



Arctic biogenic aerosol sulphate at Alert, Nunavut, 1993-2003 and its relationship to sea ice coverage

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Isotope apportionment techniques were used to derive the amount of aerosol sulphate from dimethylsulphide (DMS) oxidation in aerosol samples from Alert, Nunavut, Canada. A significant increase in DMS sulphate is seen for the period 1993 to 2003 for weekly high volume filter samples. Changes in DMS sulphate aerosol concentrations are most apparent in the fall and winter months; October, November and December. The relationship between aerosol sulphate and methanesulphonic acid (MSA), a second product of DMS oxidation, has been explored with respect to sea ice coverage from Special Sensor Microwave Imager (SSM/I) passive microwave satellite data for the same period. A significant relationship between yearly average DMS sulphate at Alert and Arctic sea ice extent ($P = 0.01$) is observed when the year 2001 is treated as an outlier. A significant increase in MSA with time is not observed for the same time period, but a trend is apparent when a longer term record is considered. MSA in aerosols at Alert, Nunavut are correlated with NOW polyna ice cover rather than Arctic ice coverage and this difference is likely related to seasonal differences in the SO_4/MSA branching ratio. These results are important to the global radiation budget and may provide constraints for Arctic DMS aerosol feedbacks in future aerosol coupled climate models.