

REMOTE SENSING MEASUREMENTS OF ATMOSPHERIC SPECIES AT FOUR EUROPEAN STATIONS: A BELGIAN CONTRIBUTION TO THE NETWORK FOR THE DETECTION OF STRATOSPHERIC CHANGE (NDSC).

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The Belgian Institute for Space Aeronomy (BIRA-IASB) has started operational activities for ground-based monitoring of the atmospheric composition using Differential Optical Absorption Spectrometry (DOAS) techniques, in 1990, at the International Scientific Station of the Jungfraujoch (46.5°N, 8°E). This alpine observatory constitutes, together with the Observatoire de Haute Provence (OHP, 44°N, 6°E), the primary northern mid-latitude site of the Network for the Detection of Stratospheric Change (NDSC). At the same time, the institute also initiated a close collaboration with the University of Liège for the operation and exploitation of its Fourier transform infrared (FTIR) spectrometers, also contributing to the NDSC. Since then, additional DOAS spectrometers have been installed and operated on an automatic and quasi-continuous basis at the OHP, and at Harestua (60°N, 11°E) and – more recently – at Ile de La Réunion (21°S, 55°E), both complementary NDSC stations. A dedicated data analysis program, WinDOAS, has been developed; nowadays it is used worldwide. Also, BIRA-IASB has acquired its own FTIR spectrometer. It has been deployed in two measurement campaigns at the Ile de La Réunion, and it is planned for permanent installation there in 2008.¹ A system has been developed to run the FTIR system in an automatic or remotely-controlled way.

The time series of DOAS measurements describe the variability and evolution of total column amounts of ozone (O₃), nitrogen dioxide (NO₂), OClO and bromine monoxide (BrO). They continue to provide important information in support of scientific assessments on the state and evolution of the ozone layer, as well as in support of international measurement campaigns performed in the Arctic for the study of ozone loss processes. The FTIR measurements provide the abundances of a large number of atmospheric species, including the chlorine, fluorine and nitrogen families, as well as source gases and pollutants like carbon monoxide, methane, and some CFCs and HCFCs. The observations at Ile de La Réunion will fill a gap that exists in the observational databases in the tropics, a region where ground-based measurements are scarce.

Recently, the NDSC has widened its activities to encompass tropospheric chemistry research. Advanced observational techniques are being developed to enhance the information content of the ground-based monitoring measurements, aiming at vertically resolved information in the troposphere and stratosphere.

The poster will present the DOAS and FTIR measurement and data analysis techniques, including recent advances, as well as some particular findings based on the existing tropospheric and stratospheric data sets.

¹ The FTIR activities at the Réunion are performed in collaboration with colleagues of the Université Libre de Bruxelles and of the Université de La Réunion.