

## Ozone Tropospheric and Stratospheric Trends (1995-2011) at Six Ground-based FTIR Stations (28°N to 79°N)

C. Vigouroux<sup>1</sup>, M.D. Mazière<sup>1</sup>, P. Demoulin<sup>2</sup>, C. Servais<sup>2</sup>, F. Hase<sup>3</sup>, T. Blumenstock<sup>3</sup>, M. Schneider<sup>3</sup>, R. Kohlhepp<sup>3</sup>, S. Barthlott<sup>3</sup>, J. Klyft<sup>4</sup>, G. Personn<sup>4</sup>, M. Palm<sup>5</sup>, J. Notholt<sup>5</sup>, J. Hannigan<sup>6</sup> and M. Coffey<sup>6</sup>

<sup>1</sup>Belgian Institute for Space Aeronomy (BIRA-IASB), Ave circulaire 3 1180 uccle, Brussels, Belgium; +32 2 373 0363, E-mail: corinne.vigouroux@aeronomie.be

<sup>2</sup>Institut d'Astrophysique et de Géophysique, University of Liège ULg, Liège, Belgium

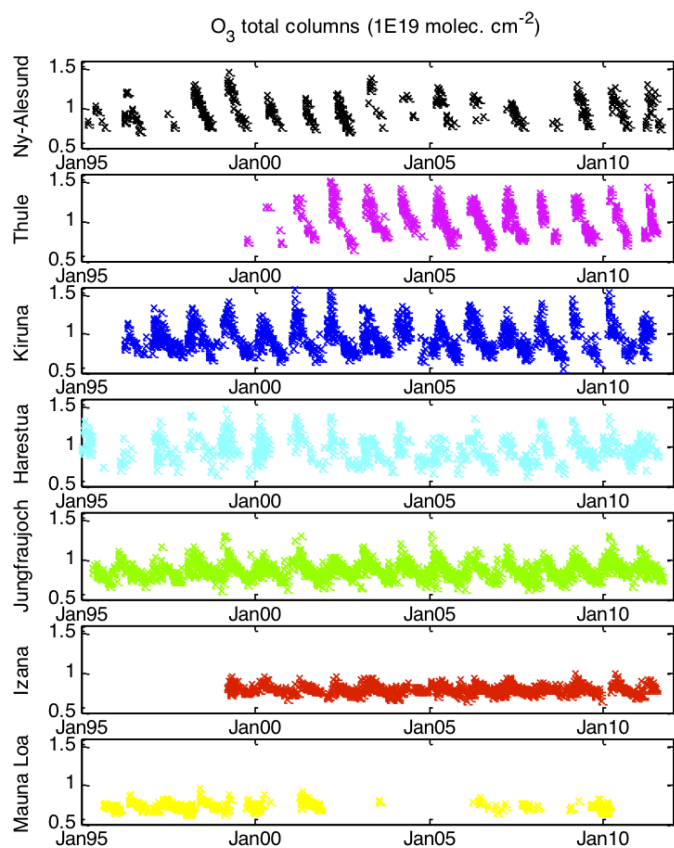
<sup>3</sup>Institute for Meteorology and Climate Research IMK-ASF, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

<sup>4</sup>Chalmers University of Technology, Göteborg, Sweden

<sup>5</sup>Institute of Environmental Physics, University of Bremen, Bremen, Germany

<sup>6</sup>National Center for Atmospheric Research, Boulder, CO 80307

As part of the Network for the Detection of Atmospheric Composition Change (NDACC), the retrieved ozone profiles from Fourier transform infrared (FTIR) solar absorption spectra from five stations in Western Europe, from 79°N to 28°N, have been analyzed in Vigouroux et al. (2008)<sup>1</sup>. Using the optimal estimation method, vertical information is obtained for the total column and in four distinct layers: ground-10, 10-18, 18-27 and 27-42km. A bootstrap resampling method was used to determine the trends of the total and partial columns, over the 1995-2004 period. Updated trends for the 1995-2009 have been published in the World Meteorological Organization 2010 Report. Here, we present further updates to mid-2011 for the five European stations plus the station at Thule, Greenland (77°N). The trends obtained by bootstrap resampling are discussed for each layer and the total column. A major result is the significant positive trend in the upper stratosphere at the Jungfraujoch Station (47°N), which indicates a sign of mid-latitude ozone recovery.



**Figure 1.** Total column time series for 1995 to mid 2011 from seven NDACC FTIR stations covering Europe, Greenland and Mauna Loa, HI by latitude from 19° to 78° N.