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Aerosol Retrievals using GRASP from HARP CubeSat Data in Near Cloud Regions

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Understanding aerosol interactions with Earth's system is vital to determining our planet's energy balance. Aerosol-cloud interactions play a complex but critically important role in estimates of radiative flux in cloudy regions. Most global aerosol information is currently gathered through satellite-based measurements of radiometric intensities. The Hyper Angular Rainbow Polarimeter (HARP) CubeSat, an instrument; developed at the University of Maryland Baltimore county, was launched into space in 2019 and began collecting data in April 2020 from ISS orbit. HARP measured the intensity of light at the top of the atmosphere in three polarization angles at four different wavelengths, with the 670 nm band having a hyper-angular capability of up to 60 viewing angles. in the last two years, HARP has captured several aerosol events, including the 2020 major "Godzilla" trans-Atlantic dust transport event from the Sahara. HARP-2, the successor to HARP CubeSat, will be aboard NASA's upcoming Plankton Aerosol Cloud Ocean Ecosystem (PACE) satellite. HARP-2 will have improved radiometric and polarimetric accuracy compared to the original HARP. Our study presents aerosol retrievals near cloud regions or continuum zones using the Generalized Retrieval of Aerosols and Surface Properties (GRASP) algorithm. We observe the aerosol optical depth (AOD) variation near cloud regions and try to determine the cause of the large variation near clouds and compare it with other available instrument AOD observations namely, AERONET ground-base measurements, VIIRS (on Suomi-NPP) and ABI (on GEOS-R). This study will help to improve aerosol near cloud retrievals and interpret other remote sensing data more comprehensively.

Keywords: aerosol, clouds, continuum zone, retrieval algorithm