Canadian Operational Air Quality Forecasting Systems: Status, Recent Progress, and Challenges

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ECCC's Canadian Meteorological Centre Operations (CMCO) division runs a number of operational air quality (AQ)-related systems that revolve around the Regional Air Quality Deterministic Prediction System (RAQDPS). The RAQDPS generates 48-hour AQ forecasts and outputs hourly concentration fields of O_3, PM2.5, NO_2, and other pollutants twice daily on a North-American domain with 10-km horizontal grid spacing and 80 vertical levels. A closely related AQ forecast system with near-real-time wildfire emissions, known as FireWork, has been run by CMCO during the Canadian wildfire season (April to October) since 2014. This system became operational in June 2016.

The CMCO's operational AQ forecast systems also benefit from several support systems, such as a statistical post-processing model called UMOS-AQ that is applied to enhance forecast reliability at point locations with AQ monitors. The Regional Deterministic Air Quality Analysis (RDAQA) system has also been connected to the RAQDPS since February 2013, and hourly surface objective analyses are now available for O_3, PM2.5, NO_2, PM10, SO_2 and, indirectly, the Canadian Air Quality Health Index. As of June 2015, another version of the RDAQA has been connected to FireWork (RDAQA-FW). For verification purposes, CMCO developed a third support system called Verification for Air QUality Models (VAQUM), which has a geospatial relational database core and which enables continuous monitoring of the AQ forecast systems' performance.

Urban environments are particularly subject to AQ pollution. In order to improve the services offered, ECCC has recently been investing efforts to develop a high resolution air quality prediction capability for urban areas in Canada. In this presentation, a comprehensive description of the ECCC AQ systems will be provided, along with a discussion on AQ systems performance. Recent improvements, current challenges, and future directions of the Canadian operational AQ program will also be discussed.