Reply to referee comments (RC) to manuscript egusphere- 2025-446

The authors are grateful to Referee#1 for providing very valuable feedbacks to the manuscript. Our detailed point-by-point response to their comments are reported below.

We believe that the modifications requested by the reviewers improved the reading and the understanding of the manuscript, fostering its significance.

Review of "Elemental composition, iron mineralogy and solubility of anthropogenic and natural mineral dust aerosols in Namibia: a case study analysis from the AEROCLO-sA campaign" by Formenti et al.

This manuscript presents the results of aerosol measurements conducted at Henties Bay, Namibia, with a focus on ionic and elemental composition in total suspended particles. Two regimes were identified, one related to regional dust and the other related to dust from anthropogenic activities. The paper is well written and provides insightful results to a region underrepresented in the literature.

General Comments:

- Much of the discussion of the results relies on the relationship between different elements (i.e. Figure 4), however, it is difficult to tell by eye when a change in the ratio is significant. The authors might consider placing error bars on the time series data, especially on the plots showing the time series of the elemental ratios.

  All figures with time series of concentrations and ratios have been modified to include the error bars.

- More discussion in the differences between the PM_1 and TSP composition would be useful. Currently, the PM_1 results are described (i.e. lines 356-350, throughout section 3.2.3) but additional insight into what the authors think is causing these differences would strengthen the paper. Additionally, it is unclear whether PMF was run on the TSP samples or both, as there is only one sentence (line 189-191) alluding to the PM_1 PMF composition. If PMF was included on the PM_1 samples, this would be a useful comparison.

  This is now included and moved to the main text as also suggested by Referee#2. However, it should be noted that the discussion on the PM1 composition is limited as the low flow rate used during the campaign resulted in concentrations below the detection limit, notably regarding the metal water-soluble fraction.

Minor Comments:

- Section 3.2.1: What factors are driving the change in the Cl^-/Na^+ ratio? Are the lower values observed during P1 due to acid displacement of chloride in sea salt, or do you expect non sea salt sources of these ions during different periods.

  We believe that the lower values observed in P1 are due to acid displacement of chlorine in sea salt. Acidity is elevated in this period due to the high concentrations of fluoride

- Section 3.2.2. The source of fluoride being the marine shelf is intriguing. Can the authors comment on the mechanism of how the aerosol ends up enriched in F? Does the sea water in that region have higher F content?

While we are not aware of measurements of F in the Namibian sea water, Atlas and Pytkowicz (1977) and Hossein et al (2024) describe the mechanims by which F could be released in sea water by dissolution. Upon dissolution, the release of F^- to the atmosphere can be attributed to the reaction with hydrogen in water to form hydrogen fluoride gas (or a solution of hydrofluoric acid; Anbar and Neta, 1967). The high content of fluoride in the Namibian soil is also documented and attributed to weathering and dissolution of fluoride-containing minerals (Hossein et al, 2024). These comments and references are now added to the manuscript.

- Line 414: "…and with the exception of a peak value on 26 August, the Si/Al ratio…" the figure does not show a peak on this day, should this be another date?

  We thank Referee#1 for spotting out this mistake, the correct date is 24 August 2017

- Consider showing the time series of the PMF factors in the main text.

  This is now done

- Consider dividing P3 into two sections in the time series in the main text as is done in the supplemental box plots, especially Figure 4. It is clear that there are two regimes, but this is not discussed in the text until later in the manuscript.

  This is now done

- Figure 3: Please clarify in the figure captions when gaps in the graphs correspond with missing data (as is the case in figure 1) and when the measurements were below the limit of detection (as mentioned in the text for figure 3). Also, please label P1 and P2 for consistency with other figures

  This is now done

- Figure 5: Could these be labeled with the date they were collected? The four XANES spectra were chosen because they had the highest Fe loading. Do the authors think the fact that these four appear similar is due to a similar source for these four. If so, it may be more interesting to include different examples in Figure 5, such as the samples with clay/hematite signatures, or Fe(II) signatures mentioned in the text. Overlaying the spectra may also help the readers observe small differences between the spectra.

  We thank the Referee#1 for the suggestions. We added the dates and modified the figure so to address so to display a selection of samples representing different compositions, origin and periods. `We also added the display of the contributions of the standards to the deconvolution. We tried to overlay the spectra but it is difficult to show them in a clear way. So we decided not to.

- Supplemental: In some cases one of the PMF factors is called Si-rich, and others it is Sand.

  These instances are now corrected

Typographical

Line 416: Planes should be replaced with plains.

Line 592: Gater should be replaced with Later.

These are now corrected

Reference

Anbar, M., and Neta, P.: Reaction of fluoride ions with hydrogen atoms in aqueous solution, Transactions of the Faraday Society, 63, 141-146, 10.1039/tf9676300141, 1967.

Atlas, E., and Pytkowicz, R. M.: Solubility behavior of apatites in seawater, Limnology and Oceanography, 22, 290-300, https://doi.org/10.4319/lo.1977.22.2.0290, 1977.

Hossein, M., Rwiza, M. J., Nyanza, E. C., Bakari, R., Ripanda, A., Nkrumah, S., Selemani, J. R., and Machunda, R. L.: Fluoride contamination a silent global water crisis: A Case of Africa, Scientific African, 26, e02485, https://doi.org/10.1016/j.sciaf.2024.e02485, 2024.