

THAILAND

1. Monitoring

The total ozone and UV radiation monitoring are carrying out at Thailand Meteorological Department (TMD) that there are the Global Ozone Observing System stations of WMO-Global Atmospheric Watch programme. The measurements performed by the Atmospheric Ozone, Solar Radiation and Turbidity Observations Subdivision at Bangkok and Southern Meteorological Centre at Songkhla.

Stations	Locations	Ozone Measurements	UV measurements
Bangkok (No. 216)	13.67 N, 100.62 E	-Dobson Spectrophotometer No.090 -Brewer Spectrophotometer No.121	- Brewer Spectrophotometer No.121
Songkhla (No. 345)	7.20 N, 100.60 E	-Brewer Spectrophotometer No.120	- Brewer Spectrophotometer No.120

Total ozone measurements made by using:

- Dobson spectrophotometer No. 090 since 1979. The latest inter-comparison was in Tsukuba, Japan 1996. The monthly test results are currently still stable.
- Brewer spectrophotometer No. 120 is used since 1997 and re-installed after replacing of some parts in 2001.
- Brewer spectrophotometer No.121 is used since 1996 and calibrated in 2000 with the traveling Brewer No 017. (By the International Ozone Service Company, Canada)

For the important process of data calculating and analysis, it is very appreciated using some worth software as DOBSON/DOBSTOOL for Dobson data also the O3BREWER and UVBREWER by the Solar and Ozone Observatory, Czech Hydrometeorological Institute's development, which are really useful for the ozone communities.

UV Radiation

Both UVA and UVB are measured with Brewer spectrophotometer in range of 286.5-363 nm for the main purpose of research and public awareness in meteorology programme.

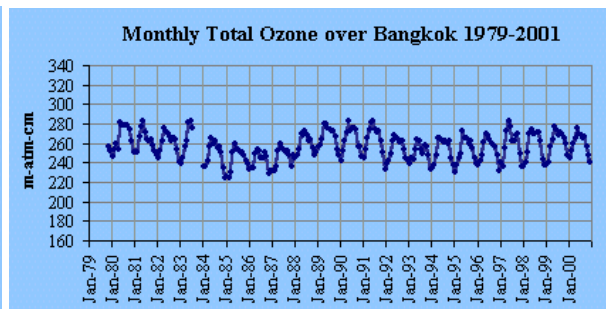
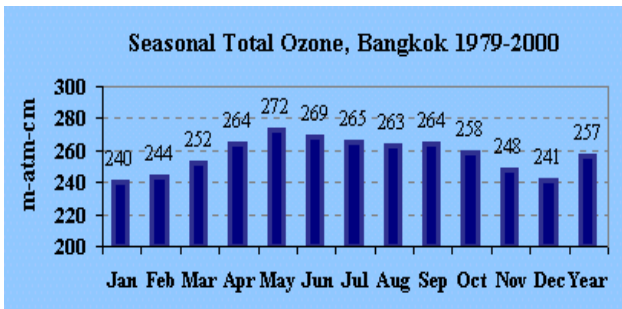
Ozone and UV Radiation data

Both Dobson and Brewer data were reported regularly to World Ozone and UV Radiation Data Centre in Toronto that will be finally checked and Quality Assurance.

2. Research

Research on ozone in tropics countries may not used directly to the study of UV increasing but is very important for many aspects of its effects and modeling especially on solar UV radiation that is very high in this region. Also there is requirement to measure simultaneously with other atmospheric parameters like aerosol and other gases (i.e.SO₂, NO_x). As the limit of groundbase measurement we have been used the satellite data from NASA's Earth Probe TOMS that are very valuable.

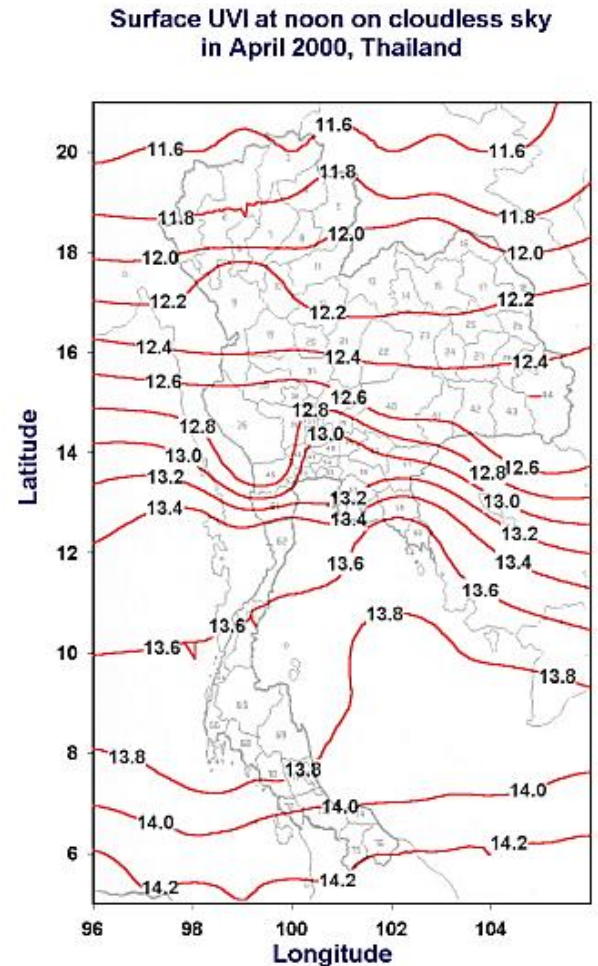
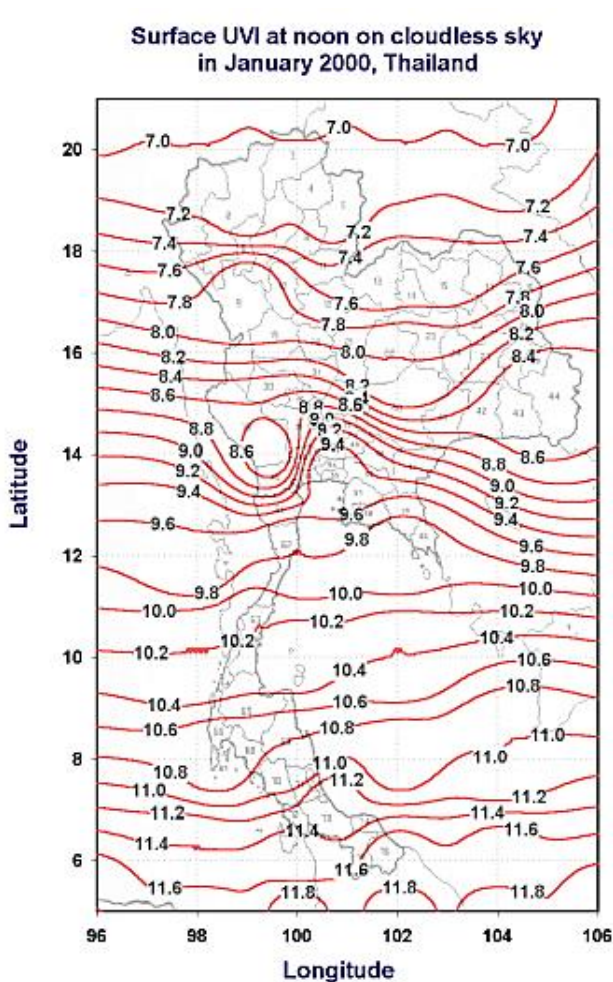
We will see the behavior of long term ozone variation from the measurements, by seasonal and small changing by annually from the examples below.



UV Radiation

UV index forecasting were initiated by TMD and presented as a daily public service at the website http://www.tmd.go.th/ozone/uv_index.htm, mainly in summer season for 4 parts of Thailand.

UV index calculation is operated under the STAR model (credit to Dr.Harry Schwander and others) by using total ozone data from groundbase measurements and TOMS's data for the other sites of the country; aerosol optical depth at 550 nm is also needed. The study shows that UV index levels are high – to very high at noon on clear sky throughout a year the examples are shown as follow.



Mostly of public information related to ozone and UV radiation are distributed in form of publications, radio programme and Internet.

Ozone and UV radiation as well as its effects to Thai people's health and environments are interested and still involving to many national researches in several medical and education institutes.

3. Planned Activities

Although the UV effects on human skin of mostly people in tropics are not most sensitive against solar UV Radiation but actually there is increasing number of cataract and skin cancer patients and more concerning about UV radiation and health effects. Therefore, we will have more activities in many aspects. The plans are including to:

- Improve the quality of instruments and data by calibration and performing in more standard maintenance for Brewer Spectrophotometer
- Improve the procedure of UV index forecasting by research on atmospheric aerosol and ozone forecasting over Thailand (at least in main parts)
- Set up more site of UV monitoring to ensure the quality of UV researches.

4. Recommendation

There are some difficulties of Brewer maintenance in humid country and in the domestic processes to a calibration. Some problems could not be solved directly by the right person at the right problems. To avoid the unqualified local company to handle the instruments, they require WMO's support and directly managing as government-to-government method. Including the possibility in case of the Brewer workshop could extend a period of training on Brewer maintenance and technical analyses.
