INTRODUCTION

As part of the INTEX-B project a Time of Flight Aerosol mass Spectrometer (ToF-AMS, Aerodyne Research Inc.) was deployed at the peak of Whistler Mountain (2182 mASL), to examine the effect of trans-pacific transport, as well as local and regional pollution influences on the site. The Whistler mountain site (BC, Canada), is an ideal location for studying these processes as it is often influenced by air masses from the pacific in the free troposphere.

In order to decipher the complicated particulate mass spectra obtained from the ToF-AMS, a Principal Component Analysis (PCA) technique was developed and applied to the data. Results of the PCA are presented, which aid in the apportionment of aerosol mass to specific processes, by identifying co-varying aerosol components.

APPLICATION OF PRINCIPAL COMPONENT ANALYSIS TO AEROSOL MASS SPECTROMETRY DATA FROM THE WHISTLER HIGH ELEVATION SITE

RESULTS & DISCUSSION

Component 1 (sulfate) dominates when Whistler is de-coupled from the valley below.

Component 3 is highly similar to the mass spectrum obtained during the oxidation of α-pinene in smog chamber studies. It is likely that component 3 at Whistler is associated with oxidation products of biogenic origin.

RESULTS & DISCUSSION

Four components were usually sufficient to describe the Whistler AMS data, accounting for >99% of the total variance.

Biogenic aerosols (component 3) may account for up to 60% of the net total aerosol mass derived by PCA.

A primarily sulfate component may be a result of trans-pacific transport.

Possible biomass burning component was also identified (period 3).

Organs during period 3 likely a result of subsidence from aloft.

Biomass burning was not evident during Period 1.

HCl was observed in both inorganic components during Period 1.

Aerosols during period 1 were more likely associated with the valley below (within the boundary layer).

CONCLUSIONS

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