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Cloud Retrieval Information Content Studies with the Pre-Aerosol, Cloud and ocean Ecosystem (PACE) Ocean Color Imager (OCI)

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The NASA Pre-Aerosol, Cloud and ocean Ecosystem (PACE) Science Definition Team (SDT) report released in 2012 defined imager stability requirements for the Ocean Color Instrument (OCI) at the sub-percent level. While the instrument suite and measurement requirements are currently being determined, the PACE SDT report provided details on imager options and spectral specifications. The options for a threshold instrument included a hyperspectral imager from 350-800 nm, two near-infrared (NIR) channels, and three short wave infrared (SWIR) channels at 1240, 1640, and 2130 nm. Other instrument options include a variation of the threshold instrument with 3 additional spectral channels at 940, 1378, and 2250 nm and the inclusion of a spectral polarimeter.

In this work, we present cloud retrieval information content studies of optical thickness, droplet effective radius, and thermodynamic phase to quantify the potential for continuing the low cloud climate data record established by the MOderate Resolution and Imaging Spectroradiometer (MODIS) and Visible Infrared Imaging Radiometer Suite (VIIRS) missions with the PACE OCI instrument (i.e. non-polarized cloud reflectances and in the absence of midwave and longwave infrared channels). The information content analysis is performed using the GEneralized Nonlinear Retrieval Analysis (GENRA) methodology and the Collection 6 simulated cloud reflectance data for the common MODIS/VIIRS algorithm (MODAWG) for Cloud Mask, Cloud-Top, and Optical Properties. We show that using both channels near 2 microns improves the probability of cloud phase discrimination with shortwave-only cloud reflectance retrievals. Ongoing work will extend the information content analysis, currently performed for dark ocean surfaces, to different land surface types.