

MALAYSIA

OBSERVATIONAL ACTIVITIES

The International Conference on Tropical Ozone and Atmospheric Change held in Penang, Malaysia in February 1991 underscore the lack of atmospheric ozone measurements and research in the equatorial region. Realizing the importance of developing countries in the tropics to play a more important role in the global initiatives to achieve a better understanding of the atmospheric changes and the effects on the environment linked to ozone changes, Malaysia has initiated its active involvement in the World Meteorological Organization (WMO) Global Ozone Observing System (GO₃OS) with the launching of its ozone monitoring programme in October 1992.

The ozone monitoring programme involves monitoring of ozone concentrations at the surface, the vertical distribution of ozone up to the stratosphere and total column ozone in the atmosphere.

Column Measurement of Ozone

Total column ozone measurements in Malaysia began in 1992 using the Sci Tec Inc. Brewer Ozone Spectrophotometer Mark II, instrument number 090 at the Petaling Jaya Station, Petaling Jaya Meteorological Station (Lat. 03 deg.06' N, Long. 101 deg. 39' E, elevation 45.7m above MSL). This is the only regular long term total column ozone monitoring site in Malaysia.

Ultraviolet Measurements

Daily ultraviolet radiation measurements are also made using the same Brewer Spectrophotometer mentioned above.

Ozone Profile Measurements

Ozone profile measurements are conducted at the Kuala Lumpur International Airport, Sepang Meteorological Station (Lat. 2 deg. 43' N, Long. 101 deg. 42' E, elevation 16.3m above MSL) using the Vaisala Digicora system. Sounding are made twice a month during the times when the AURA satellite passes the station. Overpass times are made available by the SHADOZ (Southern Hemisphere ADditional OZonesondes) project.

Surface Ozone

Hourly surface ozone concentration is measured continuously using the Thermo Environment Instruments Inc. C49 Ozone Analyzer at the Cameron Highlands Meteorological Station (Lat. 04 deg. 28' N, Long. 101 deg. 22' E, elevation 1545.0m above MSL). Prior to that, surface ozone measurements were made using the Monitor Lab ML 9811 Ozone Analyzer from the year 1997 to 2002.

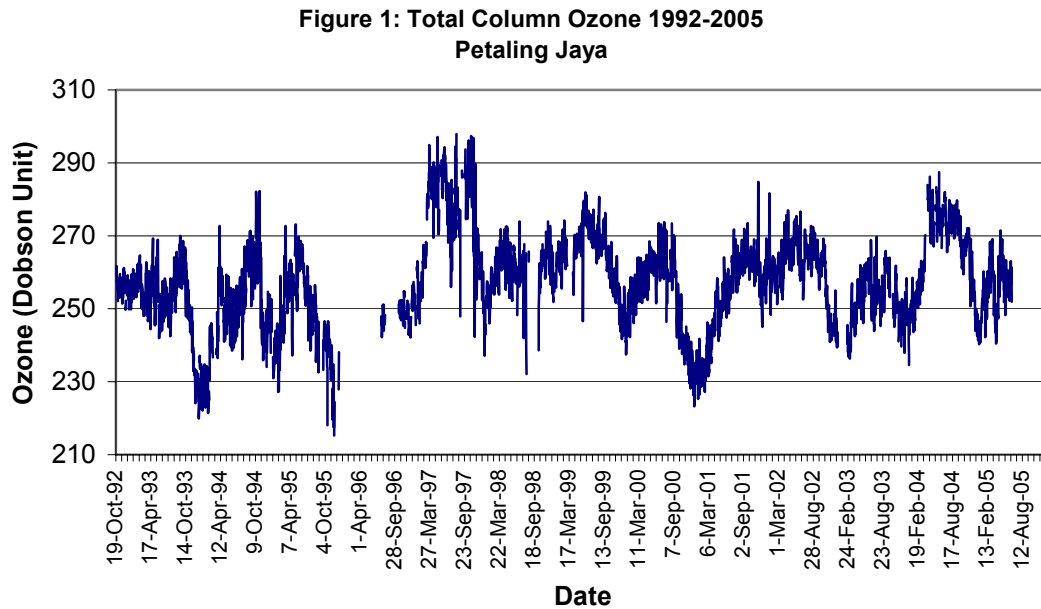
Calibration Activities

The Brewer Spectrophotometer is calibrated by International Ozone Services of Canada. The calibration is performed every two years. Quality assurance and quality control procedures are strictly adhere to during ozone sounding and surface ozone measurements.

RESULTS FROM OBSERVATIONS AND ANALYSIS

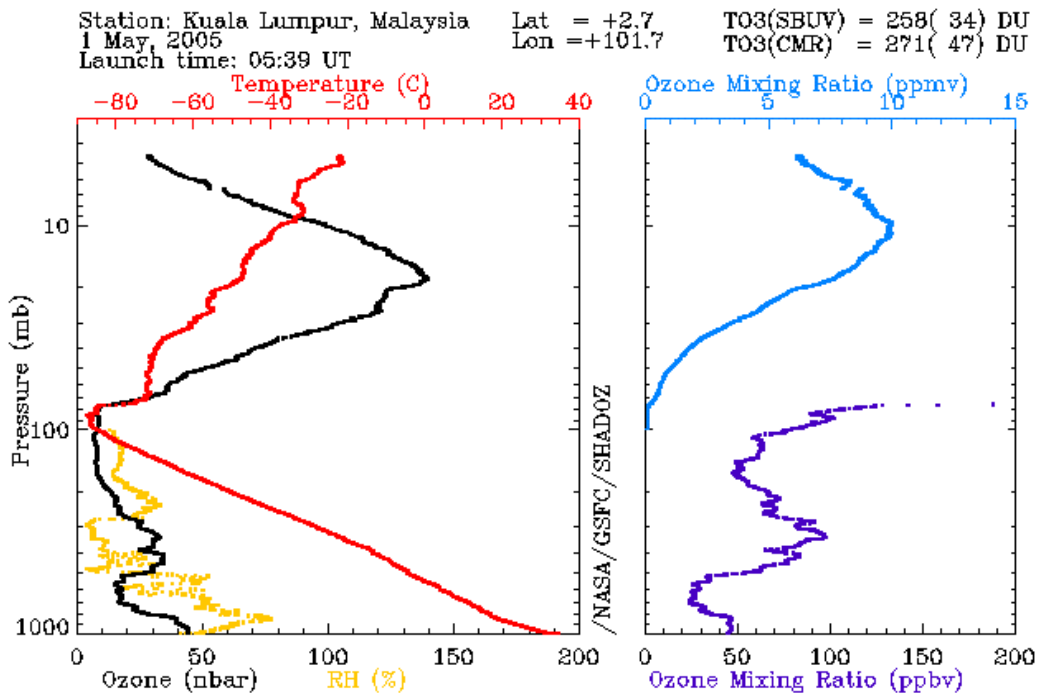
Total Column Ozone

The time series of total column ozone measurements since 1992 is shown in Figure 1.



Ozone Profile Measurements

The figure below shows the latest vertical ozone profile made available on the SHADOZ website.



RESEARCH ACTIVITIES

Asian Ozone Pollution in Eurasian Perspective

This project concerns spatial distribution and temporal variability of ozone, an important atmospheric constituent in the troposphere, which is an effective greenhouse gas and a toxic substance for human health and vegetation. It aims to get a perspective of surface ozone in Asia and to discuss how it is affected by human activity by clarifying both intra- and inter-continental long-range transport over the Eurasian continent.

The project compiles observational data of surface ozone at remote and rural sites as well as selected urban sites data in Asia. The integrated dataset will illustrate the overview of ozone pollution in Asia, and will be used to evaluate the contribution of emissions of ozone precursors in various parts of Asia as well as those from Europe and North America by using the "tagged" method of the global chemical-transport. International workshops are organized for the discussion of data compilation/ analysis and for proposing policy strategy how to reduce ozone pollution in Asia.

DISSEMINATION OF RESULTS

Data Reporting

Total column ozone data and vertical ozone profile data are reported every six months to the WMO Global Atmosphere Watch World Ozone and Ultraviolet Radiation Data Centre in Canada.

Information to the Public

Vertical ozone profile data is made available after every launch on the SHADOZ website for the scientific community.

Daily solar UV index is posted on the Malaysian Meteorological Department's website as a service to the public.

Annual air quality reports containing data and information on ozone monitoring is published annually.

Information on ozone and ozone issues are discussed and posted on the Malaysian Meteorological Department website.

Relevant Scientific Papers

Tropospheric ozone climatology over Peninsular Malaysia from 1992 to 1999, Journal of Geophysical Research, Vol. 107, NO. D15, 10.1029/2001JD000993, 2002. Authors: S Yonemura, H Tsuruta, S Kawashima, S Sudo (NIAS) Leong C P, Lim S F, Zubaidi (MMS)

Annual and El Nino-Southern Oscillation variations in observations of in situ stratospheric ozone over Peninsular Malaysia, Journal of Geophysical Research, Vol. 107, NO. D13, 10.1029/2001JD000518, 2002. Authors: S Yonemura, H Tsuruta, S Sudo (NIAS) Leong C P, Lim S F, Zubaidi (MMS)

Effects of monsoons and ENSO on atmospheric ozone in Malaysia, Jurnal Fizik Malaysia, Volume 22, Number 1 & 2, March & June 2002, Authors: J T Lim, S F Lim, C P Leong, H Tsuruta, S Yunemura.

PROJECTS AND COLLABORATION

Southern Hemisphere Additional OzoneSondes (SHADOZ)

SHADOZ (Southern Hemisphere Additional OZonesondes) project is designed to remedy data discrepancy of a number of stations that are operating in the southern hemisphere tropics and subtropics which has differing frequency and reporting procedures. SHADOZ achieve its aims by coordinating launches, supplying additional sondes in some cases, and by providing a central archive location. Data will be collected in a timely manner and will be available through this website to the SHADOZ and TOMS Science Teams, as well as to the scientific community as a whole.

Currently, twelve active sites are participating in SHADOZ. The sites are at Ascension Island; American Samoa; Fiji; Irene, South Africa; Java, Indonesia; Malindi and Nairobi, Kenya; Natal, Brazil; Paramaribo, Surinam; La Réunion, France; San Cristóbal, Galapagos; and Kuala Lumpur, Malaysia.

FUTURE PLANS

Air Quality Modelling

The Malaysian Meteorological Department (MMD) in its 5-year Development Plan beginning in 2006 plans to introduce air quality forecasting as one of its product and service. Among the parameters that will determine air quality will be surface ozone concentrations in ambient air.

Monitoring

The MMD is planning to measure surface ozone concentrations at the Danum Valley GAW Station to detect changes in ozone levels during the dry biomass burning season in the island of Borneo.

Research

A proposal to study the oxidant and particle photochemical processes above a South-East Asian tropical rain forest prepared by the Lancaster University, United Kingdom is being evaluated by funding agencies. This joint project involves a number of parties including the MMD.

NEEDS AND RECOMMENDATIONS

Capacity building and exchange programmes and twinning projects in quality assurance and quality control is needed to improve data quality and accuracy.

Increase in the frequency of ozonesonde launch from once a fortnight to once a week. The SHADOZ project is expected to provide this support.

Total column ozone and UV measurements to cover the island of Borneo. An additional Brewer spectrophotometer installed in the state of Sabah will provide these data over Borneo.
