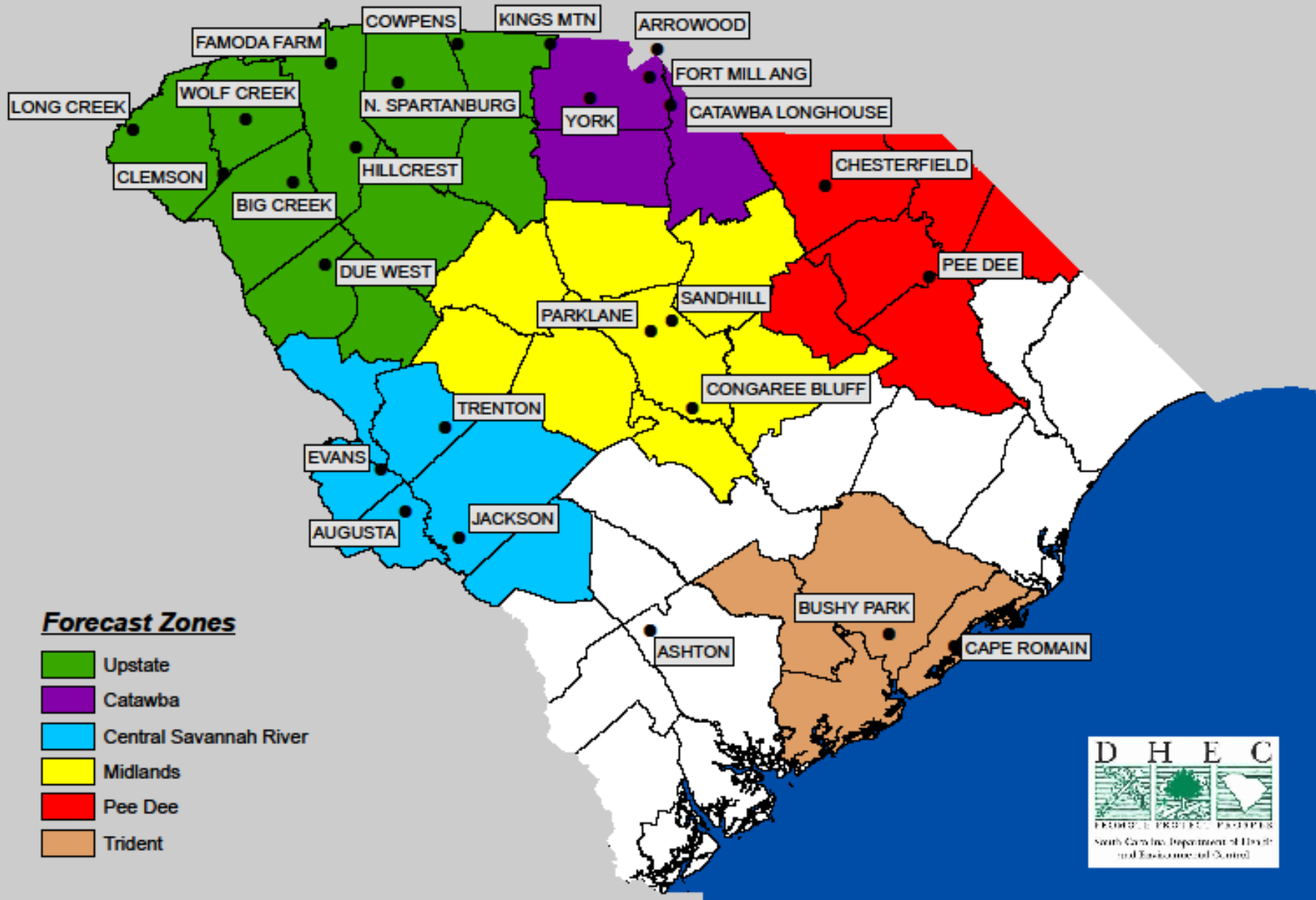
A background image of a sunset over the ocean. The sun is low on the horizon, creating a bright orange and yellow glow that fades into a blue sky. The water is dark with some white foam from waves breaking near the shore.

# **NOAA/EPA Air Quality Model Feedback: South Carolina**

**Preliminary CMAQ Ozone Performance 2014**

# Ozone Monitoring Network & SC Forecast Zones, 2014

(as of 3/25/2014)



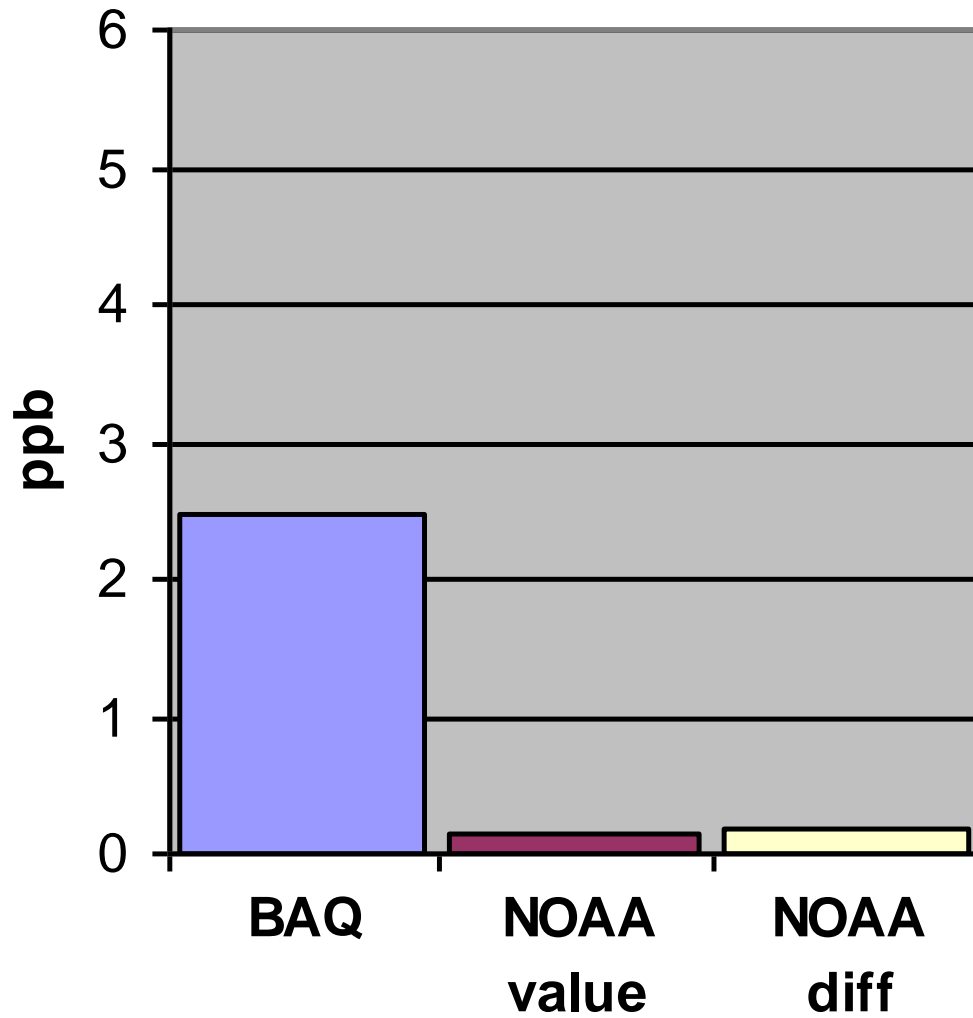
# CMAQ Verification Methodology

- NOAA/EPA 12Z model run was used exclusively for this study.
- Day 2 (tomorrow's forecast) CMAQ model maximum 8-hour concentrations are extracted for every day since April 1<sup>st</sup> at ALL MONITOR LOCATIONS that are used by South Carolina for verification.
- Day 1 (today's forecast) CMAQ model maximum 8-hour concentrations are extracted for every day since April 1<sup>st</sup> at ONE REPRESENTATIVE MONITOR SITE from each forecast zone. The chosen representative location is the typical maximum monitored concentration site for the zone.
- **“NOAA Value”**  
(Day 2 zone max 8-hour CMAQ prediction) – (Day 2 zone max 8-hour monitor observation)
- **“NOAA Diff”** {representative monitor location from each zone}  
[(CMAQ day 2 prediction) – (CMAQ day 1 zone max 8-hour CMAQ prediction)]  
+ (Day 1 zone max 8-hour monitor observation) – (Day 2 zone max 8-hour monitor observation)
- South Carolina DHEC “**BAQ**” forecast biases are shown for comparison.

# Compare Three Zones

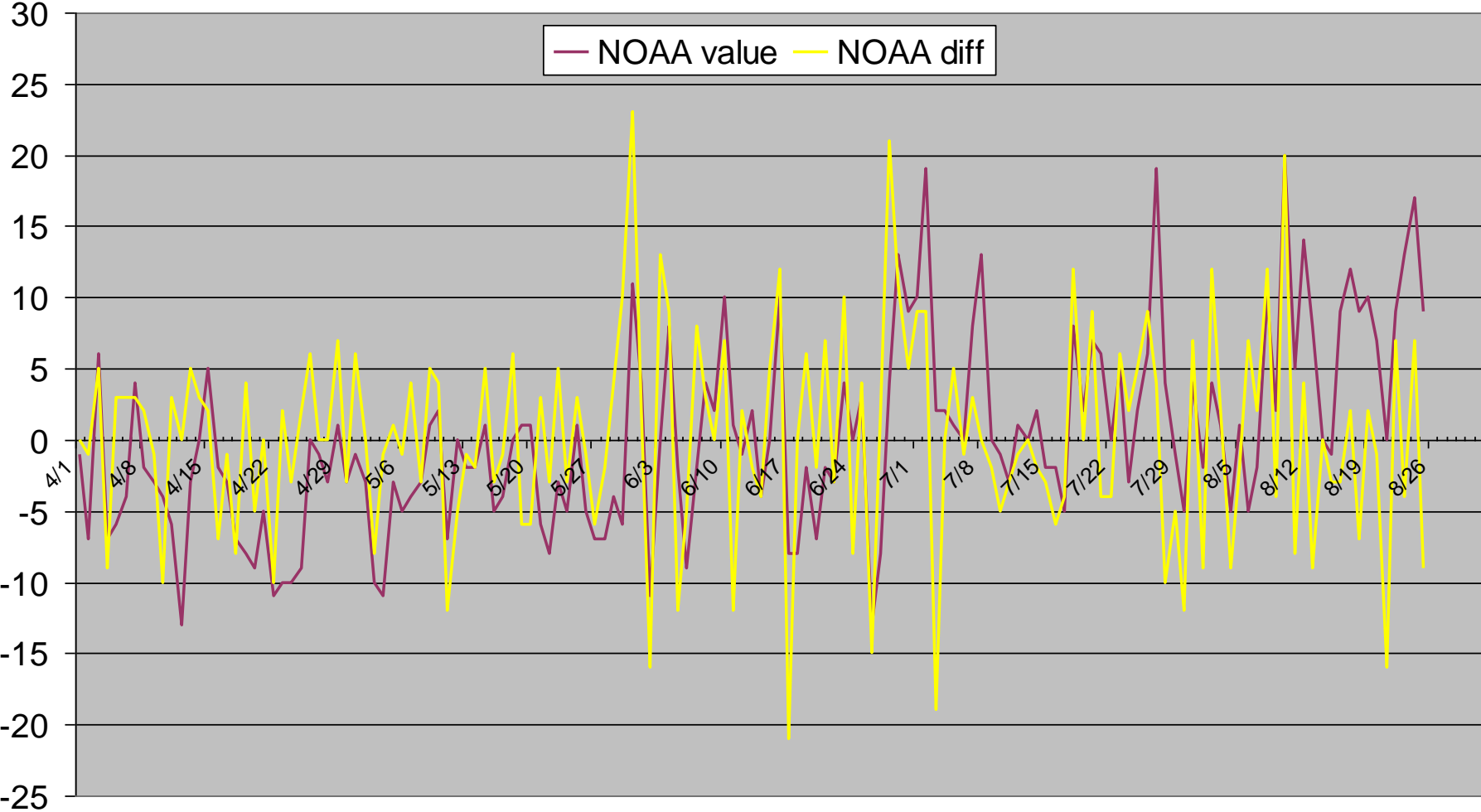
- **Upstate SC** (includes the cities of Greenville and Spartanburg) is the most inland portion of SC. This site was chosen to represent the Piedmont area.
- **Midlands SC** (includes the city of Columbia) represents the middle portion of SC.
- **Trident SC** (includes the city of Charleston) is a coastal zone. This zone is usually affected by sea breezes and marine layer inversions.

# Average Forecast Bias Upstate SC (Spartanburg)

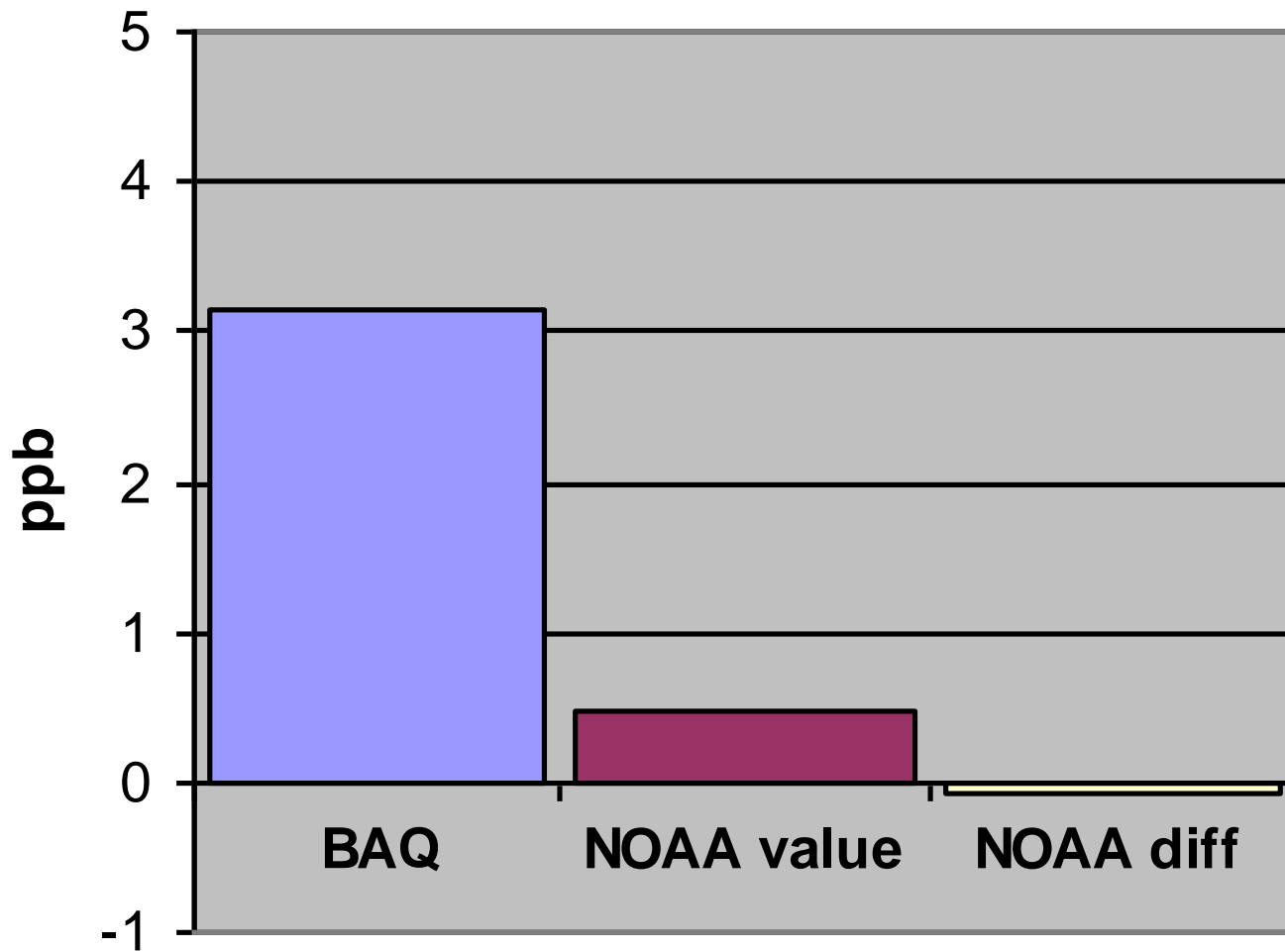


### CMAQ Forecast Bias (PPB) Upstate SC (Spartanburg)

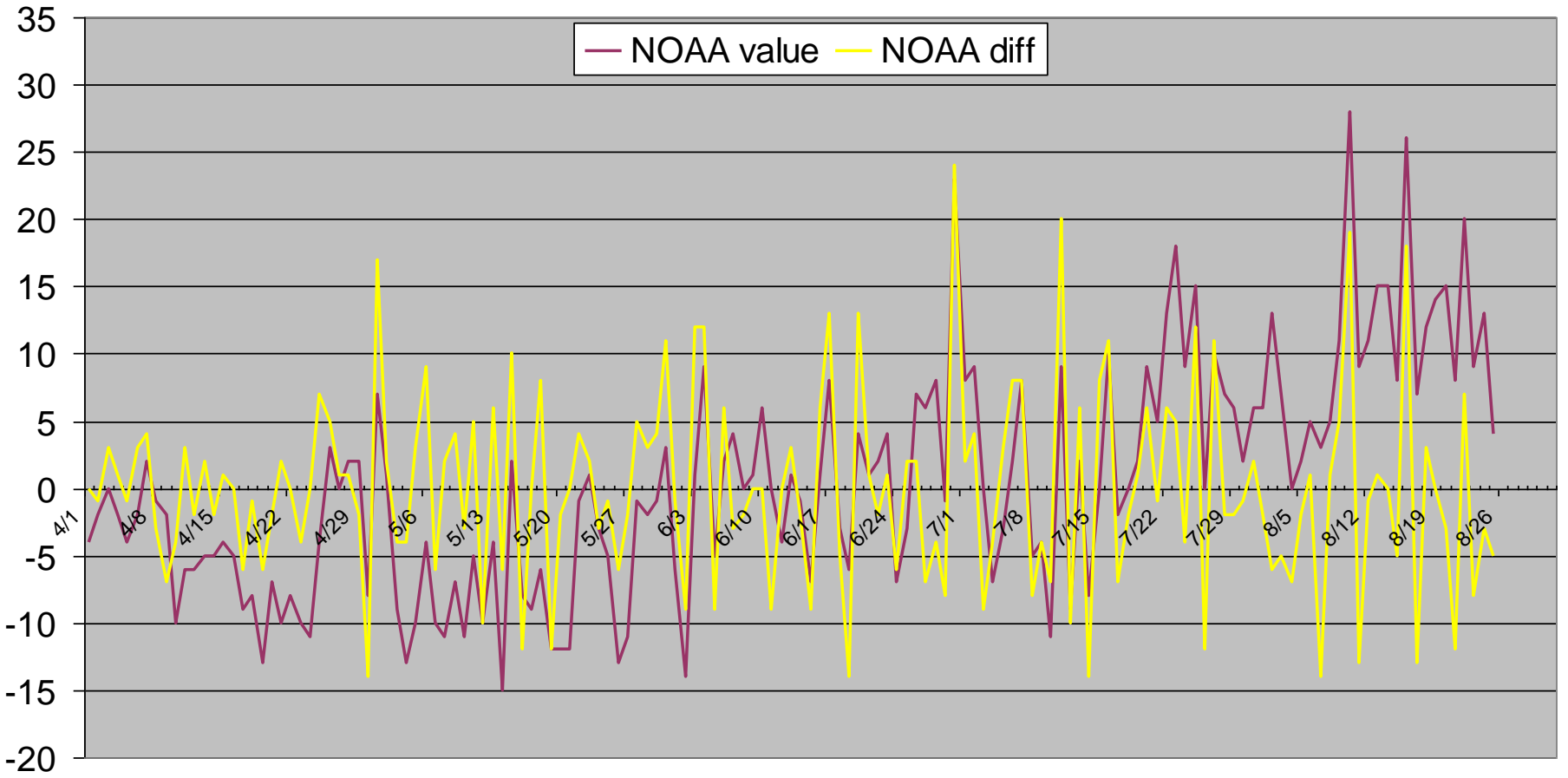
— NOAA value — NOAA diff



# Average Forecast Bias Midlands SC (Columbia)

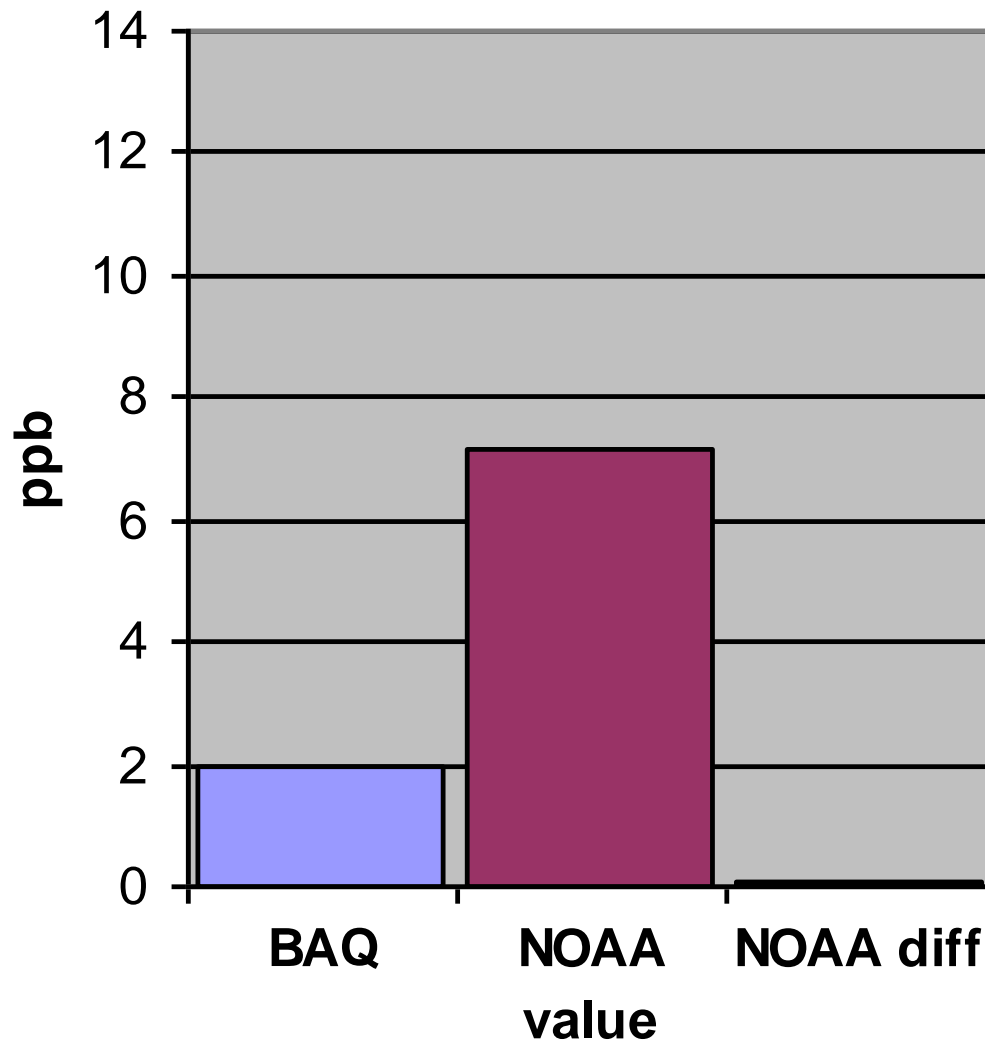


### CMAQ Forecast Errors (PPB) Midlands SC (Columbia)

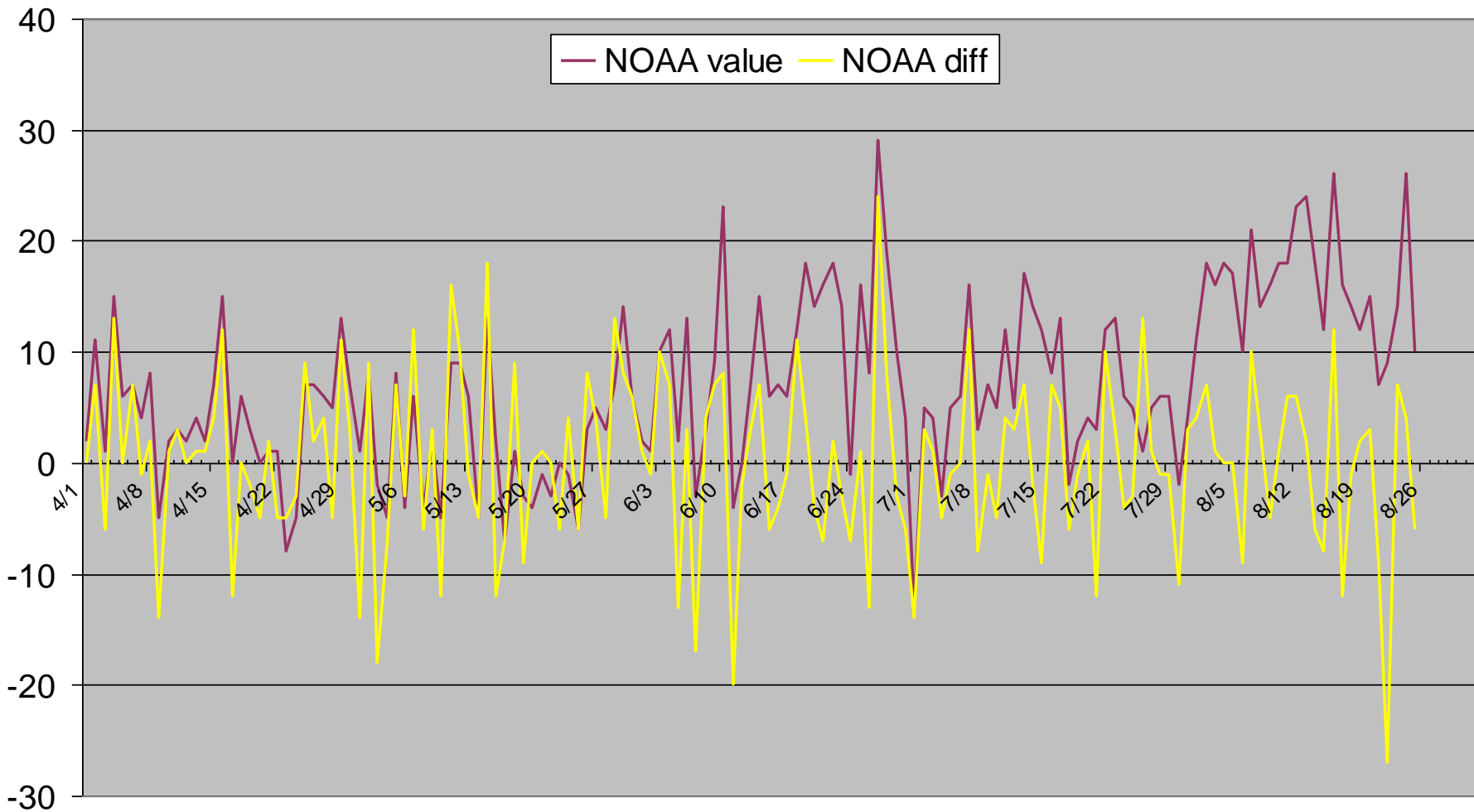




# Average Forecast Error Trident SC (Charleston)



### CMAQ Forecast Bias (PPB) Trident SC (Charleston)



# Operational CMAQ Performance for SC 2014

Forecast Bias (PPB)	Midlands (Columbia)			Upstate (Spartanburg)			CSRA (Augusta, GA)		
	BAQ	NOAA		BAQ	NOAA		BAQ	NOAA	
		Value	Diff		Value	Diff		Value	Diff
2014 Season	3.1	0.5	-0.1	2.5	0.2	0.2	2.6	3.3	0.2
Spring (April 1 – June 15)	0.1	-4.5	-0.1	0.7	-2.8	0.1	1.3	-0.3	-0.2
Summer (June 16 – Aug 25)	6.4	5.8	0.0	4.4	3.3	0.3	3.9	7.2	0.6

Forecast Bias (PPB)	Pee Dee (Florence)			Catawba (Rock Hill)			Trident (Charleston)		
	BAQ	NOAA		BAQ	NOAA		BAQ	NOAA	
		Value	Diff		Value	Diff		Value	Diff
2014 Season	1.2	0.8	-0.1	4.8	6.8	-0.1	1.9	7.1	0.1
Spring (April 1 – June 15)	-1.0	-2.5	-0.2	3.3	3.1	-0.6	0.4	3.6	0.4
Summer (June 16 – Aug 25)	3.6	4.3	0.0	6.3	10.7	0.4	3.6	10.9	-0.3

# Summary of SC Comments on NOAA Operational CMAQ Guidance

- “NOAA Value” (Day 2 CMAQ actual value) forecasts generally over-predicted ozone concentrations.
- “NOAA Value” over-predicted more often during summer months (June-August). The bias was much closer to zero in April and May, but Upstate, Midlands, and Pee Dee zones were under-predicted in spring months.
- “NOAA Diff” CMAQ forecast daily differences (day 2 CMAQ value – day 1 CMAQ value + day 1 monitor observation) generally removes the day to day model bias on average. This method is used by SC forecasters to develop a day 2 forecast.
- The model tends to over-predict urban plumes during ideal ozone production conditions (dry, warm, sunny, little or no wind, subsidence, extended periods of a stable atmosphere).
- The data shown in this presentation are preliminary.
- Operational CMAQ output is excellent guidance!! Thanks!
- Would it be possible for future year air quality forecaster workshops to be held after the conclusion of the ozone season (say November)?