Geophysical Research Abstracts
Vol. 15, EGU2013-12119, 2013
EGU General Assembly 2013

Ozone tropospheric and stratospheric trends (1995-2012) at six ground-based FTIR stations (28°N to 79°N)

Corinne Vigouroux (1), Martine De Mazière (1), Philippe Demoulin (2), Christian Servais (2), Frank Hase (3), Thomas Blumenstock (3), Matthias Schneider (3), Regina Kohlepp (3), Sabine Barthlott (3), Omaira García (4), Johan Mellqvist (5), Glenn Persson (5), Mathias Palm (6), Justus Notholt (6), James Hannigan (7), and Michael Coffey (7)

(1) Belgian Institute for Space Aeronomy, Brussels, Belgium (corinne.vigouroux@aeronomie.be), (2) Institut d'Astrophysique et de Géophysique, University of Liège, Liège, Belgium, (3) Institute for Meteorology and Climate Research (IMK-ASF), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany, (4) Izaña Atmospheric Research Centre (IARC), Agencia Estatal de Meteorología (AEMET), Spain, (5) Chalmers University of Technology, Göteborg, Sweden, (6) Institute of Environmental Physics, University of Bremen, Bremen, Germany, (7) National Center for Atmospheric Research (NCAR), Boulder, USA

In the frame of the Network for the Detection of Atmospheric Composition Change (NDACC), contributing ground-based stations have joined their efforts to homogenize and optimize the retrievals of ozone profiles from FTIR (Fourier transform infrared) solar absorption spectra. Using the optimal estimation method, distinct vertical information can be obtained in four layers: ground-10 km, 10-18 km, 18-27 km, and 27-42 km, in addition to total column amounts. In a previous study, Vigouroux et al. (2008)[1] applied a bootstrap resampling method to determine the trends of the ozone total and four partial columns, over the period 1995-2004 at Western European stations. The updated trends for the period 1995-2009 have been published in the WMO 2010 report[2].
Here, we present the updated trends and their uncertainties, for the 1995-2012 period, for the different altitude ranges, above five European stations (28°N-79°N) and above the station Thule, Greenland (77°N). In this work, the trends have been estimated using a multiple regression model including some explanatory variables responsible for the ozone variability, such as the Quasi Biennial Oscillation (QBO), the solar flux, the Arctic Oscillation (AO) or El Niño-Southern Oscillation (ENSO). A major result is the significant positive trend of ozone in the upper stratosphere, observed at the Jungfraujoch (47°N), which is a typical mid-latitude site, as well as at the high latitude stations. This positive trend in the upper stratosphere at Jungfraujoch provides a sign of ozone recovery at mid-latitudes.

[1] Vigouroux, C., De Mazière, M., Demoulin, P., Servais, C., Hase, F., Blumenstock, T., Kramer, I., Schneider, M., Mellqvist, J., Strandberg, A., Velazco, V., Notholt, J., Sussmann, R., Stremme, W., Rockmann, A., Gardiner, T., Coleman, M., and Woods, P. : Evaluation of tropospheric and stratospheric ozone trends over Western Europe from ground-based FTIR network observations, ACP, 8, 6865-6886, 2008.

[2] Douglass, A., and Fioletov, V. (Coordinating Lead Authors), Godin-Beekmann, S., Müller, R., Stolarski, R., Webb, et al.: Stratospheric Ozone and Surface Ultraviolet Radiation, Chapter 2 in Scientific Assessment of Ozone Depletion: 2010, Global Ozone Research and Monitoring Project–Report No. 52, 516 pp., World Meteorological Organization, Geneva, Switzerland, 2011.