**Global Atmosphere Watch (GAW)** 

# **GAW Activity Report for WMO RA VI**

for the period 05/1998 - 05/2002

submitted to

World Meteorological Organization Regional Association VI (Europe) Office of the Acting President c/o Mr. F. Q. Ribeiro

submitted by

GAW Rapporteur for WMO RA VI c/o G. Müller

# 1 Summary

In the past ten years, GAW has placed emphasis on developing the more global aspects. Consequently, the GAW Central Facilities have been developed to serve the global network, however, with a provision and strong encouragement to support regional structures.

This document summarizes the activities of GAW Central Facilities (such as SAGs, QA/SACs, WCCs, WDCs) as they relate to WMO RA VI as well as the activities of GAW Regional Facilities (RCC, Training facilities, etc.). A report on the national GAW programs, their achievements and further plans will be prepared following the RIGA 2002 GAW Workshop for WMO RA VI. For the time being, the following activities may be mentioned:

- the activities of the ozone part of GAW in WMO RA VI which came out from general recommendations of the SAG for ozone: The Regional Calibration Center for Surface Ozone, Hradec Kralove Czech Republic carried out ozone inter-comparisons between traveling standards and the standard reference photometer for various countries. The Regional Dobson Calibration Center at Hohenpeissenberg Germany started its activities in 1999 and performs its function under a bilateral co-operation with Hradec Kralove, Czech Republic. Very important and valuable assistance has been provided by some European meteorological services to GAW stations in developing countries.
- the support for regional GAW structures by the QA/SAC World Calibration Center for Surface Ozone Carbon Monoxide and Methane) at Dübendorf – Switzerland that is planning to analyze and improve the data flow within WMO RA VI. This QA/SAC has set up a training laboratory for immission monitoring in 1999.
- the definition of the aerosol parameters to be measured at Global and Regional sites by the SAG Aerosols. A World Calibration Center for Aerosols (physical characteristics) is in preparation at Leipzig - Germany. In Ispra – Italy, a World Data Centre for Aerosols was formally established in 1995.
- the establishment of World Calibration Centers for N<sub>2</sub>O and VOC at Garmisch-Partenkirchen – Germany in cooperation with the QA/SAC Germany, Langen – Germany. Development of SOPs for these components and first audits at selected stations and training workshops.
- the establishment of the GAW Training & Education Centre at the Global Station Zugspitze-Hohenpeissenberg to support the QA/SAC Germany in training activities.
- The installation of a web-site at the World Radiation Data Center at St. Petersburg Russia and the set-up of a training laboratory for air and precipitation quality at Kosetice Observatory – Czech Republic which is now open to all RAVI members.

The network of GAW stations within WMO Regional Association VI comprises roughly half of all designated GAW stations. The exact number is not known at present and the knowledge about the activities of these stations is scattered. A meta-database for GAW stations (GAWSIS, GAW Station Information System) is currently under development and is designed to help consolidate existing information and to improve the network-wide exchange of information.

# 2 GAW Central Facilities within WMO RA VI

## 2.1 Scientific Advisory Groups

#### SAG Aerosols

- Contact Dr. Urs Baltensperger, e-mail: urs.baltensperger@psi.ch
- Host Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland
- Activities The SAG Aerosols was established in 1997. Major activities during the reporting period include:
  - The definition of a list of aerosol parameters to be measured at Global and Regional sites.
  - The construction of a template for data submission to the World Data Centre in Ispra.
  - The deployment of the first Precision Filter Radiometers (PFRs) provided by the Swiss government for measuring aerosol optical depth.
- *Plans* The major goals for the future are:
  - Completion of the aerosol procedure report, providing guidelines for the measurement of the recommended aerosol parameters.
  - The establishment of a World Calibration Centre for the physical aerosol parameters with the Institute for Tropospheric Research in Leipzig.
  - The search for a World Calibration Centre for the chemical aerosol parameters.

## SAG UV Radiation

Contact Chair: Prof. Paul C. Simon, e-mail: Paul.Simon@oma.be

Secretariat: Dr. Liisa Jalkanen, e-mail: Jalkanen\_L@gateway.wmo.ch

*Host* Institut d'Aéronomie Spatiale de Belgique (IASB-BIRA)

3, Avenue circulaire; B-1180 Uccle, Brussels, Belgium. (Affiliation of chair)

Activities The solar radiation component of GAW has concentrated its efforts on UV radiation measurements at the Earth's surface. Other specialised WMO programmes (i.e. WWW and BSRN) have dealt with other aspects of solar radiation.

The SAG UV (formerly SSC UV, for Scientific Steering Committee on UV monitoring) was established in 1995 and has already met 6 times. It regularly appoints sub-groups. Major activities during the reporting period include:

- 1. Edition of a number of reports and guidelines:
  - WMO-UMAP Workshop on Broad-band UV Radiometers (No. 120).
  - Instruments to Measure Solar Ultraviolet Radiation (No. 125: Part 1: Spectral instruments).
  - Guidelines for Site Quality Control of UV Monitoring (No. 126)
  - Guide to the WMO/GAW, World Ultraviolet Radiation Data Center.
  - The GAW Strategic Plan for 2001-2007 (No. 142) has a section on Solar radiation, mainly UV. The GAW Guide is being updated and has sections on

Solar and UV radiation.

- 2. Intercomparison campaigns:
  - Several UV instrument intercomparisons were carried out, with support of national agencies and/or the European Commission, and have helped greatly to improve the quality of the UV measurements.
- 3. Data Centre:
  - Data submission to the World Data Centre is available through the internet web (http://www.msc-smc.ec.gc.ca/woudc/).
- 4. Web site:
  - The global UV network information has been posted on the UV Web (http://titan.srrb.noaa.gov/UV/left.html) and has been updated. Over 190 links to other web sites, summaries of UV monitoring around the world, information about upcoming meetings, instrument manufacturers, and recent publications are available.
- 5. User community:
  - A survey of the UV data user community needs has been made.
  - Presentations of the UV SAG activities are given at the major UV conferences.
  - Recommendations for harmonisation of the UV index have been produced.
- Plans
- To update the procedures for UV data archiving and distribution through the WOUDC, in collaboration with other World Data Centers; to promote data submission.
  - To update the UV networks status and establish the GAW station status as part of the Standard Operation Procedures (SOPs).
  - To define QA guidelines as part of the SOPs.
  - To continue defining instruments specifications in relation to monitoring objectives with the required ancillary measurements (by producing guidelines for broad- and narrow-band instruments as part of the SOPs).
  - To establish a UV World Calibration Center and Regional Calibration Centres in order to initiate regular instrument calibrations and intercomparisons campaigns.
  - To design the GAW UV radiation monitoring network and produce Data Quality Objectives and a SOP for UV measurements.
  - To promote the data to the user community with appropriate documentation.
  - To contribute to the revision of the definition of the international UV index and promote its use.
  - To specify the needs and use of UV modelling in GAW and relationship of satellite measurements in GAW.
  - To establish procedures for co-operation with BSRN and WWW.

## SAG Greenhouse Gases

Contact WMO/AREP

Host currently supended

Activities No activities specifically for WMO RA VI

*Plans* The SAG GG needs a new host. A merger with the WMO CO2 experts group is currently being explored.

## SAG Ozone

- Contact Dr. Karel Vanicek, e-mail: vanicek@chmi.cz
- *Host* Solar and Ozone Observatory of CHMI, Hvezdarna 456, Hradec Kralove, 500 08 Czech Republic
- Activities The activities of the ozone part of GAW in WMO RA VI came out from general recommendations of the SAG for ozone accepted at its meetings in Geneva 1998, Crete 1999 and Sapporo 2000. These include realization mainly the following tasks described also in other parts of this document.
  - Regular calibrations of Dobson spectrophotometers from WMO RA VI were performed every year by the Regional Dobson Calibration Center at MOHP/DWD, Germany since 1999.
  - Brewer ozone spectrophotometers operated at European GAW stations were also regularly calibrated against the world reference instrument.
  - A regional part of the total ozone monitoring network in the former USSR territory was substantially supported through the GAW program in WMO RA VI.
  - Scientific teams from WMO RA VI GAW stations participated extensively in development of standard operating procedures (SOPs) for ozone sondes and laboratory calibration campaigns in Jülich (JOSIE).
  - Substantial progress has been made in defining and implementing calibration procedures for surface ozone measurements and data collection by specialists from EMPA, NILU and CHMI.
  - Very important and valuable assistance has been provided by some European meteorological services to GAW stations in developing countries, e.g. by SMI to Nairobi station and FMI to Ushuaya station on ozone sounding, and by CHMI to about 20 stations on training of Dobson operators.
  - Special LIDAR observations of vertical profiles of ozone in the stratosphere continued at several observatories in WMO RA VI in recent years.
- *Plans* To maintain ground-based ozone monitoring networks at least at their present quality levels.
  - To implement new SOPs for ozone sondes as soon as they are approved.
  - To improve co-operation between European GAW stations and ESA on validation of measurements from new satellite ozone monitoring projects and in supporting ground-based ozone monitoring systems.

## 2.2 Quality Assurance/Scientific Activity Centres (QA/SACs)

#### QA/SAC Germany

- *Contact* Dr. Volker A. Mohnen, e-mail: mohnen@ifu.fhg.de (until Nov 30, 2001) Mr. Werner Rudolf, e-mail: werner.rudolf@uba.de
- Host IFU-FhG, 82467 Garmisch-Partenkirchen, Germany (until Nov. 30, 2001)

UBA Langen, Langen, Germany

- Activities Establishment of World Calibration Centers for N<sub>2</sub>O and VOC at IFU. Development of SOP's for these components and first audits at selected stations. Participation in GAW-TEC training workshops. Completion of WMO-CEOS GAW report No. 140 and planning of new IGOS-Theme: IGACO (Integrated Global Atmospheric Chemistry Observations) under WMO leadership.
- *Plans* World Calibration Center for Aerosols (physical characteristics) at Leipzig. Transfer of primary responsibility from IFU to UBA Langen

## QA/SAC Switzerland

- *Contact* Dr. Jörg Klausen, e-mail: joerg.klausen@empa.ch
- Host EMPA Dübendorf, CH-8600 Dübendorf, Switzerland
- Activities QA/SAC Switzerland was established in April 2000. Major activities during the reporting period include
  - Development of a meta-database for GAW stations (GAWSIS, GAW Station Information System – <u>www.empa.ch/gaw</u>). The database holds information about sites, contacts, and detailed meta-data about the measurements performed at the sites. This project is carried out in close collaboration with the Secretariat and WDCA.
  - Organization of the GAW Workshop for WMO RA VI, scheduled for May 27-30, 2002. This workshop is intended to provide an overview on GAW activities in the region and will produce recommendations and an action plan for further development of the program.
- *Plans* To finalize an internet-based version of GAWSIS and to consolidate the information available about the GAW regional stations in WMO RA VI.
  - To analyze and improve the data flow within WMO RA VI.
  - To advocate the (scientific and other) use of GAW data primarily through workshops.

#### 2.3 Calibration Centres

#### World Calibration Centre for Surface Ozone, Carbon Monoxide and Methane

- Contact Dr. Brigitte Buchmann, e-mail: brigitte.buchmann@empa.ch
  - Dr. Christoph Zellweger, e-mail: christoph.zellweger@empa.ch
- Host EMPA Dübendorf, CH-8600 Dübendorf, Switzerland
- Activities Performance and system audits were performed at the GAW stations Sonnblick (08/98), Mace Head (05/98), Jungfraujoch (01/99), Izaña (06/00), Zugspitze (02/01), and Ny Ålesund (09/01). These audits included surface ozone in all cases, and CO and methane in some cases. All stations were found to operate within the recommended uncertainties.
  - Ozone inter-comparisons between traveling standards and the standard reference photometer (SRP#15) were carried out for UBA Wien (02/99, 02/00, 02/01), Laboratorio Referencia do Ambiente, Portugal (02/00), FMI (04/00, 06/01), and IfU (10/00).

- During the EMEP/WMO/GAW workshops in Kosetice (10/98), training in surface ozone measurements was provided.
- *Plans* Operation is planned to continue as is. Support for regional GAW structures will continue within the limited capacity of the WCC.

## World Calibration Centres for N<sub>2</sub>O, VOC and Aerosols (physical characteristics)

Contact Dr. E. Scheel for N2O, e-mail: scheel@ifu.fhg.de

Dr. B. Rappenglueck for VOC e-mail: rappenglueck@ifu.fhg.de

Dr. A. Wiedensohler for physical characteristics of Aerosol, e-mail: alfred.wiedensohler@tropos.de

Host IFU-Garmisch for N<sub>2</sub>O and VOC

IfT-Leipzig for Aerosol

All these WCCs will be operating under the direction of UBA Langen, Germany.

- Activities All three World Calibration Centers are still operating in the "research/implementation"- mode.
- *Plans* Official announcement of the operational readiness of the three new WCCs by UBA-Langen in spring of 2002

#### **Regional Calibration Centre for Surface Ozone**

Contact Ing. Jaroslav Šantroch, CSc., e-mail: santroch@chmi.cz

- Ing. Jiri Novak, e-mail: novakj@chmi.cz
- Host CHMI, Na Sabatce 17, 143 06 Prague 4, Czech Republic
- Activities Ozone inter-comparisons between traveling standards and the standard reference photometer (SRP#17) were carried out for the Meteorological Services of Poland (12/99, 03/01), Hungary (11/00, 11/01), Slovakia (11/99, 11/00, 11/01), Slovenia (05/01), Lithuania (11/01) and Estonia (04/01).
- *Plans* Operation is planned to continue as is. Limited support from the Czech government is planned to continue.

## **Regional Calibration Centre for Total Ozone**

Contact Dipl. Met. Ulf Koehler, e-mail: ulf.koehler@dwd.de

Dr. Karel Vanicek, e-mail: vanicek@chmi.cz

- Host Meteorological Observatory Hohenpeissenberg, Regional Dobson Calibration Centre for WMO RA VI, Albin-Schwaiger-Weg 10, D-82383 Hohenpeissenberg, Germany
- Activities The Regional Dobson Calibration Center started its activities in 1999 as a facility for calibration of Dobson ozone spectrophotometers and for a support to the regional Dobson network in WMO RA VI. RDCC is located at the Meteorological Observatory of DWD at Hohenpeissenberg (MOHP), Germany, and performs its function under a bilateral co-operation with the Solar and Ozone Observatory of CHMI in Hradec Kralove (SOO-HK), Czech Republic. Every year, calibrations of 5-8 instruments from WMO RA VI against the regional reference instrument D064 are

performed at MOHP. The reference instrument D064 is directly traceable to the World Primary Standard Spectrophotometer D083, maintained by NOAA-CMDL, Boulder, USA. Activities of RDCC in the reporting period are described in detail in its annual reports (http://www.chmi.cz/meteo/ozon/dobsonweb/eurdcc.htm) and include

- Training of operators of Dobson spectrophotometers from selected GAW stations in WMO RA VI and from developing countries outside Europe as organized by SOO-HK. Between 1996 and 2001, more than 23 observers from 21 stations have participated in these training campaigns supported by CHMI and WMO. All of them were provided with special software tools developed by RDCC for standardized processing of Dobson observations at their stations
- Implementation of a new Dobson station at Amberd, Armenia in 2000 for monitoring of total ozone in Caucasian region.
- Plans
  Regular calibration of Dobson instruments from WMO RA VI will continue at RDCC every year and will be coordinated with inter-comparisons organized by WMO.
  - Absolute calibration of the regional reference instrument D064 and its comparison towards the WRPS D083 will be performed at least every 3 years.
  - A closer co-operation with Brewer stations is planed through joint calibration actions and workshops to guarantee a consistency of long-term total ozone observations in WMO RA VI.
  - Support for maintenance of ground-based Dobson stations and the regional reference instrument of WMO RA VI will be searched mainly under satellite ozone monitoring and research programs of ESA.

## 2.4 GAW World Data Centres

## World Data Centre for Aerosols

- Contact Dr. Julian Wilson, e-mail: julian.wilson@jrc.it
- *Host* Institute for Environment and Sustainability, Joint Research Centre, I-21020 Ispra, (Va), Italy.
- Activities The World Data Centre for Aerosols was formally established in 1995 to archive aerosol related observations within GAW.
  - In 2000 the NARSTO data exchange standard was adopted for the submission of data to and the receipt of data from the data centre. <u>http://cdiac.esd.ornl.gov/programs/NARSTO/narsto.html</u>
  - As part of the EC funded project SINGADS (ENV4-CT98-0780), the EMEP CCC and the WDCA have collaborated to produce a specimen dataset of EMEP and WDCA data in the NARSTO data exchange standard.
- *Plans* Operation is planned to continue. Use of the WDCA data will be improved by linking it to GAWSIS.

## World Radiation Data Centre

Contact Dr. Anatoly Tsvetkov, e-mail: tsvetkov@main.mgo.rssi.ru

- Host Main Geophysical Observatory (MGO), Karbyshev Str., 7, Sankt-Petersburg, 194021, Russia.
- Activities WRDC was established in 1964 and nowadays participates in GAW program.

Major activities during the reporting period include

- Installation of web-site at the WRDC with user-friendly interface which helps to view solar radiation data measured at the world radiometric stations (http://wrdc.mgo.rssi.ru).
- Representation of results of supplementary quality checks of GAW sites data.
- *Plans* Communication with PIs from GAW sites on the matters of data submission to the WRDC, data quality and other related methodological problems.

#### World Data Centre for Surface Ozone (K. Torseth)

- Contact Kjetil Tørseth, e-mail: kjetil.torseth@nilu.no
- Host Norwegian Institute for Air Research (NILU), P.O Box 100, N-2027, KJELLER
- manual of the World Data Centre for Surface The Data reporting Activities Ozone (WDCSO3) was finalized in December 1998. The manual as well as information about the data centre in general can be found at the WDCSO3 web-site http://www.nilu.no/projects/nadir/wdcso3/wdcso3.html). NILU has as Chemical Coordinating Centre for the European Monitoring and Evaluation Programme (EMEP) responsibility for collecting surface ozone data. Steps have been made to facilitate the exchange of data and to avoid double Therefore, we also accept the submission of ozone reporting within Europe. data according to the EMEP data reporting guidelines as specified at www.emep.int. Currently only a few sites have reported data to the data centre.
- *Plans* An obvious challenge is to increase the number of sites reporting to the data centre, and in particular from outside Europe. Requests for data will be made to measurement leaders at GAW sites (available from GAWSIS) in the coming year.

# 3 Training Activities

## GAWTEC, Germany

- *Contact* Dr. Gerhard Enders, e-mail: g.enders@schneefernerhaus.de
  - Dr. Katja Mannschreck, e-mail: k.mannschreck@schneefernerhaus.de
- Host UFS Schneefernerhaus, Zugspitze 5, D-82475 Garmisch-Partenkirchen, Germany
- Activities GAWTEC, the GAW Training & Education Centre, was established in July 2001 at the Global Station Zugspitze-Hohenpeissenberg to support the QA/SAC Germany in training activities. GAWTEC organizes training courses for GAW station personnel on measurement techniques and data handling, and assists in the transfer of technology.
  - 1st course July 22-August 3, 2001 with 9 trainees from Belarus, Croatia, Latvia, Lithuania, Macedonia, Ukraine, Uzbekistan, and Yugoslavia. Main objectives: surface ozone, precipitation measurement, precipitation chemistry, data quality.
  - 2nd course Nov. 19-30, 2001 with 10 trainees from Algeria, Chile, Indonesia, Kenya, Latvia, Malaysia, Paraguay, Poland, Portugal, and Uruguay. Main objectives: radiation (incl. UV), carbon monoxide, surface ozone, data quality.
- *Plans* Operation will continue with two courses per year, each for up to 10 trainees.

## EMPA Dübendorf, Switzerland

- *Contact* Dr. Brigitte Buchmann, e-mail: brigitte.buchmann@empa.ch
- Host EMPA Dübendorf, CH-8600 Dübendorf, Switzerland
- Activities A training laboratory for immission monitoring was set-up in 1999. This facility was used for training of representatives of Portugal (02/00), Germany (03/00), and Russia (01/01).
- *Plans* The training facility at EMPA is open to all members of WMO RA VI.

#### CHMI Kosetice, Czech Republic

Contact Ing. Jaroslav Santroch, CSc., e-mail: santroch@chmi.cz

Dr. Milan Vana, PhD, e-mail: vana@chmi.cz

- *Host* CHMI, Observatory Kosetice, 394 22 Kosetice, Czech Republic
- Activities A training laboratory for air and precipitation quality was set-up in 1998
  - This facility was used for training of representatives of Latvia (12/98)
  - Organization of the First Join EMEP-GAW/WMO Workshop for System and Performance Audit, Kosetice, Czech Republic, October 19 – 23, 1998

*Plans* The training facility at CHMI is open to all members of WMO RA VI.

# 4 Collaboration with GAW Partner Programs

#### GAW Urban Research Meteorology and Environmental Project (GURME)

*Contact* SAG: Prof. Paul Mason, e-mail: pjmason@meto.gov.uk

Secretariat: Dr. Liisa Jalkanen, e-mail: Jalkanen\_L@gateway.wmo.ch

*Host* GURME maintains a web site at the University of Iowa, USA.

http://www.cgrer.uiowa.edu/people/carmichael/GURME/GURME.html

- Activities The GURME project and SAG were established in 1999.
  - European experts, who are actively engaged in air pollution forecasting, participated in the First GURME Forecasting Workshop by presenting modeling tools. The tools represented a sampling of the contemporary models that are being developed and used in a variety of air quality forecasting and other air pollution activities.
  - Pilot projects, to demonstrate how NMHSs can successfully undertake or expand their urban environment programmes, are promoted in GURME; a project has been established in Moscow.
  - The passive sampler project samples have been analyzed at IVL in Gothenburg, Sweden.
- *Plans* It is envisaged that another GURME project will be started in Europe.
  - The European NMHSs will continue transferring their expertise in air quality forecasting to developing countries.

#### Baseline Surface Radiation Network (BSRN) (A. Ohmura)

- Contact Prof. Atsumu Ohmura, e-mail: ohmura@geo.umnw.ethz.ch
- *Host* Institute for Atmosphere and Climatic Science, Swiss Federal Institute of Technology (ETH), Winterthurerstr. 190, CH-8057 Zurich, Switzerland.
- Activities Continuous observation of climatically relevant irradiances and atmospheric characteristics in major climatic zones for the purposes of improving climate models, supplying satellite radiometry with ground truth and detecting important changes in radiation fields. BSRN is a project of the World Climate Research Program (WCRP) and consists of 21 stations (10 of which are within WMO RA VI) and the data center. The instruments, methods of their deployment and calibrations are standardized. The project started in 1992 and nine nations are actively participating. The data are open for all scientists in all nations, immediately after the data quality is assured. The station scientists, data center personnel and external experts meet every two years to exchange information and discuss on the methods of radiometry and makes plan.
- *Plans* The next BSRN meeting will take place in Regina, Canada in June 2002. It is planed to establish stations in the regions not yet supplied with stations. These are especially desert areas and high mountains. The project is conceived to continue so long as WCRP exists.

## Network for the Detection of Stratospheric Ozone (NDSC)

- Contact Prof. Niklaus Kämpfer, kaempfer@mw.iap.unibe.ch
- *Host* Inst. of Applied Physics, University of Bern, CH-3012 Bern, Switzerland
- *Activities* Monitoring of ozone profiles from approx. 20 70km by microwave radiometry with a time resolution of 2 hours. Data are sent to NDSC data archive.
- *Plans* Operation of a microwave radiometer for the retrieval of watervapor profiles in the middle atmosphere

# 5 National GAW Activities

A report about national GAW activities will be prepared following the GAW Workshop for WMO RA VI, May 27-30, 2002, Riga (Latvia).

# 6 Activities under development

#### A new IGOS-Theme: Integrated Global Atmospheric Chemistry Observation (IGACO)

- Contact Dr. Guy Brasseur, e-mail: brasseur@dkrz.de
- Host WMO-GAW, Geneva
- Activities Proposal for IGACO (a continuation and expansion of WMO-CEOS GAW report 140) was accepted in June by the IGOS Partners and a preliminary Theme-Team has been established under the leadership of Dr. Guy Brasseur. It met at WMO (Geneva) on Nov. 15/16, 2001 to develop a strategy for IGACO.
- *Plans* A series of consultation workshops will be organized to define the needs of the broad user community and the capabilities of current and future measurement programs (satellite and ground-based).