

# VIETNAM

## INTRODUCTION

National Hydro – Meteorological Service of S.R. Vietnam (NHMS) has 3 ozone and UV-B observing stations. The observation is carried out since May 1992 in Hanoi station (21°01'N, 105°51'E). From 1994, Sapa station (22°21'N, 103°49'E) and Tan Son Hoa station (10°47'N, 106°42'E in Ho Chi Minh City) also start observe. However, the observation in Tan Son Hoa station was stopped from April 2008 because of instrument's problem. All the management for the ozone and UV-B observation in NHMS is operated by the Aero – Meteorological Observatory (AMO).

## Observational Activities

The Total amount of atmospheric ozone (TO3) and UV-B are measured by M124 filter instrument, manufactured in Russia. The TO3 is measured 7 times per day with the sun height is in between 20° and 70°. The UV-B is measured 11 times per days from 7h to 17h LT (within period of 1<sup>st</sup> May to 31<sup>st</sup> October), and 9 times per day from 8h to 16h LT (within period of 1<sup>st</sup> November to 30<sup>th</sup> April). From 2005 to 2008, AMO have sent all M124 for calibration in GGO (Petersburg, Russia) once, in 2006. Since the new filters of M124 were not available, so after the calibration few months, our M124 instruments could not give the data with high quality. Even though, all the 3 stations have to absorb TO3 and UV-B, following the National Guide for observation.

## Results from observation and analysis

According to the Global Distribution of Total Ozone, measured by satellite, Vietnam is located in the region with the total amount of ozone is changed from 200DU to 300DU (1), minimum in winter and maximum in summer.

From 1/2006 to 12/2007, as indicated on the Table and Figure 1 the total ozone measured at Tan Son Hoa were changed in between 120DU to 240DU, lower than the result measured by satellite. The trend of TO3 was not similar in 2006 and 2007. It seems irregular in TO3 trend of year 2007 with rapid increase from the minimum in February to the maximum in May and June. Overall, TO3 in 2006 and 2007 was lower than the normal value.

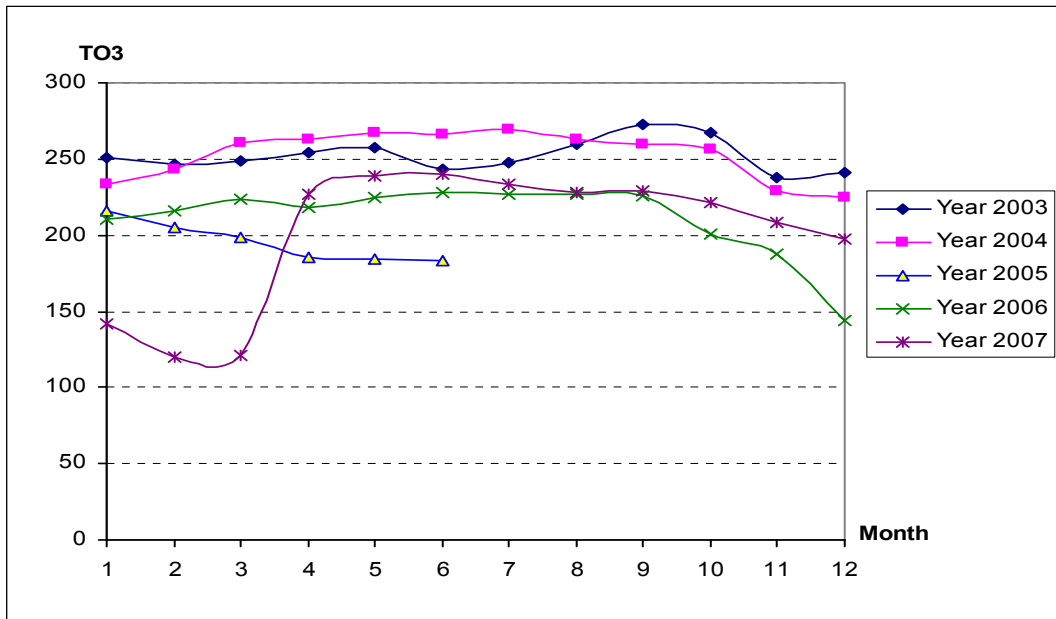
At the same time the TO3 measured in Hanoi was slightly higher (table and figure 2). Also, it is very abnormal in trend of TO3 in 2007. In fact, the maximum appears in February instead of summer as usually.

The TO3 measured at Sapa arranged almost from 200 to 300DU along 2006 and 2007. But, the annual trend of TO3 in 2007 was not the same compared with the map of Global Distribution of TO3, measured by satellite. As shown on the figure, TO3 at Sapa decreased from January to December, except for February.

**Table and Figure 1: Annual trend of TO3 measured at Tan Son Hoa.**

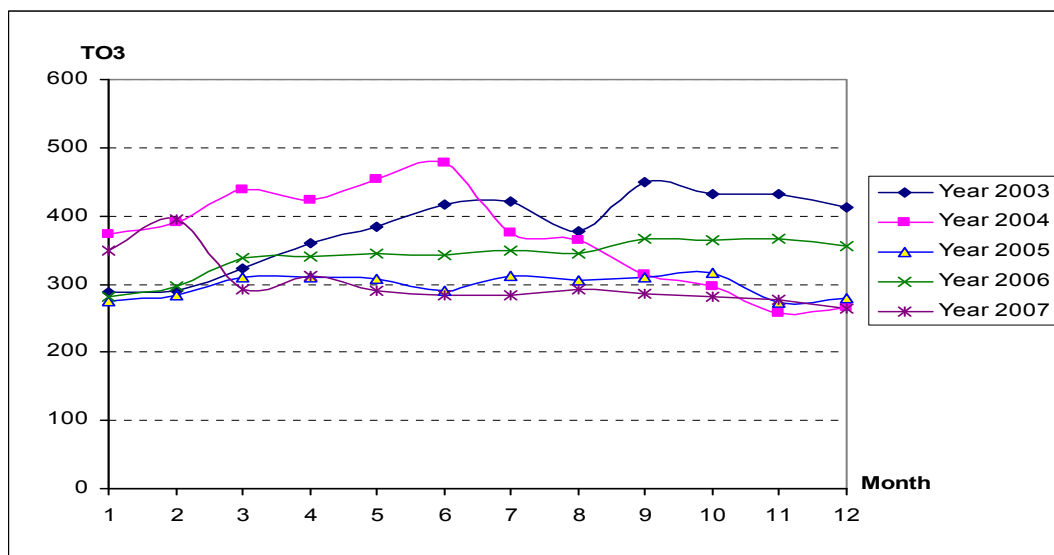
Month	Year 2003	Year 2004	Year 2005	Year 2006	Year 2007
1	251	234	216	211	142
2	247	243	205	216	120
3	249	261	199	224	121
4	254	263	185	219	227
5	257	267	184	225	239
6	243	266	183	228	240
7	248	269	n/a	227	233

8	260	263	n/a	226	228
9	273	260	n/a	226	229
10	267	256	n/a	201	221
11	238	229	n/a	187	208
12	241	225	n/a	144	197



**Table and Figure 2: Annual trend of TO3 measured at Hanoi.**

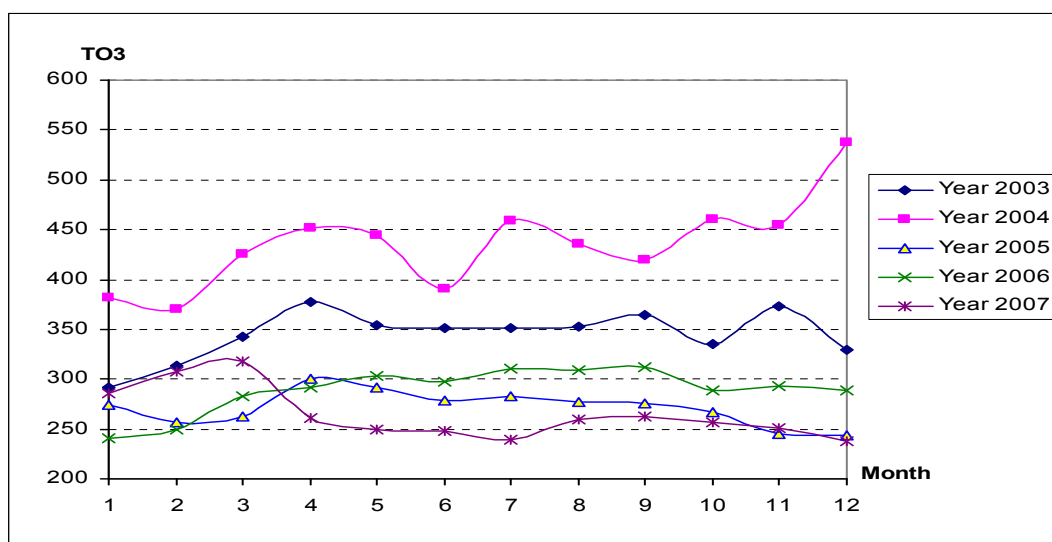
Month	Year 2003	Year 2004	Year 2005	Year 2006	Year 2007
1	288	373	274	281	350
2	290	390	284	296	394
3	322	439	310	338	292
4	360	424	310	340	312
5	385	454	308	344	291
6	417	478	291	342	283
7	422	376	311	349	284
8	377	365	305	344	292
9	450	314	310	365	285
10	431	297	316	365	281
11	431	257	273	367	276
12	412	267	280	356	265



Month

**Table and Figure 3: Annual trend of TO3 measured at Sapa.**

Month	Year 2003	Year 2004	Year 2005	Year 2006	Year 2007
1	291	382	274	241	286
2	313	370	257	250	308
3	342	425	263	283	318
4	377	452	301	292	261
5	354	444	292	303	250
6	352	390	279	298	248
7	352	459	283	311	239
8	353	436	277	309	259
9	365	419	276	312	262
10	335	460	267	289	256
11	373	454	246	294	251
12	330	538	243	288	238



So, last two years 2006 and 2007 the TO3 data measured in Vietnam has not been qualified, especially in 2007, due the fault M124 and we have no budget for calibrating the equipments in Russia every year. Since the ozone data was not qualified, the UV-B would not qualify too. So the UV-B data would not be reported here.

#### Future Plan

Since the filters of M124 will not be produced NHMS plan to replace the new equipment for ozone and UV-B observation and to continue the international collaboration in this field.

In planning from now to the 2010, the total ozone and ultraviolet radiation network will be improved and replaced by new equipment. The equipment that we want to equip is Brewer spectrometer. However, our difficulty is limited finance. After this workshop, we hope to get the help from WMO on this Brewer equipment and document to serve for activity of total ozone and ultraviolet radiation in Vietnam.

#### Needs and recommendations

1. NHMS needs the financial support to replace the equipment for measuring the TO3 and UV-B to meet the requirement of the quality of data.
2. NHMS's personnel's need the scientific and technical training and more international collaboration.
3. NHMS needs the financial support for exchange of visits amongst personnel from the monitoring stations of NHMS and other countries for improve our personnel's operational skill and knowledge.
4. NHMS hope to receive the support to carry out the ozonesounding in Hanoi at least once a week since we conduct the radiosounding twice a day by the DigiCORA-RS sonde, manufactured by Vaisala Co., Finland.

Finally, I would like to thank to WMO/UNEP give me opportunity to attend this meeting and give the national report on ozone and UV-B monitoring activities in S.R. Vietnam and NHMS would expect more international support in this field.

#### References

- D.W. Fahey (2002) Twenty Questions and Answers About the Ozone Layer. Report of the Fifth Meeting of the Ozone Research Manager of the Parties to the Vienna Convention for the Protection of the Ozone Layer. Geneva, 25 -27 March, 2002.*  
*National Guide for ozone and UV-B observation, 2002.*

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