NOAA Ozone Model Predictions (PRD)

- Model predicted CT ozone exceedances (code orange) for 19/26 days (73%)
- Considered a success when at least one site verifies a code orange exceedance (≥76ppb)
- Most exceedances were coastal CT (17/26)
- Very few false alarm days!
- CTDEEP forecasted 14/26 correctly (54%)
- Exceedances occur at lower high max temps at Bradley with new NAAQS
Exceedances occurred when Bradley was 86°F or above, except for May 13th and Aug 22nd.
April 16, 2012

- Model still under-predicts early season events, but only slightly
- Bradley temp was 92 degrees!
May 13, 2012

- Model had right idea again!
- Max Bradley temp only 84 degrees
- We forecasted 46 ppb at Stafford, verified at 86 ppb!
June 20, 2012

- Coastal trough with mid-Atlantic high
- Surface winds west to northwest, becoming southwest along coast
- Very GOOD model forecast
- We forecast 80 ppb Stratford, verified at 97ppb
June 21, 2012

- Surface winds west northwest
- Ozone pooling over LIS advects in on sea breeze to immediate coast
- This occurred several times with mid-Atlantic high pressure regimes
- We forecast 83 ppb at Madison, verified at 90 ppb
June 22, 2012

- Pre-frontal trough hangs off coast and sea-breeze advects ozone
- Model again handles this scenario well
- We forecast 75 ppb at Greenwich, verified at 81 ppb
June 28, 2012

- Mid-Atlantic High produces westerly surface winds with local sea breezes again.
- We forecast 56 ppb at Greenwich, verified at 88ppb!
- Expected northwest surface winds to dominate at coast.
June 29, 2012

- Pre-frontal trough with southwest winds along coast
- We forecast 77 ppb at Groton, verified at 104 ppb!
- Historically, the NOAA model has overpredicted the LIS plume by 10-20 ppb, but this year is different.
- Quasi-stationary pre-frontal troughs?
• Weak cold front stalls along coast with southwest winds occurring along coast.
• We forecast 80 ppb at Groton, verified at 83 ppb
July 1, 2012

- Weak cold front dissipates along coast
- Same scenario - northwest winds inland, southwest along coast
- We forecast 72 ppb at Stratford, verified at 93 ppb
July 4, 2012

- Weak warm front, but northwest winds inland and southwest along coast
- We forecast 75ppb at Stratford, verified at 78 ppb
July 6, 2012

- Warm front passage late in the day
- Model had right idea, just a slight under-prediction
- We forecast 72 ppb at Westport, verified at 77 ppb
July 12, 2012

- Mostly southeast surface winds in CT
- Model under predicted, but had right idea
- We predicted 58 ppb at Stafford, verified at 76 ppb
- Probably emissions from I-95 corridor were enough for the low exceedance
July 13, 2012

- Mostly southerly winds, turning southwest in western CT
- We forecasted 79 ppb in Danbury, verified at 90 ppb
July 14, 2012

- Mid-Atlantic high scenario - westerly winds inland, southwest at coast
- We forecast 79 ppb at New Haven, verified at 90 ppb
July 17, 2012

- Southwest winds in western CT, turned southerly towards the east, advecting ozone further north
- We forecasted USG along coast, but only 70 ppb at Stafford (verified at 96 ppb)
- Model missed the northerly ozone transport
July 18, 2012

• Pre-frontal trough with southwest winds along the coast
• We forecast 78 ppb at Groton, verified at 91 ppb
July 26, 2012

- Broad southwest flow develops after warm front passage
- Model slightly under predicted this event by 10-15 ppb
- We predicted 58 ppb at Stafford, verified at 83 ppb
• However, same-day prediction picked it up which means meteorology changed.
August 2, 2012

- Winds turn southwesterly during the day with weak high pressure
- We forecasted 78 ppb at Greenwich, verified at 81 ppb
August 3, 2012

- Southwest winds with approaching cold front
- Model performed well
- We forecasted 84 ppb at Stratford, verified at 84 ppb
August 8, 2012

- Mostly southerly winds, so expected maritime influence
- Model got it right!
- We forecasted 59 ppb at Danbury, verified at 78!
August 9, 2012

- Another case of southerly winds at surface
- We forecasted at 79 ppb at Danbury, verified at 87 ppb
August 17, 2012

- South to southwest surface winds, advected ozone from I-95 corridor
- We forecasted 71 ppb at Stafford, verified at 83 ppb
August 22, 2012

• Weak trough off the coast made this hard to predict (next slide). Same day model forecast picked up the exceedance
• We forecasted 72 ppb at Stratford, verified at 82 ppb
August 23, 2012

- Mid-Atlantic high scenario - light westerly winds turn southerly along coast
- We forecasted 76 ppb at Westport, verified at 77 ppb
August 24, 2012

- Variable winds turn southerly along coast
- We forecasted 71 ppb at Stratford, verified at 81 ppb
August 31, 2012

- Broad southwest flow develops across the State
- We forecasted 83 ppb in Madison, verified at 97 ppb
A rare case of over-prediction
Since model performed well with the mid-Atlantic high scenario, we went for it!
We forecasted 79 ppb at Danbury, but it verified only at 75 ppb
September 7, 2012

- A rare case of over-prediction
Conclusions

- The NOAA model outperformed our forecasts- 73% vs. 54%
- The NOAA model past record of over-predicting during July-August didn’t occur this year!
- Many cases of prefrontal troughs with southwest winds along coast handled well by model
- We expected days with southerly winds to have more maritime ‘clean’ air, but southwest winds aloft mixed down