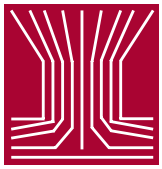
An International Specialty Conference
Sponsored by the American Association
for Aerosol Research

Final Program Addendum

- **Exhibitors**
- **Speaker Ready Room**
- **Changes to Plenary Sessions Speaker Schedule**
- **Listing of Late Breaking Posters in Session 12PG (Wednesday Afternoon)**; Late Breaking Posters in Session 17PJ are listed in the Final Program and Abstract Book (Abstracts of Session 12PG Late Breaking Posters are attached at the end of the addendum)
- **Presentation Withdrawals**
- **Presentations Moved to New Sessions**
- **Changes to Co-Authors or Presenter Listed in the Program and Abstract Book**
- **Late Breaking Abstracts Presented in Session 12PG and Session 11A-4**



American Association for Aerosol Research

Exhibitors	Booth Number
Grimm Technologies Inc	23
Met One Instruments	22
New Star Environmental	17
RJ Lee Group, Inc.	16

Exhibitors

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RJ Lee Group provides consulting, contract research and analytical laboratory services in the field of materials characterization. Analytical services address industrial hygiene, environmental, forensic, materials failure, construction defects and other materials problems.

Exhibitor Changes

Tisch Environmental, Inc has moved to booth 20.
Magee Scientific has moved to booth 21.

Speaker Ready Room

Georgia 1 has been designated the Speaker Ready Room.

Sunday, February 6	5:00 PM - 9:00 PM
Monday, February 7	7:00 AM - 6:00 PM
Tuesday, February 8	7:00 AM - 6:00 PM
Wednesday, February 9	7:00 AM - 6:00 PM
Thursday, February 10	7:00 AM - 6:00 PM
Friday, February 11	7:00 AM - 12:00 PM

Changes to Plenary Sessions Speaker Schedule

Speaker	Original Day	New Day
Jeff Holmstead	Monday, Feb. 7	Tuesday, Feb. 8, 8:00 AM
John Bachmann	Tuesday, Feb. 8	Monday, Feb. 7, 10:10 AM

Listing of Late Breaking Posters in Session 12PG (Wednesday Afternoon)

Wednesday, Session 12PG Late Breaking Results Georgia Hall

3:40 PM - 4:25 PM: Posters with even numbers.
4:25 PM - 5:20 PM: Posters with odd numbers.

12PG-35 **SOURCE CONTRIBUTIONS TO THE ORGANIC AEROSOL FRACTION IN THE TENNESSEE VALLEY: SEASONAL AND URBAN-RURAL DIFFERENCES**, *ROGER L. TANNER, Tennessee Valley Authority, Muscle Shoals, AL; Mei Zheng, Ke Lin, Georgia Institute of Technology, Atlanta, GA; James J. Schauer, University of Wisconsin, Madison, WI; Ann P. McNichol, Woods Hole Oceanographic Institute, Woods Hole, MA*

12PG-36 **THE DESIGN OF THE ITALIAN NETWORK FOR BACKGROUND PM MEASUREMENTS**, *Gabriele Zanini, Lina Vitali, FABIO MONFORTI, ENEA,Agency for New Technologies,Energy and Environment, PROT-INN Section, Bologna, Italy*

12PG-37 **AN INTEGRATED APPROACH TO AIR QUALITY ATTAINMENT**, *DANIEL S. COHAN, Georgia Department of Natural Resources, Atlanta, GA*

12PG-38 **IMPACT OF WOOD SMOKE ON WINTER AEROSOL CONCENTRATIONS IN FRESNO, CA: SPATIAL AND TEMPORAL DISTRIBUTION**, *Jeffrey Collett, COURTNEY GORIN, Colorado State University, Fort Collins, CO; Pierre Herckes, Arizona State University, Phoenix, AZ*

12PG-39 **LIGHT AIRCRAFT AEROSOL RESEARCH INLET (LAARI)**, *PEDRO A. BUENO, Jennifer C. Hains, University of Maryland Department of Chemistry and Biochemistry, College Park, MD; BRETT F. TAUBMEN, Penn State University Department of Meteorology, University Park, PA; Lackson T. Marufu, University of Maryland Department of Meteorology, College Park, MD*

12PG-40 **A STUDY OF PHYSICAL, CHEMICAL AND OPTICAL CHARACTERISTICS OF AMBIENT AEROSOLS IN SOUTHEAST ASIA DURING HAZY AND NON-HAZY DAYS**, *SIAO WEI SEE, Rajasekhar Balasubramanian, Kit Yin Wong, National University of Singapore, Singapore*

12PG-41 **CHARACTERIZATION OF INDOOR AEROSOLS ASSOCIATED WITH RESIDENTIAL AND COMMERCIAL COOKING**, *SIAO WEI SEE, Rajasekhar Balasubramanian, Shu Xian O*

12PG-42 **THE USE OF VACUUM ULTRAVIOLET IONIZATION FOR THE DETERMINATION OF ORGANIC AEROSOL COMPOSITION IN AN AEROSOL MASS SPECTROMETER**, *MEGAN NORTHWAY, John Jayne, Tim Onasch, Manjula Canagaratna, Doug Worsnop, Aerodyne Research, Inc., Billerica, MA; Darin Toohey and Jose Jimenez, University of Colorado, Boulder, CO*

12PG-43 **NEW MEASUREMENTS SITE FOR PHYSICAL AND CHEMICAL PARTICLE CHARACTERIZATION IN AUGSBURG, GERMANY**, *J. Cyrys, M. Pitz, H.-Erich Wichmann, A. Peters*

12PG-44 **INTRA-COMMUNITY VARIABILITY IN SIZE-FRACTIONATED AEROSOLS AND SOURCE APPORTIONMENT OF LOCAL PM USING ORGANIC COMPOUNDS AS TRACERS**, *Margaret Krudysz, Paul Mayo, Suresh Stratnam, John Froines, University of California, Los Angeles, CA; Philip Fine, Ed Avol, Costas Sioutas, University of Southern California, Los Angeles, CA*

12PG-45 **METAL SPECIES IN URBAN PARTICULATE MATTER**, *JUERGEN MUELLER*, *Umweltbundesamt, Langen, Germany*

Presentation Withdrawals

Abstract Number:	Author(s) of Record	Title
7PF-21	Heinz Fissan	PM10 And PM2.5 Source Apportionment At Three Urban Back Ground Sites In The Western Ruhr-Area, Germany
17PE-24	N. Shantikumar Singh	Influence Of Meteorological Processes On Aerosol In An Urban Environment
14C-3	Suresh K. Varghese, S. Gangamma	Effect Of Ventilation Systems And Air Cleaners On Decay Rates Of Particles Produced By Indoor Sources In Indian Urban Household
18B-2	Freitas and Pacheco	Selenium In Fine Particles (Pm2.5) Over Metropolitan Lisbon (Portugal) -- Canonical Levels And Relevant Episodes

Presentations Moved to New Sessions

Original Abstract Number	New Abstract Number	Author of Record	Title
19C-3	15A-4	Kaarle Hämeri	Growth Of Atmospheric Aerosol Particles In Water And Ethanol Vapours: Effect Of SO2 Oxidation
(Late Breaking)	11A-4*	Guenter Engling	Determination Of Levoglucosan In Biomass Combustion Aerosol By HPAEC-PAD

*Abstract 11A-4 can be found at the end of the addendum, following 12PG session abstracts.

Changes to Co-Authors or Presenter Listed in the Program and Abstract Book

Abstract Number	**Revised Author/Presenter List (*Revised Title if Changed)***
6C-4 (Co-a*uthor List Change*)	*YOUNG J. KIM*, Hyun R. Jung, Min J. Kim, Byung U. Lee, Advanced Environmental Monitoring Research Center (ADEMRC), Department of Environmental Science and Engineering, Gwangju Institute of Science and Technology (GIST), Gwangju, Korea; Shin D. Kim, Jin S. Park, Department of Environmental Engineering, University of Seoul, Seoul, Korea; Dong S. Lee, Bo K. Lee, Department of Chemistry, Yonsei University, Seoul, Korea; Jin S. Han, Suck J. Lee, Air Quality Research Division, National Institute of Environmental Research, Seoul, Korea; Kyung W. Kim, Department of Environmental Engineering, Gyeongju University, Gyeongju, Korea (*Characteristics Of Fine Particulate Matter And Its Impact On Visibility Impairment At Two Urban Sites In Korea; Seoul And Incheon*)
8B-4 (Co-a*uthor List Change*)	*KARSTEN BAUMANN, Georgia Institute of Technology, Atlanta, GA,* Eric Edgerton, Atmospheric Research and Analysis, Inc., Cary, NC; Michael Chang, Georgia Institute of Technology, School of Earth & Atmospheric Sciences, Atlanta, GA; Ted Russell, Georgia Institute of Technology, School of Civil & Environmental Engineering, Atlanta, GA
11A-2 (Co-a*uthor List Change*)	*KARSTEN BAUMANN, Georgia Institute of Technology, Atlanta, GA*; Alper Unal, Georgia Institute of Technology, School of Civil & Environmental Engineering, Atlanta, GA; Sangil Lee, Georgia Institute of Technology, School of Civil & Environmental Engineering, Atlanta, GA; Mei Zheng, Georgia Institute of Technology, School of Earth & Atmospheric Sciences, Atlanta, GA
2A-2 (Change of *Presenter*)	*JUDITH CHOW* will be presenting for Junji Cao the paper entitled "Characterization And Source Apportionment Of Atmospheric Organic And Elemental Carbon In 2003 Autumn And Winter Over Xi'an, China"
2C-1 (Change of *Presenter*)	*JAMIE SCHAUER* will be presenting for Hans Paxbaum the paper entitled: "Contribution Of Atmospheric Polymers To OC At A Rural And An Urban Site In The Area Of Vienna"
17P-D-8 (Change of *Presenter*)	*MARIA DE FÁTIMA ANDRADE* will be presenting for Taciana Albuquerque the poster entitled "Size Distributions of the Atmospheric Aerosol in the Metropolitan Area of San Paulo: A Case Study for The Winter of 2003"

12PG-35

SOURCE CONTRIBUTIONS TO THE ORGANIC AEROSOL FRACTION IN THE TENNESSEE VALLEY: SEASONAL AND URBAN-RURAL DIFFERENCES, *ROGER L. TANNER, Tennessee Valley Authority, Muscle Shoals, AL; Mei Zheng, Ke Lin, Georgia Institute of Technology, Atlanta, GA; James J. Schauer, University of Wisconsin, Madison, WI; Ann P. McNichol, Woods Hole Oceanographic Institute, Woods Hole, MA*

The contribution of specific sources to the mass of organic aerosols in the ambient atmosphere is of great interest because of their likely contribution to the health effects of aerosols. The complexity of the organic aerosol fraction has made the quantification of organic aerosol sources particularly difficult. One recent approach showing promise combines the use of organic tracers of specific OC sources with 14C isotopic analysis to determine both fossil and non-fossil components of primary organic aerosols and those "other" unattributed fossil and non-fossil organics usually referred to as secondary organic aerosols (SOA) (Zheng et al., 2002). Tracers include alkanes, hopanes and steranes, alkanoic and alkanedioic acids, PAHs, resin acids, cholesterol and levoglucosan, from which the primary organic contributions from 8 source groups—diesel exhaust, gasoline exhaust, wood combustion, meat cooking, paved road dust, cigarette smoke, natural gas exhaust, and vegetative detritus can usually be quantified. This work reports the parsing of organic aerosol sources conducted for 3 groups of PM2.5 high-volume samples (collected on quartz filters) from a mid-sized urban area (Chattanooga) in the early spring season, from a smaller urban area (Muscle Shoals in NW Alabama) in winter, and in a remote area (Look Rock, GSMNP) in summer and early fall. Source allocation was combined with 14C measurements to determine the contributions of primary and secondary organic aerosols of fossil and biogenic (modern carbon) origin. The results are self-consistent datasets by location and season wherein the lowest modern carbon fractions were observed at the urban location with comparable primary and secondary, fossil and biogenic contributions. In contrast, primary contributions, mostly biogenic and including a large wood-burning contribution, dominated in winter at the Muscle Shoals site. Summer contributions at Look Rock were mostly modern carbon from secondary sources, likely due to gas-to-particle conversion of biogenic emissions. * Zheng, M., G.R. Cass, J.J., and E.S. Edgerton, Environ. Sci. Technol. 36, 2361-2371 (2002).

12PG-36

THE DESIGN OF THE ITALIAN NETWORK FOR BACKGROUND PM MEASUREMENTS, *Gabriele Zanini, Lina Vitali, FABIO MONFORTI, ENEA,Agency for New Technologies,Energy and Environment, PROT-INN Section, Bologna, Italy*

In EU countries, 2005 is a crucial year for PM regulation as the second phase of application of the Directive 1999/30/EC will start stating stricter air quality limits. The former values 40 µg/m3 as annual average and a daily threshold value of 50 µg/m3 not to be exceeded more than 35 days per year will be gradually lowered to respectively 20 µg/m3 and 50 µg/m3 with not more than 7 exceedances. Moreover the second Position Paper on PM proposes to change the metric and to set limit values for PM2.5 . Derogations are admitted for natural PM due to, for example, long range transport (saharian dust from northern Africa) or dust resuspension from semi-arid regions. In southern Europe these episodes are more probable than in central or northern Europe. Furthermore, other phenomena contribute to the natural PM background in the Mediterranean, namely the higher contribution of secondary aerosols because of the high rate of photochemical conversion and the low rate of precipitations and air masses exchange in the area. As the Italian peninsula is very close to the origin area of saharian dust, it is likely that the contribution of this kind of PM could be important. In order to quantify the source apportionment and the natural share of PM, the Italian Ministry of Environment has committed the design of a network based on few sites far away from local sources and representative of the different climatologic zones of the Country. Bearing in mind this general criteria many sites have been examinated from the Alps to Sicily in hilly, flat and coastal districts: the back-trajectories model HYSPLIT_4 has been applied in order to quantify the number of episodes of saharian dust likely to involve the future measurement sites. In order to identify the dominant air masses origin, air masses in each examined location have been back-traced for 10 days for each day from 1/1/2000 to 12/31/2003. Model results have shown as about 15-20% of air masses arriving in southern Italy sites (Sicily and Calabry mountains) have traveled on the Sahara desert at least for one day, whereas this share decreases to about 5% for northern Italy stations (Po valley and Dolomiti). The model simulations allowed to select only seven sites which will become the italian PM network. These stations will measure at least PM10, PM2.5 and PM1 on a daily basis. Furthermore, the evaluation of the share of Elementary Carbon, Organic Carbon, mineral dust, marine dust, sulphates, nitrates and ammonia is also planned for all mass fractions. Wind and atmospheric stability (through natural radioactivity measurements) will also be measured in each station whereas number concentration of fine particles (diameter < 0.5 µ), ozone, PAN, PAHs and N-PAHs are expected to be measured al least in some of the stations. The paper will show PM phenomenology in Italy and will describe the methodology for selecting sites, instruments and procedure adopted in designing the PM national network.

12PG-37

AN INTEGRATED APPROACH TO AIR QUALITY ATTAINMENT, *DANIEL S. COHAN, Georgia Department of Natural Resources, Atlanta, GA*

With the recent onset of more stringent National Ambient Air Quality Standards (NAAQS) for fine particulate matter (PM2.5) and ozone, hundreds of counties have been designated by the U.S. Environmental Protection Agency as non-attainment areas. States are mandated to develop state implementation plans (SIPs) demonstrating how attainment will be achieved in those areas, many of which had never violated any of the earlier NAAQS. Many states face the daunting challenge of developing SIPs for multiple non-attainment regions for both PM2.5 and ozone. However, this challenge also represents an opportunity to adopt integrated approaches that consider the interconnections of air quality with economic growth, regional planning, and public health. This poster will present a framework for incorporating considerations of control costs and health benefits into the SIP development process. It will highlight emerging technologies and resources for three key components of what is envisioned as an integrated and multi-faceted approach to SIP development: (1) AirControlNET (developed by E.H. Pechan for U.S. EPA) and other resources for identifying potential control measures and quantifying associated costs, (2) atmospheric sensitivity analysis techniques for predicting the impacts of control measures on air quality, and (3) software such as BenMAP (developed by Abt Associates Inc. for U.S. EPA) for linking air quality improvements with likely benefits to human health, vegetation, and visibility. The incorporation of cost and benefit considerations into the SIP development process can help orient control strategy selection toward more cost-effective options and can help state agencies better communicate the full implications of an air quality plan to the public. Consideration of atmospheric sensitivity is especially crucial for ozone and PM2.5 because the responsiveness of these pollutants to emissions varies sharply by location and precursor compound. Linkage of sensitivity analysis with the cost and benefit components allows policy makers to evaluate various abatement options on a common metric and to prioritize control of sources to which ambient pollutant concentrations are most sensitive. Thus, it is suggested that atmospheric modeling should be conducted not merely as a final demonstration of attainment for an overall SIP strategy, but also to generate atmospheric sensitivity estimates early in the planning process that can help guide the selection of potential measures. Effective communication among atmospheric modelers and policy planners will be crucial to the success of the envisioned framework.

12PG-38

IMPACT OF WOOD SMOKE ON WINTER AEROSOL CONCENTRATIONS IN FRESNO, CA: SPATIAL AND TEMPORAL DISTRIBUTION, *Jeffrey Collett, COURTNEY GORIN, Colorado State University, Fort Collins, CO; Pierre Herckes, Arizona State University, Phoenix, AZ*

The city of Fresno is located in the San Joaquin Valley in central California. This region experiences anomalously high levels of air pollution and, in particular, elevated levels of particulate matter (PM) during the winter season. In an effort to better quantify winter time PM and the contribution of wood smoke to pollution events in Fresno, a field campaign was conducted between December 24th, 2003 and January 15th, 2004. Over this three week period both coarse and fine 24-hour average PM samples were collected at five locations in Fresno including residential, urban, and industrial sites. Subsequent analyses of the collected samples were performed to determine the spatial variability in concentrations of the wood smoke marker levoglucosan and to examine the overall contribution of wood smoke to total PM concentrations. Samples were collected over a 24-hour time averaged period using quartz fiber filters with hi-volume collectors equipped with a size cut to limit the lower filter loading to PM with a diameter of 2.5 microns or less (PM2.5). The analytical techniques used to quantify the chemical composition of collected samples include Sunset Laboratories Organic and Elemental Carbon Analyzer, high-performance liquid chromatographic (HPLC) separation of levoglucosan and other carbohydrates with pulsed amperometric detection (PAD), and Gas Chromatography coupled to Mass Spectrometry (GC/MS) of both sample extracts and derivatized extracts. The results of this study indicate that intra-city variability is minimal for 24-hour time periods: both PM2.5 and wood smoke concentrations were relatively consistent between sampling sites. Typical PM2.5 concentrations varied between 6 and 60 μg/m3 with two distinct periods captured during the field study. In the first part of the study from December 25th, 2003 to January 7th, 2004 the PM2.5 concentration underwent large variations between one day and the next, where as the later period suggests a more consistent level of PM2.5 with concentrations of approximately 30 μg/m3. The results of OC/EC analysis show that the fine filter total carbon (TC) generally tracks the concentration of PM2.5. However, the proportion of TC to PM2.5 can vary substantially from 90% to 10% with an average TC concentration of 15 μg/m3. The ratio of elemental carbon (EC) to organic carbon (OC) varied by site, but typically EC was between 15% and 20% of OC. The concentration of levoglucosan, a common wood smoke marker, was between 0.1 and 1.0 μg/m3. The highest contribution of wood smoke to OC occurred on holidays when levoglucosan comprised 3% of OC.

12PG-39

LIGHT AIRCRAFT AEROSOL RESEARCH INLET (LAARI), *PEDRO A. BUENO, Jennifer C. Hains, University of Maryland Department of Chemistry and Biochemistry, College Park, MD; BRETT F. TAUBMEN, Penn State University Department of Meteorology, University Park, PA; Lackson T. Marufu, University of Maryland Department of Meteorology, College Park, MD*

Many counties in the Mid-Atlantic are in violation of EPA air quality standards. Factors that influence air quality in this region include emissions, meteorology, chemistry, and dynamics. Unfortunately, some of these processes are not well characterized and their fractional contributions to air pollution in the region are not well understood. In 1992, in response to this challenge, a consortium of Mid-Atlantic States initiated a research program called Regional Atmospheric Measurement Modeling and Prediction Program (RAMMPP) to conduct holistic, long-term air quality studies in the region. RAMMPP involves four elements: Forecasting; Meso-scale modeling; Chemical Transport Modeling; and Measurements. The work presented herein focuses on the measurement aspect, specifically the surface based measurements made at Fort Meade, MD and a new aerosol inlet developed for light research aircraft. Aircraft provide a mobile platform for measuring aerosol property vertical profile information. The efficacy of these measurements, however, is constrained by the aerosol inlet system sampling efficiency. Larger particles are often lost to turbulent deposition and impaction within the inlet and sampling lines, respectively. This precludes the measurement of coarse mode particles, important to visibility and radiative transfer studies. Turbulent deposition of large particles occurs upon slowing the sample air stream within the inlet from the aircraft velocity to the recommended sampling velocities of the aerosol instruments (~10 m s-1). We have designed an aerosol inlet for a light aircraft with an average air speed of 60 m s-1 and a sample flow rate of 28.5 L min-1 . The calculated Reynolds number (Re) at the opening is 11,430 and decreases to 3,811 at the inlet terminus. Sampling line impaction is reduced by decreasing the number of bends upstream of the instruments. A parallel sampling manifold splits the sample stream into four separate streams, three of which are split from the primary sample stream. Initial results from modeling studies using Computational Fluid Dynamics (CFD) software from Fluent show that the transport efficiency of spherical particles with a 10 ?m diameter and density equivalent to NH4HSO4 released at the inlet opening and counted at the manifold terminus is roughly 50%. The transport efficiency improves as particle diameter decreases to a near perfect efficiency for particles less than 2.5 ?m in diameter. Wind jet analyses with optical particle counters upstream and downstream of the inlet and sampling lines will validate the theoretical calculations and provide empirical sampling efficiency values. This new inlet design will facilitate the more efficient collection of coarse mode particles, a benefit to satellite validation work, column closure tests, and climate change studies.

12PG-40

A STUDY OF PHYSICAL, CHEMICAL AND OPTICAL CHARACTERISTICS OF AMBIENT AEROSOLS IN SOUTHEAST ASIA DURING HAZY AND NON-HAZY DAYS, *SIAO WEI SEE, Rajasekhar Balasubramanian, Kit Yin Wong, National University of Singapore, Singapore*

Singapore is one of the most densely populated countries in the world with a population of over 4 million and a total land area of 646 square kilometres. Apart from local emissions from the burning of fossil fuels in industries and transportation, the outdoor air quality is also influenced by transboundary air pollution. In particular, biomass burning in Indonesia in the inter-monsoon periods or near the end of the southwest monsoon in August and September is of serious concern since it is a recurrent air pollution problem and adversely affects many countries in Southeast Asia including Singapore. However, studies dealing with smoke haze in this region have been mostly confined to short-term investigations of a selected number of air pollutants near the hot-spots. As a result, the long-range transport of smoke haze and its impact on sensitive ecosystems and human health are poorly understood. As part of a major study on biomass burning and the resultant smoke haze in Southeast Asia, a systematic field investigation was conducted to characterize the physical, chemical and optical properties of ambient aerosols in Singapore from August to December 2001 on both hazy and non-hazy days. The major goal of this study was to gain a better understanding of atmospheric visibility reduction in this region and to identify the factors contributing to the regional haze phenomenon. The parameters measured in this study included: (1) time-integrated measurements of mass concentration and size distribution of airborne particles with the Micro-Orifice Uniform Deposit Impactor (MOUDI), (2) concurrent measurements of number concentration and size distribution of aerosols in real-time with the Scanning Mobility Particle Sizer (SMPS), the Aerodynamic Particle Sizer (APS) and the Ultrafine Condensation Particle Counter (UCPC) in parallel operations, (3) continuous measurements of black carbon with the Aethalometer, and (4) time-integrated speciation measurements of particles collected in the different stages of the MOUDI, with emphasis on carbonaceous aerosols, i.e. total carbon (TC), elemental carbon (EC) and organic carbon (OC), ions, and metals. The particle mass and number, sulphates (SO42-), nitrates (NO3-), ammonium (NH4+), EC and OC levels were approximately 2 to 4 times higher on hazy days as compared to non-hazy days. However, the rest of the chemical constituents in aerosols did not show appreciable differences between clear and hazy days. The results obtained from this comprehensive field study will be discussed in the conference.

12PG-41

CHARACTERIZATION OF INDOOR AEROSOLS ASSOCIATED WITH RESIDENTIAL AND COMMERCIAL COOKING, *SIAO WEI SEE, Rajasekhar Balasubramanian, Shu Xian O*

In most developed countries, food cooking using liquefied petroleum gas represents one of the most important sources of aerosols in homes and buildings with non-smokers. Incomplete combustion of fuel, food and oil emits small particles containing a host of inorganic and organic components including mutagens and carcinogens, and thus poses a health threat to the building occupants. However, the physical and chemical properties of indoor aerosols produced by gas cooking have not been investigated yet in a comprehensive manner. We have recently carried out a systematic study in residential and commercial kitchens where stir frying in a wok is the most commonly used cooking method. This cooking method is known to generate more ultrafine particles than other methods. The parameters measured during the cooking activities included the following: (1) time-integrated measurements of mass concentration of fine particles with the MiniVol Portable Air Sampler, (2) continuous measurements of mass and number concentrations of particles and their size distributions in real-time with the Electrical Low Pressure Impactor, (3) continuous measurements of black carbon with the Aethalometer and (4) time integrated speciation measurements of fine particles, with emphasis on ions, metals, polycyclic aromatic hydrocarbons and aliphatic hydrocarbons. This indoor air quality assessment also included scripted indoor cooking activities to assess the contribution of cooking activities to indoor particle concentrations. This investigation revealed that cooking can increase the levels of indoor aerosols by as much as 10 times. The enhancement in the particle concentration is relatively higher in the commercial kitchen where there is more intense cooking in a less ventilated space. Results obtained from this comprehensive field study will be presented and discussed in the conference.

12PG-42

THE USE OF VACUUM ULTRAVIOLET IONIZATION FOR THE DETERMINATION OF ORGANIC AEROSOL COMPOSITION IN AN AEROSOL MASS SPECTROMETER, *MEGAN NORTHWAY, John Jayne, Tim Onasch, Manjula Canagaratna, Doug Worsnop, Aerodyne Research, Inc., Billerica, MA; Darin Toohey and Jose Jimenez, University of Colorado, Boulder, CO*

In recent years, the Aerodyne Aerosol Mass Spectrometer (AMS) has become a widely used and accepted tool for determining aerosol size distributions and chemical composition for non-refractory inorganic and organic aerosol. The current version of the AMS uses a combination of flash thermal vaporization and 70 eV electron impact (EI) ionization. EI is advantageous because it is a universally utilized and quantitative technique; however, for organic compounds the fragmentation caused by 70 eV electrons is extensive. Furthermore, recent field campaigns have confirmed that atmospheric aerosols, in particular organic aerosols, are complex mixtures of many compounds. Hence, EI mass spectra of organic aerosols are difficult to convolute because they are composites of the overlapping fragmentation patterns of all species present. Previous AMS studies have been limited to classifying organics in broad categories such as “oxidized” and “hydrocarbon-like”. Here, we present new efforts to gain more information about organic aerosol composition by employing vacuum ultraviolet (VUV) ionization in an AMS. The VUV source used is a low-pressure krypton lamp (l ~120 nm) powered by a radio-frequency discharge. In our novel design the lamp is placed in direct proximity of the ionization region of the AMS, with only a window separating the lamp and the ionizer. This design allows for alternation of photo-ionization and electron impact ionization within the same instrument. Preliminary results of photo-ionization and electron impact ionization are compared for a number of compounds including diesel soot, oleic acid, polyaromatic hydrocarbons, complex organic material (humic acids), and long chain hydrocarbons. Much less fragmentation occurs with VUV than EI ionization, and for many compounds the parent ion is the most dominant ion in the spectrum. This is particularly true when the temperature of the vaporizer is decreased, reducing thermal fragmentation of compounds. Future technical modifications for improvements to the sensitivity of the technique and its potential for ambient measurements will be discussed.

12PG-43

NEW MEASUREMENTS SITE FOR PHYSICAL AND CHEMICAL PARTICLE CHARACTERIZATION IN AUGSBURG, GERMANY, *J. CYRYS, M. Pitz, H.-Erich Wichmann, A. Peters*

Since 1999 epidemiological studies on short-term effects of fine and ultrafine particles were performed in Augsburg, Germany. The exposure to the particles was characterized only by the particle mass (PM2.5) or total number concentration taken on hourly base. Currently we set up a new measurement site for more detailed physical-chemical particle characterization of the ambient aerosol for future epidemiological studies. The new fixed monitoring site is located 2 km to the south of the city center in Augsburg. Spatial variation measurements showed, that this site is representative for the city of Augsburg and that the correlation between the measurement site used in the past and the new measurement site is very strong (spearman correlation coefficient > 0.9). At the new measurement site a Scanning Mobility Particle Sizer (SMPS) system with an Aerodynamic Particle Sizer (APS) is used for the measurements of the particle number distribution in the size range from 3 nm to 10 µm. Additionally this system is equipped with a thermodenuder to distinguish between the volatile and non volatile part of the particle fraction. Two Tapered Element Oscillating Microbalance (TEOM) (for PM2.5 and PM10) systems are fitted out with the Filter Dynamics Measurement System (FDMS) to avoid the losses of particle mass due to the heating of the TEOM filter at 50 °C. The continuous measurements with Electrical Aerosol Detector (EAD) together with the Diffusion Charging Particle Sensor (DC) and the Photoelectric Aerosol Sensor Model PAS2000 measurements yield information about the total active aerosol surface (Fuchs surface) and the particle-bound polycyclic aromatic hydrocarbons. Besides the physical characterization of the ambient aerosol, we also approached the chemical composition (particulate sulfate, nitrate and organic- and soot-carbon mass concentration for PM2.5), Black Smoke (as the function of absorption coefficient) and elemental composition of the particles. The very first time series of the measured parameters will be presented. Such detailed physical and chemical characterization of ambient aerosol is done only on very few other sites in Germany or in Europe and only for short time periods. To our knowledge longer time series of such extensive aerosol measurements are not done in Germany to date. On the basis of the collected data we will be able to further characterization of the ambient aerosol in Augsburg in terms of source apportionment and the daily variation of the impact of the specific particle source. With the measuring data it is also possible to examine the influence of fine and ultrafine particles on health. Presently, the main focus is on health effects on the cardiovascular system; these examinations are conducted by the Cooperative Health Research in the region of Augsburg (KORA project).

12PG-44

INTRA-COMMUNITY VARIABILITY IN SIZE-FRACTIONATED AEROSOLS AND SOURCE APPORTIONMENT OF LOCAL PM USING ORGANIC COMPOUNDS AS TRACERS, *MARGARET KRUDYSZ, Paul Mayo, Suresh Stratnam, John Froines, University of California, Los Angeles, CA; Philip Fine, Ed Avol, Costas Sioutas, University of Southern California, Los Angeles, CA*

Particulate matter (PM) emitted by a variety of sources has been associated with significant health risks. High concentrations of ultrafine particles have been found near freeways, with significantly lower concentrations further from the pollution source. This implies that local traffic patterns and complex pollution sources such as freeways, power plants, refineries, airports and seaports are important in assessing particulate matter impacts on urban communities. Understanding these impacts on human health requires evaluation of particles' sources, formation mechanisms, and their spatial and seasonal variability. Source reconciliation studies allow for determination of PM sources most harmful to human health, and when coupled with toxicity research, result in more effective regulatory strategies with higher air quality standards, and ultimately reduce population exposure to these damaging pollutants. Organic compounds can act as tracers for pollutant emissions and can contribute to the evaluation of sources and atmospheric fates of urban aerosols. Partitioning of these compounds between the ultrafine, accumulation, and coarse modes provides additional information on the types of sources, the amount of secondary organic aerosol present, and their contributions to different particles size ranges.

Among some of the heaviest residential traffic locations in southern California are communities in Long Beach. Current fixed PM monitoring sites may not accurately reflect population exposure due to the presence and variability in local pollution sources. Although contribution of the significant sources to an exposure atmosphere has been quantified previously, no efforts have been made to study source apportionment of aerosols on a community scale. This work-in-progress investigates the spatial variation in PM-associated organics and attempts to quantitatively assess PM components in relation to various emission sources.

Summer PM samples were collected outside of residential homes, elementary schools, and central monitoring sites in 2004. Collection of wintertime particles will occur at two elementary schools and two central monitoring sites during winter of 2005. A pair of Personal Cascade Impactor Samplers operating at 9 l/min and separating particles into ultrafine (<0.25 mm), fine (0.25-2.5 mm), and coarse (>2.5mm) fractions, will be deployed at each site for 7 continuous days. Impactors will be loaded with quartz filters for elemental and organic carbon, organic speciation, and inorganic ion analysis, and teflon filters for particle mass and elemental content determination. Quantification of individual organic compounds will involve extraction with a mixture of methanol and dichloromethane after spiking with deuterated internal standards. Combined and concentrated extracts will be split into two parts. One fraction will be derivatized with diazomethane to convert organic acids to their methyl esters, and the other will remain underivatized. Both fractions, as well as authentic quantification standards with known amounts of the same isotope-labeled compounds used to spike the samples, will be analyzed by Gas Chromatography/Mass Spectrometry techniques.

These data will evaluate the accuracy of using central site monitors for exposure assessment and will use organic compounds for source apportionment of size-fractionated aerosols by chemical mass balance methods.

12PG-45

METAL SPECIES IN URBAN PARTICULATE MATTER, *JUERGEN MUELLER*, *Umweltbundesamt, Langen, Germany*

Airborne particulate matter (PM) consists of many insoluble metal species which partly are toxic. Up to date inorganic components of small concentrations mostly are analysed by Absorption Spectrometry (AAS, ICP-MS). However, only elements and no species are measured. In order to analyse elements in PM the sample is dissolved in inorganic acids. Thus, the compounds are destroyed and the solution becomes adequate only for elemental analysis.

By impactor measurements within the last decades it was found that the different species of an element accumulate in different size ranges of PM. The elemental mass size distributions consist of two or more modes. To each mode a compound of the measured element can be assigned. The Mass Median Diameter (MMD) of an elemental specie is related to it's specific vapour pressure p_s (Pa):

(1) $MMD = 0{,}1\ (1 - \lg p_s)\ \mu m$
$p_s < 1$ Pa

Each mode represents a compound. The intensity of the mode is related to the amount of the compound.
It was found that toxic chromium (VI) are in fine particles smaller than 1 µm whereas the harmless $Cr_2\ (III)O_3$ is in coarse particles larger than 5 µm.

In the case of iron the species in PM can be measured by use of Mößbauer-spectroscopy. Comparing these results with impactor measurements it was found that $FeCl_3$ and $Fe_2(SO_4)_3$ are in particles smaller than 1 µm, Fe_2O_3 in the size range between 2 and 5 µm. Fe_3O_4 and FeOOH are in coarse particles bigger than 5 µm.

By use of the impactor measurements in connection with equation (1) the concentrations of many metal species in PM were determined.

11A-4

DETERMINATION OF LEVOGLUCOSAN IN BIOMASS COMBUSTION AEROSOL BY HPAEC-PAD, *GUENTER ENGLING, Christian M. Carrico, Pierre Herckes, Sonia M. Kreidenweis, Jeffrey L. Collett, Jr.; Atmospheric Science Department, Colorado State University, Fort Collins, CO; Derek E. Day, William C. Malm, NPS/CIRA, Colorado State University, Fort Collins, CO; Ronald Babbitt, Emily Lincoln, U.S. Forest Service, Missoula, MT; Yoshiteru Iinuma, Hartmut Herrmann, Leibniz-Institut für Troposphärenforschung, Leipzig, Germany*

Atmospheric particulate matter can at times be heavily influenced by smoke from biomass burning, such as from wild fires, prescribed burns, or residential wood burning. The major thermal degradation product of cellulose, 1,6-anhydro-beta-D-glucopyranose (levoglucosan), has been identified in recent studies as a main component in tropospheric aerosol particles. Due to its source-specific emission from biomass pyrolysis and its atmospheric stability, levoglucosan is an important molecular marker for fine particle emissions from biomass combustion. While several source profiles for wood combustion under confined conditions, such as in residential wood stoves and fireplaces, have been established, there is still little data from the open combustion of biomass. This study, conducted at the Rocky Mountain Research Station Fire Sciences Lab in Missoula, MT, in November 2003 was aimed at characterizing the chemical and physical nature of the primary aerosol emissions from the combustion of various types of biomass under different combustion regimes. Detection of levoglucosan in atmospheric samples is typically performed by gas chromatographic (GC) separation with mass spectrometric (MS) detection. An alternative detection method based on liquid chromatographic separation of the non-derivatized analytes, using an anion exchange mechanism, followed by pulsed amperometric detection (PAD), was used in this study. PAD is a powerful detection technique with a broad linear range, very low detection limits, and high specificity for carbohydrates. High performance anion-exchange chromatography (HPAEC) coupled with PAD is capable of separating complex mixtures of carbohydrates, such as those found in biomass burning aerosol, without the need for chemical derivatization. During this study known amounts of various fuels, including hardwood and softwood, needles, and grasses, were burned in a large combustion chamber. Fine-particle samples were collected on quartz fiber filters using high-volume (Hi-Vol) collectors, equipped with PM2.5 impactors. Preliminary results show interesting patterns in the emission profiles of various molecular markers as a function of fuel type and combustion conditions. Levoglucosan in particular was detected as the major aerosol constituent in the fine mode of most fuel types. In general, hardwood emissions contained higher levoglucosan concentrations than softwood. While heading fires of needles and sagebrush produced more levoglucosan than backing fires, grasses showed the opposite trend. Furthermore, the flaming stage during the combustion of oak wood resulted in significantly higher levoglucosan emissions compared to the smoldering phase. The burning of pinewood on the other hand, generated more levoglucosan in the smoldering phase relative to a flaming fire. The levoglucosan mass concentrations from selected samples were compared to data obtained by an independent method, HPLC-MS, and showed good agreement. In addition to levoglucosan, the anhydro sugars mannosan and galactosan, as well as selected other carbohydrates, including glucose, were detected.