The Characteristics of the Cloud Properties Retrieved from Global Imager Aboard the ADEOS-II (Midori-II) Earth Observation Satellite

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Abstract : The characteristics of the cloud optical and microphysical properties obtained from GLI aboard the ADEOS-II satellite were shown in the presentation. The GLI-derived results were compared with the MODIS-derived results and got a different feature in the effective radius between GLI and MODIS. The investigation of the difference has just started.

INTRODUCTION

It is pointed out by the Intergovernmental panel on Climate Change (IPCC) 2001, that the aerosol-cloud interaction process is one of the largest uncertainties in the climate change studies (IPCC 2001). It emerged that aerosol in the atmosphere can influence the Earth radiation budget through changes in the cloud optical and microphysical properties by the two kinds of indirect effect of aerosol (e.g., *Twomey et al*. 1984; *Coakley et al*. 1987; *Radke et al*. 1989). The first kind effect is a change in the cloud radiative properties due to cloud particle radius reduction by aerosols, and the second kind effect is a change in the cloud lifetime and precipitation efficiency. The observations and the progress in cloud and aerosol microphysical modeling in the climate model will contribute to improving the accuracy of future climate predictions.

DATA ANALYSIS

The optical and microphysical properties of the warm water and cold ice clouds were retrieved from the ADEOS-II (Midori-II) GLI data by use of the GLI data analysis system

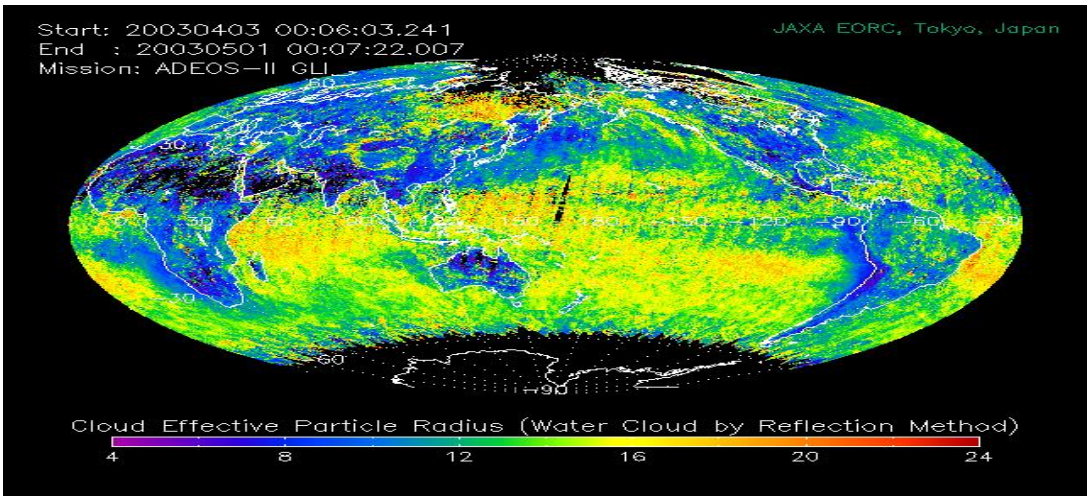

Fig. 1 Cloud effective particle radii (water cloud) in April 2003, obtained from GLI data analysis.

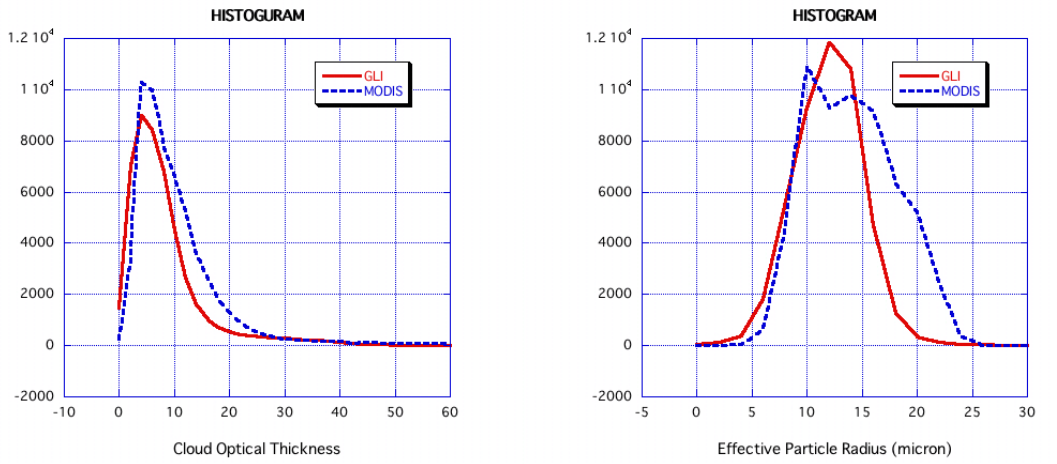

Fig.2 Histogram of the global analysis obtained from GLI (red curve) and MODIS (blue curve). Cloud optical thickness (Left), and cloud effective particle radius (Right) .

based on Nakajima and Nakajima (1995) algorithm with an enhancement of the water vapor correction for the global scale analysis by Kawamoto et al (2001). The GLI data were analyzed every four days and merged and averaged for the one-month period. The one-month mean results of warm water clouds in April 2003 has interesting features. The very thick cloud optical thickness appeared in the east coast of the North America, in the East Europe, and in the South-East Asia. The Atlantic Ocean and West to Middle Pacific oceans were covered by the moderately optically thick water clouds. The cloud effective particle radii were smaller on the continents and coastal areas than ocean area. The South-East Asia to the middle pacific area was the region of the existence of the smaller cloud effective particles.

GLI AND MODIS

The comparison between GLI products and MODIS products of warm cloud microphysical properties showed different features. The one-month mean of the GLI-derived cloud effective radii showed a single mode with a mode radius of 12 micrometers whereas the MODIS-derived results had bi-modes at 10 and 14 micrometers. Basically, the cloud effective radii are larger in MODIS than GLI especially over the open ocean area. The investigations of the difference are now undergoing. The possible reason for the differences can be due to the difference of the cloud phase algorithm and/or different wavelength of the short wave infrared channel, GLI (3.7 micron), MODIS (2.1 micron), that is used for the droplet size retrievals, and so on. On the other hand, the cloud optical thickness of GLI and MODIS showed almost the same values.

SUMMARY

The seven-month global observing data obtained from GLI aboard ADEOS-II satellite has analyzed by using data analysis system installed in JAXA. The global datasets of the cloud properties were released to the users since December 2003. The characteristics of the GLI-derived cloud properties qualitatively consist with the present scientific knowledge of the

cloud statistics. However, the effective particle radius obtained from GLI and MODIS products showed a different feature. The investigation of the difference has just started.

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