P1-17 **6.5N, 125E in the Philippines: A Proposed Lidar Site for Atmospheric Studies**

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I. Introduction

Atmospheric aerosols and clouds are acknowledged to play important roles in global climate changes and in the earth's radiation budget in general. Aerosols modify the radiation field directly through scattering and have indirect influence on water cycle because it is one key for cloud nucleation. In particular, an interest in stratospheric aerosols grew from the suspicion that they trigger ozone destruction. Although stratospheric aerosols are observed to be independent of seasons they are enhanced during volcanic eruptions. The compelling need to monitor changes in global distribution and time evolution of stratospheric aerosol layer motivated a number of ground-based lidar groups to form networks to address this need. Various campaigns have also been conducted to study anthropogenic and natural aerosols in the troposphere. The observations include the aerosols' chemical composition, radiative and optical properties and their cloud nucleating properties as well. On the other hand, the net effect of the variations in the optical and physical properties of clouds on climate is not yet fully understood. Low thick clouds are known to reflect incoming radiation back to space causing cooling while high clouds trap outgoing terrestial radiation and produce greenhouse effect. In order to understand the effects of these clouds on climate, their optical and radiative properties need to be determined accurately at different locations and latitude.

Lidar systems together with auxiliary equipment such as sunphotometer and radiosonde, have proven to be useful in obtaining information on the spatial and temporal changes in the properties of clouds and aerosols at different geographical locations. However, survey of literature shows that most ground based lidar stations are located above 30 deg N and below 30 deg S, hence the tropics is almost a blank area as far as lidar data is concerned.

II. Goals

In view of the above discussion, a new lidar system at the site (6.5 N, 125 E) is proposed. At present, there are already two existing lidar systems in the Philippines located in the highly urbanized area of MetroManila (14 N Lat.). The pioneering work at these sites includes monitoring of suspended particulates (Alarcon, et al 1996), depolarization in cloud (Dorado, et al 1999) and multiple scattering (Galvez, 1999). It is envisioned that these two systems together with the proposed system will form the Philippine Lidar Network. The main goal is to obtain and analyze data in a systematic manner from three different locations and correlate aerosol and cloud properties with varied meteorological conditions. While the two existing systems are located in highly urbanized and heavily polluted areas, the new site is rural and agricultural in setting. It is located in a valley with mountain ranges about 20 km in both northeast and northwest directions and about 60 km from the sea in the south. The almost clear air condition near the ground is ideal for observing high clouds and stratospheric aerosols since attenuation of the laser beam near the lidar will be minimal. Another area of lidar research worth exploring in this site is the application in vegetation monitoring. This will be highly relevant to the local community whose livelihood largely depends on agriculture, both in small and large scales.

III. Methods

For areas of studies mentioned above, a multiple wavelength- backscatter lidar, with flexible configuration will be most appropriate. With a Q-switched Nd:YAG transmitter, the vertically looking lidar will utilize 1064 and 532 nm for high altitude studies (stratospheric aerosols and cirrus clouds) with depolarization at 532 nm. The physical set-up can be designed such that multi-zenith angle measurements will be possible for tropospheric aerosols studies. Transmitting three wavelengths (1064, 532 and 355 nm) at two zenith angles will provide independent measurements of aerosol extinction coefficients. Furthermore, both in-laboratory and remote sensing experimentation on plants will be explored at 532 and 355nm.

IV. Summary

A new lidar system is proposed at a tropical site (6.5 N, 125 E) in the Philippines mainly for tropospheric and stratospheric aerosol/cloud studies and for possible application in vegetation monitoring. This system will become part of the Philippine Lidar Network whose main goal will be to systematize acquisition and analysis of data from different locations, and correlate optical properties of atmospheric clouds and aerosols with various meteorological conditions.

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