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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Identifying biomass burning impacts on air quality in Southeast Texas 26–29 August 2011 using satellites, models and surface data" *by* David A. Westenbarger and Gary A. Morris

Anonymous Referee #1

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This manuscript presents a wide array of evidence to support the claim that biomass burning fires in Louisiana and Mississippi contributed to a several-day air pollution event in southeast Texas in August 2011. The array of evidence includes ground-level observations of ozone, aerosols, and CO; meteorological back trajectories; satellite observations of fires and air pollutants; and an atmospheric model.

As its main objective, the article asserts that it "demonstrates an approach to identifying biomass burning influences on high ozone events which may be useful in determining compliance with EPA NAAQS. ... This approach could well be adapted for application

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to other pollution events in the HGB area as well as in other regions and at other times." This claim is true in the sense that the methods could be adapted and applied readily by a regulatory agency. The back trajectories are straightforward to run, and almost all of the observations and modeling are publicly available and conducted by others. Whether it would be at all useful for NAAQS compliance is more questionable; EPA tends to be skeptical of claims of "exceptional events", and this method cannot quantify the amount of ozone contributed by the out-of-state fires. The authors do not even demonstrate that the event is exceptional, despite their claim that "this evidence clearly demonstrates that O3 events on 26Aug and 29Aug were unusual even for this area." No evidence is presented of a long-term record to show whether these events were exceptional or even unusual.

In terms of scientific merit, the contributions of this paper are thin. No new methods or rigorous analysis are introduced, so the main value is in demonstrating the wide array of available data and modeling results that can be assembled readily. Nevertheless, the methods are sound and the presentation is clear. Thus, the revisions described below are relatively minor in order for the paper to be publishable in some journal. The main judgment for the Editor to make is whether this paper's compilation of outside data and modeling results to analyze a single episode in a single region is sufficient to merit publication in ACP.

Specific comments: 1. 2011 was a year of extreme drought and wildfires for Texas. This should be noted, though the authors find evidence that the smoke for this particular episode was from out of state. 2. Nothing is done to show how exceptional or unusual this event was. Thus, the paper does not "demonstrate that O3 events on 26Aug and 29Aug were unusual." (p. 3, line 14) 3. In several instances, such as p. 3, lines 21-22, and p. 5, lines 6-8, the authors give the impression that the meteorology of the Houston region makes it prone to high ozone. In fact, despite its occasional episodes of high ozone, on an average summer day Houston has less ozone than most cities and even some rural areas, thanks to its favorable meteorology of inflow from the Gulf

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of Mexico. That inflow also helps keep PM levels within EPA limits, despite the region's large population, heavy traffic, and numerous industrial sources. And stratosphere-troposphere exchange ozone events (p. 5, line 9) are infrequent in this region relative to mountainous regions. Yes, there are meteorological conditions such as the post-frontal conditions of this episode or other stagnant periods that are conducive to the high ozone that leads the region to non-attainment. But the article perpetuates mistaken impressions about the frequency of polluted days in Houston and the favorability of its meteorology for ozone formation beyond occasional episodes. 4. The abstract and conclusions mention the use of the CMAQ model, but that is not presented in the paper. 5. The ozone data plotted in Figure 1 are inconsistent with a claim that out-of-state biomass burning played a dominant role during this episode. Peak ozone concentrations vary by a factor of 2 across the Houston region, reflecting a typical pattern of a sharp gradient between ozone upwind and downwind of the region's main local emissions sources. Pollution traveling from days-away fires would have a more spatially uniform pattern. It is less clear from the PM/AOD/CO data whether there is a broad-based contribution from out-of-state fires. 6. I find it difficult to glean much of value from the numerous histograms in Figure 3.

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