Retrieval of the ice cloud properties from MODIS and HIMAWARI-8 satellite measurements by Voronoi ice particle scattering model

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Ice clouds play an important role in the radiation balance of the Earth's atmospheric system through interaction with solar radiation and infrared emission. However, there are still large uncertainties in characterizing their microphysical and optical properties, due to their complex habit. In this study, single scattering property of the aggregated ice cloud particle called Voronoi habit model is developed for applying in the ice cloud radiative transfer simulations and retrieval of their optical and microphysical properties. A combination of the finite- difference time-domain (FDTD) method, Geometric Optics Integral Equation (GOIE) technique, and geometric optics method (GOM) are applied to compute the single scattering properties of the Voronoi model. The POLDER multi-angles measurements are employed to evaluate the efficiency of the Voronoi model on retrieval of the ice cloud properties. The CAPCOM cloud property retrieval algorithm is improved to retrieve the ice cloud properties for MODIS and HIMAWARI-8 satellite measurements based on the Voronoi model. Optical thickness and effective particle radius of the ice clouds are retrieved from Aqua/MODIS data using the CAPCOM and Voronoi models. The inversion results by Voronoi model and the CAPCOM algorithm are compared to MODIS collections-6 ice cloud products for investigating the retrieval results by the Voronoi models. Ice cloud properties are also retrieved from the HIMAWARI-8 satellite data. In this presentation, we will also introduce the some results of the ice cloud retrievals by Voronoi model and characteristics of the ice cloud properties in Asia-Pacific region.

Keywords: Ice cloud, Particle scattering property, Microphysical property

