สำนักงานวิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

CHAPTER I

INTRODUCTION

1.1 Rational

Two separated problems of the atmospheric ozone are stratospheric ozone depletion at the Antarctic and Atlantic Polar Regions in each spring time since 1979 and another is increasing of ozone concentration as an important pollutant on the earth's surface. All countries have tendency to solve these problems and their related affects to the atmospheric environments both tropospheric ozone in biosphere and upper levels especially the stratospheric ozone.

The vertical distribution of ozone (ozone profile) is an important parameter in the ozone layer monitoring network under the Global Atmospheric Watch (GAW) programme in the World Meteorological Organization (WMO). It is clearly useful for studies of atmospheric radiation processes and several applications in energy and environmental research. Total column ozone is general information in measuring ozone amount at the earth's surface while tracking in the vertical distribution indicate its concentration in any altitude and its interactions to the other gases and atmospheric radiation which are governing the dynamics of the atmosphere and climate change.

The ozone profile can be measured by Ozone Sonde, satellite, and ground-based Brewer spectrophotometer or Dobson Spectrophotometer (the ground-based are used Umkehr technique). However, when there are limits in using Ozone Sonde and satellite, the Umkehr measurement then becomes an alternative importance.

The classical Umkehr curve was first observed at the beginning of the 20^{th} century in the study of total ozone column variations with season and latitude. The ozone profile was related to the Umkehr technique which represents the ratio of zenith sky intensities measured at two wavelengths, one is strongly absorbed and the other is less absorbed by ozone molecules.

1.2 Research Objectives

As the ozone plays vital role by absorbing ultraviolet (UV) radiation and determining temperature structure in the atmosphere. The vertical distribution of ozone is significant and leads to understanding the variation of ozone in the

atmosphere. With the Brewer Umkehr technique, Songkhla ground-based station can be represented the vertical distribution of ozone for Thailand because the continuous Umkehr raw data from 2001-2003 can retrieve ozone profile up to 50 km. The objectives of this research are as the following:

1.2.1 To study a method of retrieving ozone profile from Umkehr raw data obtained by the Brewer measurement.

1.2.2 To obtain the data set of ozone profile over Songkhla.

1.2.3 To obtain seasonal ozone profile patterns over Songkhla.

1.3 Scope of the Research

This research intends to describe the principle of Umkehr ozone profile algorithm that is routinely used with the Brewer observation. The scopes of this research are as follows:

1.3.1 Study previous works related to ozone profile and Umkehr method.

1.3.2 Collect data from the Brewer spectrophotometer measurement at Songkhla during 2001-2003.

1.3.3 Process Umkehr measurement with the Umkehr software from the collected data.

1.3.4 Identify seasonal patterns of ozone profile over Songkhla.

1.4 Methodology

1.4.1 Review the previous works.

1.4.2 Collect Umkehr data measured by the Brewer Spectrophotometer at Songkhla, Ozone Sonde measured at Sepang Airport, Malaysia and satellite-based (Stratospheric Aerosol and Gas Experiment II; SAGE II).

1.4.3 Study Brewer measurement and its Umkehr technique used to retrieving the vertical ozone distribution.

1.4.4 Study a flowchart of Brewer Umkehr algorithm.

1.4.5 Study in Ozone Sonde and SAGE II measurements.

1.4.6 Analysis the patterns of ozone profile and compare the results with the other measurements.

1.4.7 Discussion and Conclusion.

1.5 Expected Outcome

The usefulness outcomes of this research are as following:

1.5.1 Obtain an algorithm of the ozone profile calculation.

1.5.2 Obtain a data base of ozone profile.

1.5.3 Obtain seasonal ozone profile patterns of Songkhla.