

Potential benefits of urban High-Resolution NWP Predictions to Air quality modelling

In the next few years, NWP systems operational at many national centers will become more capable of representing urban meteorological features as their horizontal resolution dramatically increases. As an experimental step, a subkm and urban version of the Global Environmental Multiscale (GEM) atmospheric model was effective up to 0.25 km over the Greater Toronto Area for more than a year. Overall aspects of this system will be presented in the Theme 6 about the ECCC Panam project.

In this study, specific aspects of this system that are likely to have an impact on the air quality modelling are presented. In particular, the Planetary Boundary Layer (PBL) height and features are examined. Specific properties of the urban fabric, such as radiative trapping in the canyon-like streets, the more intense and delayed heat storage, as well as increased drag as compared to rural areas, are more realistically represented in the system. Consequently, the impact of large surface heterogeneities can be highlighted on the representation of meso to sub-meso scales meteorological processes, including the interaction between urban and lake breezes. An attempt is made to provide an alternate diagnostic of the PBL Height that would adequately integrate the effect of small-scale processes.