

Description of Advanced Himawari Imager (AHI) Yonsei aerosol retrieval algorithm Version 1

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Japan Meteorological Agency (JMA) successfully launched the next-generation geostationary satellite called Himawari-8 in 7 October 2014 and started a formal operation in 7 July 2015. The Advanced Himawari Imager (AHI) sensor having 16 channels (from 0.47 to 13.3 μm) is the next-generation geostationary satellite that observes the full disk every 10 minutes. This study attempts to retrieve the aerosol optical properties (AOPs) based on the spectral matching method, with using three visible and one near infrared channels (470, 510, 640, 860nm). This method requires the preparation of look-up table (LUT) approach based on the radiative transfer modeling. Cloud detection is one of the most important processes for guaranteed quality of AOPs. Since the AHI has several infrared channels, which are very advantageous for cloud detection, clouds can be removed by using brightness temperature difference (BTD) and spatial variability test. The Yonsei Aerosol Retrieval (YAER) algorithm is basically utilized on a dark surface, therefore a bright surface (e.g., desert) should be removed first. Then we consider the characteristics of the reflectance of land and ocean surface using three visible channels. The known surface reflectivity problem in high latitude area can be solved in this algorithm by selecting appropriate channels through improving tests. Based on validation results with the sun-photometer measurement in AErosol Robotic NETwork (AERONET), we confirm that the quality of Aerosol Optical Depth (AOD) from the YAER algorithm is comparable to the product from the Japan Aerospace Exploration Agency (JAXA) retrieval algorithm. Our future update includes a consideration of surface reflectance at ocean BRDF and non-spherical aerosols. This will improve the quality of YAER algorithm more, particularly retrieval for the dust particle over the bright desert surface in East Asia.

