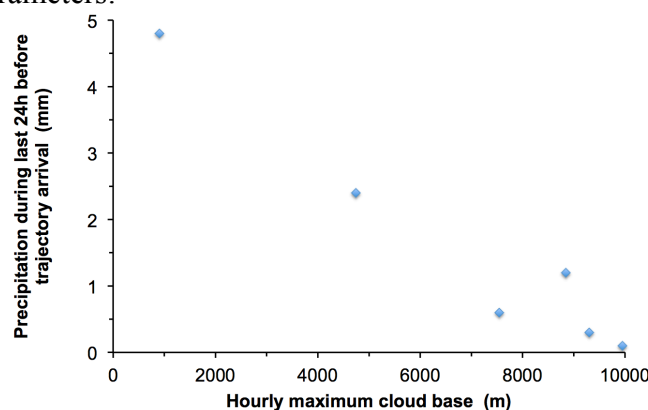


Major comments:

1. We added the suggested references to the discussion of growth rates.
2. The possibility that sporadic anthropogenic emissions were interpreted as NPF events cannot be excluded completely. However, there are a number of facts arguing strongly against this possibility leading to serious misinterpretation of the data:
  - a) Location and operation of the Mt. Zeppelin station exclude local contamination to a very large extent.
  - b) Manual inspection of the time series by one of the co-authors (PT) further reduced the risk of contaminated data.
  - c) The temporal evolution of MEV events, i.e. concurrent and sustained concentration increases at several particle sizes below 60 nm does not correspond to a typical passage of stack emissions from a large combustion source, (Ogren and Heintzenberg, 1990). Instead, it looks very much like MEV events observed under even stricter constraints on local or regional sources of contamination on icebreaker Oden in the central pack ice area, (Karl et al., 2013), and, according to reviewer #2 also looks similar to nocturnal NPF-events in Australian forests.
3. The hypothesis of gel-forming phytoplankton contributing to NPF has been elaborated extensively in the introduction, supported by a large number of references (Karl et al., 2013; Karl et al., 2012; Orellana et al., 2011; Leck and Bigg, 2010; Leck and Bigg, 2005a, b, c; Leck et al., 2004). The data available to date do not allow statements about the dominance of this hypothesized mechanism.
4. We added the following text to the section introducing the model-calculated meteorological parameters: “We emphasize that their accuracy depends on the quality of the meteorological model inside HYSPLIT4 and on the accuracy and representativeness of the meteorological fields utilized by the model. Of the local meteorological record the frequently recorded air temperature was considered the most reliable and thus explored in a comparison of trajectory calculated and modeled local meteorological data. When comparing the 42600 contiguous hourly records from 2008-01-01 until 2012-11-10 the average ratio of measured and calculated temperatures is 0.98, with a coefficient of determination of 0.96.”

The ceilometer data did not include precipitation. However, the statistics below might be able to reduce the reviewer’s doubts about the quality of the model-calculated meteorological parameters:



Minor comments:

Comment	Response
Line 29	Changed as suggested
Line 30	Yes, the sentence now begins with “The occurrence of NPF-events appears to be somewhat sensitive...”
Line 34	Changed as suggested
Introduction	Building on a short quantification of the dataset the last paragraph of the introduction does just what the reviewer requests, i.e. describes the aim of the study. Thus, we would like to keep this paragraph where it stands.
Solar flux is not described in Database, but used in data analysis.	All utilized parameters were described in Table 1. To clarify the text further we added to the caption of Table 1: All parameter explanations starting with “Trajectory” refer to parameters calculated by HYSPLIT4 at each trajectory step. Also, we added the sentence The utilized model parameters are listed in Table 1 in the database section after introducing the model- calculated parameters.
Line 200	Changed as suggested
Line 217	Changed as suggested
Line 235	Changed as suggested, albeit citing Stohl (1998).
Line 249	Changed as suggested
Line 255	Changed as suggested
Line 258	Changed as suggested
Line 275	Changed as suggested
Line 277	We added the sentence “The products of the photochemical oxidation of DMS the ratio MSA/ nssSO <sub>4</sub> <sup>2-</sup> show a temperature dependence (Bates et al., 1990), favoring MSA in the cold Arctic environment (Karl et al., 2007).”
Line 438	We do not feel that the suggested change would improve the readability of the paper and appeal to the editor to disregard this suggestion
Line 509	No, as stated on lines 464 to 466: “Besides these common characteristic lengths individual fixed thresholds were chosen and discussed below for each approach in order to generate at least 200 unique events per approach, (see Table 2). An additional column in Table 2 now shows the fraction of the total number of hours covered by unique events of the three types.

Line 654	Corrected
Line 755	“Arctic stratus” is a generally accepted term in the Arctic literature since at least 1976. We prefer to maintain the wording as is.
Line 764	Yes, however, the molar ratio of MSA to nssSO <sub>4</sub> could be used as a proxy for sorting
Line 787	Changed as suggested
Line 827	Changed as suggested
Line 847	Changed as suggested
Line 868	We disagree because of (as stated in the paper) “the relatively small daily variations in solar elevations”
Conclusions are too long and descriptive	To make the title of this section more appropriate it now reads “Summary and conclusion”
Line 912	“change in” as stated
Figure 6	Yes, information added to the captions of Figs. 6, 9, and 10.

## Literature

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Stohl, A.: Computations, accuracy and applications of trajectories - A review and bibliography, *Atmos. Environ.*, 32, 947-966, 1998.