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Atmospheric Measurement Techniques Discussions

Interactive comment on "Identification of platform exhaust on the RV Investigator" *by* Ruhi S. Humphries et al.

Anonymous Referee #1

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General comments:

The paper introduces a method on excluding ship exhaust. With this method, the authors expected to identify the periods influenced by ship exhausts and save those exhaust-free data which would be deleted by traditional method (by wind speed and direction). However, the manuscript is not convincing enough to support the conclusion that the method is robust and applicable to other dataset obtained onboard. High uncertainties even misleading might exist. This paper may not be sufficient to be published on AMT. I would suggest a very major revision.

Suggestions for revision:

1. It is necessary to describe main structure of the RV Investigator, especially, providing

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Discussion paper

the location of the main chimney and its distance to the inlet/aerosol laboratory. This is important to proof that what the authors filtered by the wind direction is mainly from the ship engine exhausts. Also, the authors can give a description of chimney-aerosol inlet distribution in which the method could be useful.

2. Page 3 Line 12, the authors expressed that "not all measured parameters respond to the exhaust simultaneously, or necessarily at all." The explanation following the point is confusing and not really acceptable. The sensitivity or detection limit of the instruments cannot be the reason for not measuring ship exhausts – which is usually shown as extremely high concentration of the tracers like BC, CO, and CO2 etc. The MAAP measured the BC particle with the optical method, so it is hardly missing the ship exhaust particles which is not extremely small (e.g. showing peaks on 40nm and 70nm, see Mar Viana et al., AE, 2014). In Figure 2, only CN showed high value at 0000 on May 19, but the other tracers not. How to proof that the high CN is indeed from the ship emissions? Make sure all other self-contamination sources (e.g. painting on the ship surface, human activities with large emissions) could be excluded.

3. Regarding BC threshold filter, why chose 70ng/m3 as the threshold; why not using the rolling window method as CO, CO2 and CN?

4. The rolling window with waving criteria for filtering data can eventually exclude the outliers. This could be a better way than the constant criteria and can save a lot of data. However, the sources of the outliers have to be clarified before deleting the data. Similar to the 2nd point, how to make sure the extremely high values around 0000 of May 19 do represent the ship exhausts while BC, CO, CO2 cannot say this. The present method excluded also the high values out of the range 90° to 270° of the relative wind direction, are these points corresponding to the data on 0000 May 19? If yes, does this mean these high value points may not be related to the exhausts?

5. Also, the authors recognized that CN would be the most useful parameter for data cleaning and took the CCN as an example. Since only CCN was tested, this conclu-

sion might only work for CCN. How is the situation of aerosol components like sulfate, organics, or particles in small size range (e.g. 40nm which are usually the size for fresh engine exhausts)? The authors may want to give more examples on other chemical compositions, or even applications on other datasets to show this method can work universally.

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