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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contrasting atmospheric boundary layer chemistry of methylhydroperoxide (CH_3OOH) and hydrogen peroxide (H_2O_2) above polar snow" *by* M. M. Frey et al.

Anonymous Referee #2

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This paper presents measurements of hydrogen peroxide and methylhydroperoxide above the snow pack in Greenland and Antarctica. The analytical methods used and the careful evaluation of the physical and chemical environment by the authors yield great confidence in the results. The paper presents a number of very important results that will be of interest to the atmospheric community. Methylhydroperoxide was the only organic peroxide present and was found to be the dominant peroxide at times is quite important. The observation that atmospheric boundary layer levels of hydrogen peroxide and methylhydroperoxide appear to be controlled by different process is significant, and that the contribution of MHP to the ROOH budget is not simply related to hydrogen peroxide levels is another important finding.

The careful consideration of the peroxide budgets and the potential source and sinks in the snow and firn air leads one to conclude that more process studies will be needed at low NOx levels to fully understand this complex system. In short the paper presents important observations that will aid the atmospheric community and further evaluates the dynamical and chemical process controlling the observed peroxide levels. I recommend publication of these important results. I think the manuscript could be strengthened by addressing a few additional questions.

1. In section 4.3 in examining the hydrogen peroxide sources the authors suggest a change in air mass contributed to the increase in H2O2. Do other air mass tracers, in addition to water vapor, support a change in air mass?

2. In section 2 under the methods section the authors discuss a correction to the continuous channel for all hydroperoxides. Were any other organic peroxides observed, other than MHP? Is the total signal correction using the HPLC data (H2O2 + MHP) and H2O2 or were other organic peroxides observed?

3. A few more details regarding the firn air probe would be helpful. What kind of “test runs” were performed? Were peroxides added to the inlet to test recovery, and if so how? What material was the inlet constructed with?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 1235, 2009.