Geophysical Research Abstracts, Vol. 7, 05107, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05107

Five years of Terra/MOPITT data: A satellite perspective on the variability of pollution in the troposphere

D.P. Edwards (1), L.K. Emmons (1), J.C. Gille (1), and J.R. Drummond (2)

(1) National Center for Atmospheric Research, Boulder CO, USA, (2) University of Toronto, Toronto ON, Canada, (edwards@ucar.edu/1-303-497-1492)

Measurements from the Terra satellite launched in December of 1999 now provide a global record of the recent inter-annual variability of tropospheric air quality through observations of carbon monoxide (CO) from the Measurement Of Pollution In The Troposphere (MOPITT) instrument. This is the first dataset of its kind, and represents a significant advance in satellite remote sensing, CO being one the few tropospheric trace gases that can be successfully monitored from space. CO is a good tracer of both natural and anthropogenic pollution since it is produced by incomplete combustion processes such as the burning of fossil fuels in urban and industrial areas, the use of biofuels in developing countries, by biomass burning in the tropics, and by wildfires. It is also a very important gas in tropospheric chemistry, affecting the oxidizing capacity of the atmosphere and playing a role in the formation of tropospheric ozone. In this paper, we present an examination of the seasonal and recent inter-annual variability of tropospheric CO, accompanied by a discussion of the various sources and sinks. In a zonal sense, the principal Northern Hemisphere sources are related to anthropogenic urban and industrial activity, and seasonal variations reflect the atmospheric oxidant loading which determines the primary sink of CO. In the Southern Hemisphere, agricultural biomass burning provides very strong emissions. Of the five years of data available from the Terra satellite, the Winter and Spring of 2002/2003 show anomalously high pollutant loadings compared to other years. This was a result of fires in western Russia in the late Summer and Fall of 2002, and intense fires in the southeast of Russia in the Spring of 2003. We compare the resultant MOPITT CO distribution with indications of fires and aerosol plumes observed by the Terra/Moderate-resolution Imaging Spectroradiometer (MODIS). Finally, we trace the emissions from

these fires to indicate how intense local pollution sources can impact continental and global scale air quality.