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14-Advancements in Remote Sensing for Meteorology and Climatology oral presentation

The ground-based ACTRIS Cloud Remote Sensing network and its use for the validation of EarthCARE satellite observations

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The pan-European initiative ACTRIS (Aerosol, Cloud and Trace Gas Research Infrastructure) is currently being implemented, and will reach its fully operational status in 2026 with more than 100 distributed observational sites all around Europe. A key component of ACTRIS is its ground-based cloud remote sensing network, which is based on previous work within the Cloudnet program. It currently comprises 15 operational sites, with plans to expand to approximately 25 sites. Each of these sites combines at least a Doppler cloud radar, a lidar ceilometer, a microwave radiometer, a disdrometer. From these observations synergistic products, such as a cloud target classification as well as hydrometeor profiles are derived.

A significant advantage of ACTRIS is the establishment of central facilities that ensure the standardized processing of observational data. The ACTRIS Centre for Cloud Remote Sensing (CCRES) is developing QA/QC methodologies to monitor sensor stability and ensure consistency across sites. This centralized approach makes data comparable across sites and different climate zones, and thus very valuable for evaluating and improving numerical weather prediction models or validating satellite observations.

The Earth Cloud Aerosol and Radiation Explorer (EarthCARE) is a satellite mission implemented by the European Space Agency in collaboration with the Japan Aerospace Exploration Agency to measure vertical profiles of aerosols, clouds, and precipitation properties alongside radiative fluxes. EarthCARE was launched in May 2024. It is equipped with a Cloud Profiling Radar (CPR), with first-time Doppler velocity observations from space. a high-spectral-resolution lidar, as well as a multispectral imager and can be viewed as a space-based equivalent of an ACTRIS ground-based remote sensing observatory.

This presentation will provide an overview of the ACTRIS cloud remote sensing program and present the recent developments towards homogeneous ACTRIS data, specifically focusing on cloud radars data Such data have high potential for satellite calibration and validation. We will show first results of EarthCARE CPR and level2 product validation using the ground-based ACTRIS network performed within the German Initiative for the Validation of EarthCARE (GIVE).