

Interactive comment on “Mineralogy and mixing state of North African mineral dust by on-line single-particle mass spectrometry” by Nicholas A. Marsden et al.

Anonymous Referee #3

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First, I sincerely apologize for the delay of my revision.

The paper by Marsden et al. analyses the mineralogy and mixing state of North African mineral dust by applying a novel on line single particle mass spectrometry technique (LAAPTOF instrument) and comparing it to results by the more classical scanning electron microscopy analysis (SEM). Data were collected for natural dust observed at Cape Verde during the ICE-D campaign and from experiments on re-suspended dust in the AIDA chamber facility.

Results allow to show the performances of the LAAPTOF in estimating the mineralogical signature and mixing state of particles with different origins as measured at Cape

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Verde and from chamber data. The paper provides a thorough analysis of the chemical composition and mineralogy. Discussion of possible atmospheric implications of taking advantage of measurements presented in this paper is provided.

This is a very valuable work presenting new results from a novel technique to study the mineralogy of dust aerosols and its applications. While I do not have major comments on the content of the paper itself, which I find of very high quality, I have some doubts on the presentation of data and methods and discussion of results. In fact I find the paper too much detailed in some specific aspects, in particular the full section 2.1 seems confusing and it is not clear what is method, results or discussion. Probably the presentation of such part should be modified. At the same time some specific details that would be required are not presented in Section 2 (more details in time resolution, uncertainties of the used techniques). Despite the reference is done to another methodological paper, these information should be done also in the present work for consistency. The “Results” section also deserves to be discussed probably in a “lighter” way to be more accessible also for a non-advanced reader, and probably merged to the discussion in Sect. 2.1.1-2.1.3. In conclusion, I think the work deserves publication on ACP but only after the presentation is better organized, probably shortened in some parts. I propose some comments to the authors in the following together with some minor comments.

Detailed comments

Abstract, line 6-7: specify the temporal resolution required

Abstract, line 19-20: please clarify the sentence

Page 2, line 8: “observations”

Page 2, lines 16-22: this section is confusing; you speak about soil to aerosol partitioning and atmospheric ageing, but this is not very clear

Page 2, lines 23-28: also this section is confusing since it mixes considerations on the

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temporal and spatial resolution of dust mineralogy

Page 3, line 22: the reference by Kok et al. (2017) is not appropriate here since the Kok et al. paper is mostly on the effect of particle size but not mineralogy

Section 2.1 please add information on the temporal resolution and measurement uncertainties

Sect. 2.1.1, 2.2.2, 2.1.3: please reorganize these sections to clarify the methodological aspects, while the aspects mostly linked to discussion of data should be moved to Sect. 3 (“Results”)

Sect. 2.2: which is the impact of the differences in the sampled size distribution compared to LAAPTOF?

Sect. 2.4: the vicinity of the measurement site to the airport runway has an effect on measurements?

Page 10, line 8: “to analyse”

Results and Discussion, sections 3 and 4: I invite the authors to consider if some of the aspects in Sections 2.1 should not be moved here and also if the whole presentation of results and the discussion should not be reduced a little bit in length and also made more readable for a non-advanced reader. The text is fact very dense and complicated in some points in my opinion and it could be probably simplified.

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