

# ATMOSPHERIC CHEMISTRY RESEARCH BY LAPAN

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## ABSTRACT

*Human activities result in the release of particle into atmosphere. The particle addition to the atmospheric chemical composition. It will influence the atmospheric heat balance, may also change the climate.*

*LAPAN's activities in the atmospheric chemistry observation are : surface trace gases measurement, profile ozone observation, total ozone observation, aerosol observation, and rain acidity observation.*

*From our observation in LAPAN office we can see that the CO<sub>2</sub> concentration have increase tendency. In dry season the concentration of CO<sub>2</sub> larger than in the wet season.*

## INTRODUCTION

Human activities, especially those related to industrial processes and the practice of agricultural burning and soil management, result in the release of particles into the atmosphere. Freon utilization in human modern life for air

conditioning, liquid spraying and industrial need also causes in the increases of released gases to the atmosphere which affect the stability of the atmosphere.

The particles addition to the atmosphere will change the atmospheric chemical composition.

It will influence the atmospheric heat balance, may also change the climate. All aerosols scatter and absorb both solar and infrared radiation. There maybe warming in some region and cooling in the other. The green house gases like: CO<sub>2</sub>, CFC, and CH<sub>4</sub> will absorb infrared radiation. The net global effect will probably be one of the atmospheric warming (Bach, et.all., 1980).

To know the climate change because the alteration of the atmospheric chemical composition Atmospheric Research and Development Center of LAPAN does the integrity research in the atmospheric physics, the atmospheric chemistry, and the atmospheric dynamics. For doing the research LAPAN supports by four divisions as follow:

1. Atmospheric Standard Division
2. Atmospheric Dynamic Division
3. Space Meteorology Division
4. Energy Potential and Atmospheric Pollution Division

### **LAPAN'S ACTIVITIES IN THE ATMOSPHERIC CHEMISTRY OBSERVATION**

The program have been conducting are:

### **Surface trace gases observation**

All the first time we measured CO<sub>2</sub> and CH<sub>4</sub> with gas chromatography. Since last two years we measured continuously 24 hours. The trace gases have been measuring are CO<sub>2</sub>, CO, NO, NO<sub>2</sub>, O<sub>2</sub> We observed the surface ozone since 1985, we collaborate with Tokyo University.

### **Carbondioxide (CO<sub>2</sub>) observation with balloon.**

In this observation we will measure the profile of CO<sub>2</sub>. We launched the payload with stratospheric balloon. The payload consist of vacuum electropolished stainless steel tube. The tube will open and closed by remote control system. The gas sample will analyse with gas chromatography

### **Profile ozone observation.**

In this observation we launched ozone payload with meteorology balloon, we launch it in Watukosek, irregularly. We use the equipment which is produced by Mesei Company from Japan. This year, we measure profile ozone too in Bandung with equipment which is produced by Vaisala from Finland. In this observation we have collabo-

ration with Tokyo University and Nagoya University.

### **Total Ozone Observation.**

For total ozone observation we measure in Watukosek and Ciater, we have collaboration with NASDA for observation in Watukosek, and with Nagoya University for observation in Ciater.

### **Aerosol Observation.**

We measure surface aerosol with Digital Dust Indicator. Since last year we have collaboration with Nagoya University for measuring the profile aerosol in Watukosek.

### **Rain acidity observation.**

Atmospheric SO<sub>2</sub>, Nox through the phase and concentration process can be change become sulphuric and nitric compound. The two compounds are the main cause of rain water acidity.

## **OBSERVATION RESULT**

In this paper we will not discuss all the atmospheric chemistry observation by LAPAN. We will give example about CO<sub>2</sub> observation in Bandung.

## **CO<sub>2</sub> Observation**

The air sample was collected at the Atmospheric Research and Development Center Jl. Dr. Junjuran No. 133 Bandung. We observed CO<sub>2</sub> since 1989 until today. In 1989-1991 we analysed with Gas Chromatography. The air collection was done during office hour with one hour interval.

Sample collection procedure and analytical technique are follow:

The air sample was collected using sampling tube with a trap at the end of the tube. First the tube has to vacuumized the trap was closed. Second, open the trap at the study area, when the tube was full with the air, we took the tube to the laboratory to be analyzed using Gas Chromatography. It is detecting using Thermal Conductivity Detector (TCD) with column SS Porapak N.

Since 1992 we measured CO<sub>2</sub> by MIR 9000 IR Gas Filter Correlation Multigas Analyzer. This equipment measure continuously in 24 hours. The result of CO<sub>2</sub> measurement in fig-1.

### **Discussion**

1. In dry season the CO<sub>2</sub> concentration is high. The

maximum concentration on August 1993.

concentration because the traffic in this highway increase.

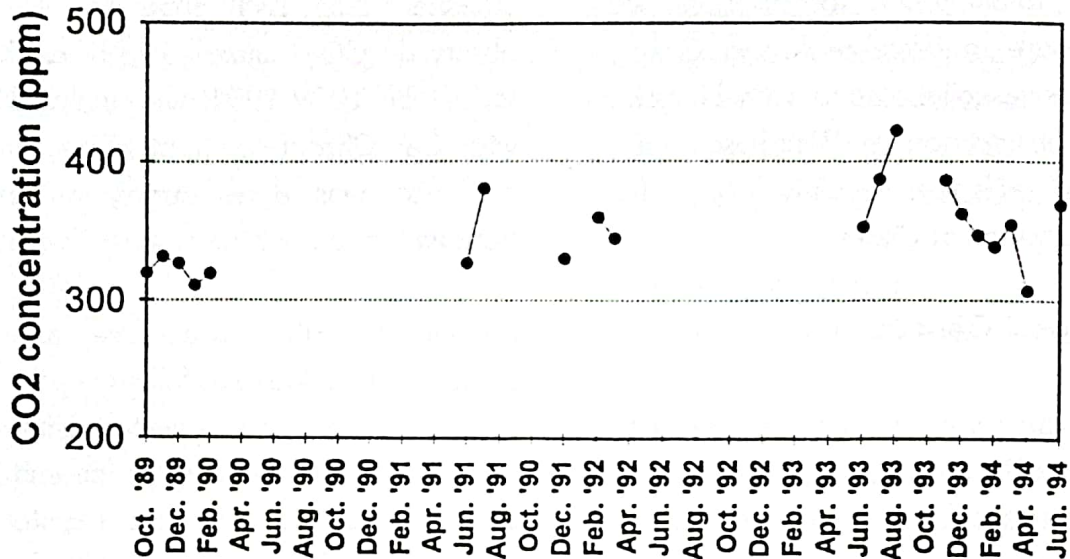


Fig 1. Monthly average of CO<sub>2</sub> concentration (ppm)

2. In wet season the CO<sub>2</sub> concentration less than in dry season maybe there is washing out process in the atmosphere.
3. Since October 1989 until June 1994 the concentration CO<sub>2</sub> have increase tendency. LAPAN office is transportation and settlement area. We started to measure CO<sub>2</sub> when the construction of highway Pasteur - Padalarang just finished. The traffic is not crowded as now. The increasing tendency of CO<sub>2</sub>

### FUTURE PROGRAMME

The atmospheric chemistry research which has done by LAPAN is for from our objective. For the development of the conducted research, enlargement of research can be obtain by adding research program for:

- a. research of the trace gases and aerosol distribution modelling in urban, industrial and traffic area.
- b. research of the profile trace gases and aerosol in the atmosphere for

- every layer (altitudes). The samples are taken by balloon or aeroplane and conduct the measurement of the gases by remote sensing or satellite.
- c. research about reaction process in the atmospheric. Some particles will influence each other because there are some reaction in the atmospheric like photochemical reaction. This reaction can influence the increasing of surface ozone, aerosol concentration, and the decreasing of stratospheric ozone concentration, etc.
  - d. research for finding the pollution level by measuring acidity of rain water and solved ions.
  - e. research about oceanic atmospheric chemistry.
  - f. research about chemical cycle in the earth, ocean and biosphere system and effect of human activity.
  - g. research about the relation of the atmospheric composition change with global and regional climate change.
  - h. research of the negative effect of climate change and aspect of the earth system to the atmospheric chemical composition.

## References

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