

An assessment of the directive radiative forcing of aerosols with a combination between the HARP2 polarimeter and the OCI instrument on PACE

J. V. Martins^a, Anin Phuttukkudy^a, Richard Xu^a, Brent McBride^a, Oleg Dubovik^b

^aEarth and Space Institute, University of Maryland, Baltimore County, Maryland, USA

^bGRASP-Earth, Lille, France

Corresponding author: martins@umbc.edu

The combination between the Hyper-Angular polarization measurements by the Hyper-Angular Rainbow Polarimeter (HARP2) sensor and the hyperspectral wide spectral coverage of the Ocean Color Instrument (OCI), both flying onboard the NASA PACE spacecraft, provide us with an unprecedented ability to measure the microphysical properties of aerosol and cloud particles and at the same time determine the spectral angular properties of the underlying surface.

The use of the GRASP algorithm on these data sets allows for the retrieval of the aerosol particle size, their complex refractive indices, and some elements of the aerosol phase matrix, while also providing characterization of the surface BRDF (Bidirectional Reflectance Distribution Function) and BPDF (Bidirectional Polarization Distribution Function). The HARP2 ability to observe every pixel in its swath with multiple viewing geometries provides a good technique for the estimate of spectral fluxes in the measured wavelengths (between 440-870nm). At the same time, OCI provides highly accurate and continuous hyperspectral coverage from 320 to 895nm and some additional discrete wavelength bands all the way to the shortwave infrared including (940, 1038, 1248, 1378, 1618, 2130, and 2258nm). This powerful combination of measurements gives us enough information for the evaluation of the direct radiative forcing by aerosol particles over multiple surface albedos.

Furthermore, the wide swath of HARP2 and OCI allows for global coverage in only two days, which provide us with an excellent opportunity to evaluate the aerosol forcing over multiple regions of interest around the globe including the effect of biomass burning in the Amazon and in the African continent, dust, and critical regions with substantial episodes of urban pollution. A selection of cases around the globe will be explored in this paper, describing examples of cooling and heating by aerosols over relatively bright and dark surfaces.

Preferred mode of presentation: Oral