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Interactive comment on “DMS and MSA measurements in the Antarctic boundary layer: impact of BrO on MSA production” by K. A. Read et al.

Anonymous Referee #2

Received and published: 1 March 2008

This paper presents some exciting new BrO data in conjunction with DMS and aerosol MSA measurements during the 2004 CHABLIS study at Halley Station. The authors calculate the potential production rate of DMSO and MSA from DMS oxidation by OH and BrO and shows that the relatively high MSA concentrations (high MSA/nss sulfate ratio) observed near the Antarctic coast could be due to DMS + BrO oxidation. This is suggested because BrO oxidation could be far more efficient at producing DMSO, that would subsequently be converted to MSA, than would the OH oxidation route. If true this would provide a very different interpretation of why MSA/nss sulfate ratios might decrease as one moves from the coast to the Antarctic plateau. This could be a very important point when trying to interpret ice core records. There are many uncertainties

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associated with the calculations presented in this manuscript as pointed out by the authors. DMS concentration are known at the measurement site, not at the source where the DMS first starts being oxidized. Likewise, OH and BrO concentrations are not known along the path of DMS transport. Also, some branching ratios on the transition from DMS to particle MSA had to be assumed. The authors argue, however, that the contribution of BrO oxidation to MSA production could be an order of magnitude larger than that produced by OH oxidation alone, and thus probably provides the dominant influence on MSA production at Halley Station. This manuscript provides important new insight into coastal DMS oxidation and while there is more that needs to be done in this area, it should help redirect more research into understanding Antarctic halogen chemistry. Some corrections have already been suggested by M. Legrand. These comments still remain after the authors response to Legrands input: 1)Item 2660 line 22: does 10e3 refer to a rate coefficient (see table 2) or a rate times an assumed concentration? Even after revising the DMS + BrO rate up by a factor of 10 this statement is still not clear. 2)In the corrected version an OH concentration of 1×10^5 rather than 3×10^5 is used, but is this assumed as an annual average? If so how is this applied to calculate DMSO/MSA production, because when OH is high, so is the DMS concentration, but under local winter condition both are low? Can a reasonable estimate of how [OH] varies with time be used to calculate DMSO/MSA production. 3)In the conclusion, item 2676 line 3: please specify what filter data is said to appear to correlate.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 2657, 2008.

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