Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-352-RC1, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Investigating size-segregated sources of elemental composition of particulate matter in the South China Sea during the 2011 Vasco Cruise" *by* Miguel Ricardo A. Hilario et al.

Anonymous Referee #1

Received and published: 2 October 2019

The manuscript provides detailed elemental analysis of the samples from a two week-long Vasco cruise to the remote SCS/WPS environment. It also gives some insights into aerosol sources contributing the region's aerosol load. Contributions from soil dust, oil combustion, sea spray and fly ash were established in addition to dominant biomass burning. Paper provides some insights into sources; however, the main drawback is the lack of quantitative information on the contribution from the analysed/selected elements to a total aerosol mass or number. How much mass was reconstructed with this elemental analysis and how important it is in the total mass balance? Authors refers to

cloud formation effects, however, there is no information on number concentrations or any relation of the sources and possible cloud formation.

Source contribution derived from PMF represents only the elemental part of the PM, but, as I wrote above, no quantitative information is provided. Therefore, the main conclusion from this manuscript is very qualitative and just points to an existence of other than biomass burning sources. The main question then is whether this information is new without any quantitative assessment? Also, the text on Line 22 refers to 28 selected elements, what were the criteria for selection? Figure 5 shows relative contributions to only element mass, but main components such as OM and EC are not included, not even sulphate or nitrate.

Lines 498-500: 'Understanding these sources is key to characterizing aerosol composition and transport in the SCS/WPS and, by extension, developing our understanding of aerosol- cloud behavior in the region.' Indeed, but for this you need to include quantitative mass composition information (including OM, SO4, NO3) or/and number distributions.

Another problem is mass size distributions provided in the manuscript. Very narrow modes at stages 7 and 5 (260-340 nm and 560-750 nm), but no mass at stage 6, raise many questions. How is this representative of ambient accumulation mode? Can these narrow modes be real? It seems to me, that there was a problem with stage 6, either in sampling or other processes, where accumulation mode peak should have occurred, but the mass is missing there for almost all elements. To conclude, the statement on bimodal distribution is very far from reality and the two narrow modes observed here are never observed with any online size measuring instrumentation.

Some elements are attributed to same source origin, but time evolution is different, e.g. Lines 221-222 claim 'K, S, Al, and Si have very similar mass size distributions over the cruise period which are suggestive of 221 a common source (Fig. 3a-d).', but size distributions change form red to green or blue periods is very different for Si and

K, also Al and K. Similarly, for other cases, e.g. the time trend of coarse Cl is quite different from fine, how does this agree with fine and coarse Cl coming from the same source, sea spray? Table 1 shows quite low correlation between PM 2.5 and PM10 for Cl, which is strange for the element form single sea spray source. How do you explain large contributions from other than sea salt origin elements in coarse sea spray factor (Figure 6 a)). Would that point to Cl also originating from other than sea spray sources? Or text on Line 336 claims that Si is originated from different source, which is in contradiction to the text above it.

Specific comments:

Lines 36-38: repeating the abstract,

Lines 38-48: rewrite to have normal text flow, now it is just a collection of sentences without any strong link.

Line 60: 'Soil dust and coarse mode biological particles may also play a role in as ice nuclei (O'Sullivan et 60 al., 2014), as biomass burning plumes are known to entrain such particles (Reid et al., 1998; 2005; Schlosser et al., 2017).' Elaborate on what you mean by biological particles from biomass burning.

Line 62: Sources do not mixt, aerosol particles do, similarly on line 66, sources do not have complicated chemistry and interactions.

Line 89: PMF was performed on selected PM elements/tracers, not total PM.

Line 183: how much of the total mass was the sum of the species?

Lines 189-190. Why only selected species and not all that were measured? What were the criteria for selection?

190-192. The method is not clear here. What was done?

Line 196: What do you mean by 'Below detection limit (BDL) values were replaced with half the detection limit (Han 196 et al., 2006).'

Figure 3: add more ticks to y axis. It is difficult to read now. Missing mass at stage 6 is unrealistic in ambient terms.

Lines 220-221: what is sigma of such narrow modes?

Line 258: add 'element' to mass concentrations in 'PM1.15 and PM10 mass concentrations';

Line 305: What do you wanted to say by this 'likely through wet deposition processes', elaborate.

Lines 409-410: elaborate on what you mean by 'However, as PMF is an unsupervised technique, it may miss significant aerosol events, particularly transient ones' what do you base your statement that PMF can miss events on? Reference?

Line 535: how much of the total mass is these 34

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