

***Interactive comment on* “The summer aerosol in the Central Arctic 1991–2008: did it change or not?” by J. Heintzenberg and C. Leck**

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We are very grateful for the time that rev. 1 invested in reviewing our manuscript.

The question of “trends” Understandably, rev. 1 has a problem with our usage of the concept of “trend”, which he (she) seemingly feels should only be applied to contiguous time series. There are no such time series concerning the atmospheric aerosol in the central Arctic. Our main arguments for analyzing our data for possible “trends” anyway were the facts that a) they cover a total time period of 18 years during which substantial climatic changes in the Arctic occurred; b) they cover the same Arctic region; c) they all cover the same month of August (and some more); d) they were collected on the same platform with very similar sensors; e) they are unique and no synopsis of the four expeditions has been published before. It can be argued if aerosol changes

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derived from such data should be called “trends”. The online Merriam Webster dictionary offers as alternative definitions for the noun “trend”: 1: a line of general direction or movement 2a : a prevailing tendency or inclination 2b : a general movement 2c : a current style or preference 2d : a line of development 3: the general movement over time of a statistically detectable change; also: a statistical curve reflecting such a change To our understanding definitions one and/or three fit our study. However, to avoid misunderstandings we eliminated the concept trend from the revised text

“Not much new science” The aerosol data of the four campaigns have not been “described in detail before”. In fact, the aerosol size distributions of 2008 have not been published at all before. For the present study internally consistent data sets of all four expedition-years focusing the analysis to conditions with at least 12 hours of travel time over the pack ice were constructed and are reported for the first time. Adding the 2008 data increased the total time span by another seven years, suggesting a first look at possible long-term changes (trends) and/or persistent features in the central Arctic aerosol. As an aside: Even if the 2008 results were identical to any or all previous years’ data we feel that this finding would be well worth reporting from the remote central Arctic region that is not covered by any other surface aerosol data. We appreciate that rev. 1 recognizes our analysis of Hoppel diameters as “interesting idea” and refer to our response further down concerning related inconsistencies.

“Not very well written” To meet the criticism of both reviewers the general structure and use of English and punctuation have been improved.

We are sorry about the inconsistent values given for the investigated range of DHO. For the paper we finally settled on 30 to 150 nm, which has been corrected in the revision.

Thank you for pointing out the inconsistent heading concerning travel times and fog occurrences, which now are collected under the separate sub-heading “Air travel times and fog occurrences during the four expeditions” after the meteorological discussion of the four individual years.

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For further details please refer to our response to rev. 2.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 887, 2012.

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