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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Airborne measurements of HCl from the marine boundary layer to thelower stratosphere over the North Pacific Ocean during INTEX-B" *by* S. Kim et al.

Anonymous Referee #1

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A review of “Airborne measurements of HCl form the marine Boundary Layer. by Kim et al.,

This paper represents important airborne measurements of hydrogen chloride (HCl) made over the North Pacific. This paper would benefit from additional data analysis and discussion.

Introduction

There are several other mechanisms for the production of HCl. The RH + Cl Rxn may actually dominate.

Instrumentation

Please list the accuracy of the HCl measurements and the precision separately. Did any film build up on the inlet? How can you be sure you were quantitative? Were any tests done?

Model

Although the mechanism and loss process of HCl are reasonable well understood for the stratosphere, they are not for the MBL. Please describe in detail the ClOx Chemistry used in the model.

Results and discussion

HCl*, based on lifetimes, is mostly (>90%) in the form of HCl. Therefore, this should not be a source of any major difference between previous studies. As a matter of consistency please correct the R2 of 0.72 to match the R2 (0.74) in the figure. Solving for the [Cl] using a steady state argument for [HCl] is not valid. First HCl has a much longer lifetime (<1 s versus ˜12 h) in the MBL. Furthermore, HCl is only a minor source of Cl. The greatest source of inorganic Cl is probably from surface reactions involving OH, HOBr, ClONO2, or NOy. In order to estimate [Cl], measurement of a shorter lived ClOx species would be helpful. It would be interesting to see if other mechanism could produce additional Cl. OH and Cl- in aerosols are typically measured on the DC-8 along with several other parameters.

Figure 9

The increase in HCl at about 9:05 am is probably a result of extra NOy/aerosol inorganic Cl production and the partitioning of ClOx to ClONO2. I do not think we can unravel the complex interplay of aerosol chemistry, the ClOx and NOx cycles by looking at a few measurements made over 4 minutes. What is striking about this figure is the large increase in HCl in the MBL versus the other parameters.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 3563, 2008.

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Interactive Comment