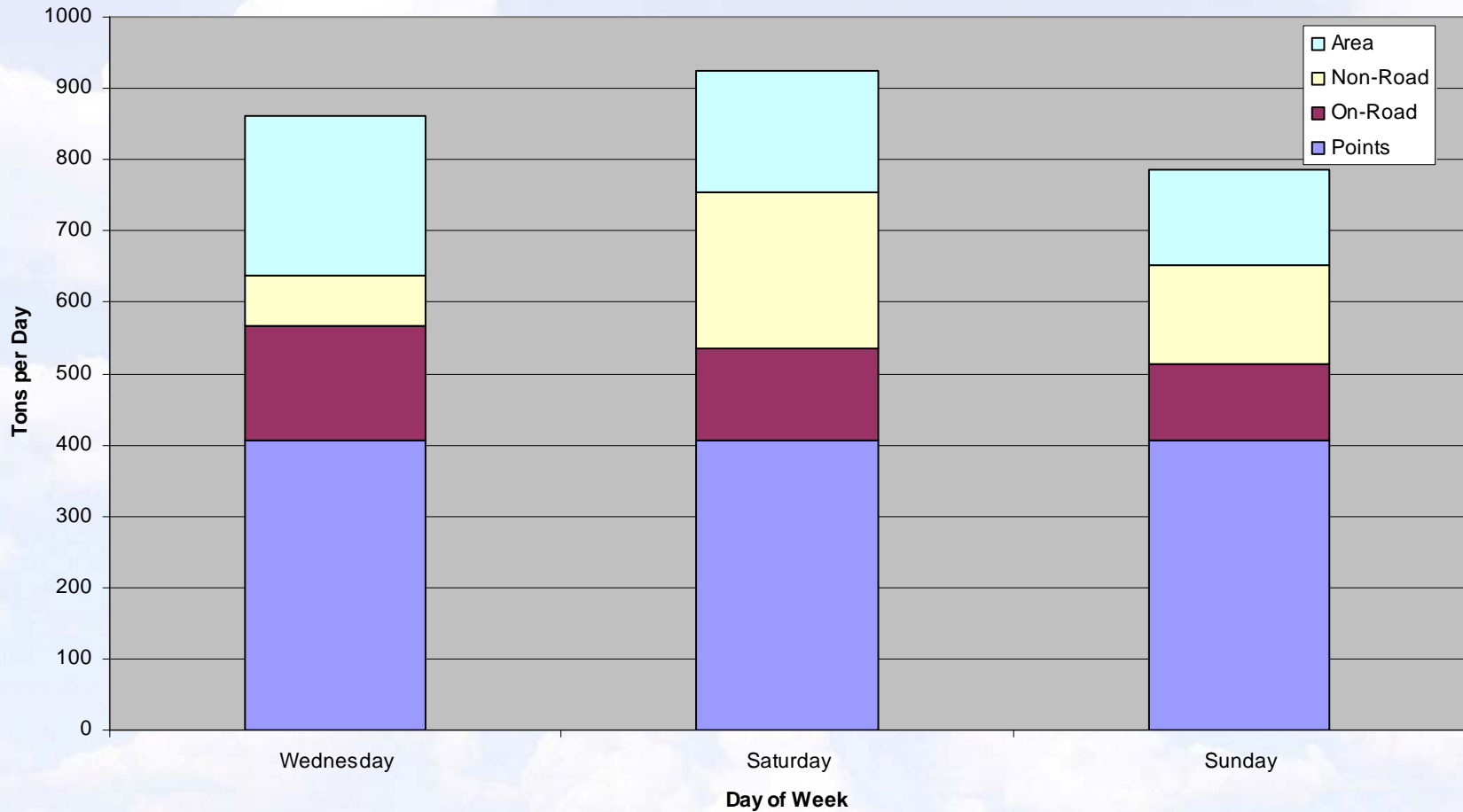


Weekday vs. Weekend NO_x Emissions in the HGB 8-County Area August-September, 2000





Weekday vs. Weekend VOC Emissions in the HGB 8-County Area August-September, 2000

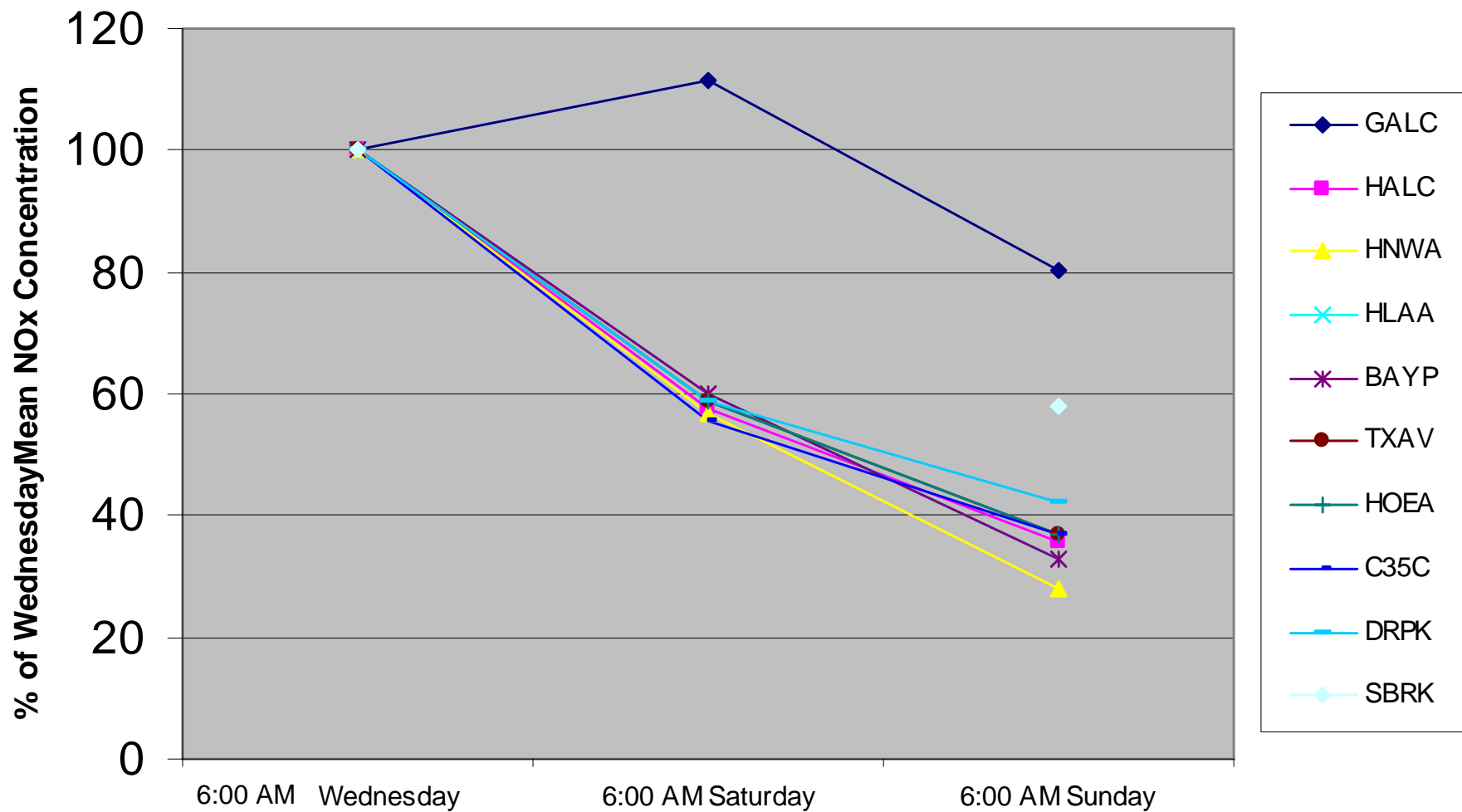




Ambient NO_x

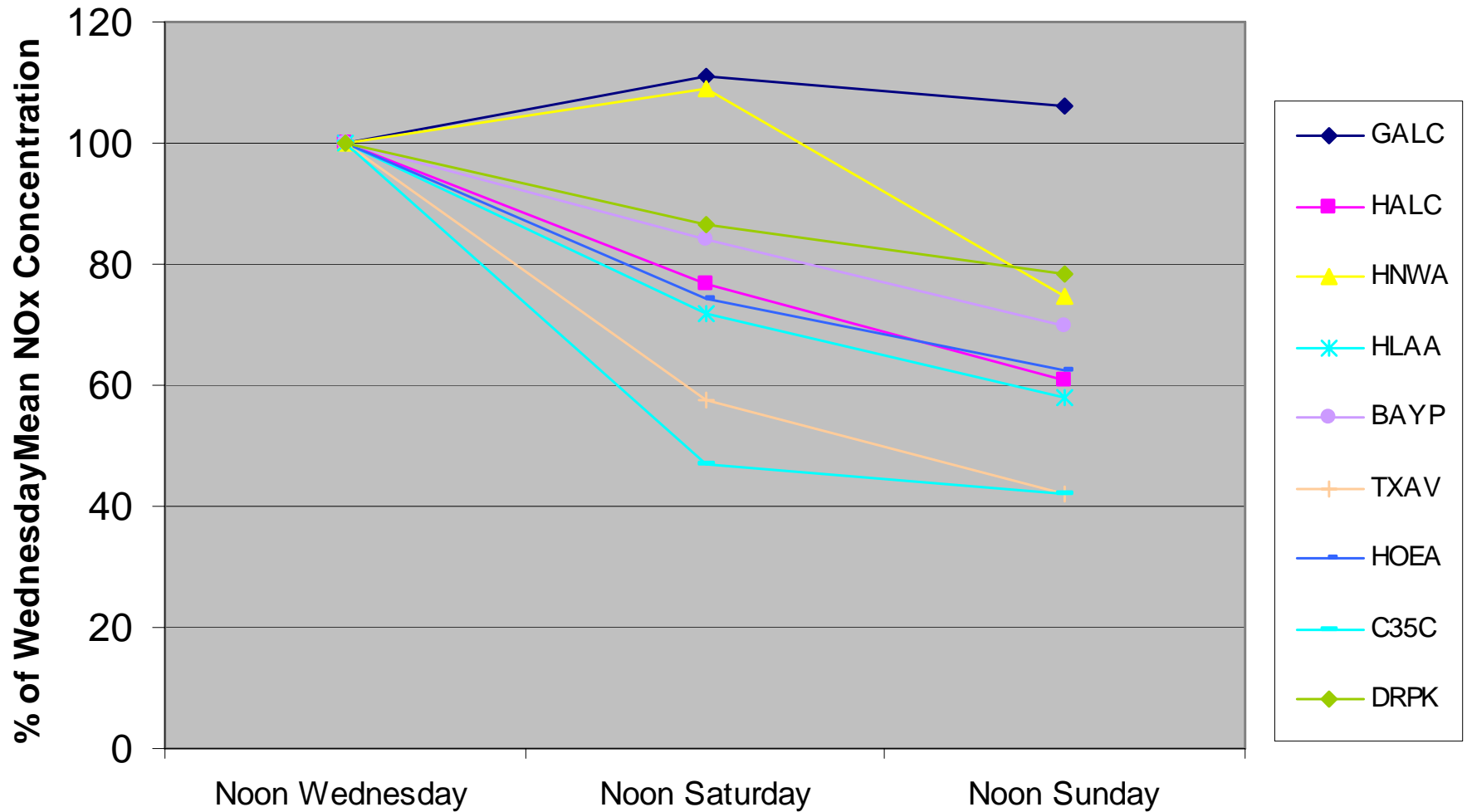
- The following graphs show average NO_x concentrations by day-of-week as a % of Wednesday concentrations (from Blanchard, 2005)
 - March-October, 1998 through 2003
 - 6:00 AM and Noon

HGB 6 AM NOx Concentration as a % of Wednesday Value



Data from Blanchard & Tannenbaum, 2005

HGB Noon NOx Concentration as a % of Wednesday Value

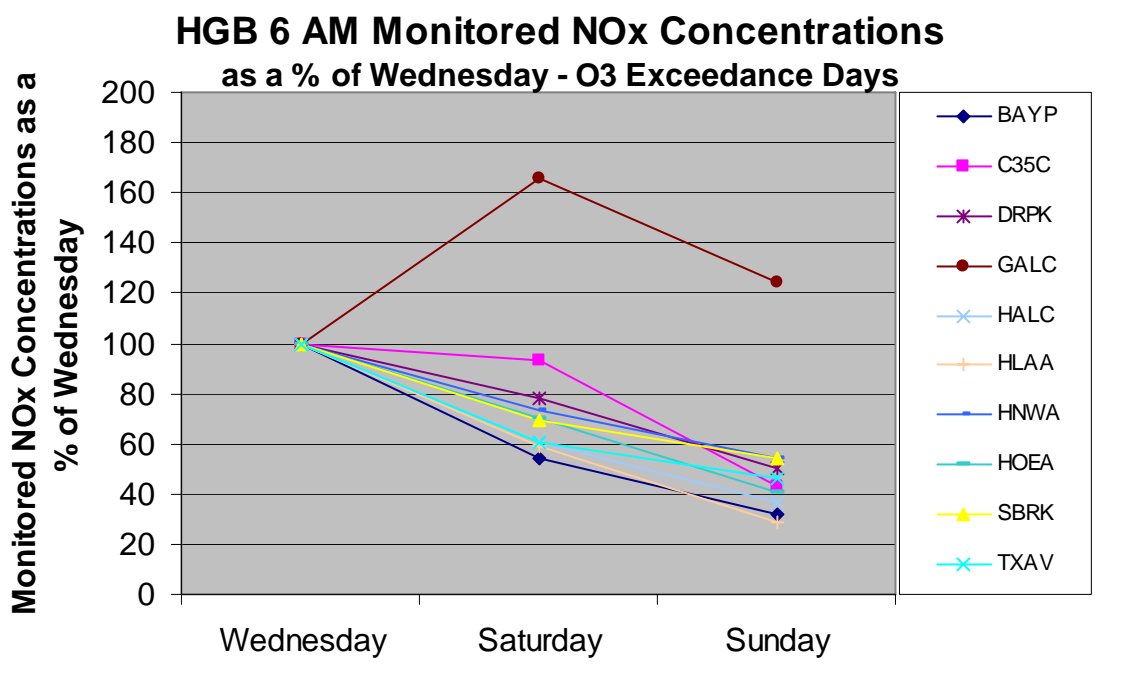
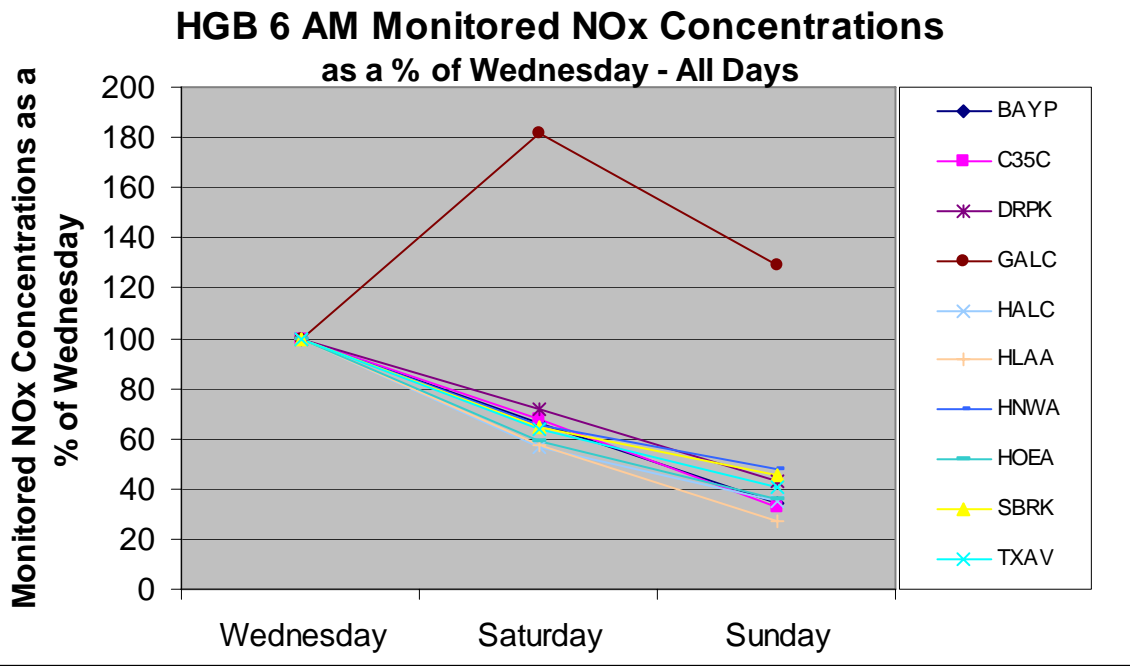


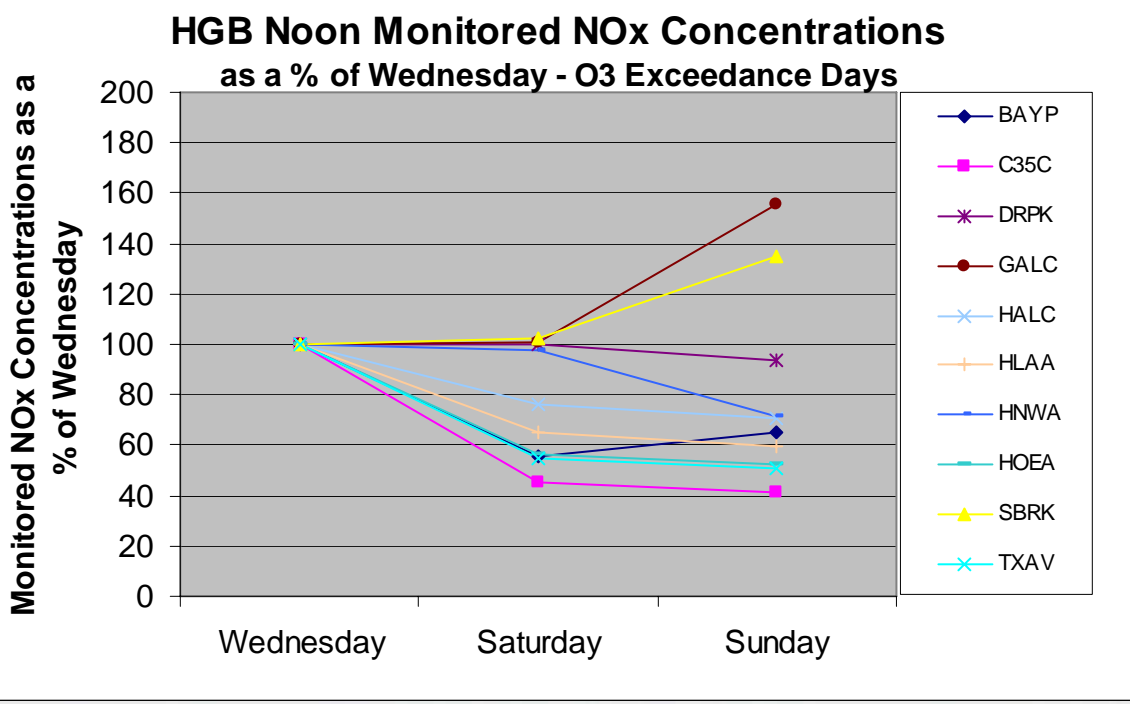
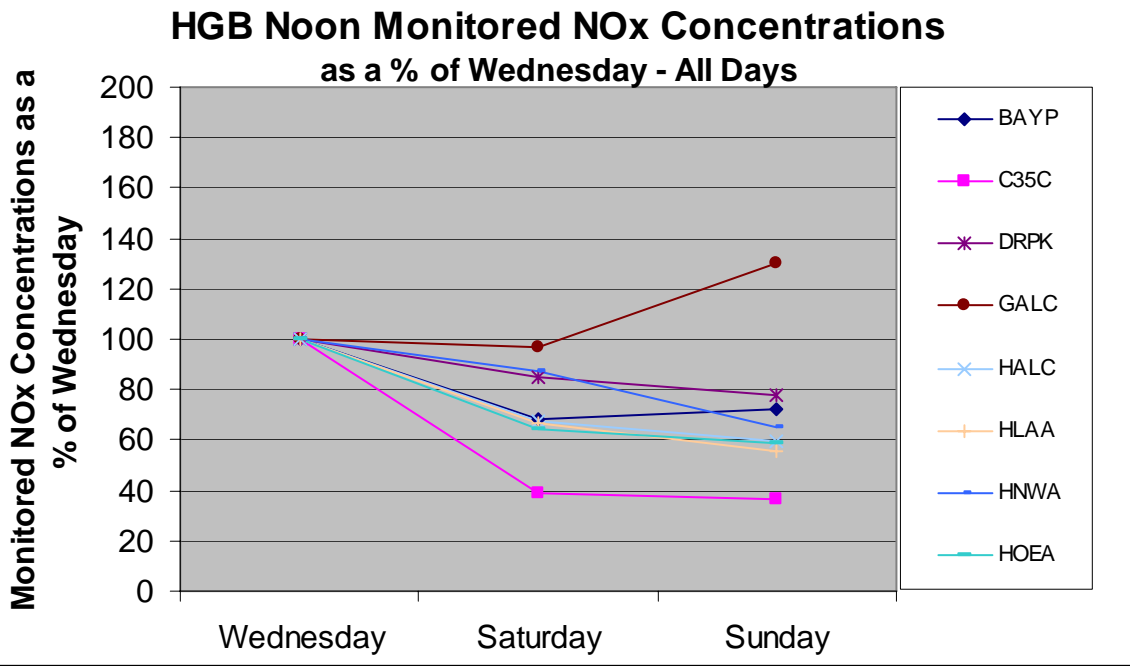
Data from Blanchard & Tannenbaum, 2005



Ambient NO_x (cont.)

- We looked at the same set of monitors as Blanchard, & found similar patterns
 - June-September, 2000 through 2004
 - All days
 - 8-hour exceedance days
 - 6:00 AM and Noon



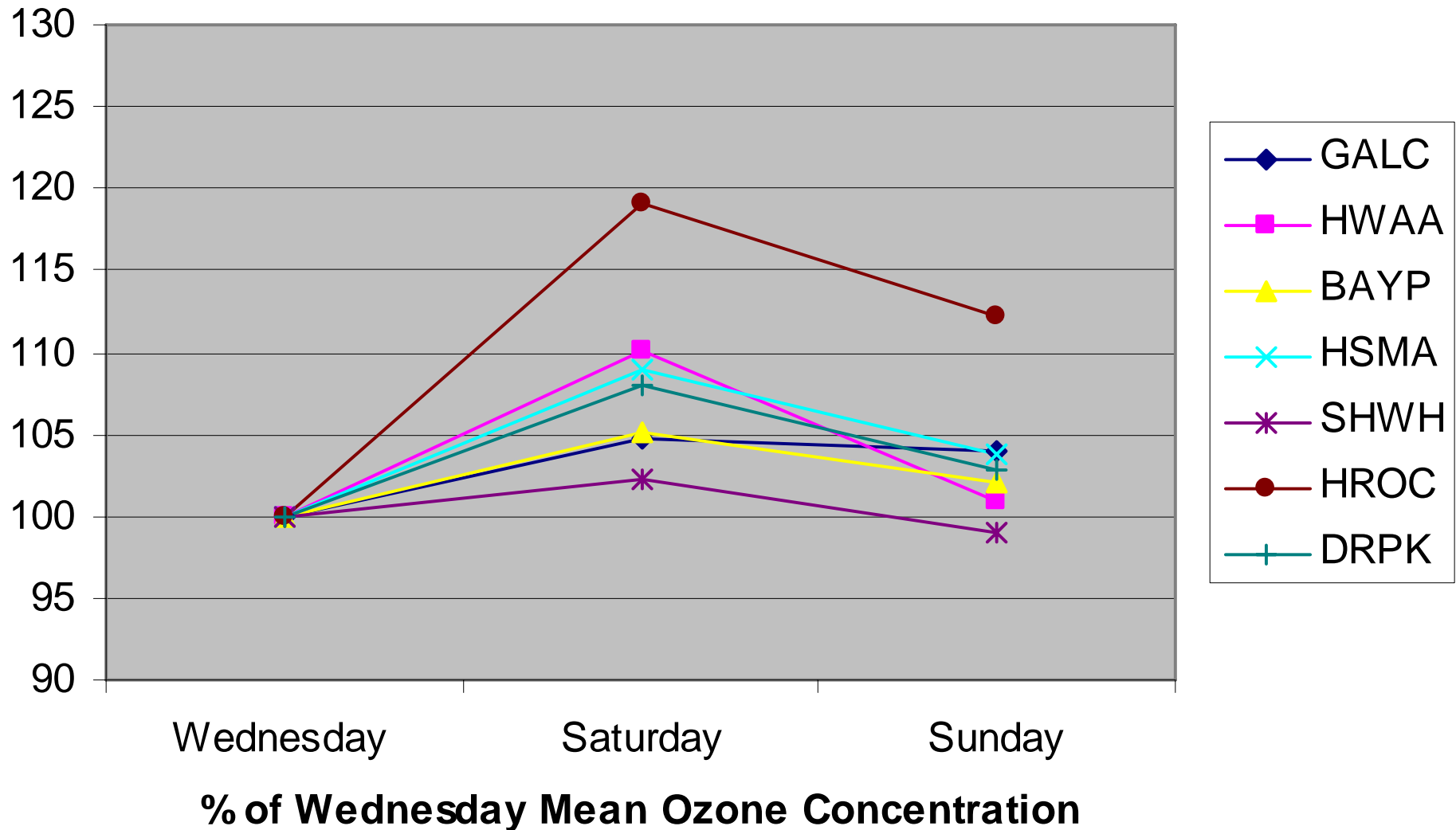




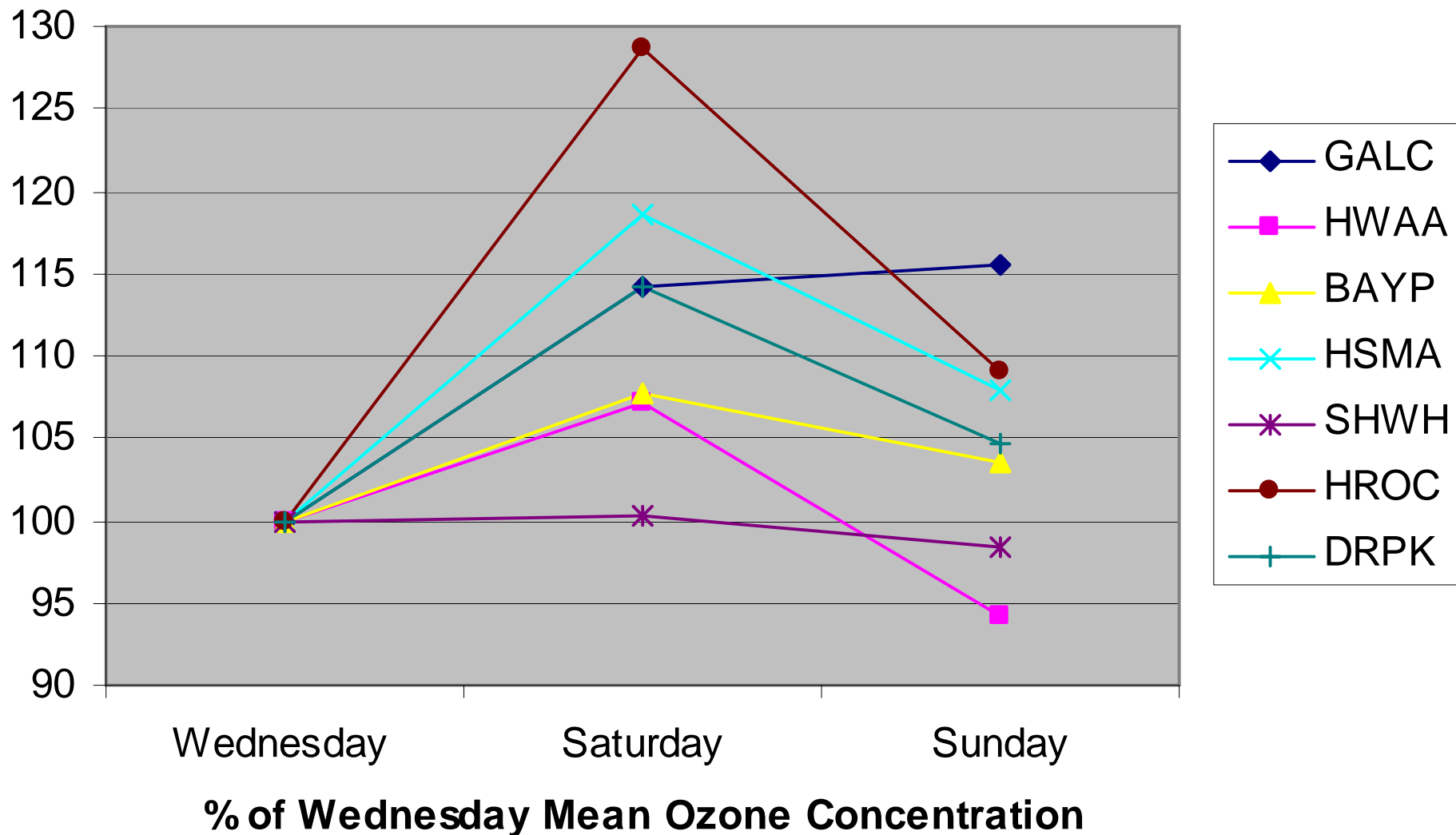
Ambient Ozone

- Blanchard (2005) also studied ambient 8-hour ozone concentrations in the HGB area. The following graphs show ozone as a percentage of the Wednesday value.
 - Average of all days and three highest days
 - March-October, 1998-2003

Average Ozone Concentration as a % of Wednesday Value



Top 3 Ozone Concentrations as a % of Wednesday Value



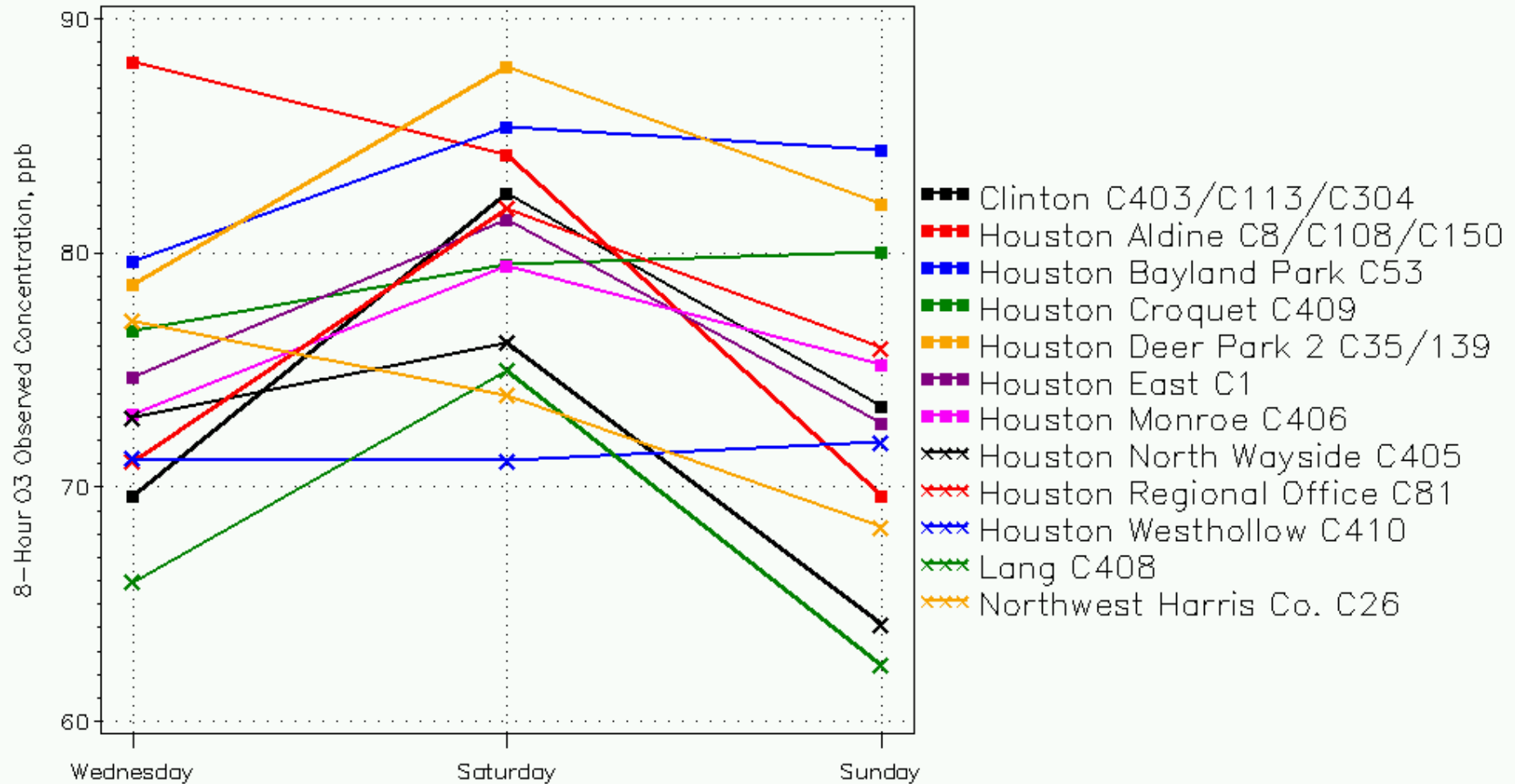


Ambient Ozone

- We also looked at ambient ozone. The following graphs show peak and average 8-hour ozone at CAMS stations in the HGB area:
 - Wednesdays, Saturdays, & Sundays
 - June-September, 2000 through 2004
 - Ozone exceedance days only

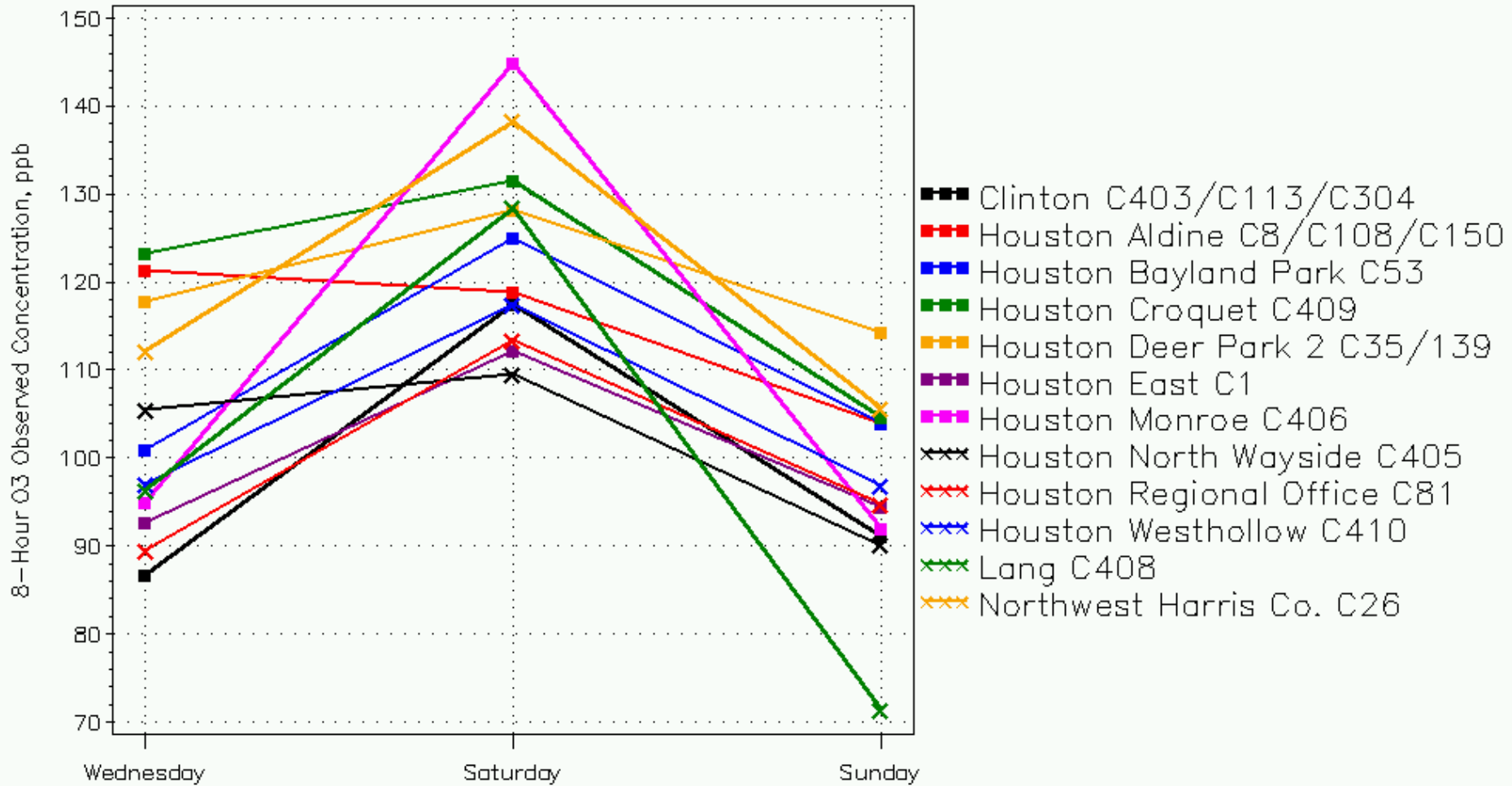


HGB Weekday/Weekend Observed Ozone 2000–2003 All Sites, Mean 8–Hour Ozone, Months: 6–9





HGB Weekday/Weekend Observed Ozone 2000–2003 All Sites, Peak 8–Hour Ozone, Months: 6–9





Modeled NO_x and Ozone

- We devised a set of diagnostic runs to test the response of CAMx to the weekday/ weekend effect.
- We ran the entire August 18-September 6 baseline using the same anthropogenic emissions for each day:
 - Representative weekday
 - Representative Saturday
 - Representative Sunday



Model Results

- We are in the process of comparing model predictions with what the ambient measurements show.
- Tune in next month for the completed analysis.



Reference

- Blanchard, C. & Tannenbaum, S;
Weekday/Weekend Differences in Ambient Concentrations of Primary and Secondary Air Pollutants in Atlanta, Baltimore, Chicago, Dallas-Fort Worth, Denver, Houston, New York, Phoenix, Washington, and Surrounding Areas.

NREL Project ES04-1

NREL Subcontract No. LDX-4-44213-01

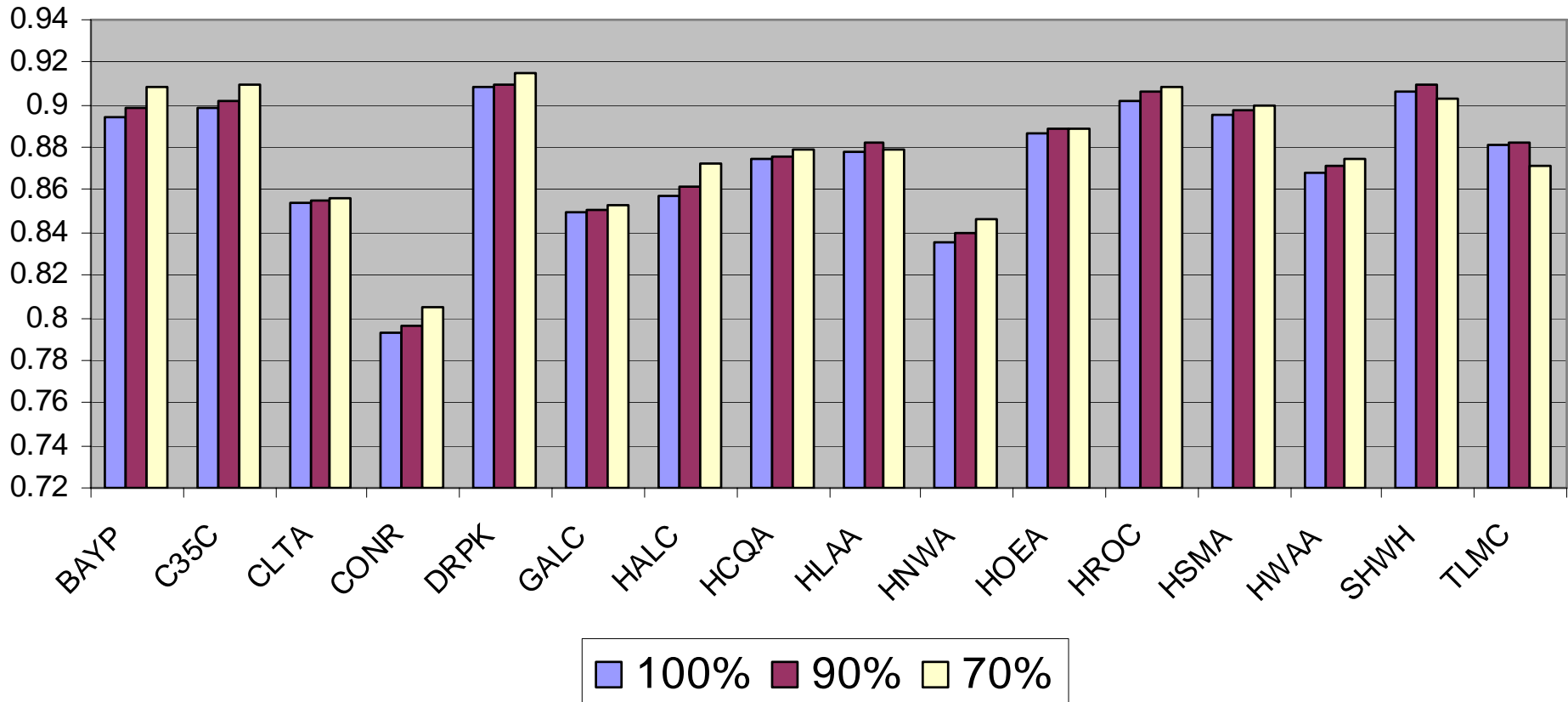


Biogenic Diagnostic Test

- Another test of model's response involves alternative base cases:
 - Does the model's response to emission reductions change if the model's assumptions change?
 - In particular, does model give a different directional guidance (VOC vs. NO_x) under different assumptions?
- We compared modeled relative reduction factors (RRFs) and 2009 future design values (DV_f s) under three different assumptions about biogenic emission rates:
 - Current 2009 Future Base (100%)
 - 90% of Current 2009 Future Base
 - 70% of Current 2009 Future Base

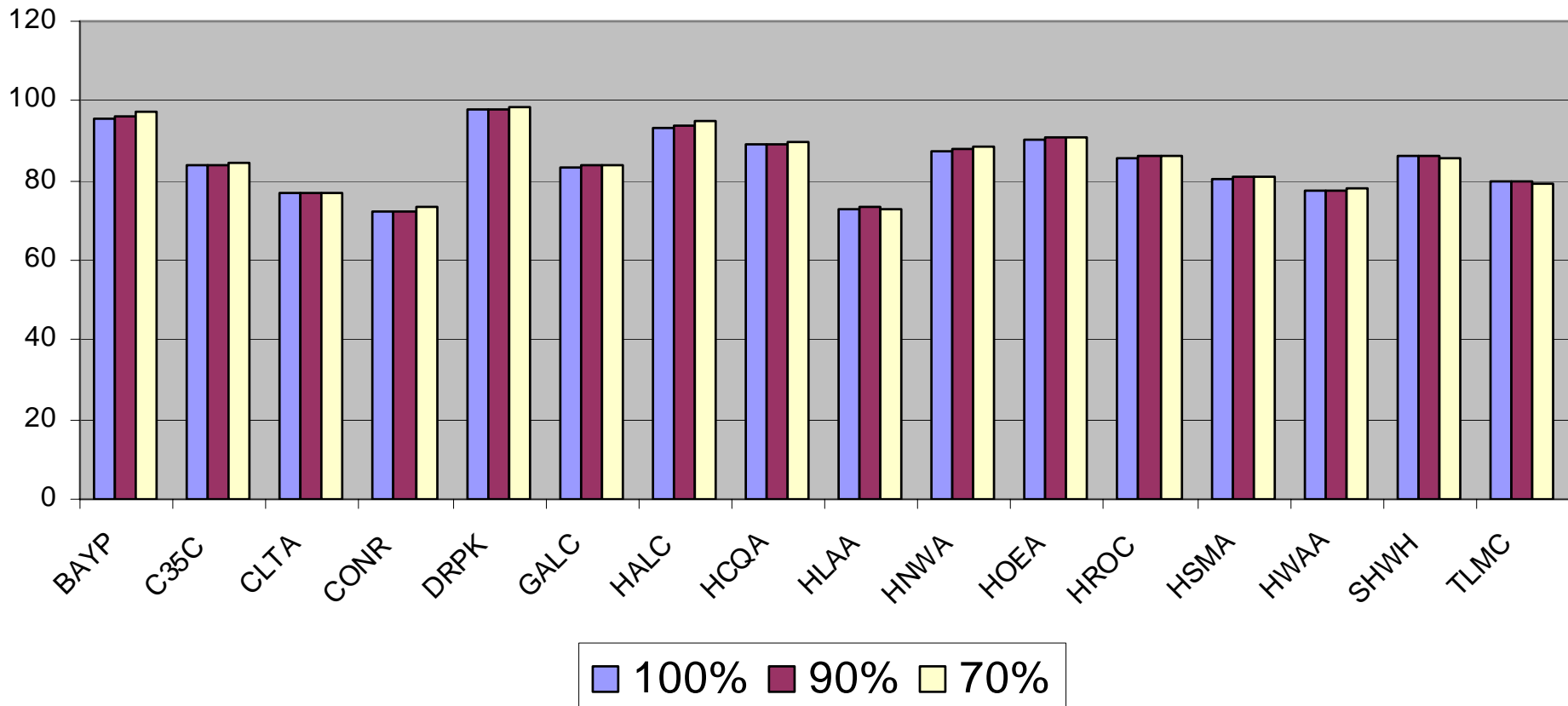


Relative Reduction Factors for various Biogenic Emission Levels





2009 Future Design Values for various Biogenic Emission Levels





Diagnostic Analysis

- Model's response to emission reductions from 2000 to 2009 was consistent across 3 levels of biogenic emission assumptions.
- Model's response decreased slightly with decreasing biogenic emissions at most monitors.
- No indication from this test that directional guidance from model would change under different biogenic emission assumptions – still need to reduce NO_x emissions to reach attainment.