

## ***Interactive comment on “The Trace Element Composition of Size Fractionated Suspended Particulate Matter Samples from the Qatari EEZ of the Arabian Gulf: The Role of Atmospheric Dust” by Oguz Yigiterhan et al.***

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Received and published: 13 September 2019

Response to Comments of the Reviewer # 1

“The Trace Element Composition of Size Fractionated Suspended Particulate Matter Samples from the Qatari EEZ of the Arabian Gulf: The Role of Atmospheric Dust” by Yigiterhan et al.,

The paper presents new data set on high precision measurements of trace element concentrations in bulk particulate matter of two size fractions collected by net tow

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samples from the EEZ of Qatar, Arabian Gulf. The researcher differentiated between lithogenic and biogenic sources of the elements implying correction using dust composition. Furthermore, relation between the excess metal concentrations with distance from the coast was used to ascertain the anthropogenic sources. The work carried out is impressive and will significantly improve the knowledge of biogeochemistry of trace elements in this region. Overall, the manuscript is clear and easy to follow. However, I suggest minor revision, which will further improve the scientific understanding of the study, performed as well the quality of the manuscript. The field campaigns carried out during this research is separated by not only years but season. First campaign performed during October 2012 where as in 2014 samples were collected in April. Referring to Table 2 and 3, we see prominent changes in elemental compositions (both total and excess) particularly in the areas, which were revisited (Doha and Dukhan).

Such seasonality is not reported or discussed.

- Response to comment:

We have not specifically focused on temporal and seasonal variations of size fractionated SPM in our manuscript. We have conducted 2 sampling campaigns in October 2012 and April 2014. The second sampling campaign was not the continuation or repetition of the first one. Due to logistic reasons, we were able to conduct the 2nd sampling after a while. Additional samples were collected during a third cruise in October 2014. The data from these samples will be used in a later publication (Yigiterhan et al., in preparation). During the 1st sampling campaign, the size fractionated net-tow samples were collected from off-shore stations (away from the coast and bay areas), we specially focused to catch the influence of the intense anthropogenic impact of oil and gas industry around the islands and deep water rigs, heavy industries located along the southeastern coast, offshore hydrocarbon extraction fields etc. Doha and Dukhan offshore stations were also part of the campaign, which were selected to reflect the influence of desalination plants and oil fields. All samples were collected out of the bays, away from the coast, relatively loaded with less SPM and reflecting

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more integrated coverage of the EEZ. However, in 2014 sampling campaign, as you can see from Figure 2; sampling was conducted from semi-closed bay areas for Doha and Dukhan stations, both from the East and West sides of the Qatar Peninsula, reflecting completely different water characteristics, under large anthropogenic effect due to more re-suspended sediments and dust load. The samples were collected along a linear transect inside the Bays and average composition was used for interpreting the data in the manuscript. That is why we have different metal concentrations between 2 years for the same “named” stations (Doha and Dukhan). These differences in concentrations may not point out the temporal variations. Kindly note that we tried to reflect these compositional variations in Figure 6 and 7 for small and large size fractions and for two campaigns with different sampling characteristics. Rather than focusing on temporal and seasonal variations, compositional change of SPM versus distance were targeted for two different size fractions.

Specific comments have been mentioned below: Comment 1: Line 3-5, Page 2 and Line 12-17 Page 7: As stated, researcher didn't manually characterized phytoplankton and zooplankton fractions in their two net-tow samples. It would be wise not to generalize 50\_μm fraction as phytoplankton and 200\_μm as zooplankton. Particularly a 50\_μm net-tow would also capture micro zooplankton. In fact, in tables and figures the author took care about this by stating bulk plankton or small net tow.

- This was corrected. The use of phytoplankton and zooplankton were removed. Now refer only to 50 and 200 mesh as small and large size fractions.

Comment 2: Line 6-7, Page 2: The line is misleading. Sampling campaigns were distinctive with varying space and time. 11 sites were sampled during 2012 whereas in 2014 six stations were sampled.

- This line was corrected

Comment 3: Line 30, Page 2: Multiple key words implying same meaning can be removed. E.g., Particulate matter and marine particle, Elemental composition and

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Trace metal etc.

- This was fixed, multiple key words were removed

Comment 4: Line 26, Page 6: Shraawoo's Island

- The name of the island was corrected

Comment 5: Page 6-7: Please provide depth range among the sampling locations.

- The water maximum bottom depth range for 2012 sampling stations were varying between 12 to 55 meters depth. However for the 2014 sampling campaign, the sampling depths were varying between 2 to 5 meters in quite shallow bay areas.

Comment 6: Line 20, Page 13: It is mentioned that “Unfortunately, neither Ca nor P analyses were included in this data set.”, however, authors presented Ca/Al data from net tow samples in Fig.6

- The confusion was carefully corrected

Comment 7: Line 12, Page 14: dust instead of “duct”

- The misspelling was corrected

Comment 8: Line 8, Page 15: HAc-HyHCl instead of “HAc:HyHCl”

- The formula was corrected

Comment 9: Line 15, Page 19: Ca is mentioned as biogenic/anthropogenic element but not included in table 6.

- We have fixed this. The text was revised and Ca was deleted from the list of elements in Line 19. The Ca concentrations were analyzed in the 3<sup>rd</sup> data set (in publication) but has not been included as a separate table into this manuscript to prevent data dump. On the other hand, kindly note that Ca was in the list of elements analyzed for both leached and unleached data set of Qatari dust samples. This was essential to observe the influence of CaCO<sub>3</sub> dissolution in weak acidic conditions.

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Comment 10: Line 10, Page 20: Study occupied entirely in the EEZ of Qatar and doesn't represent entire Arabian Gulf.

- The text was revised

Figure Captions:

Figure 1: Figure represents sampling locations during 2012 campaign only. - Corrected

Figure 2: Near shore sampling were performed during 2014. - Corrected

Figure 7: Refrain from stating phytoplankton - Phytoplankton was removed

Missing References:

Turekian 1977 - The missing reference was added

Knauer and Martin, 1981 - The missing reference was added

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2019-183>, 2019.