

Interactive  
Comment

## ***Interactive comment on “Fluxes of microbes, organic aerosols, dust, and methanesulfonate onto Greenland and Antarctic ice” by P. B. Price et al.***

### **Anonymous Referee #1**

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#### General comments:

This manuscript presents a comparative analysis of data from three ice cores in Greenland and Antarctica obtained with scanning fluorimetry and unique instrumentation, TUCS (Targeted Ultraviolet Chemical Sensor), previously developed and successfully used by the authors. The value of this non-destructive yet powerful approach lies in the possibility for on-site continuous mapping of fluorescent spectra of cells (based on natural protein-bound fluorescence of tryptophan) and biomolecules (non-tryptophan fluorescence) on a micrometer scale along large sections of ice cores as illustrated on Fig. 1. The fine scale fluorescence fluctuations are used to infer the concentra-

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tions of microbial cells and organic material and provide useful indicators for future microbiological analyses with other methods. Previously the authors have linked their fluorimetry data to in-situ microbial metabolism and trace gas anomalies. In this study results from the fluorimetric analyses have been viewed from another angle - the intensity and sources of atmospheric fluxes transporting and depositing dust, microbial cells and aerosols over polar ice. Furthermore, the authors evaluate these fluxes in a relative aspect between different Antarctic and Greenland ice cores and compare these ratios with similar calculations for dust and methanesulfonate measured by others in several ice cores over different geological periods for over 100,000 years (Table 1). Based on these comparisons the manuscript presents important conclusions on the intensity and sources of these fluxes on both poles. In summary, the present study contributes to the ongoing search for new methodologies to study the origin, distribution, diversity and in-situ activity of microbial life that is deposited and chronologically preserved in glacial ice. Furthermore it adds to the exploration of the relationships between the microbial records and the extensively studied continuous geochemical and trace gases paleoclimate records in deep glacial ice that is of great importance but still limited.

#### Specific comments:

Because the manuscript lacks Material and methods section, the methodological details are scattered throughout the text and more difficult to apprehend, especially for a reader not acquainted with the previous publications from this group. In this relation a list of the ice cores with corresponding full names of acronyms (WAIS, EDML, EPICA, GISP2, etc) will be useful.

p.4684, line 8 - non-Trp is used in the introduction while its denotation as emission spectra peaked at different wavelength than protein-bound tryptophan is introduced later. Correspondingly, the terms non-microbial or organic aerosols are more accurate than non-Trp aerosols.

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p.4684, line 13 - How mass concentrations of microbes are measured when compared to average dust concentrations in ng/g? It is not clear what is the information from these ratios in g/g in Table 1, part 1.

p.4684, line 24 - For the time range of thousands of years the term 'climatological information' will be more suitable than 'meteorological' usually related to short term changes.

Technical corrections:

p.4684, lines 2,4,5 - e.g. is not necessary before references.

p.4684, lines 20 - Typo in 'then onto ice'

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Interactive comment on Biogeosciences Discuss., 5, 4681, 2008.

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