# 2018 Developments in Canada's Operational Air Quality Forecasting Systems

Radenko Pavlovic[1], Michael Moran[2], Verica Savic-Jovcic[2], Alexandru Lupu[2], Jack Chen[3], Hugo Landry[1], Sylvain Ménard[1], Rodrigo Munoz-Alpizar[1], Paul-André Beaulieu[1], and Amin Erfani[1]

[1]Canadian Centre for Meteorological and Environmental Prediction, Environment and Climate Change Canada (ECCC), Montreal, Quebec, Canada
[2]Air Quality Research Division, ECCC, Toronto, Ontario, Canada
[3]Air Quality Research Division, ECCC, Ottawa, Ontario, Canada

The Canadian Meteorological Centre Operations (CMCO) division of Environment and Climate Change Canada runs a number of operational air quality (AQ)-related systems that revolve around the Regional Air Quality Deterministic Prediction System (RAQDPS). The RAQDPS produces 48-hour AQ forecasts and outputs hourly concentration fields of $O_3$, $PM_{2.5}$, $NO_2$, and other pollutants twice daily on a 10-km North American grid. The core of the RAQDPS is the GEM-MACH (Global Environmental Multi-scale – Modeling Air quality and CHemistry), an in-line chemical transport model. A near-twin forecast system known as FireWork, which also includes satellite-based estimates of near-real-time biomass burning emissions over North America, has been run by CMCO since 2014 and became an operational system in May 2016.

In fall 2018 the RAQDPS and FireWork underwent major upgrades. The main changes included adoption of (a) a new meteorological configuration, including the recycling of key physics variables, a new initialization scheme and a new piloting model, (b) an updated version of the GEM-MACH's chemistry code, and (c) a new set of input emissions files based on more recent Canadian, U.S., and Mexican national emissions inventories, as well as (d) the addition of wet and dry deposition fields as routine outputs to support objective analysis of atmospheric deposition. Together, these changes resulted in an overall improvement in RAQDPS forecast skill. This presentation will describe these improvements and their impacts on model performance. In addition, planned short- and long-term updates of the Canadian operational AQ forecast program will be discussed.

For oral presentation at *9th International Workshop on Air Quality Forecasting Research*
Nov. 7-9, 2018, Boulder, Colorado
Session 1: Progress in Operational Forecasting – U.S. and International Perspectives