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# Linking vertical profiles of clouds and aerosols to radiation – the EarthCARE satellite

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The European Space Agency (ESA) is presently implementing the Earth Cloud, Aerosol and Radiation Explorer (EarthCARE) mission in cooperation with the Japan Aerospace Exploration Agency (JAXA).

The satellite will use active cloud and aerosol profiling with simultaneous passive observations of outgoing solar and thermal radiation in order to accurately quantify the impact of cloud and aerosol profiles on atmospheric heating rates, reflected solar and emitted thermal radiation.

The satellite payload consists of two active and two passive instruments. The Atmospheric Lidar (ATLID) operates at 355nm and is equipped with a high-spectral resolution receiver and depolarisation channel that separates molecular from particulate back-scatter and distinguishes cloud and aerosol types. The Japanese Cloud Profiling Radar (CPR) is a highly sensitive W-band Doppler radar (94GHz) that measures cloud profiles, precipitation and vertical motion within clouds. The Doppler observation will observe vertical motion in clouds providing novel information on convection, precipitating ice particles and raindrop fall speed.

A Multi-Spectral Imager (MSI) with a 150km wide swath and seven channels in the visible, near-IR, short-wave IR, and thermal IR, will provide scene context information and allow the reconstruction of three-dimensional atmospheric scenes when combined with lidar and radar retrievals. A Broad-Band Radiometer (BBR) observing broad-band solar and thermal radiation reflected and emitted from the Earth, with three fixed field of view looking forward, nadir and backward, will make collocated measurements of the outgoing reflected solar and emitted thermal radiation.

The synergistic exploitation of the four instruments will provide 3D cloud-aerosol-precipitation scenes, with collocated broad-band radiation data, over a mission lifetime of three years. The satellite acceptance review is scheduled for 2019.

This presentation will provide an overview of the mission and its expected science data products.