Asian, South American, and African air quality management strategies often follow the patterns set by Europe and North America, although more effective methods have been proposed and demonstrated. Leapfrogging opportunities abound in the areas of multipollutant standard setting, emissions characterization, air quality monitoring, source and receptor modeling, quantifying and valuing adverse effects, emission reduction technologies, and implementation strategies. Major changes are difficult to implement in a long-established regulatory climate due to a large investment in current infrastructure and an established regulatory culture. As environmental management investments are just being made in many countries, these nations can demonstrate more efficient and effective air quality management practices and set a future standard for countries with established systems.

The conference—sponsored by A&WMA, the newly formed China A&WMA 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)—brought together more than 450 scientists, regulators, and industrialists from 38 different countries. Delegates shared their experiences and ideas in plenary addresses, platform sessions, and poster presentations, with an emphasis on how their information might be used for leapfrogging ahead of standard practices. The exhibition included 21 vendor booths with a wide variety of new products relevant to leapfrogging. Half-day professional development courses included instructions on ultrafine particles, real-world emission measurements and inventories, ambient aerosol sampling and analysis, air quality database and analysis tools, quality assurance of ambient, source, and meteorological measurements, as well as exposure assessment and risk management.

An evening reception and laboratory tour were held at IEECAS, which highlighted research on Asian air quality, China’s paleoclimates, and Asian dust. A conference study tour evaluated different artifact preservation methods being applied at the Museum of Terra Cotta Warriors and the Hanyanglin Museum; there is growing evidence that atmospheric exposure is changing the appearance of these recently unearthed relics.

The technical conference program, selected presentations, and the 1144-page conference Proceedings are available at the post-conference Web site, www.dri.edu/leapfrog. It is not possible to fully summarize the more than 300 conference technical presentations, so only highlights are given here, with reference to the Proceedings. Highlights are classified by the eight questions posed by Dr. Christine Loh, President of Civic Exchange, in her opening plenary address that set the stage for the conference theme: 1) Do you know where you are? 2) Are you keeping track of your leap? 3) How many ways can you leap? 4) Do you know where you want to land? 5) What’s your capacity to leap? 6) Is everyone leaping? 7) Who has gone before you? and 8) Why is leapfrogging so difficult?

Do You Know Where You Are?
Determining where you are in terms of air quality management requires accurate estimates of emissions, ambient concentrations, and adverse effects. The measurements needed to obtain these estimates can be expensive and sometimes imprecise with current technology. Several presentations of new technologies offered ways to make these measurements more cost-effective and accurate. With respect to ambient measurements, small, battery-powered, and often wireless sensors were shown for ozone, carbon monoxide, particulate matter (PM), and black carbon (BC). An unmanned aerial vehicle (UAV) operating on a pre-set flight route was demonstrated as a cost-effective method to determine vertical pollutant distributions and the real-world composition of fresh stack emissions. A new multi-wavelength light scattering instrument showed potential for improving assessment of atmospheric radiative properties related to visibility and climate. This was complemented by integrated aerosol characterization systems that better quantify particle size, light absorbing properties, and liquid water uptake.

Remote sensors and satellite-based platforms are becoming more reliable, but there are still large uncertainties with respect to spatial and temporal resolution as well as interferences from other obstructions.

Several presentations addressed new ways to identify and quantify emissions and compile inventories. Li et al. showed an example of “backfrogging,” in which the Chinese government has adapted the antiquated EPA Method 5 as Chinese national standard GB/T 16157-1996 for PM stationary source testing. This method involves 1950s technology that hauls ice buckets, glass impingers, and contaminable reagents up dirty stacks to test for one pollutant at a time. Li et al. also described a potential leapfrogging opportunity with more appropriate multipollutant dilution sampling that better simulates real-world emissions. Baldwin et al. demonstrated advances in extracting large droplets from stationary source stacks, an unresolved problem that has arisen as wet-scrubbers are in more common use for sulfur dioxide (SO2) emission reductions. An inertial droplet separator was demonstrated to slow these droplets sufficiently to "turn the corner" out of the stack and into a dilution chamber. Satellite-based observations are being applied to determine where and when large biomass burns are occurring and relating these observations to microscopic particle measurements on the ground.

Acknowledgments
Special acknowledgment is due to the five invited plenary speakers: Dr. Christine Loh, Civic Exchange, Hong Kong; Dr. Junfeng (Jim) Zhang, Rutgers University, New Jersey; Dr. Bingheng Chen, Fudan University, Beijing, China; Dr. Alan C. Lloyd, The International Council on Clean Transportation, California; and Academician Jiming Hao, Tsinghua University, Beijing, China. Additionally, Dr. C.V. Mathai, APS, and a past president of A&WMA (2008), provided a history of the Association and an outlook for the future; and Jeffrey Clark, EPA, highlighted the strategic challenges of air quality in the 21st century. In addition to the conference sponsors, we wish to thank the Scientific Steering Committee, Local Organizing Committee, A&WMA 2008–2010 Presidents (C.V. Mathai, Richard Sprott, and Gwen Eklund), A&WMA Executive Director (Mike Kelly) and staff, the session chairs, platform and poster authors, and exhibitors for their efforts in making this a successful conference.

Thanks are also due to Jiamao Zhou and her colleagues at IEECAS for local arrangements—including transportation, tours, accommodations, meals, and registration. Dana Trimble, Jo Gerrard, Elke Seymour, and Jennifer Baro at DRI maintained the conference Web site, collected and organized abstracts, kept contact with delegates and registrants, and assembled the conference Proceedings. Roger Kreidberg, DRI, provided editorial support.
Are You Keeping Track of Your Leap?
This relates to the previous question, requiring monitoring of emissions, ambient concentrations, and hopefully effects across long time periods. Chen and Hao showed past trends and future projections of emissions, ambient concentrations, and energy use for China. While there were some large increases in the 1990s, there have been some recent upgrades in pollution controls, and projections for the future are improving. Song et al. observed decreases in Chinese BC emissions from 1990 to 2007.

How Many Ways Can You Leap?
A major challenge to current air quality management concerns the many effects of multiple pollutants. Effects cover spatial scales ranging from local to global. Many policies related to the environment—and also to transportation, construction, agricultural, and energy—must be considered. While several of the presentations recognized these challenges, especially with respect to potential co-benefits related to air pollution and climate, there was only incremental progress in providing guidance on how to set priorities beyond the health-based air quality standards that are commonly applied worldwide.

Do You Know Where You Want to Land?
It is important to set goals in emissions, air quality standards, and emission reduction strategies that are appropriate for the economic and cultural situations of the planning area. Mduli et al. provided a good example of long-term planning for South Africa’s emerging air quality management program, which includes identification of high pollution zones, development of specialized air quality management plans for each zone, cooperative governance and stakeholder involvement, and concentration of limited resources (human and financial) to address problems. A related presentation described advances in lower-emitting stoves for heating and cooking that leapfrog ahead of traditional methods that pollute indoor and outdoor air.

Other air quality management programs were summarized for Iran, Uzbekistan, Argentina, Turkey, and Mongolia. A major difficulty relates to the multipollutant/multi-effects issue described above and how complex relationships can be established to optimize air quality management strategies. Since the major emphasis of most air quality regulations is on public health, recent public health advances constituted a major focus. Several unregulated pollutants, such as ultrafine particles and PM BC, are emerging as potentially important to adverse health effects.

What’s Your Capacity to Leap?
There are resource constraints even in the most developed countries, let alone in countries with populations overwhelmed by meeting basic human needs. Resource constraints were not addressed in formal presentations, but the topic resulted in much discussion between sessions. Personal and professional relationships were established that hopefully will result in future collaboration and support to develop air quality management capacities where they are needed.

Is Everyone Leaping?
Several descriptions of collaborative international efforts captured teamwork among different countries and organizations to address issues that transcend national borders. Mega-events—such as the Olympics, Asian Games, and World Expos—stimulate countries to transform transportation and industrial infrastructures to more sustainably move large numbers of people and reduce pollution. Jang summarized recent collaborative efforts between the United States and China for improving air quality modeling assessments. These assessments include cost/benefit analyses, as well as establishing relationships between emissions and ambient concentrations.
Who Has Gone Before You?
Many examples were given of emerging technologies applicable to a wide range of air quality issues. Fedra and Witwer\textsuperscript{71} and Dye et al.\textsuperscript{72} outlined successful software systems that improve air quality forecasting results.\textsuperscript{71-74} These results can be rapidly distributed to the general public so that decisions can be made about tolerable personal exposure. San Jose et al.\textsuperscript{75} provided a resource documenting and comparing many forecasting models that can serve as a basis for future improvements. Risk assessment,\textsuperscript{76} dispersion modeling,\textsuperscript{70,77} receptor modeling,\textsuperscript{78,79} climate/air quality interactions,\textsuperscript{47,48} and BC measurements\textsuperscript{80} all received substantial attention.

Why Is Leaping So Hard?
Answers to this question were not addressed in formal presentations, but the question stimulated much discussion. One impediment is that no one wants to leap first. For this reason, the conference provided a service in making others aware of those who have already leapt. Another impediment is inertia. European and North American countries have a large body of precedent and installed infrastructure that may be out of date, but is still too costly to replace. For this reason, jurisdictions just embarking on air quality management should carefully examine leapfrogging opportunities prior to adopting these methods. Finally, the multidisciplinary nature, and fast-changing knowledge base, of air quality science requires extraordinary effort for managers and scientists to keep informed. With its broad-based range of topics and delegates, the Xi’an A&WMA International Specialty Conference did much to address this challenge.

Conference Awards
Selection criteria were outlined for several A&WMA awards. Award plaques were presented by Academician Jiming Hao to the following outstanding performers:

**Shengrui Tong**, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China, received the Outstanding Student Poster Presentation Award.\textsuperscript{81} Student poster presentations were judged on technical content, clarity of the presentation, overall layout and color of the poster, presence of presenter, ability to answer questions, number of visitors, and provision of handouts.

**Dr. Huiqing Guo**, University of Saskatchewan, Saskatoon, Canada, received the Outstanding Student Poster Presentation Award.\textsuperscript{82} Criteria were the same as those for the student poster presentation.

**Hilda Xiaohui Huang**, Hong Kong University of Science and Technology, Hong Kong, SAR, received the Outstanding Student Platform Presentation Award.\textsuperscript{83} Student presentations were judged on technical content, clarity of the presentation, timing, ability to answer questions, and number of session attendees.

**Prof. Chul-Un Ro**, Inha University, Incheon, Korea, received the Outstanding Author Award. Prof. Ro, his students, and colleagues prepared 10 poster and platform presentations\textsuperscript{84-85} with extended abstracts for the conference.

**Prof. Min Hu**, Peking University in Beijing, China, received the Outstanding Professor Award. Prof. Hu brought the most students from China (four), and each of them were co-authors on at least one poster or platform presentation.\textsuperscript{84-88}

**Prof. Byeong-Kyu Lee**, University of Ulsan, Korea, received the Outstanding International Professor Award. Prof. Kyu brought the most students from outside of China (four), and each of them participated in a platform presentation.\textsuperscript{89-92}

**Dr. Ronald E. Wyzga**, Electric Power Research Institute, Palo Alto, CA, received the Outstanding Session Chair Award.\textsuperscript{93} Dr. Wyzga was judged to have done the best job of all session chairs in soliciting abstracts, recruiting delegates, reviewing, and categorizing abstracts received, keeping presenters on time, and managing questions and answers.

**Dr. Hongjie Li**, President of Wuhang Tianhong Instruments in Wuhan, China, received an Outstanding Exhibitor Award.\textsuperscript{84} This award was based on exhibit layout (instruments, booth display, and computer display), visitors attracted, and quality of printed brochures, handouts, and promotional items.

**Peter Lawson**, Casella Measurement, Bedford UK, also received an Outstanding Exhibitor Award.\textsuperscript{94} based on the same criteria as above.
Statement of Ownership, EM October 2010

Statement of Ownership, Management, and Circulation

1. Publication Title: EM. 2. Publication Number: 1088-9981. 3. Filing Date: September 13, 2010. 4. Issue Frequency: Monthly. 5. Number of Issues Published Annually: 12. 6. Annual Subscription Price: $265/$405. 7. Location of Known Office of Publication: One Gateway Center, Third Floor, 420 Ft. Duquesne Blvd, Pittsburgh, PA 15222-1435. 8. Complete Mailing Address of Headquarters or General Office: Air & Waste Management Association, One Gateway Center, Third Floor, 420 Ft. Duquesne Blvd, Pittsburgh, PA 15222-1435. 9. Purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes have not changed during the preceding 12 months. 10. I certify that the statements made by me above are correct and complete. — Lisa Bucher, Managing Editor

A. Total Number of Copies (Net press run) 5311 5700
B. Paid and/or Requested Circulation
   1. Paid/Requested Outside-County Mail Subscriptions Stated on Form 3541 3926 3770
   2. Paid In-County Subscriptions Stated on Form 3541 0 0
   3. Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution 603 614
   4. Other Classes Mailed Through the USPS 0 0
   5. Total Paid Distribution 4529 4384

C. Total Paid Distribution 4529 4384

D. Free Distribution by Mail (Samples, complimentary, and other free)
   1. Outside-County as Stated on Form 3541 150 150
   2. In-County as Stated on Form 3541 0 0
   3. Other Classes Mailed Through the USPS 0 0
   4. Free Distribution Outside the Mail (Carriers or other means) 400 1050
   5. Total Free Distribution 550 1200
   6. F Total Distribution 5079 5484
   7. Copies not Distributed 232 116
   8. Total Distribution 5079 5484
   9. I. Percent Paid 90% 80%

16. This statement of ownership will be published in the October 2010 issue of this publication.
17. I certify that the statements made by me above are correct and complete. — Lisa Bucher, Managing Editor

Copyright 2010 Air & Waste Management Association