



EarthCARE: Simultaneous observation of clouds, aerosols and radiation from space

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Clouds and aerosols play a central role in the Earth radiation budget by reflecting incoming solar radiation and trapping outgoing thermal radiation. Aerosols are furthermore acting indirectly on the radiation budget by providing condensation nuclei for cloud formation. Many climate models oversimplify the representation of cloud processes, which significantly restricts future climate predictability. In order to better parameterise clouds and aerosols and their influence on the radiation budget, global observations of three-dimensional cloud and aerosol structures and their spatial and temporal variability are needed simultaneously with collocated radiation measurements.

The EarthCARE satellite mission was selected in 2004 for implementation as the third ESA Earth Explorer Core Mission in cooperation with the Japanese Aerospace Exploration Agency, JAXA. The mission will provide collocated retrievals of the three-dimensional structure of cloud and aerosols together with top-of-the atmosphere radiance and flux estimates. The payload consists of a 355nm Lidar with a high spectral resolution receiver to distinguish molecular and particle backscatter, a 94GHz cloud radar provided by JAXA with Doppler capability to also observe vertical motion within clouds, a multi-spectral imager with solar and thermal channels for horizontal (across-track) cloud and aerosol information and a broad-band radiometer with three field-of-views.

Various scientific preparatory activities are presently on-going, in particular the development of an end-to-end mission simulator and geophysical retrieval algorithms. Cooperation between the European/Canadian and Japanese science teams and the American CloudSAT and CALIPSO teams has been established and will ensure both the continuity of similar but advanced data sets and the utilisation of established expertise and experience.

Following its launch foreseen for 2015, EarthCARE will provide synergistically retrieved cloud, aerosol and radiation/flux data over a mission life time of three years. Its data will support cloud-aerosol-radiation process studies and the improvement of cloud parameterisation in global circulation models used in climate research and numerical weather prediction.

The presentation will provide an overview and status of the satellite and payload, the status of the science preparation and the expected data products.