An IO3C/WMO-GAW Expert Team

On

Absorption Cross Sections Of Ozone(ACSO):

An Activity On IGACO-Ozone

Recommendation to establish an Expert Team for careful evaluation of absorption cross sections of ozone for use in atmospheric ozone measurements and analysis, particularly concerning the Huggins bands

(based on a recommendation of the Scientific Advisory Group for Ozone of WMO's Global Atmosphere Watch Programme (GAW) and the International Ozone Commission(IO3C) of the International Association of Meteorology and Atmospheric Science(IAMAS):)

Various methods have been developed for measurements and long-term monitoring of atmospheric ozone. Among the most precise are those based on spectroscopic principles. Many of the most suitable methods are based on ozone absorption in the Huggins band (300-350 nm). Instruments making use of ozone absorption in the Huggins band include the ground-based sun photometers (such as Dobson and Brewer spectrophotometers used in the global network operated under the auspices of WMO and UV-Visible DOAS instruments operated in the frame of NDACC), LIDAR instruments and satellite instruments such as TOMS (Total Ozone Mapping Spectrometers), SBUV (Solar Backscatter Ultraviolet Radiometer), GOME (Global Ozone Monitoring Instrument) OMI (Ozone Monitoring Instrument) and SCIAMACHY (Scanning Imaging Spectrometer for Atmospheric Chartography).

Ozone absorption cross sections are crucial input parameters for the retrieval of atmospheric ozone concentrations from such measurements. Currently the data published by Bass and Paur (1985) are commonly used for many instruments including TOMS, but other cross-sections are also used, e.g. for GOME and SCIAMACHY. The accuracy of ozone cross sections including their temperature dependencies are one of the most important limiting factors for the accuracy of such atmospheric ozone measurements and several investigators have reported that radiance spectra from satellite instruments, such as GOME and OMI, fit better with more recent measurements of ozone cross-sections (e.g. Malicet et al., 1995) than with Bass & Paur cross-sections. These results need to be confirmed using direct-sun irradiance spectra taken from ground-based instruments and such spectra have recently become available. Because the knowledge of ozone absorption cross sections and their temperature dependencies limit our ability to fully exploit the potential of state of the art atmospheric ozone measurements, IO_3C and

WMO recommend that an ad hoc expert team on “Absorption Cross Sections Of Ozone(ACSO): An Activity on IGACO-Ozone” be established with the following terms of reference:

(1) Review presently available literature of ozone absorption cross sections and their temperature dependencies covering all relevant temperatures; first priority is the wavelength range of 300-350 nm with possible extension to visible and IR wavelengths.

(2) Determine the impact of changing ozone aborption cross sections for all of the commonly used (both ground-based and satellite atmospheric ozone instruments. This part of the study should include the impact on the consistency of the ozone records from instruments in the world-wide monitoring of ozone and the impact of the implementation on the groups responsible for the instruments

(3) Recommend whether a change should be made to the WMO/IO_3C standard ozone absorption cross section data that are presently used.

(4) If a change is recommended, then provide guidelines and time-line for implementing new absorption cross sections, separately for each instrument type.

(5) Write a report of the relevant findings including recommendations;

(6) Communicate and discuss the recommendations with the community of the involved experts;

(7) Complete this activity and disband the Expert Team within two years of the first meeting in 2009.

In implementing this activity, a partnership between the International Ozone Commission (IO_3C) and WMO-GAW is established. GAW will be represented through the WMO Scientific Advisory Group for Ozone (SAG-O3) working with the GAW IGACO-O3/UV office (FMI Helsinki). Within this partnership, the chairperson of the Expert Team and its members need to be decided and its terms of reference above finalized. The chairperson of the Expert Team needs to be an experienced physical chemist with the required expertise in laboratory experiments. The members need to include experts on all commonly used instruments, including instruments operated from ground and space as well as representatives of the GAW SAG-Ozone, GAW IGACO-Ozone office, the WMO Secretariat and the IO_3C.

Suggested Milestones:

Month 0: Kick off meeting of the expert team

Month 6: Report of a literature investigation to be presented at a joint SAG/IGACO-O3 meeting. Start of the feasibility study on the impact of changing ozone absorption cross-sections.

Month 12: Report of the results from the feasibility study and provide recommendations

Month 18: Organize a Forum to communicate and discuss results with the scientific community and make final decision. Start working on proposing guidelines and time-line for implementing changes

Month 24: Provide for each instrument a strategy and guidelines for implementation

Resourcing Commitment

Participants of this Expert Team are expected to seek support of their organizations to provide their contribution to the effort including travel to two meetings over a two year period. Secretariat support for two meetings will be arranged by WMO and the cost of publication will be shared between WMO and IO_3C.

Signatures of

D/ARE of WMO

on behalf of Chair JSC of WMO-GAW

President of IO_3C