

Interactive comment on “The transport history of two Saharan dust events archived in an Alpine ice core” by H. Sodemann et al.

Anonymous Referee #1

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This paper reports on the relationship between chemical signature of two dust events in an Alpine ice core and backward air trajectory. In the two dust events, significant MSA concentration was found in March 2000 but not for October 2000. The main idea of this paper is to explain the difference of chemical signature in the dust events as derived from different air mass histories. This is an interesting approach to investigate ice core data. This paper includes detailed meteorological analysis especially for dust mobilization and transportation toward the Swiss Alps. The authors present also limitations of their meteorological model and interpretation. However, before publication, the authors have to address the major concerns in the following.

Major comments: 1. Purpose of this study is not clearly stated. Reasons of (1) use

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of an ice core from a mountain glacier and (2) selection of events in year 2000 are especially important for this paper. To show goodness of the sophisticated trajectory analysis, chemical data of detailed rain or snow samples can be used for evaluation and suitable for checking event timing and precipitation processes in the model.

2. Depositional environment and dating accuracy of the ice core should be described in the text. Is depositional environment of the saddle point suitable for continuous accumulation of snow without wind erosion? Details of dating method and error analysis of dating are needed to justify starting points (month of year 2000 in this case) of backward trajectories.

3. Threshold of wet deposition using relative humidity ($> 80\%$) should be justified. Is there any general reference to this? As in Fig 6 and 10, temporal change of RH along the trajectory over the sites may provide useful information.

4. About the length of discussion, section 5 “Meteorological analyses” is too long. Most of discussion in section 5 does not provide strong conclusion regarding chemical signature of the Alpine ice core, hence, the structure of discussion looks unbalanced.

Technical comments: P 7508 line 6-: TSP data at JFJ are used to select candidate of dust events in March 2000. Why don't you put these data together in one figure with trajectory out-put such as RH and dust estimation to select the event candidate. Do you have the TSP data for October to show the same type of the figure mentioned above?

P 7510 line 9: Please show specific name of location on map such as Ligurian Sea.

P 7516 line 13 and Figure 11: Is Figure 11 made from trajectory results during whole month (October 1 to 31 and March 1 to 31)? If so, it may include unnecessary trajectories forming dust events in the ice core. Please specify data used here.

Figures 5, 7, 8, and 9: Please show location of Piz Zupo.

Figure 6: In Fig. 6, large amount of precipitation was observed around the ice core

site. This could lead low dust concentration in snow although atmospheric dust concentration was high. Is this consistent with ice core data?

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 7497, 2005.

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