

FINE AEROSOL CHEMICAL COMPOSITION AT THE ARM SOUTHERN GREAT PLAINS
SITE DURING THE 2003 AEROSOL IOP

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ABSTRACT

Key aerosol properties were characterized by a number of research groups during an Intensive Observation Period (IOP, May 2003) at the Southern Great Plains (SGP) site as part of the U.S. DOE Atmospheric Radiation Measurement (ARM) program. To compliment the goal of gaining an understanding of aerosol optical properties and their contributions to aerosol and cloud radiative effects, we measured fine ($d < 1 \mu\text{m}$) aerosol chemical composition and mass concentrations at the SGP Central Facility surface site. Aerosol ionic components, including ammonium, sulfate, nitrate, potassium, calcium, magnesium, sodium, chloride, oxalate, formate, and acetate, were measured during the daytime using a particle-into-liquid sampler coupled to ion chromatography technique at a time resolution of 8 min and a limit of detection (LOD) of $0.1 \mu\text{g m}^{-3}$. The results showed that ammonium and sulfate were the dominant ions with a typical molar ratio close to 2 to 1; potassium and nitrate were prominent only on a few days and were mostly below LOD; oxalate was present in nearly half of the samples but at a very low level; acetate and formate were observed occasionally but the LOD of these two species were significantly higher than the rest of the ions; sodium, chloride, calcium and magnesium were near their LOD for the entire period. We will report the measured fine aerosol ionic composition and the inferred organic contents derived from aerosol mass concentrations measured using the TEOM instrument. The relationships between chemical composition and aerosol properties such as light scattering and size dependence on relative humidity will be investigated.