

We thank Anonymous Referee #1, Matthew Johnson and our editor K. M. Meiners for taking time to review the revised version of our manuscript and are happy about the positive feedback. While Anonymous Referee #1 did not request any further changes, we list the input of Matthew Johnson and K. M. Meiners (bold letters) and our answers (common formatting) below. Changes in the text are given within quotation marks in italics.

**I thank the authors for a careful and professional revision. I like the revised Introduction paragraph (p.2, l.58–67) which will help readers grasp the context and aim of the work. I am happy to recommend publication with one minor requested addition: Please add 3–4 sentences in the Discussion explicitly stating how source-dependent Fe variability could bias the interannual mineral dust comparisons, even if variability appears small at this site.**

We gladly rephrased the answer to this question given in the first round of revisions and added it to the manuscript. The text now reads:

*“A high variability of Fe content in mineral dusts found at a site, e.g., due to different source regions, would increase the uncertainty of the method. While elemental ratios may be used for source apportionment, Scheuvs et al. (2013) found that Fe contents are rather constant and homogeneously distributed in northern African dusts and sediments, comparable to the composition of the upper continental crust. On a bigger regional scale, Kandler and Scheuvs (2019) report that the local variation in the composition of dust can exceed the differences between Asian and African dust. We observed only small variation of the Fe mass fraction in dusts collected at our site between 2020 and 2024 covering several transport events, reflected in the first parameter ( $25\pm 3$ ). Still, one must be aware that the calculated mineral dust concentrations and depositions presented below will be influenced by the source-dependent Fe variability. This can affect single events and interannual comparisons.”*

We added the two mentioned publications to the References section.

**As requested by Reviewer 2, could you please provide additional text to the Discussion to explicitly state how source-dependent Fe variability could bias the interannual mineral dust comparisons, even if variability appears to be small at the study site?**

We added this as described above.

**Furthermore I suggest the following minor (technical) corrections:**

**Headings of Sections 2.3 and 2.4: Please spell TOA and IC out and not use these abbreviations in section titles.**

**Caption of Table 1: Use “are” rather the “is” in second sentence (as results is plural)**

**Figure 4: Check format, in the submitted pdf the legend interferes with the right upper corner of the graph. Also would it be possible to provide the linear fit within the graphic – including an R2 value?**

**Line 301: spell “literature” rather than “Literature”**

**Line 321: is there a “%” missing after the mass fraction value?**

**Line 331: “On” rather than “In” the smallest scale**

**Line 461: Please consider rephrasing the caption for Figure C1 to make it more readable.**

Thank you for the corrections regarding typos and rephrasing. We changed the text accordingly.

Regarding Figure 4, we agree that the frame of the legend was not clearly visible. Thus, we increased the thickness of the lines to clearly separate the legend and the data points. We added the linear fit given

within Equation (2) also in the graph and included the  $R^2$  value. We additionally increased the thickness of the lines for the legend in Figure 5 to make it more visible.

Concerning Line 321: As mentioned in the Author's response in the first round of revisions, this parameter describing the share of Fe in mineral dust is dimensionless. It is the reciprocal value ( $1/0.04 = 25$ ) of the mass fraction of Fe in mineral dust (median: 4 % = 0.04). To increase comprehensibility, we rephrased the text:

*"Uncertainty includes the variability of the Fe mass fraction in mineral dust, represented by the factor to estimate mineral dust loadings from Fe loadings ( $25 \pm 3$ ), and spreading of data points around the fit to calculate Fe loadings from  $\Delta\text{ATN}_{700-450}$  ( $11 \pm 7$  %)."*