Geophysical Research Abstracts
Vol. 16, EGU2014-4449, 2014
EGU General Assembly 2014

Attribution of free tropospheric ozone over eastern China using TES ozone observations, NO_2 OMI retrievals and the TM5 chemistry transport model

Willem W. Verstraeten (1,2), Folkert (K.F.) Boersma (1,2), Jason Williams (1), Kevin W. Bowman (3), and John R. Worden (3)

(1) Royal Netherlands Meteorological Institute, Climate Observations, De Bilt, Netherlands (willem.verstraeten@knmi.nl), (2) Wageningen University, Environmental Sciences, Wageningen, the Netherlands, (3) Jet Propulsion Laboratory, Pasadena, California, USA.

Tropospheric ozone is an important greenhouse gas and a global air pollutant originating from photo-chemical oxidation of precursors such as volatile organic compounds (VOCs) and CO in the presence of NOX in favouring meteorological conditions, long range transport and stratosphere-troposphere ozone exchange (STE). Assessing ozone trends in the troposphere remain difficult due to scarcity of long-term measurement sites, but spaceborne sensors can cope much better with that thanks to their spatio-temporal abilities.
Today, eastern Asia has the fastest growing anthropogenic emissions. It has been suggested that much of this pollution is exported eastwards towards western North America affecting the local ozone concentrations in the troposphere.
We analysis time series of free tropospheric ozone observed from space by TES (Tropospheric Emission Spectrometer onboard NASA's EOS-Aura satellite) over eastern China. Based on the TM5 chemical transport models (CTM) using six years (2005-2010) of model simulations we attribute the observations to the different sources of ozone using model runs with different anthropogenic emissions of NOX.
Here we show a strong and rapid increase ($\sim$7 ppbv, or 10% per year) in free tropospheric ozone over China retrieved with the TES satellite instrument from 2005 to 2010. We attribute this increase to a larger inflow of stratospheric ozone and particularly to enhanced ozone production following highly significant increases in Chinese NOX emissions as observed with the OMI satellite instrument. Despite the emission reduction in the western United States, the observed ozone concentrations in the free troposphere raise, which is attributed to the increase of Chinese emissions.