

Interactive comment on “Effect of sea breeze circulation on aerosol mixing state and radiative properties in a desert setting” by Yevgeny Derimian et al.

Anonymous Referee #1

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A combination of remote sensing observations, in-situ measurements and chemical analysis at the individual particle scale (especially by scanning electron microscopy with energy-dispersive X-ray spectrometry, SEM/EDX) was used for the chemical, microphysical and optical aerosol characterization at Sede Boker in the Negev Desert, Israel. By making use of the comprehensive data set, estimations were made of the impact of the sea breeze on the aerosol radiative effect and of the aerosol core-shell structure and the implication for remote sensing. This is clearly a thorough study. However, the results are mainly based on aerosol samples that were respectively collected before and during the sea breeze on 16 August 2012. One may wonder how representative the situation on that day was for the remainder of the summertime or whether it

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may also occur for the other seasons. As indicated below, the manuscript has other shortcomings, so that some revision is needed before it can be published in ACP.

Specific comments:

1. A comprehensive SEM/EDX characterization for aerosol samples from the same Sede Boker site was previously performed by Sobanka et al. (J. Atmos. Chem., 44, 299-322, 2003). In this study coarse (2-10 μm aerodynamic diameter, AD) and fine (<2 μm AD) aerosol samples from summer and winter campaigns were analysed. Although the authors make reference to this paper in the Introduction, they fail to compare their particle classification presented in Figure 3 and their particle type proportions of Figure 8 with results from Sobanska et al. Some comparison with the summer data of Sobanka et al. is necessary.
2. Page 3, lines 18-20: A literature reference would be welcome for the statement in this sentence.
3. Page 6, lines 1: It unclear what it meant by "data correspond to the quality level 1.5". Some explanation is needed here.
4. Page 19, line 26, and page 31, Figure 8: The use of PM1 and PM2.5, as used here, is very confusing. These terms are normally used to denote particles smaller than 1 and 2.5 μm AD, respectively, whereas they clearly denote other size ranges in the current manuscript. I recommend replacing PM1 by PM2.5-1 and PM2.5 by PM10-2.5.
5. Technical and other (mostly minor) corrections:
 - page 1, line 19: replace "found be" by "found to be".
 - page 2, line 14: there is something grammatically wrong with "which hygroscopic".
 - page 2, line 28: replace "site sometimes" by "site is sometimes".
 - page 3, line 14: replace "program, e.g., (Ichoku)" by "program (e.g., Ichoku)".

- page 3, line 18: replace "area of" by "areas of".
- page 3, line 22: replace "show generally" by "showed generally".
- page 3, line 24: replace "Although, the" by "Although, the".
- page 3, line 32: I presume that "(4)" should be replaced by an appropriate literature reference.
- page 4, line 8: replace "Although, the" by "Although, the".
- page 4, line 25: replace "The Ångström" by "An Ångström".
- page 8, line 9: replace "by (Eilers, 2003; Eilers and Boelens, 2005)" by "by Eilers (2003) and Eilers and Boelens (2005)".
- page 9, line 25: replace "in details the" by "in detail the".
- page 10, line 34: replace "2 mm in contrast to 2.5 – 3 mm" by "2 μm in contrast to 2.5 – 3 μm ".
- page 11, line 2: replace "in visible" by "in the visible".
- page 11, line 14: replace "that sensitivity" by "that the sensitivity".
- page 12, line 11: replace "fine fractions" by "fine fraction".
- page 12, line 27: replace "in (Reid et al., 2003)" by "in Reid et al. (2003)".
- page 12, line 27: replace "per particles type" by "per particle type".
- page 15, lines 10-11: replace "in (Derimian et al., 2016)" by "in Derimian et al. (2016)".
- page 15, line 26: replace "in (Derimian et al., 2016)" by "in Derimian et al. (2016)".
- page 16, lines 18 and 23: replace "Dubovik et al., (2000)" by "Dubovik et al. (2000)".
- page 16, line 29: replace "in (Dubovik et al., 2000)" by "in Dubovik et al. (2000)".

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- page 17, line 1: replace "in (Dubovik et al., 2000)" by "in Dubovik et al. (2000)".
- page 17, line 20: there should be space before the "are" in "are 440".
- page 17, line 22: replace "it also" by "it is also".
- page 18, line 5: replace "14b)," by "14 b,".
- page 18, line 16: replace "Also, notable" by "Also notable".
- page 18, line 34: replace "of (Dubovik et al., 2000)" by "of Dubovik et al. (2000)".
- page 19, line 7: replace "in details" by "in detail".
- page 20, lines 22-23: the quotation marks are unpaired.
- page 21, line 9: replace "J ATMOS OCEAN TECH" by "J. Atmos. Ocean. Tech.".
- page 22, line 18: the journal name should be abbreviated.
- page 24, line 3: the journal name should be abbreviated.
- page 24, lines 5-8: there are several problems with this reference.
- page 25: the heading of Table 1 should be above the table instead of below it; furthermore, replace "Relative humidity" by "relative humidity".
- page 27, line 5: there is something wrong with "arrival occurred on"; rephrasing is needed.
- page 33, within the top right panel of Figure 11: replace "C" by "Ca".
- page 34, line 7: I cannot see any colored arrows in the figure.
- page 36, line 5: it is unclear what "in this section" is doing here.

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