

# PHILIPPINES

## OBSERVATIONAL ACTIVITIES

### Column measurements of ozone

#### *On-going Monitoring Activities*

In the Philippines, regular monitoring of total ozone and UV-B is conducted by the PAGASA using the Brewer Ozone Spectrophotometer and Dobson Spectrophotometer. Ozone monitoring activities are located at the PAGASA Science Garden Complex in Quezon City (14.6500 °N, 121.0500 °E).

Daily measurements of total ozone in the Philippines are being carried out at the local ozone-observing network since late 1970's. Monitoring of atmospheric ozone and related parameters (e.g. UV solar radiation) are performed as a contribution of PAGASA to the Global Atmosphere Watch Programme (GAW) of the World Meteorological Organization (WMO).

An automated Brewer spectrophotometer (# 127) measures both direct sun and zenith sky measurements several times per day. The Brewer instrument is calibrated with respect to the travelling standard #017 of the Atmospheric Environment of Canada (AES). The Brewer instruments are programmed to make total ozone measurements on the sun and/ on the zenith sky. The Brewers also make Umkehr measurements of the ozone vertical profile and spectral scans of the horizontal UV irradiance. Measurements using Brewer Spectrophotometer started in late 90's.

### Profile measurements of ozone and other gases/variables relevant to ozone loss

At present PAGASA do not have ozonozondes and ozone lidar to make measurements of the ozone profile.

### UV Measurements

At the moment we do not have broadband measurements or narrowband filter measurements for UV-radiation monitoring. Such kind of regular measurements are very essential to be developed in our country, but again there is a shortage of funds. What we have right now is a Brewer spectrophotometer which measures UV radiation on a daily basis.

### Calibration Reports

#### **Dobson #52**

An expert from Japan Meteorological Agency QA/SAC, Koji Miyagawa, made the first field survey in the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Philippines in March 22-31, 2004 to evaluate, repair and calibrate the Dobson Spectrophotometer (D052). Before the arrival of the expert, Dobson 052 has stopped its operation in preparation for the site transfer. During the instrument check-up the cobalt filter was broken but was repaired with glue and is being reused at present. A defective 470k resistor was replaced. The observers were briefed with the observation method and proper instrument maintenance. A computer software for the total ozone data management was provided and personnel involve in ozone observations were trained regarding its usage. The instrument is now operational in the new site.

## Brewer #127

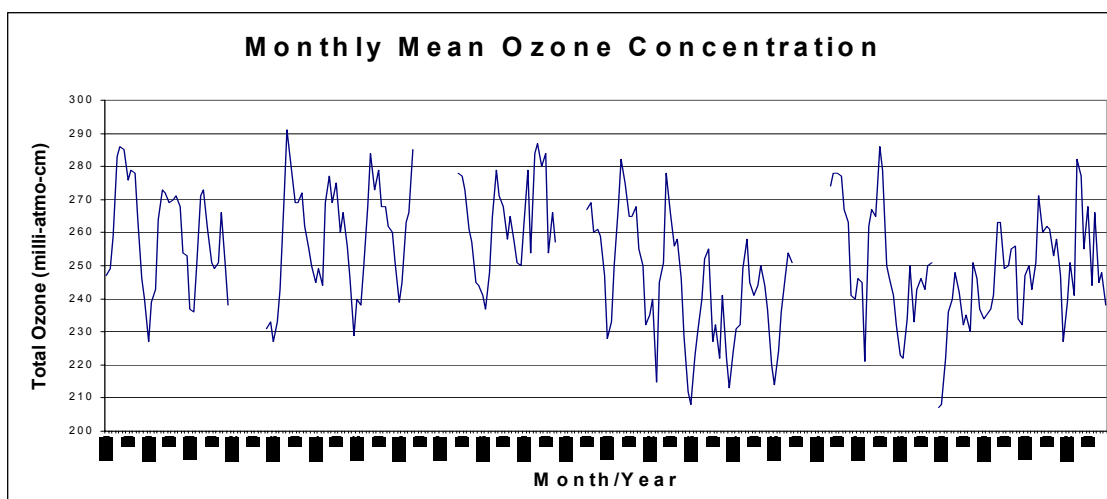
Int'l Ozone Services (IOS) completed the calibration and service of Philippines Brewer #127 during period March 16-20, 2005. This project was to be supported by the World Meteorological Organization (WMO). The instrument has been out of service for the past 5 years due to azimuth tracker power supply failure. The standard lamp (SL) ratios had increased from values of 2160/4420 to 2340/4835 and sensitivity had dropped by ~40%. This large change normally means the PMT filter is deteriorating and probably will need to be replaced soon to stabilize the instrument. The ETC constants were adjusted to values 3580 / 4415 to get best agreement to #017. In the table and graph below are the direct sun daily means and results of #127 and #017 using final constants. Two Sun Scan (SC) test results showed that cal step of 295 was still proper.

### UV Calibration:

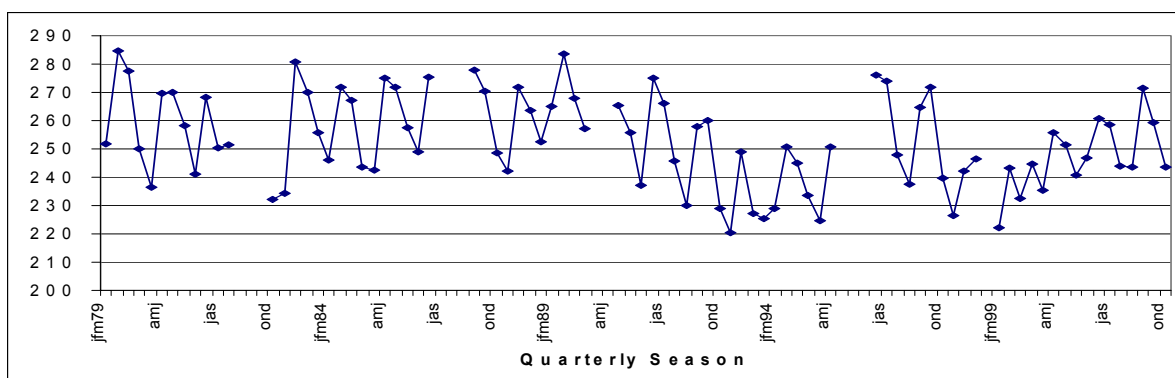
The UV calibration was checked and the final response file (uvr07705.127) is recommended for future use. The initial UV calibration (uvr07605x.127) showed that the sensitivity had decreased ~40% and due to low counting rates.

### RESULTS FROM OBSERVATIONS AND ANALYSIS

Research activities mainly focus on statistical analysis. Trend analysis using ozone data from 1979-2002 (Figure 1) shows that there is no statistically significant trend in the yearly data. As shown in Figure 2, there is a seasonal variation in ozone concentration. Ozone values are high during summer (April-September) and tend to decrease during fall- winter (November-February). There are some data gaps and this can be attributed to instrument malfunction from November '89 to Jun'90 and June'95 to April '96 . Other data gaps are caused when the instrument was sent to Melbourne, Australia for general repair and participated in the intercomparison held every four years. The last intercomparison was held in Tsukuba, Japan in 1996.



**Figure 1: Monthly Mean Ozone Concentration (1979-2002).**



**Figure 2: Seasonal Ozone Concentration (1979-2002).**

## THEORY, MODELLING AND OTHER RESEARCH

Ozone research activities mainly focus on statistical analyses (trends). The trends of both total ozone amounts are studied regularly.

## DISSEMINATION OF RESULTS

### Data Reporting

All data are being sent to the WMO World Ozone and UV Data Center operated by the Canadian AES in Toronto.

## PROJECTS AND COLLABORATION

PAGASA is an active member of the Technical Working Group for the Phase-out of Ozone Depleting Substances (ODS) in the Philippines. PAGASA participates actively in the evaluation of policies and in designing strategies that are needed in order to phaseout the use of ozone depleting substances in the country. At present the Philippines has made considerable progress in phasing-out CFC's especially in mobile airconditioning, fire fighting, refrigeration, foam as well as in the solvents industry. As early as in late 90's most of these CFC's were already phaseout in the country.

## FUTURE ACTIVITIES

- Investigating the causes of high and low concentrations of ozone by correlation analysis with meteorological factors and other pollutants
- Development of UV-B index programme
- Establish Broadband radiometers for additional UV monitoring stations
- Comparison of observations using Dobson and Brewer Spectrophotometer.

## NEEDS AND RECOMMENDATIONS:

Operation of the Brewer spectrophotometer in the Philippines remains a big challenge especially for PAGASA with limited resources. Replacement of parts are very expensive. Without the support of WMO and the help of Mr Ken Lamb of the International Ozone Services we cannot sustain the regular maintenance and calibration of instruments. In order to maintain ozone monitoring activities in the Philippines we need the following:

- Technical and financial assistance for the regular calibration of Brewer and Dobson spectrophotometer. Another calibration of the Brewer Spectrophotometer should be planned in 2006 and that a new filter be installed at that time to stabilize the instrument. There is also an urgent need for Dobson intercomparison with the standard Dobson #116.
- Further training of technical personnel in the maintenance of instruments.
- Services of experts to carryout calibration services are very important to ensure continuity of ozone observations especially for Brewer instruments. Support of WMO in order to sustain the regular maintenance and calibration of instruments is very essential.

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