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Validation of cloud thermodynamic phase and cloud top temperature from MSG-SEVIRI with groundbased measurements

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The Satellite Application Facility on Climate Monitoring of EUMETSAT (CM-SAF) aims to provide the climate research community with cloud and radiation products derived from geostationary and polar orbiting meteorological satellites. The CM-SAF focuses on long time series of these products for the European region and has the ambition to extend this area to the full disk area within the next few years.

This abstract presents the validation of the CM-SAF algorithms for the retrieval of cloud thermodynamic phase (CPH) and cloud top temperature (CTT) from the Meteosat Second Generation (MSG) SEVIRI imaging radiometer. Retrievals from one month of data are compared with ground measurements from the CloudNET sites of Cabauw, Chilbolton and Palaiseau, for which CTT and CPH are observed from radar/lidar measurements. The research currently focuses on assessing the limitations and accuracy of the retrieval methods in general and identification of multi-layer cases in specific.

The CPH algorithm is based on the visible (0.6 μm) and the infrared (1.6 μm) channels present on MSG-SEVIRI. Radiative transfer model calculations with DAK are done to simulate reflectances at 0.6 and 1.6 μm as a function of optical thickness and effective radius. Phase functions of water clouds are based on Mie theory for spherical cloud droplets. Phase functions of ice clouds are based on ray tracing for imperfect hexagonal columns.

The CTT algorithm uses information from the 0.6 and 10.8 μm channels. From reflectance in 0.6 μm cloud optical thickness is derived, from which a cloud emissivity

is yielded. The CTT follows from the brightness temperature in 10.8 μm, corrected for the retrieved cloud emissivity.

The validation presented in this abstract makes a unique dataset of cloud thermodynamic phase and cloud top temperature available to the climate research community.