

# Estimating the effective phase function of cloud particles from the 3MI sensor

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The phase function of a collection of cloud particles depends on the thermodynamic phase, size distribution, geometric shape, and surface texture of the particles. *In situ* measurements and remote sensing of the phase function are promising means to study the development and microphysical variation of clouds. For example, multi-viewing satellite instruments, including the Multi-angle Imaging Spectroradiometer (MISR) sensor and the Polarization and Directionality of the Earth’s Reflectance (POLDER) sensors, are sensitive to the phase function at backward scattering directions and provide unique datasets that are used in the validation of the phase functions for satellite data processing.

An effective approach to investigate the phase function of cloud particles from reflectivity measurements is the Spherical Albedo Difference (SAD) method. In this method, the variation of the retrieved cloud spherical albedo is considered an indication of the difference between the true phase function and the phase function used in the spherical albedo retrieval. We further extend the SAD method to retrieve an effective phase function. The extended algorithm is applied to the synthetic data of the Multi-viewing, Multi-channel, Multi-polarisation Imager (3MI) to evaluate the applicability to the new satellite sensor.

The 3MI sensor is a spaceborne imaging spectropolarimeter planned to fly aboard the MetOp Second Generation A satellite platform. The design of the instrument leverages heavily on the POLDER sensors to use most of the expertise we gained through the years of operation of the POLDER sensors. The nominal resolution is 4 km at nadir, and the sensor acquires total and polarimetric reflectivity at nine wavelengths. In this presentation, we summarize the planned Level-2 cloud products from the 3MI sensor and specifically report on the preliminary results from the application of the effective phase function estimation.

Preferred mode of presentation: Oral/Poster