Geophysical Research Abstracts
Vol. 13, EGU2011-12425, 2011
EGU General Assembly 2011

Transport Analysis of Ozone Enhancement in Southern Ontario during BAQS-Met

Huixia He (1), David Tarasick (1), Junhua Zhang (1), Mike Moran (1), Paul Makar (1), Yves Rochon (1), Wayne Hocking (2), and Michel Bourqui (3)

(1) Air Quality Research Division, Enviornment Canada, Canada, (2) Department of Physics and Astronomy, University of Western Ontario, London, ON, Canada, (3) Department of Chemistry and Atmospheric and Oceanic Sciences, McGill University, Montreal, QC, Canada

The Border Air-Quality and Meteorology Study (BAQS-Met) was conducted in the Great Lakes region of southwestern Ontario in June and July of 2007 in part to study the ability of the Environment Canada AURAMS (A Unified Regional Air-quality Modeling System) chemical transport model (CTM) to represent regional air pollution in southwestern Ontario, near the U.S.-Canada border.

Twice-daily ozonesondes were launched from Harrow, in southwestern Ontario, Canada, during the BAQS-Met field campaign A number of significant ozone enhancements in the troposphere were observed that were the result of stratospheric intrusion events. The observations are compared with results from two Environment Canada numerical models, the operational weather prediction model GEM (used as input to FLEXPART), and a new version of AURAMS, in order to examine the ability of these models to accurately represent sporadic cross-tropopause ozone transport events. The models appear to reproduce ozone intrusion events with some skill, implying that GEM dynamics (which also drive AURAMS) are able to represent such events well. There are important differences in the quantitative comparison, between the modeled intrusion and that seen in the observations, but it is not clear if this results from errors in some of the trajectories (each intrusion is a sum of many FLEXPART trajectories), from the representation of ozone by PV (Potential Vorticity), or from errors in the actual GEM input fields. However; in particular, the poor vertical resolution of AURAMS around the tropopause causes it to bring down too much ozone in individual intrusions. GEM-FLEXPART calculations indicate that stratospheric ozone intrusions contributed significantly to surface ozone on several occasions during the BAQS-Met campaign and made a moderate but significant contribution to the overall tropospheric ozone budget. These campaign results also suggest that stratospheric intrusions are responsible for much of the variability of ozone in the mid-latitude free troposphere.