



Scientific Aspects of the Earth Clouds and Radiation Explorer (EarthCARE) Mission

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In recent years, the value of multi-sensor remote sensing applied to cloud, aerosol, radiation and precipitation studies has become clear. For example, combinations of instruments including passive radiometers and lidars or radars have proved invaluable for their ability to retrieve profiles of cloud macrophysical and microphysical properties. This is amply illustrated by various results from the US-DoE ARM (and similar) surface sites as well as results from data collected by sensors aboard the A-train satellites CloudSat, CALIPSO, and Terra.

The Earth Clouds Aerosol and Radiation Explorer (EarthCARE) mission is a combined ESA/JAXA mission set for launch in 2015 and has been designed with sensor-synergy playing a key role. The mission consists of a cloud-profiling radar, a high-spectral resolution cloud/aerosol lidar, a cloud/aerosol imager, and a three-view broadband radiometer (BBR) covering both LW and SW bands. The mission will deliver cloud, aerosol and radiation products focusing on horizontal scales ranging from 1 km to 10 km. EarthCARE is a cloud-aerosol-radiation process oriented mission that will extend the record of active space-based cloud and aerosol measurements started by CloudSat and CALIPSO. EarthCARE data will be used in multiple ways ranging from cloud-aerosol model evaluation studies, to GCM-orientated cloud microphysical property parameterization development, to radiative closure studies, and even data assimilation activities. By using innovative methods of combining the 2-D vertical properties retrieved along the nadir lidar/radar view with the 2-D horizontal context provide by the imager, EarthCARE will be able to deliver level-2 products which will, thanks to BBR data, have already been evaluated for radiative consistency.

In this presentation, a brief overview of EarthCARE mission will be given, describing the scientific motivation of the mission and highlighting the synergetic view of the data processing chain. Various sample applications of EarthCARE data will then be discussed. The presentation will draw on examples from previous studies using A-train data as well as synthetic cases produced using the EarthCARE simulator (ECSIM).