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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The impacts of regional shipping emissions on the chemical characteristics of coastal submicron aerosols near Houston, TX" *by* Benjamin C. Schulze et al.

Anonymous Referee #2

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The impacts of regional shipping emissions on the chemical characteristics of coastal submicron aerosols near Houston, TX Authors: B. Schulze et al.

Summary: This study summarizes AMS measurements over three weeks in 2016 near the coast of Houston to evaluate the effects of changes to shipping fuels to lower sulfur content. The major conclusions of the paper are (i) total PM mass loadings were not changed significantly after adoption of the new regulations, (ii) average 75% if the non-sea salt sulfate was anthropogenic, (iii) shipping emissions increase marine organic aerosol oxidation state, (iv) non-sea salt sulfate was correlated with amines, and (v) model calculations suggest that shipping emissions may enhance inland aqueous SOA

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Discussion paper

production.

The paper is well-written and should be published in the journal after addressing the minor issues below.

Comments:

1. The shipping routes in and out of Houston overlap with the significant offshore oil extraction occurring all along the coastline. It is surprising that the potential for emissions from oil and gas extraction activities are not discussed, especially given the result that total PM produced from offshore sources was similar before and after adoption of the low-sulfur fuel regulations. Some analysis and discussion of oil and gas production as a possible sources is warranted in the paper. Also, please add a plot of offshore drilling activities to Fig 5.

2. Sea-salt sulfate is estimated in proportion to sea-salt chloride which is semi-volatile and may be replaced by nitrate. It would be more accurate to use sodium for this analysis, or make the argument that combined chloride + nitrate totals are low and so sea-salt sulfate must also be low. This argument should be presented at the first point where sea-salt sulfate is first quantified.

3. The measurement period of three weeks seems relatively short when attempting to draw general conclusions about the concentration and nature of the marine aerosol. The trends in Fig 2 and Fig 4 illustrate variations at multiple time scales including some that may be longer than the three week measurement period. The authors should note the limitations inherent in the three week measurement period when attempting to draw general conclusions.

4. Line 787: The comparison of the mechanistic WSOC predictions in Houston to the results from a different box model calculation carried out in Los Angeles seems inappropriate. The humidity, mix of sources, and atmospheric chemical regimes in Los Angeles make this a poor comparison point for Houston. The authors reference

several modeling studies carried out specifically for Houston. These should provide a better comparison point to judge if the amount of aqueous SOA associated with marine aerosols/shipping emissions is reasonable.

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