

Recent Upgrade to the Chemical Transport Model Used in the Canadian Operational Regional Air Quality Deterministic Prediction System

Michael D. Moran^{1*}, Sylvie Gravel², Verica Savic-Jovicic¹, Radenko Pavlovic³, Hugo Landry³, Alexandru Lupu¹, Sylvain Ménard³, Sophie Cousineau³, and Didier Davignon³

¹Air Quality Research Division, Environment and Climate Change Canada (ECCC), Toronto, Ontario, Canada

²Air Quality Research Division, ECCC, Montreal, Quebec, Canada

³Air Quality Modeling Applications Section, ECCC, Montreal, Quebec, Canada

The Regional Air Quality Deterministic Prediction System (RAQDPS) is Environment and Climate Change Canada's operational regional air quality forecast system. At the heart of the RAQDPS is a limited-area version of the GEM-MACH model, an on-line meteorology–chemistry model, configured for a North America grid with 10-km horizontal grid spacing and 80 vertical levels. Since the last IWAQFR meeting in late 2015 the version of the GEM-MACH model used in the RAQDPS has undergone a major upgrade. The GEM-MACH model, which had been based on version 3 of the ECCC GEM numerical weather prediction model and version 1 of the MACH air quality module, was upgraded to a next-generation version based on version 4 of GEM and version 2 of MACH. New GEMv4 features include a new vertical coordinate, a new vertical discretization, and a mass-conserving semi-Lagrangian advection scheme. New MACHv2 features include an updated gas-phase dry deposition scheme, a new mass-conserving tracer advection scheme, new chemical lateral boundary conditions, new vertical diffusion scheme, and the correction of two significant errors affecting surface emissions and gas-phase dry deposition. This presentation will provide an overview of the above updates and will show the impact of some of them. The impact of this significant upgrade on forecast performance will also be described.

*Corresponding Author: Mike Moran
e-mail: Mike.Moran@canada.ca
Voice: (416) 739-5762
Fax: (416) 739-4288

Meeting: 8th International Workshop on AQ Forecasting Research,
10-12 Jan. 2017, Toronto, Canada

Theme: 1. Operational Forecasting and Communicating Impacts

Presentation Type: Oral presentation preferred