Updating Spatial Surrogates for the Canadian Regional Air Quality Deterministic Prediction System

Mehrez Samaali[1], Philippe Martin[1], Daniel Rioux[1], Sylvain Labrecque[1]

[1]*Integrated Approches to Air Quality Unit, Meteorological Service of Canada, Environment and Climate Change Canada, 800 rue de la Gauchetière ouest, Montréal, QC, H5A 1L9, Canada.*

Michael Moran[2], Junhua Zhang[2], Qiong Zheng[2] and

[2]*Air Quality Research Division, Science & Technology Branch, Environment and Climate Change Canada, 4905 Dufferin Street, Toronto, ON, M3H 5T4, Canada.*

Mourad Sassi[3]

[3]*Air Quality Modelling Application Section, Meteorological Service of Canada, Environment and Climate Change Canada, 2121 Route Transcanadienne, Dorval, QC, H9P 1J3, Canada.*

ABSTRACT

Air quality products and services for public health and environment protection are based on photochemical and dispersion Air Quality Models (AQMs), which need accurate spatial and temporal allocation data for emissions sources to enhance their predictive ability. Therefore, spatial surrogate data are a key input when preparing emissions data in the required formats for AQMs. The current operational Canadian Regional Air Quality Deterministic Predictions System (RAQDPS) uses a set of spatial surrogates mainly based on census data, road networks, and other geospatial data that are processed using different methodologies and assumptions. However, these spatial surrogates are representative of a given period of time and may need to be updated on a regular basis once updated shapefiles and census data become available. In addition, depending on modelling applications, some of the underlying methodologies and assumptions employed to generate these surrogates may also need to be updated. The objective of this paper is to present some new geospatial data sets and methodologies used to update the spatial allocation of on-road, rail, and aircraft sources as well as residential wood combustion for all of Canada. First, the newly available updated shapefiles and census data will be presented. Then, the methodologies used to process these data will be discussed. Finally, a demonstration of the feasibility to obtain Canada-wide updated surrogates and gridded emissions at 2.5-km resolution will be shown.

Key words: spatial allocation, shapefiles, emissions sources, surrogates.