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A Special Issue of *JA&WMA* on Papers from the “Leapfrogging Opportunities for Air Quality Improvement Conference”

By Guest Editors Junji Cao, John G. Watson, and Judith C. Chow



This Special Issue of the *Journal of the Air & Waste Management Association* contains 20 peer-reviewed scientific papers resulting from the Air & Waste Management Association (A&WMA) International Specialty Conference, “Leapfrogging Opportunities for Air Quality Improvement”, held in Xi’an, China, May 10–14, 2010. “Leapfrogging” is to progress by large jumps instead of small increments, with the help of others. The process applies to many fields; knowledge gained in one sector or country may facilitate leapfrogging in another field or region. Challenges exist, including understanding current status and determining “where you want to land.” The purpose of the Specialty Conference was to explore leapfrogging opportunities for air quality improvement.¹

Over the past two decades, many Asian countries, such as China and India, have experienced rapid economic growth that needs to be balanced with pollution control to ensure the long-term sustainability of the living environment. This Specialty Conference identified opportunities from the scientific, regulatory, industrial, and environmental communities, with over 450 participants from 38 countries. The conference included ~340 plenary, platform, and poster presentations. Delegates shared their worldwide experiences in different aspects of air quality management and assessment. Emphasis was made on how this information might be synthesized and applied to “leapfrog” ahead of traditional or past practice.

Topics addressed in this Special Issue include several disciplinary areas covering source characterization, ambient gaseous and particle measurements, pollution transport, air quality modeling, and air pollution health effects. Four papers focused on pollution source related research. Betha et al.² characterize emissions of ultrafine particles and volatile organic compounds (VOCs) from a commercial printing center in Singapore. Gupta et al.³ use X-ray fluorescence with low-Z (atomic number) particle electron probe to analyze municipal solid waste contaminated soil in India. Variations of gaseous and particulate mercury at a remediation site in Taiwan are examined by Jen et al.⁴ Li et al.⁵ discuss a compact dilution sampling system for stationary combustion sources developed in China.

Four papers address particulate matter (PM) mass and chemical composition. Malm et al.⁶ elaborate on the uncertainties in PM_{2.5} gravimetric and chemical component measurements for long-term U.S. nonurban and urban networks. Shen et al.⁷ compare vertical profiles (surface vs. 100 m height) of PM_{2.5} and PM₁₀ mass and chemical com-

position during a wintertime episode in Xi’an, China. Characteristics of PM_{2.5} and PM_{10-2.5} (PM_{coarse}) mass and carbon in a coastal and urban environment in Xiamen, China, are discussed by Chen et al.⁸ Different mixing states for sea salt, soot, and sulfate in Macao, South China, are reported by Li et al.⁹

Three papers address source impacts on regional air quality from Korea. Batmunkh et al.¹⁰ illustrate how organic carbon (OC), elemental carbon (EC), and water-soluble organic carbon (WSOC) concentrations at Gosan, Jeju Island, depend on transport pathways. Geng et al.¹¹ characterize single particles and particle size distribution of transported aerosol at Gosan during Asian dust storms. Measurements at Deokjeok Island (off the west coast of the Korean Peninsula) by Cayetano et al.¹² find enhanced crustal ionic ratios ([Ca²⁺ + Mg²⁺]/Na⁺ ratio >2) related to dust transport events, whereas Cl⁻ is enriched in on the marine boundary layer prior to the arrival of the dust plume.

Five papers apply and evaluate air quality models. Chen et al.¹³ demonstrate a weight-of-evidence receptor modeling source apportionment using Positive Matrix Factorization-Chemical Mass Balance (PMF-CMB), Effective Variance-CMB (EV-CMB), and backward trajectory analyses for PM_{2.5} from eight U.S. urban and nonurban sites in Minnesota. Kim et al.¹⁴ simulate PM formation using different gas-phase mechanisms, with an emphasis on uncertainties associated with secondary organic aerosol formation. Carruthers et al.¹⁵ compare two regulatory atmospheric dispersion models (i.e., Atmospheric Dispersion Modeling System [ADMS] and AERMOD) for pollutants emitted in complex terrain. Chemel et al.¹⁶ evaluate performance characteristics of regional air quality modeling systems based on emissions from a regulated fossil-fuel power station in Great Britain. The Regional Atmospheric Modeling System-Community Multi-Scale Air Quality (RAMS-CMAQ) model of Ge et al.¹⁷ reproduces the seasonal variability of acidic precipitation in East Asia.

Four papers deal with air pollution and health effects. Huang et al.¹⁸ show that at low temperature OC is more abundant in a printing/copy office than in outdoor measurements in Nanching, China, consistent with elevated VOCs (e.g., *m*-, *o*-, *p*-xylene, styrene, ethylbenzene) found in a commercial printing center.² Lonati et al.¹⁹ demonstrate the temporal and spatial variation of pedestrian exposure to vehicle exhaust and other pollutant mixtures in Milan city center, Italy. Klemm et al.²⁰ examine the data

needed (e.g., sampling duration and frequency) to evaluate air pollution health effects for a given geographic area (e.g., Atlanta, Georgia). Chen et al.²¹ summarize past findings from epidemiological studies in China and resulting policy implications.

The specialty conference was sponsored by A&WMA, the newly formed A&WMA China Section, the Institute of Earth Environment, Chinese Academy of Sciences (IEECAS), the Desert Research Institute (DRI), the U.S. Environmental Protection Agency (EPA), China Light and Power (CLP), and the National Natural Science Foundation of China (NSFC). The editors are grateful to all of the authors and participants, the conference organizers, and to those who submitted and revised manuscripts.

The conference organizers and guest editors hope that the papers in this Special Issue provide the Journal's readers with useful information that can be used now and will still be beneficial for years to come. These papers provide a sample of the hard work and effort invested by the Xi'an International Specialty Conference participants.

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