



Doppler Cloud Profiling RADAR and EarthCARE mission in Japan

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The importance of global profile of cloud and aerosols is getting well known after full success of CloudSAT and CALIPSO of NASA. EarthCARE is a joint mission of ESA and Japan (JAXA, NICT) to adopt and expand its mission objectives. Japan contributes to provide new CPR, which has Doppler measurement capability and better sensitivity, and coordinates the expanded science with ESA science team.

Firstly, EarthCARE/CPR has very good sensitivity, -35dBZ, with a 2.5 m diameter reflector and low satellite orbit altitude (around 400km). This is six times sensitive than current CloudSAT/CPR. Also it has a Doppler measurement capability of cloud particles, -10m/s~+10m/s with <1m/s accuracy for -19dBZ signal. The Doppler velocity is measured using pulse pair method. We expect higher Doppler accuracy for the more intense signals.

Secondly, well position aligned LIDAR data, multi spectral image and three directional broadband radiance data will be measured by ESA, simultaneously. Especially LIDAR has special capability to measure Mie and Rayleigh signal independently, using UV single wavelength channels of polar and cross-polar, and hyper spectral band filter. Combination use of RADAR and LIDAR will materialize direct evaluation of micro-physical properties of cloud particles, and have wide and seamless dynamic range from aerosol to rain drops. LIDAR with multiple sensor algorithms materialize to distinguish type of aerosols. Finally combination of these EarthCARE instruments will make flux profiles with 10W/m² accuracy, which is the final goal of this mission.

Although these excellent active instruments measure the Atmosphere, the whole data will not cover all area of Earth, but the profile data just under satellite orbit. To have comprehensive 3-dimensional Earth atmosphere, the most important point is how well we can adopt the measured result to numerical model, which describes all physical process at any time and places. For the purpose, collaborations with various GCMs are crucial. In Japan case, to pursue the process of cloud and aerosol interactions, Global Cloud Resolving Model, such as NICAM, is firstly prioritized. Then the results will be more generalized and implemented to more integrated models having atmosphere, land and ocean process, such as MIROC and Integrated Earth System Model.

New technological challenges on CPR, ATLID and other instruments are on going under cooperation Japan and ESA towards 2015 launch.