

Home

Online Library ACP

- Recent Final Revised Papers
- Volumes and Issues**
- Special Issues
- Library Search
- Title and Author Search

Online Library ACPD

Alerts & RSS Feeds

General Information

Submission

Review

Production

Subscription

Comment on a Paper



[Volumes and Issues](#) [Contents of Issue 6](#) [Special Issue](#)

Atmos. Chem. Phys., 6, 1733-1745, 2006

www.atmos-chem-phys.net/6/1733/2006/

© Author(s) 2006. This work is licensed under a Creative Commons License.

Sources and transformations of particle-bound polycyclic aromatic hydrocarbons in Mexico City

L. C. Marr^{1,2}, K. Dzepina³, J. L. Jimenez³, F. Reisen⁴, H. L. Bethel⁴, J. Arey⁴, J. S. Gaffney⁵, N. A. Marley⁵, L. T. Molina², and M. J. Molina^{2,*}

¹Dept. of Civil and Environmental Engineering, Virginia Polytechnic Inst. and State Univ., Blacksburg, Virginia, USA

²Dept. of Earth, Atmospheric, and Planetary Sciences, Massachusetts Inst. of Technology, Cambridge, Massachusetts, USA

³Dept. of Chemistry and Biochemistry, and Cooperative Inst. for Research in Environmental Sciences (CIRES), Univ. of Colorado, Boulder, Colorado, USA

⁴Air Pollution Research Center and Department of Environmental Sciences, Univ. of California, Riverside, USA

⁵Argonne National Laboratory, Illinois, USA

*now at: Dept. of Chemistry and Biochemistry, Univ. of California, San Diego, USA

Abstract. Understanding sources, concentrations, and transformations of polycyclic aromatic hydrocarbons (PAHs) in the atmosphere is important because of their potent mutagenicity and carcinogenicity. The measurement of particle-bound PAHs by three different methods during the Mexico City Metropolitan Area field campaign in April 2003 presents a unique opportunity for characterization of these compounds and intercomparison of the methods. The three methods are (1) collection and analysis of bulk samples for time-integrated gas- and particle-phase speciation by gas chromatography/mass spectrometry; (2) aerosol photoionization for fast detection of PAHs on particles' surfaces; and (3) aerosol mass spectrometry for fast analysis of size and chemical composition. This research represents the first time aerosol mass spectrometry has been used to measure ambient PAH concentrations and the first time that fast, real-time methods have been used to quantify PAHs alongside traditional filter-based measurements in an extended field campaign. Speciated PAH measurements suggest that motor vehicles and garbage and wood burning are important sources in Mexico City. The diurnal concentration patterns captured by aerosol photoionization and aerosol mass spectrometry are generally consistent. Ambient concentrations of particle-phase PAHs typically peak at $\sim 110 \text{ ng m}^{-3}$ during the morning rush hour and rapidly decay due to changes in source activity patterns and dilution as the boundary layer rises, although surface-bound PAH concentrations decay faster. The more rapid decrease in surface versus bulk PAH concentrations during the late morning suggests that freshly emitted combustion-related particles are quickly coated by secondary aerosol material in Mexico City's atmosphere and may also be transformed by heterogeneous reactions.

[Final Revised Paper](#) (PDF, 1082 KB) [Discussion Paper](#) (ACPD)

Citation: Marr, L. C., Dzepina, K., Jimenez, J. L., Reisen, F., Bethel, H. L., Arey, J., Gaffney, J. S., Marley, N. A., Molina, L. T., and Molina, M. J.: Sources

Search ACP

Library Search

Author Search

News

- Sister Journals AMT & GMD
- Financial Support for Authors
- Journal Impact Factor
- Public Relations & Background Information

Recent Papers

01 | ACPD, 07 Jan 2009: Chemistry and transport of pollution over the Gulf of Mexico and the Pacific: Spring 2006 INTEX-B Campaign overview and first results

02 | ACP, 07 Jan 2009: Cloud processing, cloud evaporation and Angström exponent

03 | ACP, 07 Jan 2009: Mixing processes and exchanges in the tropical and the subtropical UT/LS

and transformations of particle-bound polycyclic aromatic hydrocarbons in Mexico City, Atmos. Chem. Phys., 6, 1733-1745, 2006. [Bibtex](#) [EndNote](#) [Reference Manager](#)