

## Validation of Himawari-8 AHI AOD through Comparison with Sun Photometer Network

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The Advanced Himawari Imager (AHI) is the primary sensor aboard the Japanese Himawari-8 geostationary satellite for regional aerosol observations with high temporal–spatial resolution. A comprehensive evaluation for AHI aerosol products (version 1.0) is significant for scientific applications and improving their products quality. In this study, we evaluated nearly two years (from July 15, 2015 to June 31, 2017) of AHI aerosol optical depth (AOD) at 500 nm by contrasting them with the AODs of the Aerosol Robotic Network (AERONET) and the Maritime Aerosol Network (MAN). The comparison between AHI land AOD and AERONET retrievals demonstrates the AHI AODs exhibit a slight overall bias of -0.05 with an uncertainty of 0.21. Over ocean, the average bias between the AHI AOD and AERONET (MAN) measurement is 0.05 (0.04) with an uncertainty of 0.10 (0.08). The AHI retrievals collocated with AERONET AODs ( $\tau_A$ ) demonstrate that the expected error of AHI AODs is  $(-0.65 \times \tau_A + 0.02, -0.33 \times \tau_A + 0.16)$  over land and  $(-0.20 \times \tau_A + 0.03, 0.08 \times \tau_A + 0.11)$  over ocean. Increased bias and uncertainty in the AHI AODs is related to different regions, aerosol types, surface types and angular, which suggests the room for future algorithm improvements. Moreover, the collocated comparisons of AHI-MODIS-AERONET matchups demonstrate the performance of the AHI daytime AODs over land is slightly lower than that of MODIS if the viewing zenith angular less than 60° and solar zenith angle larger than 55°.