New Challenges of Cloud Remote Sensing from Space

Dong L Wu

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California

Abstract-

Clouds are recognized as a major source of uncertainties in predicting climate change. Lack of observational constraints on cloud processes has hindered the development of more reliable climate and weather models. With the advanced NASA EOS and A-Train sensors, we now have better knowledge about vertical distribution, water content, and occurrence frequency of global cloudiness. New ice water content (IWC) measurements from CloudSat and MLS have led to several improvements in model physics and parameterization schemes. MISR and GPS high-resolution data start to reveal deep insights on cloud processes and dynamics in the planetary boundary layer (PBL). However, Earth sciences are still facing urgent needs to measure cloud microphysical properties, interactions between clouds and aerosol/precipitation, and processes that are coupled in 3-D space but not adequately sampled by the A-Train curtains or by the 2-D imageries. Sub-millimeter-wave, multi-angle imaging, and GPS radio occultation have emerged as promising remote sensing techniques to meet the challenges and enable new sciences for mid-tropospheric and PBL clouds.