Séminaire Vendredi 30 mai 11h00 / Seminar Friday May 30, 11:00 AM

Conférencier/Lecturer:	Mike Moran (Modelling & Integration Research, AQRD)
	Louis-Philippe Crevier (National Prediction Operations)
Par/By:	Mike Moran, Louis-Philippe Crevier, Sylvain Ménard,
	and Donald Talbot
Sujet/Subject:	Development, evaluation, and validation of a new
	operational Air Quality Forecast Model: GEM-MACH15
Présentation/Presentation:	Anglais / English
Lieu/Room:	Grande salle du premier étage CMC

Résumé/Abstract:

CMC began operational air-quality forecasting in 2001 with the implementation of an ozone-only version of the off-line regional CHRONOS chemical transport model driven by GEM forecast meteorology. Operational CHRONOS forecasts of $PM_{2.5}$ followed in 2003. Two-day CHRONOS AQ forecasts are provided both to AQ meteorologists at the regional weather centres and to the public via the EC Weatheroffice website. They provide important guidance for the preparation of smog advisories. South of the border, the U.S. NWS began operational AQ forecasting in collaboration with the U.S. EPA in 2004 with an ozone-only version of the off-line regional CMAQ model

Development of the next generation of Canada's operational Air Quality Forecast Model has been underway in Downsview and Dorval since 2006. The goal of this project is to replace CHRONOS by a regional configuration of GEM-MACH, an *on-line* chemical transport model embedded within GEM. Insertion of chemistry and other AQ processes inside GEM offers two significant technical advantages. First, GEM-MACH can make full use of the CMC supercomputers; CHRONOS, on the other hand, only uses OpenMP and hence is currently limited to 16 processors. Second, physical and chemical processes related to air quality are solved on GEM's native grid, thus reducing the number of spatial and temporal interpolations required as compared to CHRONOS.

The development of GEM-MACH has been greatly enhanced by the availability of the new GEM chemistry interface. A number of AQ process representations from the AURAMS chemical transport model have been implemented directly inside GEM using this interface. AURAMS is based on CHRONOS but includes a number of additional process representations. The current version of GEM-MACH uses the ADOM-II gas phase chemical mechanism, the ADOM aqueous-phase chemistry mechanism, and the HETV scheme for inorganic heterogeneous chemistry. Like CHRONOS, GEM-MACH15, the operational configuration of GEM-MACH, uses a two-bin sectional representation of the particulate-matter (PM) size distribution, but the PM chemical composition is treated in more detail and additional processes affecting PM concentrations have been included. Anthropogenic pollutant emissions are based on the 2005 Canadian and U.S. national emission inventories. Biogenic emissions are estimated using BEIS v3.09 algorithms. A new emissions preparation program to read and process hourly emissions to the atmosphere for input to GEM has also been developed.

This presentation will describe the design, structure, and formulation of GEM-MACH and the particular configuration chosen for GEM-MACH15. Initial results of model testing and evaluation of the GEM-MACH15 configuration on a North American LAM grid for summer 2007 and winter 2008 and comparisons of GEM-MACH ozone predictions with CHRONOS predictions will also be presented. This presentation will also serve as a supplement to a proposal to be presented at the next CPOP meeting.