Geophysical Research Abstracts
Vol. 13, EGU2011-12683, 2011
EGU General Assembly 2011

Harmonisation of GOME, SCIAMACHY and GOME-2 ozone cross-sections

Anna Serdyuchenko, Victor Gorshelev, Mark Weber, Wissam Chehade, and John Burrows
Institute of Environmental Physics, University of Bremen, Bremen, Germany

The goal of the current work is to derive a consolidated and consistent set of absorption cross-sections in the UV/visible/NIR spectral region for satellite spectrometers. The harmonization of cross-sections is carried out by a combination of re-evaluation of the pre-flight laboratory measured cross-sections with the satellite flight–model (FM) spectrometers and new experimental work to improve the absolute scaling of the available cross-section data.

The generation of long-term datasets of atmospheric trace gases is a major need and prerequisite for climate and air quality related studies. In particular ozone is an important species in the stratosphere (UV protection) and troposphere (air pollution, climate gas). The global monitoring capabilities of satellite borne atmospheric chemistry sensors play a unique role in the determination of long term trends.

Currently there are three atmospheric chemistry instruments with a high potential of synergy in orbit: the Global Ozone Measuring Experiment (GOME) on the board of ERS satellite, the Scanning Imaging Absorption Spectrometer for Atmospheric Chartography (SCIAMACHY) on Envisat, and GOME-2 on Met-Op. Two more satellites, each carrying a GOME-2 spectrometer are planned to be launched five years apart in the next decade. It will result in a time series covering two or more decades of ozone observations. As the lifetime of individual satellite missions is limited, information from different sensors needs to be combined.

Ozone absorption cross-.sections are measured with an echelle spectrometer and a Fourier transform spectrometer to cover a broad range of wavelengths from 220 nm to about 1 mkm. Spectral resolution of the new spectra varies from about 0.02 nm FWHM in UV to 0.5 nm at 1 mkm. Special attention is paid to the requirement for the precision of the absolute values of cross-sections (better than 2%), particularly in the DOAS window (325-335 nm). In addition, attention is paid to the accurate measurements of the temperature dependence of the cross-sections in 200-300K range.

Based on the results of this work, it is expected that the ozone data quality and time series will improve significantly as required for climate, air quality, and stratospheric ozone trend studies. As a delivery updated ozone cross-sections will be available for reprocessing with GOME, SCIAMACHY and GOME2 and to the scientific community as well.