

Estimation of surface solar radiation by Voronoi ice scattering model from Himawari-8 satellite measurements

Husi Letu^{a,b}, Takashi Y. Nakajima^b, Hiroshi Ishimoto^c, Run Ma^a, and Huazhe Shang^a

^a*Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences (CAS), DaTun Road No. 20 (North), Beijing 100101, China*

^b*Research and Information Center (TRIC), Tokai University, 4-1-1 Kitakaname Hiratsuka, Kanagawa 259-1292, Japan*

^c*Meteorological Research Institute, Japan Meteorological Agency (JMA), Nagamine 1-1, Tsukuba 305-0052, Japan*

*Presenting author (husiletu@radi.ac.cn)

Himawari-8 is a new-generation geostationary meteorological satellite which is successfully launched by the Japan Meteorological Agency on 7 October 2014. The Himawari-8 carries the multi-spectral Advanced Himawari Imager (AHI). In this study, cloud optical and microphysical properties are retrieved from Himawari-8 satellite measurements. Fractal ice partial scattering model called “Voronoi” [1,2] is applied in the Comprehensive Program for Cloud Optical Measurement algorithm to retrieve ice cloud properties from AHI measurements [3,4]. Retrieval results from AHI are used to estimate the surface solar radiation (SSR) using the Rstar radiative transfer model. Furthermore, AHI cloud property retrievals are compared to the MODIS C6 cloud property product. Finally, SSR data derived from AHI cloud properties is validated using ground-based observation data.

References

- [1] Ishimoto, H., K. Masuda, Y. Mano, N. Orikasa, and A. Uchiyama, 2012: Irregularly shaped ice aggregates in optical modeling of convectively generated ice clouds. *J. Quant. Spectrosc. Radiat. Transfer* **113**, 632–643.
- [2] Letu, H., H. Ishimoto, R. Jerome, T. Y. Nakajima, C. Labonnote, A. Baran, K. T. Nagao, and M. Sekiguchi, 2016: Investigation of ice particle habits to be used for ice cloud remote sensing for the GCOM-C satellite mission. *Atmos. Chem. Phys.* **16**, 12287–12303.
- [3] Nakajima, T. Y., and T. Nakajima, 1995: Wide-area determination of cloud microphysical properties from NOAA AVHRR measurements for FIRE and ASTEX regions. *J. Atmos. Sci.* **52**, 4043–4059.
- [4] Letu, H., T. M. Nagao, T. Y. Nakajima, J. Riedi, H. Ishimoto, A. J. Baran, H. Shang, M. Sekiguchi, and M. Kikuchi, 2018: Ice cloud properties from Himawari-8/AHI next-generation geostationary satellite: Capability of the AHI to monitor the DC cloud generation process. *IEEE Trans. Geosci. Remote Sens.*, DOI: 10.1109/TGRS.2018.2882803.

Preferred mode of presentation: Oral