Retrieval of aerosol optical depth over ocean from EOS-06 Ocean Color Monitor3

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Satellite based measurements of aerosol properties over larger spatial domains enable accurate assessment of climate impacts of aerosols and regular monitoring of air quality [1]. Hence, several attempts were carried out for the retrieval of aerosol parameters using space-based sensors [2] [3]. However, retrieval of aerosol properties from satellite measurements is challenging due to multiple factors, including the intricacy in delineating surface and atmospheric contribution from the top-of-the-atmosphere (TOA) radiance measured by satellite based sensors. This study presents pixel level retrieval of aerosol optical depth (AOD), at visible wavelength (555nm) over the oceanic regions, from Ocean Color Monitor 3 (OCM3) onboard the Earth Observation satellite (EOS-06). EOS-06 was launched by the Indian Space Research Organisation (ISRO) on November 26, 2022, to a polar sun synchronous orbit of altitude 760km and inclination 98°. OCM3 makes measurements in 13 spectral bands in the visible and near infrared (VNIR) range, over a swath of 1440km, at a spatial resolution of 360m at nadir. The present algorithm incorporates surface reflectance and multiple scattering of radiation in the atmosphere, by both aerosols and molecules, using radiative transfer computations. The algorithm is based on look-up-table (LUT) approach, in which satellite-measured TOA reflectance at different bands are compared with pre-computed LUT reflectance values to obtain best spectral agreement. Here, LUTs of TOA reflectance at different sun-satellite geometry are generated using region and season specific aerosol models, developed with the measurements of aerosol properties over the Arabian Sea and Bay of Bengal during the Integrated Campaign for Aerosols gases and Radiation Budget (ICARB). Retrieved AOD from OCM-3 compares very well with AOD from MODIS, which provides an opportunity to form long-term climate quality aerosol products over the global oceans by combining the measurements from both the sensors.

References

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Preferred mode of presentation: Oral