OTAG Air Quality Analysis Workgroup Results Summary

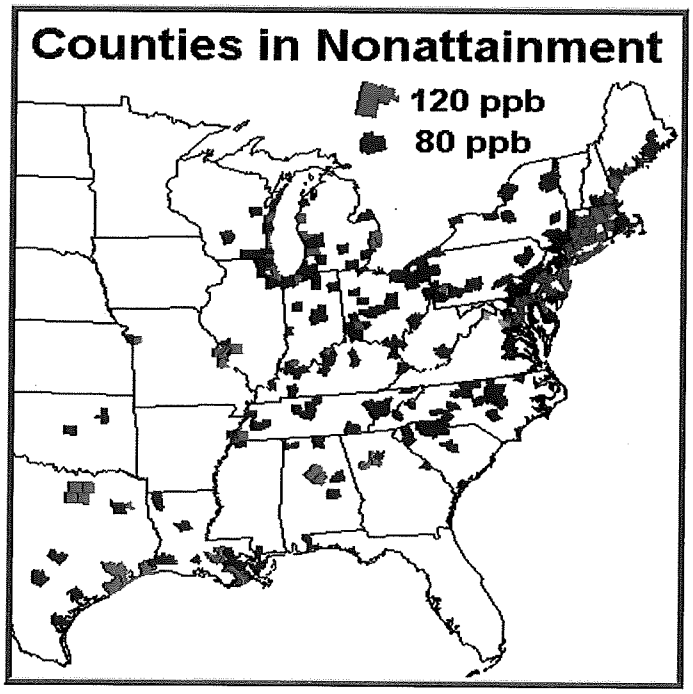
*"The Air Quality Analysis Workgroup shall identify, characterize, compare, and assess **observational** data and studies, including but not limited to, air quality trends analyses, overflight data, and meteorological studies for the purpose of evaluating the effects of the transport of ozone and its precursors on ozone nonattainment in the eastern United States."*

The primary benefit of the efforts of this workgroup is to "set the stage" for the useful interpretation of the modeling of future-year control strategies. The AQA efforts also provide a "climatological" view of the ozone problem, which extends beyond the modeled episode days and provides a broad perspective of the ozone problem and its characteristics. The major findings of this workgroup are listed below. For detailed discussion of these results, consult the AQA workgroup's 3-volume final report, available on the Internet at http://capita.wustl.edu/OTAG.

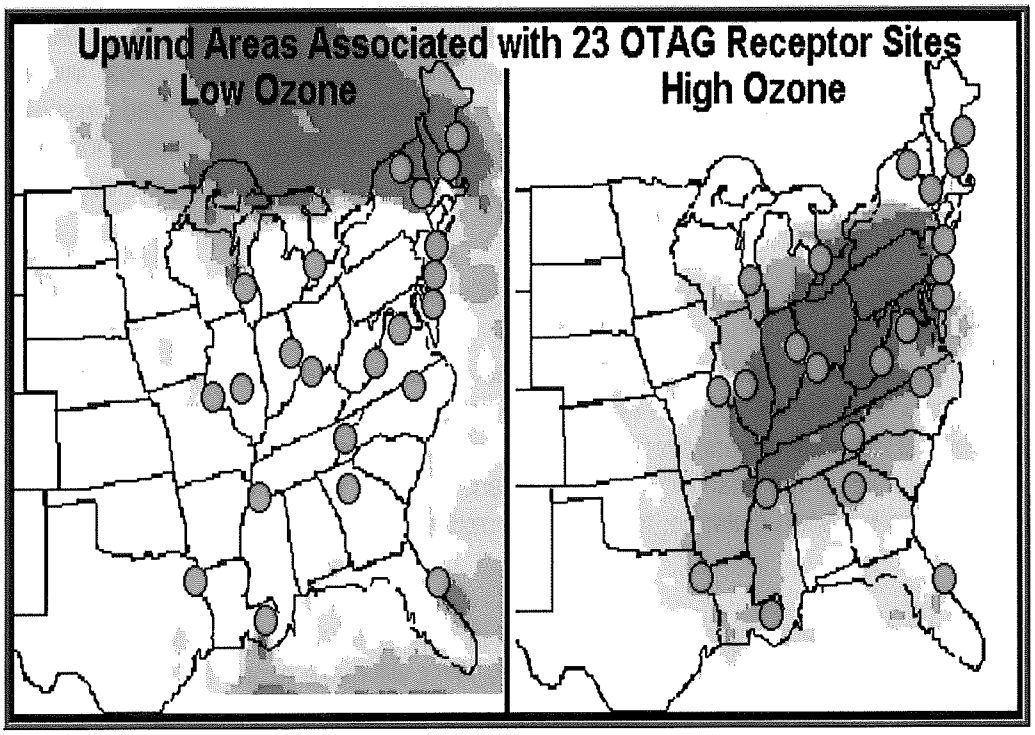
The major findings of the Air Quality Analysis Workgroup are:

- Ozone transport does occur in the OTAG domain on local, sub-regional, and regional scales. Local transport, in the 30-150 mile range, likely contributes most to ozone nonattainment. Sub-regional transport occurs over the 100-300 mile range, and regional transport can occur over the 300-500 mile range, often including significant transport via nocturnal jets aloft. In general, the longer the transport distance, the lower the ozone impact, although this may vary from case to case.

- The proposed 8-hour ozone standard will result in significantly more nonattainment areas across the OTAG domain which will be closer together. This will make ozone transport more critical with respect to nonattainment than it is under the current standard.

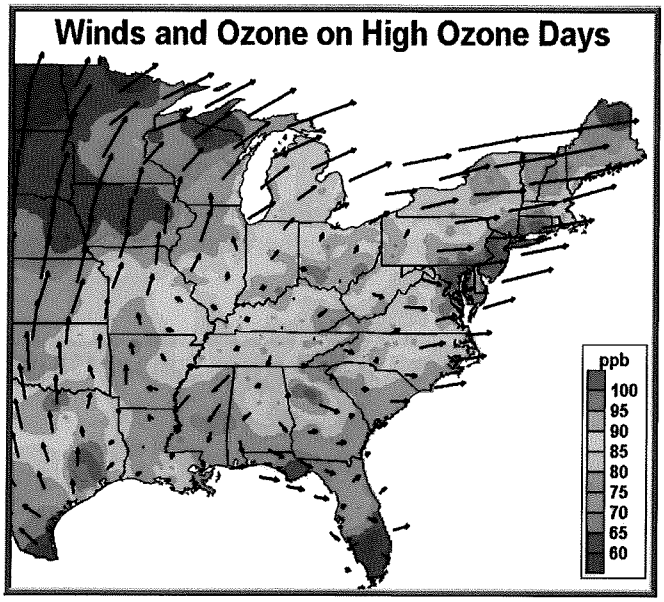


- The perceived contribution of ozone transport is strongly dependent on how the ozone "problem" is defined. Local emissions are more important with respect to peak 1-hour concentrations than with respect to lower concentration thresholds and concentrations assessed over longer averaging times (8-hour or seasonal averages), where larger areas and longer distance scales become increasingly important.




- The central portion of the OTAG domain is truly unique with respect to ozone and ozone transport. It persistently has elevated ozone levels producing an "ozone pool." Transport in any direction from this region has been implicated with high ozone levels in neighboring areas (see figure above).

- High ozone levels in the southern portion of the OTAG domain are typically associated with stagnant transport conditions resulting in shorter transport scales than on average. In contrast, high ozone levels in the northern portion of the OTAG domain are more typically associated with higher speed and persistent (i.e., nearly unidirectional) transport conditions from inside the OTAG domain (see figure below).




- Visual comparison of ozone air quality data and model results shows that the UAM-V simulations capture the large-scale features of each episode. However, there appear to be tendencies for the model to underpredict the highest ozone levels in the non-urban northern portion of the domain, overpredict the same for the southern portion of the domain, and underpredict the ozone aloft. One possible interpretation of these observations is that the model understates ozone transport, but the workgroup is not unanimous in this interpretation.

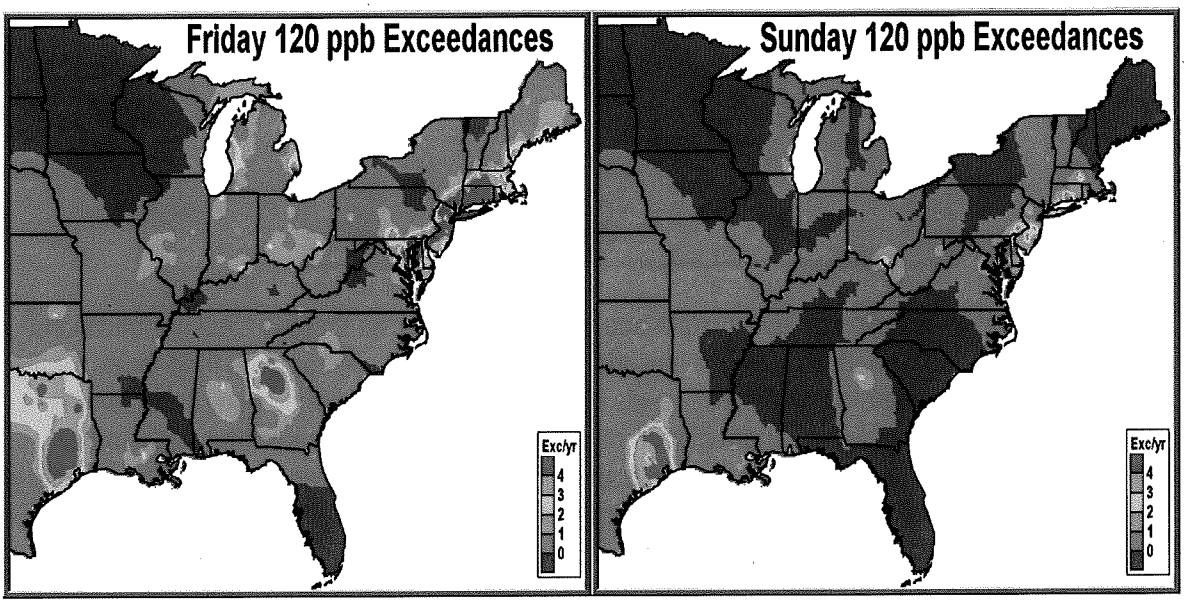
- Diagnostic comparisons of model results to ozone precursor data show significant discrepancies (especially for the biogenic VOC isoprene), suggesting that the model may be limited in its ability to assess control scenarios. The modeled control scenarios pertain to a small subset of historical episodes for any given current or future nonattainment area, and do not represent the full range of transport distances or directions which may be anticipated in the future.

- In most regions of the OTAG domain, peak ozone concentrations and the number of exceedances of the current (1-hour, 120 ppb) standard level have declined significantly over the last 15 years, indicating that historical control strategies have been effective at reducing peak concentrations. While only a few major urban areas exceed the current standard several times per year, ozone nonattainment (i.e., more than one exceedance per year) still exists across much of the domain. When longer (8-hour) averaging times are considered, the spatial extent of potential nonattainment increases substantially, and the rate of historical improvement has been generally less pronounced.

- Some "local accumulation" of ozone and/or precursors is a necessary precondition for transport of high ozone levels to downwind receptors. Meteorological conditions conducive to accumulation of high daytime ozone concentrations from local emissions include clear skies, low mixing heights, high temperature and low wind speeds. These ozone-forming meteorological conditions tend to persist over larger spatial scales, and move more slowly than the resultant patterns of ozone.

Spatial and temporal scales of ozone transport derived from various air quality analyses range up to about 2 days and 500 miles, and are typically longer than those derived from OTAG model results.

- Peak ozone levels on weekends average much lower across the domain than those during the week, suggesting that control strategies which mimic weekday-to-weekend emission changes might effectively reduce peak ozone levels. Further investigation and quantification of associated emission changes are warranted.




- The community of air quality analysts and the analytical networking capabilities that have been created as a result of the OTAG efforts have contributed substantially to the understanding of ozone pollution in general and ozone transport specifically. Nonetheless, much remains to be learned. Maintaining this network and its analytical capabilities is highly recommended.

- The OTAG process works -- even if not everyone agrees on every issue. Bringing together stakeholders, scientists, and policy-makers in such a forum has allowed for the development of high-quality analyses and encouraged the scientists to provide policy-relevant results. The entire OTAG community is considerably more informed than it was when the process began more than 2 years ago.