COMPARISON OF AEROSOL PROPERTIES DERIVED FROM SUN PHOTOMETER DATA AND GROUND-BASED CHEMICAL MEASUREMENTS.

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ABSTRACT

With the increased number of satellites being launched with objectives to observe and quantify global aerosol properties, especially over land surfaces, validation studies are needed to compare measured aerosol chemical and physical properties with those retrieved from space-borne platforms. Ground-based measurements play a key role in enhancing knowledge of aerosol properties needed for such validations. Optical measurements from sun photometers, and chemical measurements from long-term, routine filter-based sampling, currently provide two types of ground-truth data. In this work we seek to compare these two types of measurements for consistency.

Correlation studies of measurements from the Aerosol Robotic Network (AERONET) instrument located in Greenbelt, MD, and from the IMPROVE sampler in Washington, D.C. were performed. The AERONET data are obtained from a carefully calibrated CIMEL sun/sky scanning radiometer that began operating in May 1993. Inverted data include aerosol size distributions and refractive indices retrieved using the algorithm developed by Dubovik et al. (1999). The IMPROVE data at the Washington, D.C. site have been collected since August 1988 as part of the national IMPROVE network of sites in federal Class I areas, and consist of twice-weekly samples that are analyzed for PM-2.5 and PM-10 mass concentrations, major ions, organic and light-absorbing carbon, and elements. We compare the IMPROVE-derived ratios of fine to total mass with those derived from the AERONET instrument, and examine relative contributions of each mode to the total column extinction. We also compare refractive indices from the AERONET inversion to changes in the chemical composition of the aerosol, particularly the contributions of elemental carbon. The range of values found for refractive indices and fine/coarse mass fractions are compared with aerosol models proposed for use in satellite retrievals of aerosol optical depth.

Dubovic, O., M. D. King, B. N. Holben, Y. J. Kaufman, A. Smirnov, T. F. Eck, and I. Slutsker, A flexible inversion algorithm for retrieval of aerosol properties from Sun and sky radiance measurements, *J. Geophysical Research, submitted,* 1999.