Geophysical Research Abstracts, Vol. 8, 00072, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00072

Measurements of halogen atom concentrations in the Arctic troposphere

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Over the past 10 years, we have conducted measurements of carbonyl compounds that are produced from OH and Cl atom reaction with volatile organic compounds (VOCs). We have found that certain ratios of carbonyl compounds, e.g. acetone/propanal, are very sensitive to the ratio [Br]/[Cl]. Our measurements at Alert, Nunavut, indicate that the ratio [Br]/[Cl] is extremely variable in the Arctic, depending on [O_3]. Indeed, when [O_3]$\rightarrow$0ppb, this ratio can become very small, in contrast to what has been expected. Here we discuss our measurements of carbonyl compounds at Alert and Barrow, and recent measurements of halogenated volatile organic compound concentrations, which allow calculation of the absolute concentration of halogen atoms. Our results will be discussed in terms of our current understanding of the sources of these halogen atoms, particularly for chlorine atoms.