

## ***Interactive comment on “n-Aldehydes (C<sub>6</sub>–C<sub>10</sub>) in snow samples collected at the high alpine research station Jungfraujoch during CLACE 5” by K. Sieg et al.***

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Reply to Referee 1

The authors appreciate the Reviewer's thoughtful and constructive comments, which helped to improve the paper. We have revised the paper with the reviewer's comments taken into account. The responses to the comments accompanied by the original comments are given below.

Specific Comments of the referee

From my point of view, parts of the introduction and especially the discussion could

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benefit from streamlining and an improved focus leading to an improved and more concise manuscript. Subsections with hypotheses stated at the beginning followed by analysis and discussion of the data would help to increase readability.

Response: The introduction and the discussion have been rewritten. The readability of the paper was improved by adding subsections to the discussion chapter as suggested by the reviewer.

P8072/L4: Explain relevance of the Sphinx platform in the text or remove from abstract.

Response: The sentence is removed from the abstract.

P8072/Line 9: Give numerical examples for “wide range of concentrations” in abstract.

Response: Numerical example for n-nonanal concentration was added to the abstract of the manuscript.

P8073/L15: In the discussion section, authors demonstrate that anthropogenic sources are not likely to be the source of the aldehydes detected. It would still be useful to have more information on anthropogenic sources available in the introduction with additional references.

Response: More information and additional references of anthropogenic sources of aldehydes has been added to the manuscript.

P8073/L25-P8074/L23: Information from this section is descriptive and in part duplicated in Table 1. I suggest that authors delete this paragraph, and instead expand Table 1 with information on the environment sampled, analytical technique and species/concentrations detected and highlight differences in the manuscript text.

Response: Table 1 was expanded as suggested by the reviewer. The section with description of the table content has been deleted from the manuscript with the exception of highlights of the referred studies.

P8076/L9: More information or a reference should be provided about the custom-made

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snow sampling scissors.

Response: More information about the custom-made snow scissor has been added to the manuscript. Additionally, a new Figure was added to the manuscript to provide a picture of the snow scissor during the snow sampling procedure.

P8076/L11: “Snow sampling occasions” should be replaced by “Snow sampling events”

Response: “Occasions” was replaced by “events” throughout the manuscript.

P8076/L15: Additional information on snow properties would be useful for assessing since these potentially play an important role on retention and photochemical conversion of chemical species. Large blank values indicate that most of the aldehydes could actually be found in the interstitial air. These aspects of snow properties should also be discussed as part of the results.

Response: We thank the reviewer for providing an additional explanation for the large blank values found in the snow samples at Jungfrauoch. Additional information on snow properties was added to the manuscript. Furthermore, a discussion about the aspect that n-aldehydes can be sorbed to interstitial aerosol particles was added to the revised version of the manuscript.

P8079/L8079: A discussion on snow properties and their impact on aldehyde concentrations should be added as indicated above. If compounds mostly reside in the interstitial air, no phase transition occurs.

Response: A section about snow properties and their impact on C6-C10 n-aldehyde concentrations was added to the revised version of the manuscript.

P8080/L7: “heterogeneous composition”: Do the authors mean “concentrations”.

Response: The manuscript has been changed accordingly.

P8081/L3: While the authors provide a good discussion on sources for aldehydes, their fate is not discussed. An addition of this aspect and relevance for sampled snow would

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be useful.

Response: A discussion about the fate of n-aldehydes has been added to the manuscript.

P8081/L11-L23: This description of aerosol measurements carried out during the campaign should be removed since no data is available for discussion. Response: The section about aerosol measurements has been removed from the manuscript.

P8081/L23-8082/L17: Rewrite for conciseness and discuss (incl. references to figures and tables) aspects pertaining to the measured data set.

Response: The section was rewritten and appropriate references to figures and tables were added to the manuscript.

P8083/L9: Rewrite for conciseness and discuss (incl. references to figures and tables) aspects pertaining to the measured data set.

Response: The section was rewritten and appropriate references to figures and tables were added to the manuscript.

Table 1: Expand as suggested Figure 4: Move to Appendix since it is cited work Figure 5: Display own (B) and previous (A) data in a single figure. Remove connecting lines or explain their significance.

Response: Table 1 was expanded as suggested by the reviewer. Fig 4 was moved to the appendix and Fig 5 was also changed as suggested by the referee.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8071, 2009.

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