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Abstract

The GOES-R Aerosol Optical Depth Product

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Aerosols are ever-present and highly-varying constituents of our atmosphere. They play roles in many physical and chemical processes that shape the composition of the atmosphere, and thereby they affect cloud formation, visibility and air quality. They interact with radiation and thus affect the amount of radiative energy reaching the surface and reflected to space. Retrievals from space-based measurements are increasingly used to characterize the amount of aerosol present in the atmosphere over very large areas. Due to their frequent observations geostationary satellites, like GOES-R, are especially useful for detecting rapidly changing pollution events. The aerosol retrieval algorithm developed for the Advanced Baseline Imager (ABI) onboard GOES-R builds on the highly successful aerosol algorithm developed for the Moderate Resolution Imaging Spectroradiometer (MODIS) flown on the NASA Earth Observing System satellites, and borrows some features from the algorithm built for the Visible Infrared Imaging Radiometer Suite (VIIRS) onboard the Suomi NPP satellite. The algorithm estimates the aerosol optical depth (a measure of the aerosol amount) from radiation observed at multiple wavelengths by comparing these measurements to radiation calculated for discrete values of the aerosol optical depth and for a finite set aerosol types (e.g., sea salt, smoke, dust). The result is the pair of aerosol optical depth and aerosol type that provides the best match between the observed and calculated radiation. The ABI aerosol algorithm has been tested with MODIS and VIIRS data as proxy for ABI radiation measurements. The quality of the ABI aerosol product is quantified by comparing the retrieved aerosol optical depth with ground-based measurements. In this talk, I will illustrate the physics of the retrieval, highlight the challenges, and characterize the ABI aerosol optical depth product.