# The Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) Mission and its polarimeters: an overview

**Brian Cairns[a,*], Kirk Knobelspiesse[b], Otto Hasekamp[c], Vanderlei Martins[d], Jeremy Werdell[b], Antonio Mannino[b], Amir Ibrahim[b], Andrew Sayer[b], Bryan Franz[b], Bastiaan Van Diedenhoven[b], Jacek Chowdhary[e], Mikhail Alexandrov[e], and Kenneth Sinclair[e]**

[a]*NASA Goddard Institute for Space Studies, 2880 Broadway, New York, NY 10025, USA*
[b]*NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA*
[c]*SRON Netherlands Institute for Space Research, Utrecht, Netherlands*
[d]*University of Maryland Baltimore County, Baltimore, MD, USA*

[*]*Presenting author (brian.cairns@nasa.gov)*

The overarching science objectives of the PACE mission are to (i) extend key systematic ocean biological, ecological, and biogeochemical climate data records, as well as cloud and aerosol climate data records, (ii) make new global measurements of ocean color that are essential for understanding the global carbon cycle and ocean ecosystem responses to a changing climate, (iii) collect global observations of aerosol and cloud properties, focusing on reducing the largest uncertainties in climate and radiative forcing models of the Earth system, and (iv) improve our understanding of how aerosols influence ocean ecosystems and biogeochemical cycles and how ocean biological and photochemical processes affect the atmosphere. To that end the PACE mission includes a UV-SWIR imaging spectrometer and 2 multi-angle UV-NIR polarimeters. The primary instrument is the UV-SWIR imaging spectrometer, the Ocean Color Instrument (OCI), with continuous spectral coverage at 5 nm resolution from 350–865 nm together with discrete spectral bands at 940, 1038, 1250, 1378, 1615, 2130, and 2260 nm; 1 km resolution at nadir, and two-day global coverage. In addition, PACE will have a hyperspectral polarimeter, the Spectro-Polarimeter for Planetary Exploration (SPEXone) contributed by a consortium consisting of Airbus Defense Space Netherlands (ADSN) and SRON from the Netherlands and a hyperangular polarimeter, the Hyper Angular Rainbow Polarimeter (HARP2), contributed by the University of Maryland Baltimore County. SPEXone has continuous spectral coverage from 385–770 nm at 2–5nm resolution with expected polarimetric accuracy of 0.003, 2.5 km spatial sampling, and five viewing angles over ±57° from nadir. HARP2 has spectral bands at 443, 550, 670, and 865 nm with expected polarimetric accuracy of better than 0.01, 3.0 km spatial sampling and up to 60 viewing angles over ±57° from nadir. In this talk I will discuss how the polarimetric observations made by SPEXone and HARP2 complement one another and also the primary PACE instrument, OCI in terms of aerosol, cloud and ocean color capabilities.

Mode of presentation: Invited