TOTAL OZONE MONITORING ABOVE THE JUNGFRAUJOCH BY FTIR RELATIVE TROPOSPHERIC AND STRATOSPHERIC CONTRIBUTIONS

Ph. Demoulin[1], R. Zander[1], E. Mahieu[1], C.P. Rinsland[2], N. Pugachev[3], Christopher Newport[3], M. De Maziere[4], O. Hennen[4], A. Barbe[5]

[1] University of Liege - Liege, Belgium
[2] NASA - Langley Research Center, Hampton, VA, USA
[3] University, Newport News, VA, USA
[4] Belgian Institute for Space Aeronomy, Brussels, Belgium
[5] University of Reims - Reims, France

Fourier transform spectrometry in the infrared (FTIR) is a powerful technique for studying remotely the chemical composition of the Earth's atmosphere from locations spanning ground to space. While space based measurements offer the ideal geometry for deriving concentration profiles versus altitude, ground based investigations have become very successful in providing long-term monitoring of the state of the atmosphere in the form of total vertical column abundances above various sites around the world. Over the 2 to 15 micrometers spectral domain, some 20 telluric constituents, including O_3, can be studied quasi-simultaneously in this way. Such infrared observations have been performed at the International Scientific Station of the Jungfraujoch (ISSJ), Switzerland, for over a decade; since 1991, the ISSJ is operating as one of the five primary IR components of the Network for the Detection of Stratospheric Change (NDSC).

Recently, we have attempted to discriminate between tropospheric and stratospheric burdens of ozone making up the total columns routinely derived above ISSJ from the spectral analysis of isolated lines. For that, we have identified a number of spectral intervals containing multiple ozone transitions in which the central cores of the lines and the throughs between these are predominantly sensitive to, respectively, the stratospheric and lower tropospheric contents of ozone. The ongoing investigation is based on nonlinear least-squares spectral fittings to the observations, using the "SFIT" algorithm developped at the Langley Research Center. That code uses 29 layers to characterize both the physical and chemical states of the atmosphere between the altitude of ISSJ (3580 m) and 100 km. A realistic initial volume mixing ratio profile of ozone is progressively adjusted over various layers until the root square sum of the residuals of the fit to the observations reaches a minimum. The role of the observational geometry in improving the tropospheric/stratospheric O_3 ratio is also being investigated.

The poster will provide detailed information about the approach to the research summarized above. It will report quantitative results arrived at and evoke ways of extracting such results and their uncertainty in a routine fashion.

R. Zander, Institute of Astrophysics - University of Liege,
avenue de Cointe, 5, B-4000 Cointe (Liege), BELGIUM
Fax : 32-41 527474: (demoulin@geo.astro.ulg.ac.be)