

Connecting Regional Modeling Communities Across the Atlantic: The Air Quality Model Evaluation International Initiative (AQMEII)

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As any traveler crossing the Atlantic can attest, there certainly are differences between North America and Europe – differences in language, food, culture, and social attitudes, to name but a few. However, the “Old World” and “New World” have a lot in common as well; both regions are home to large and diverse populations, are characterized by advanced economies, and contribute over a quarter each to total global GDP. Another aspect shared by both regions is that diligent efforts in air quality management over the past few decades have led to a decreasing burden of air pollutants such as ozone and PM_{2.5} despite the large growth in population and economic activity.

Despite such efforts, however, both regions still face challenges in ensuring that applicable health-driven air quality standards are met and maintained everywhere. For example, during the time period from 1997 to 2009, in any given year 13 to 61 % of the urban population in Europe was exposed to ambient ozone concentrations exceeding the European Union (EU) target value set for the protection of human health (120 µg/m³ daily maximum 8-hourly average, not to be exceeded more than 25 times a calendar year), with no discernable trend over this time period¹. In the United States, more than 150 counties are expected to be designated as non-attainment for the 2008 National Ambient Air Quality Standard for ozone², set at 75 ppb for the 3-year average of the annual 4th highest observed daily maximum 8-hr concentration. As of 2009, several monitoring sites in the Canadian province of Ontario recorded exceedances of the Canada-wide Standards for ozone (set at 65 ppb for the 3-year average of the annual 4th highest observed daily maximum 8-hr concentration) that were targeted to be met by 2010³.

Regional-scale air quality modeling systems are key tools for addressing these challenges on both sides of the Atlantic. In particular, they are being used to help guide emission control policies aimed at meeting and maintaining the relevant air quality standards and to address issues related to the transport of air pollution across state and national boundaries. However, despite the fact that the science issues facing the regional-scale modeling communities on both continents are similar, there has been only limited collaboration on defining and applying a comprehensive approach to model evaluation aimed at critically assessing the strengths and limitations of the models being used in a policy setting. Recognizing this gap, scientists from both sides of the Atlantic Ocean launched the Air Quality Model Evaluation International Initiative (AQMEII) as a long term forum to monitor the state-of-the-science in regional-scale air-quality models and model evaluation methodologies⁴. AQMEII functions through the organization of periodic conference calls, workshops and the coordination of joint modeling activities to facilitate model evaluation and model intercomparisons. In its first phase, AQMEII organized annual model simulations for 2006 over both continents using specified input datasets and used the outputs from these simulations to conduct a number of model evaluation analyses. The next phase of AQMEII will be aimed at applying and evaluating on-line (i.e. coupled meteorology-chemistry) regional-scale models over both continents to advance our ability to simulate air quality – climate interactions and feedback processes. This issue of EM describes various aspects of current and future AQMEII activities.

An overview of regional-scale air quality modeling practices and perspectives in North America and Europe is provided by Steyn et al. (page ...). In particular, this article highlights the differences and commonalities in how regional-scale air quality modeling systems are being used and evaluated in both continents.

Solazzo et al. (page ...) summarize the routine surface meteorological and air quality measurements available on both continents, how these measurements were used for model evaluation in AQMEII Phase 1, and how the characteristics of these networks affect model evaluation and the interpretation of comparisons between observations and model predictions.

The article by Szykman et al. (page ...) describes the use of ground-based, upper air and satellite-based measurement platforms for characterizing the vertical structure of the atmosphere and how information from these platforms can play a critical role in the AQMEII model evaluation exercises. Moreover, the authors also provide an outlook of future measurement platforms and their role in advancing the scope of model performance evaluation.

The key findings from the model evaluation studies performed for the Phase 1 annual 2006 North American and European simulations are summarized by Schere et al. (page ...). In addition, the article also offers reflections on experiences gained during Phase 1 that will be important for guiding the implementation of Phase 2.

Finally, Rao et al. (page ...) lay out the objectives for Phase 2 of AQMEII as well as provide a look ahead at other emerging research areas. In addition, this article also highlights the growing need for the regional-scale and global modeling communities to work together in addressing emerging research areas relevant to policy-making.

References:

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