

SKYNET observation network for aerosol-cloud-radiation in the East Asia

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1. Introduction

Climate change is one of the most important key words for the Earth environmental studies. Many people are researching in their disciplinary aspects through modeling, observation and others. Aerosol and cloud behavior in the atmosphere has still one of the major ambiguity parameters on radiative effect in the climate change assessment, as shown in IPCC report(2007). There are many papers published, but still not enough. In such researches, satellite data analysis is very useful and strong for global survey. It can give global maps for cloud and aerosol products, but these products have been analyzed with some assumptions. So the validation for such products should be required. Also aerosol-cloud processes should be more cleared for improvement of modeling. In such points of view, the surface observation network in the East Asia, called SKYNET, was established and has been operated in cooperation with local institutes and universities in the area.

2. observation system

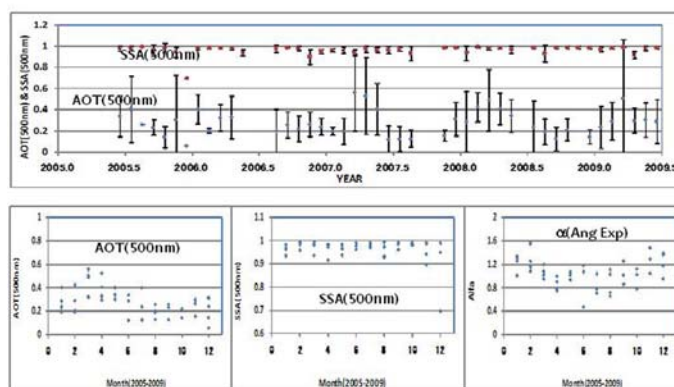
3. Instrumentation

The SKYNET was originally established by GAME project in 1997, and then extended by JAXA ADEOS II project for validation of their products. The present network is mainly supported by the GEOSS MEXT program after several active projects. It is a voluntary-based network which means that instruments have been supplied by many groups and the data obtained are shared with each other under the SKYNET data policy. The most important data policy is a concept of open-data for all users. The SKYNET sites are widely spread from a dry/Gobi area in Mongolia to a tropical area in Thailand including China sites. The SKYNET has an automatic data transfer system for super sites. The server in each site transports these data to the SKYNET main server at Chiba University once a day via an internet. After pre-processing these data, some of important data on aerosol and radiation are visualized and open on the SKYNET home page (<http://atmos.cr.chiba-u.ac.jp/>) to all researchers.

4. Results

The basic instruments of the SKYNET are sky radiometer and pyranometer to estimate aerosol radiative effect. In addition to this combination, several instruments such as pyrliometer, microwave radiometer, LIDAR, etc, are added for getting more detailed information of aerosol and cloud. At sites with such additional instruments, called super site, we have not only aerosol parameters, but also cloud parameters, such as optical thickness and liquid water path of cloud, and vertical distribution of aerosol, etc which are attractive for aerosol-cloud interaction studies.

Monthly mean of aerosol characteristics at SKYNET Cape Hedo(Okinawa, Japan)



.In particular, the cloud instruments such as i-sky radiometer, microwave radiometer and sky-view camera can give unique information to cloud studies.

4. An example of the SKYNET observation

Figure 1 shows an example of optical characteristics of aerosols observed at the SKYNET Cape Hedo in Okinawa using an i-sky radiometer. The upper figure depicts a time series of optical thickness(AOT) and single scattering albedo(SSA) of aerosol at 500nm during a period of June 2005 to June 2009. The monthly trend of AOT in the lower left figure shows that the increase in spring might be due to dust particles transported from the continent, which is corresponding to the lower Angstrom exponent in the lower right figure. The decrease of AOT in summer may seem to be marine aerosols due to southern winds of this season. On the other hand, the SSA has not so remarkable feature through seasons. The SSA is one of the most important parameters of aerosols which can affect the heating/cooling of the atmosphere and the Earth.

5. summary

The SKYNET is an observation network mainly in the East Asia for validation of satellite products and monitoring of aerosol-cloud parameters. It has been successfully maintained and operated by the community and has contributed to the climate change studies.

Keywords: aerosol, cloud, radiative effect, climate change, surface validation