Geophysical Research Abstracts
Vol. 20, EGU2018-19625, 2018
EGU General Assembly 2018

A Global OMACA Product of Optical Depth of Aerosols above Clouds: Results from 12-Year Long OMI Record

Hiren Jethva (2), Omar Torres (2), and Changwoo Ahn (3)

(2) NASA Goddard Space Flight Center, Earth Science Division, Code 614, Greenbelt, MD 20771, USA, (3) Science Systems and Applications, Inc., 10210 Greenbelt Rd, Lanham, MD 20706 USA

Aerosol-cloud interaction continues to be one of the leading uncertain components of the climate models, primarily due to the lack of an adequate knowledge of the complex microphysical and radiative processes of the aerosol-cloud system. The situations when aerosols and clouds are found in the same atmospheric column, for instance, when light-absorbing aerosols such as carbonaceous particles and/or wind-blown dust overlay low-level cloud decks, are commonly found in the several regions of the world. Contrary to the known cooling effects of these aerosols in cloud-free scenario over dark surfaces, the overlapping situation of absorbing aerosols over cloud can potentially exert a significant level of atmospheric absorption and produces a positive radiative forcing (warming) at top-of-atmosphere. The magnitude of direct radiative effects of aerosols above cloud directly depends on the aerosol loading, microphysical and optical properties of the aerosol layer and the underlying cloud deck, and geometric cloud fraction.

We contribute to this topic by introducing a novel product of above-cloud aerosol optical depth (ACAOD) of absorbing aerosols retrieved from the near-UV observations made by the Ozone Monitoring Instrument (OMI) onboard NASA's Aura platform. Physically based on the strong 'color ratio' effect in the near-UV caused by the spectral absorption of aerosols above the cloud, the OMACA algorithm of OMI retrieves the optical depths of aerosols and clouds simultaneously under a prescribed state of the atmosphere. Here, we present the algorithm architecture and results from a 12-year global record (2005-2016) including global climatology of the frequency of occurrence of aerosol-cloud overlap and ACAOD. We will also present the initial validation results of OMACA retrievals conducted using the ORACLES-1 airborne measurements taken over the Southeastern Atlantic Ocean.