Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

ACG39-16 Room:301A Time:May 20 11:15-11:30

Development of cloud algorithm for EarthCARE/MSI: Interpretation of retrievals using cloud simulation and active sensors

Takashi Nagao[1*], NAKAJIMA, Takashi Y.[1], ISHIDA, Haruma[2], SUZUKI, Kentaroh[3]

[1]Tokai University, [2]Yamaguchi University, [3]NASA Jet Propulsion Laboratory

Clouds exert an important influence on the earth water and energy balances and processes that relate to clouds underpin key climate feedbacks. Cloud remote sensing using the spaceborne instruments has been providing useful information about spatial distribution and time series of cloud microphysical properties, and contributing to better understanding of climate study. The satellite-base passive sensors that measure radiation in multi-spectral bands from the visible through the thermal infrared such as Aqua/MODIS and ADEOS-II/GLI are ones of the most commonly used instruments for cloud remote sensing. From the measurements of the passive sensors, cloud droplet effective radius (CDER), cloud optical thickness (COT) and cloud top temperature (CTT) of clouds can be retrieved. These are most important cloud microphysical properties that relate to radiation characteristic of clouds. Moreover, they are also indicators of the droplet growth such as condensational growth and collection processes. However, it is complex to interpret the retrieved CDERs and COTs in term of cloud structure and droplet growth, because clouds are usually vertical inhomogeneous and horizontal inhomogeneous.

In this presentation, we will introduce recent progresses in the interpretation of CDER and COT in term of vertical and horizontal inhomogeneity by using numerical cloud models and active instruments. First, based on the results of remote sensing simulation by using numerical cloud model, we attempt to illustrate how the values of retrieved CDER, COT and CTT are determined from in-cloud vertical structure and horizontal inhomogeneity at sub-pixel scale. Second, we attempt to seek the linkages of CDER, COT to droplet growth in nature based on synergistic use of the spaceborne active and passive sensors (CloudSat and Aqua/MODIS). Finally, we will mention about our research strategy using next coming EarthCARE mission.