Frederick W. Lurmann

Manager of Exposure Assessment Studies

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Mr. Lurmann has over 40 years of experience in atmospheric sciences and more than 15 years as a co-investigator for the U.S. Environmental Protection Agency (EPA) Children's Environmental Health Centers. He is currently a co-investigator for several National Institutes of Health (NIH)-sponsored studies involving air pollution and respiratory, neurological, metabolic, and birth outcomes. He is the co-chair of the Health Effect Institute's Panel on Health Effect of Traffic. His research has encompassed measurements, analysis, and modeling of ambient air quality and emissions since 1977. For the last 30 years, he has used his broad background and expertise in air quality, meteorology, exposure science, and data analysis to support a variety of epidemiologic studies of air pollution health effects, including the Southern California Children's Health Study. Much of his research has focused on improving the quality of exposure data and models used in health studies. His current research focus is on the development of regional-scale high-resolution exposure models and the health effects of traffic-related air pollution (TRAP).

Education

- MS, Mechanical and Environmental Engineering, UC Santa Barbara
- BS, Mechanical Engineering, UC Santa Barbara

Memberships

- Air & Waste Management Association
- International Society for Exposure Science
- American Association for Aerosol Research
- American Chemical Society

For a list of publications, see sonomatech.com/ResPub/FWLpub.pdf.

Mr. Lurmann has significant experience developing high-resolution exposure models to support air pollution epidemiologic studies, especially studies of the health effects of exposure to TRAP. His early models were primarily spatial models that relied on interpolation of measurement data, Caline4 dispersion model estimates, and land-use regression models with a modest number of variables. Mr. Lurmann and others have employed ensemble-based deep learning to develop advanced high-resolution models for NO_2, NO_X, and $PM_{2.5}$ concentrations and their uncertainties. These models combine land-cover, demographic, satellite, chemical transport, meteorological reanalysis, and elevation data, as well as roadway and dispersion model estimates of traffic and wildfire $PM_{2.5}$. He developed both point-based and grid-based models for weekly, seasonal, and annual exposures. Mr. Lurmann recognized the critical importance of collecting fine spatial resolution observations to complement the long-time series of Air Quality System (AQS) data for model development and validation. He has designed numerous saturation monitoring studies to collect data from up to 940 sites simultaneously for NO_2/NO_x, and 240 sites in eight communities for $PM_{0.2}$ and $PM_{2.5}$ mass, EC, OC, and metals, and smaller single-community networks for NO_2, NO_x, EC, OC, and speciated polycyclic aromatic hydrocarbons (PAHs). His research has found that highly clustered observational data surrounding AQS sites are extremely helpful in identifying the parameters that explain within-community (i.e., local-scale) variation in concentrations. Furthermore, analyses of ensemble learning model errors and uncertainties (i.e., "measurement error") have helped identify strengths and weaknesses in the research, and identify parameters and sources to include in future models.

Mr. Lurmann has published over 140 peer-reviewed publications on atmospheric chemistry, air quality modeling, air pollution health effects, and the health benefits of improving air quality.

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