

Interactive comment on “Planetary boundary influence at the Jungfrauoch analyzed by aerosol cycles and synoptic weather types” by M. Collaud Coen et al.

Anonymous Referee #2

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General comments:

This study analyze 14 years of aerosol parameters (bscat, babs and N) in relation to weather types, trace gas concentration and annual and diurnal variability. Long term studies are indeed beneficial, and thus merit publication. However, the current manuscript suffers from major drawbacks:

First, the discussions and arguments presented are hard to follow and the analysis of the data is sometimes very patchy, which makes it difficult for a reader to follow. Secondly, the article contains some unsupported statements, especially those relating to new particle formation. Since this study does not employ any size segregated infor-

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mation on the particle population, but only integral number, not much can in principle be said about new particle formation. One may discuss the possibility, but additional data and analysis would be needed in order to support the statements given. Thus, the discussion and conclusions must be somewhat revised.

Recommendation:

Below, I outline a number of points that caught my attention. These are a number of suggestions that need to be addressed prior publication. I do however recommend changes beyond these detailed comments in order to meet the standards of ACP. My recommendation is that the paper undergoes a major revision prior publication in order to remove overly quantitative statements as well as improving the readability of the paper. More attention should be given to increase the flow of the text, and the analysis need to be better structured. This also applies to method description. Detailed comments

P 988, line 22: ..is the most sensitive. . ." remove "the" or add "parameter"

p.996, line12-17: What is the meaning of the quantity provided in figure 4b? As I understand it, it somehow represents the percent of "accumulated" observations at the site. Is this correct? How is it relevant? Please clarify how and why this is calculated.

P996, line 25: What is meant by cause here? In relation to what? Integrated observations? Again, what is the purpose of this calculation?

P997, first paragraph: I do not follow. Please expand on the reasoning.

Page 997, second paragraph: Is it shown that new particle formation is the cause of the difference in annual cycle?

Page 997, line 25: It is stated that there is no prevalence of any particular weather type. Is this now based on figure 4b? Is then AW+N+E treated as a separate weather type? In that case I do not agree. Please clarify what is meant here.

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Section 3.3 overall: I think this section need to be rewritten. The discussion is hard to follow.

Page 998, line 11: What is meant by "...its greater sensitivity to the Aitken mode aerosol..." and how is it related to the discussion?

Page 998, line 12: Comparing results shown in figure 5, I think it is not evident that babs show least distinct diurnal cycles. Speculate on the reasons why babs would show less pronounced diurnal behavior.

Page 998, line 13-15: I do not agree that babs show no diurnal behavior in feb-march. At least not from a visual inspection. Is the discussion based on other methods? I would say there is a quite pronounced diurnal cycle for at least M and AS weather types.

Page 998, section 3.4,: it must be better clarified what variables of bscat, babs and N that are discussed in terms of annual cycles. It is very hard to follow the discussion and the statements by the author seem to contradict the results shown in the figure. I suggest to treat each variable separately and consecutively. This would allow the reader to better follow the discussion.

Page 999, line 3-4 + figure 5: What is the meaning of continuous diurnal decrease? What is clear from AS weather types during is that the diurnal cycle is not continuous. The decrease is argued to be due to wet removal. I think this statement not is supported by the data. Why would precipitation rapidly stop 24:00, and be followed by a sudden increase in the parameter value. I think that the calculations here should be checked again, it seems kind of wrong.

Page 999, line 8: Please verify these calculations. Seems odd with continues decrease.

Figure 6: I think the discussion would benefit by adding eg percentile ranges showing the range of amplitude encountered. As a reader it is hard to draw any conclusions

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from the figure.

Page 999, line 11-16: Please revise the discussion to agree with what is actually shown in the figures.

Page 999, line 16-21: Please comment on the lack of diurnal variation for Å for all month except April.

Page 1000, line 2: how can a coefficient be characteristic of polluted airmasses. Should be "...elevated values of absorption coefficient..." I guess.

Page 1000, line 8-12: Is this shown? Would N as the other parameters be sensitive to primary emissions as well? I do not follow the reasoning.

Page 1000, Line 23: "a maximum" → "at a maximum"

Page 1001, line 4-5: how can babs and be scat be dominated by weather types? Please clarify.

Page 1002, line 1-2: This is not shown here. Replace "lead to" with "favor". Figure 9: Add ranges to the values shown in figure.

P 1002, line23: "a maximum" → "at a maximum"

P1002, last paragraph: hard to follow

Page 1003, line 8-12: I do not follow

Page 1003, line 8 and onwards: To what figure does this discussion relate to? 9 or 10? Please clarify.

Figure 10: To what does the errorbars correspond to? Further more: wouldn't the discussion benefit from adding maximum and minimum values as a range around median in one plot.

Page 1004, first paragraph: Revise this section for clarity.

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Page 1005, line 8-9: what is meant by a complete replacement of JFJ by PBL.

Figure 11: Check x-labels

Page 1005, line 11: write "ri reaching 35% and 45%"

Page 1006, line 11: Is it shown that this is due to growth of newly formed particles?

Page 1006, line 20-21: "with enhanced new particle formation". One may speculate that this is the case, but this statement is not supported by the analysis given in this paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 985, 2011.