

## ***Interactive comment on “Source apportionment of fine particulate matter in Houston, Texas: Insights to secondary organic aerosols” by Ibrahim M. Al-Naiema et al.***

### **Anonymous Referee #1**

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This paper presents source apportionment results from a comprehensive on-line and off-line chemical datasets collected concurrently in Houston, Texas. The authors applied three different for source apportionment approaches to determine the sources and their contributions, which has not be done before to my knowledge. The source apportionment results were compared between the three approaches and their finding that the primary source contributions agreed was encouraging. Furthermore, it allowed for more in-depth characterization of the different sources of SOA by combining the results from the three methods, which will be of interest to many. My main comment would be that perhaps the authors could recommend a tracer for biogenic and anthropogenic SOA. I may have missed it but their comprehensive dataset might allow at

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least for a tentative proposal as applying all three source apportionment methods will not be feasible in many cases and may allow the results from this study to be applied more widely. The paper is well written and logically set out and in my opinion fits within the scope of ACP.

I have a few minor comments below that the authors may wish to consider.

1. Section 3.2: did you do a PM<sub>2.5</sub> mass balance, comparing the measured PM<sub>2.5</sub> (gravimetric) against the reconstructed PM<sub>2.5</sub> mass concentration from the chemical analysis?
2. Page 9, line 37: Can you say there is a cooking influence in CI-SV-OOA if there is evening peak in the diurnal profile? Normally, a peak associated with evening meal times is a marker for cooking emissions. Without I am not sure that there is much influence from cooking, especially as your MM-PMF analysis only apportions 1% of the PM<sub>2.5</sub> to cooking. Perhaps this is more of SV-OOA factor with some hydrocarbon/primary local emission influence.
3. Page 10, line 19: In your CMB results you have said that the unclassified OC is likely SOA, would you expect more SOA at night (49%) compared to daytime (29%)? As you have already apportioned Biogenic and anthropogenic SOA in the model, I am guessing that this SOA is regional in nature, and so I would not expect such a difference day/night.

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