

Aim of the training

Effective protection of the ozone layer requires a systematic ground-based international monitoring of total amount of ozone in the atmosphere among others. Such observations are performed in the global network maintained in cooperation with the Global Atmosphere Watch (GAW) project of the World Meteorological Organization (WMO). To keep and improve quality of routine observations and data management at stations it is necessary to use standardized methods of measurements, maintenance of the instruments and data processing by means of the personal computers and generalized software tools.

The Solar and Ozone Observatory (SOO-HK) of the Czech Hydrometeorological Institute (CHMI) in Hradec Kralove is a GAW station with a long-term experience in operation of ozone spectrophotometers. Specialists from SOO-HK have got a qualification on calibration, adjustment and repairs of these instruments within international missions organized by WMO and other institutions. A generalized PC software package for processing and management of ozone observations was created at SOO-HK and is now widely used in the global network. To assist the stations, that are going to implement updated techniques on monitoring of total ozone, CHMI organizes training for operators of ozone spectrophotometers either at SOO-HK or at stations. The training activities also represent a contribution to the function of the Regional Dobson Calibration Centre of the RA-VI Region established at the Meteorological Observatory Hohenpeissenberg, Germany that is supported by SOO-HK under the bilateral cooperation between CHMI and DWD. In recent years some of the training missions were supported by the project of the Czech Government devoted to assistance to ozone monitoring stations located in developing countries.

Organization and applications

The training missions are usually performed as two-week actions of a limited number of trainees (3-5) at SOO-HK once per year since 1996. Dobson operators who apply for the training have to contact the Head of SOO-HK first. If there is still a free capacity for a particular year the applicants are registered on an official request of a head of their institution addressed to the Director of CHMI. The training is sponsored both by WMO and by CHMI as a contribution of the Czech Government to implementation of the Vienna Convention and WMO/GAW Programme.

Program of the training

The following topics are explained, demonstrated and practiced during the training.

1. Ozone spectrophotometers - function

Theory of measurements

- Direct sun observations DS
- Zenith observations
- Umkehr observations

Function of the instrument

- Mechanical, optical and electronic parts
- Adjustment of optical alignment
- Operation of instruments

Maintenance of the instrument and adjustment of calibration constants

- Routine HG, SL tests
- Special tests
- Adjustment of calibration constants
- Cleaning of optical pieces

Intercomparisons and setting of new constants

- Calibration scales

- World and regional standards
- Transport of the instruments
- Definition of calibration constants

2. Measurements with spectrophotometers

Routine observations

- Scheduling of measurements
- Selection of sequences
- Collection and record of raw data

Special observations

- Quasi-simultaneous DS, ZB and ZC measurements for development of zenith polynomials
- Measurements at intercomparisons of instruments
- Umkehr observations

3. Processing of data with a standardized software

- Description of the software
- Installation of the program and basic parameters
- Routine processing of observations
- Re-processing of historical data sets
- Outputs - daily and monthly protocols, PC files, graphs
- Creation of WMO/WOUDC reports
- Updating of zenith polynomials
- Maintenance of the total ozone data base

4. International data exchange

- Cooperation with the WMO World Ozone and UV Data Center, Toronto - WOUDC
- Regional data exchange
- International real-time data exchange
- Comparison of the ground and satellite observations

5. Observations at home stations

Present situation, problems, supports, re-evaluation of historical data records

Lecturers:

Mr. Karel Vanicek and Mr. Martin Stanek, SOO-HK

Operators trained by experts of CHMI at SOO-HK, 1996-2006

Year	Trainees	Country	Station
1996	Mr. Aichi Salim	Algeria	Tamanrasset
	Mr. Gabriel Karamanian	Argentina	Ushuaia

1997	Mr. Constantin Rada	Romania	Bucharest
	Mrs. Sumridh Sudhibrabha	Thailand	Bangkok
	Mr. Chalor Pitimoln	Thailand	Bangkok

1998	Mr. Francisco R. da Silva	Brazil	Natal/Cachoeira Paulista
	Mr. Wafik Sharobiem	Egypt	Cairo/Aswan
	Mr. Ahmed A. Gaheen	Egypt	Cairo/Aswan

1999	Mrs. Zhao Yanliang	P.R. China	Xianghe
	Mr. Yang Liquan	P.R. China	Xianghe
	Mr. Sunday Osaghaede	Nigeria	Lagos

2000	Mr. David Melkonyan	Armenia	Amberd
	Mr. Armen Ordyan	Armenia	Amberd
	Mrs. Inese Chang-Waye	Seychelles	Mahe
	Mr. Mohammad Jafari Afiabad	Iran	Isfahan

2001	Mr. John Nzioka Muthama	Kenya	Nairobi
	Mrs. Qin Fang	P.R. China	Kunming
	Mr. Wu Jian	P.R. China	Kunming

2002	Mr. Ricardo Sanchez	Argentina	Buenos Aires
	Mr. Sergio Arizcorreta	Uruguay	Salto

2003	Mr. Esequiel Villegas	Peru	Marcapomacocha
	Mr. Orlando Ccora	Peru	Marcapomacocha
	Mr. Muhammad Annes Siddiqui	Pakistan	Quetta

2004	Mr. Mohamed Ferroudj	Algeria	Tamanrasset
	Mrs. Enametse Ditshwene	Botswana	Maun
	Mrs. Salethake Goitsewang	Botswana	Maun

	Ms. Ruth Mmusi	Botswana	Maun
2005	Mr. Danie de Spuy	South Africa	Irene for RDCC RA-I
	Mr. Gerald Meyer	South Africa	Springbok for RDCC RA-I
2006	Mr. William Otieno Ayoma	Kenya	Nairobi
	Mr. Joseph MbuviMukola	Kenya	Nairobi

More than 15 other operators were trained by specialists from SOO-HK during missions at stations till 2007.