

**MEASUREMENTS OF CHEMICAL AND OPTICAL PROPERTIES IN BIOMASS  
BURNING SMOKE AND URBAN/INDUSTRIAL PLUMES IN THE NW PACIFIC  
REGION: IMPLICATIONS FOR CLIMATE MODELS**

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## ***ABSTRACT***

During the 2003 APEX experiment on the Japanese island of Amami-Oshima, various methods for measuring elemental carbon (EC) and organic carbon (OC) were compared through concurrent measurements by carbonaceous aerosol analyzers. We also measured other physical and chemical properties of the aerosols, in order to characterize their radiative properties, including the wavelength dependence of aerosol absorption. A variety of air masses were encountered, including regional background haze, local biomass burning events, and polluted and/or dusty air masses when winds came from China.

We compared a number of temperature dependent carbon analyses within the thermal-optical transmission (TOT) method of EC/OC analysis, and found the resulting EC and OC measurements to vary only slightly. Mean OC and EC concentrations were 2.2 and 0.85, 3.2 and 3.2, and 1.5 and 0.98  $\mu\text{gC}/\text{m}^3$  for regional background haze, pollution, and pollution/dust, respectively. The maximum EC (3.7  $\mu\text{g}/\text{m}^3$ ) and OC (6.7  $\mu\text{g}/\text{m}^3$ ) concentrations were in the Chinese pollution and local biomass burning smoke aerosols, respectively. In the polluted and dusty air mass, 40-60% of EC was found in the coarse mode, presumably due to coagulation of EC onto the surface of dust.

We found aerosol absorption to have a maximum wavelength dependence of  $\lambda^{-1.8}$  in local biomass burning smoke. Absorption of regional background haze and dust air masses displayed  $\lambda^{-1.2}$  and  $\lambda^{-0.94}$  dependences, respectively. The mean single scatter albedo (SSA) and EC mass absorption efficiency (MAE) at 550 nm for the experiment were 0.90 and 8.4  $\text{m}^2/\text{g}$ , respectively. The SSA showed a slight wavelength dependence that varied with source, and the MAE showed an inverse dependence with wavelength.