PACE's advanced technologies will provide new insight into Earth's ocean and atmosphere, systems that affect our everyday lives by regulating climate.

PACE will observe the ocean and atmosphere together. This will improve knowledge of the role each system plays as our planet changes.

PACE data will be applied to some of the most pressing societal issues such as air quality and food safety.

PACE MISSION

PACE will extend and improve NASA's 20 plus years of global satellite observations of our living ocean, atmospheric aerosols, and clouds and initiate an advanced set of climate-relevant data records. By determining the distribution of phytoplankton, PACE will help assess ocean health. It will also continue key measurements related to air quality and climate.

Science Goals

To extend systematic ocean color, atmospheric aerosol, and cloud data records for Earth system and climate studies.

To address new and emerging science questions by detecting a broader range of color wavelengths that will provide new and unprecedented detail.

Key Mission Characteristics

- **Hyperspectral ocean color instrument**
- **Two multi-angle polarimeters**
- **Launch readiness date: January 2024**
- **676.5 km (420 mi) orbital altitude**
- **Sun-synchronous, polar orbit**
- **Global coverage every two days**
- **Managed by Goddard Space Flight Center**

National Aeronautics and Space Administration

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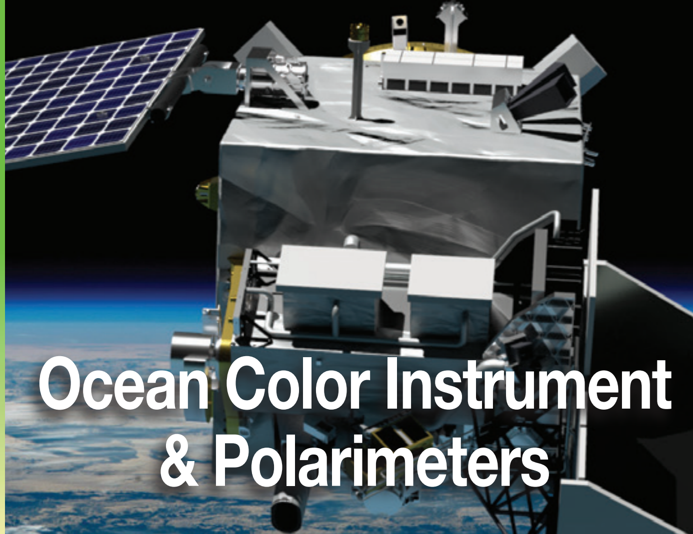


Ocean Color Instrument & Polarimeters

PACE's advanced technology will shed new light on our ocean and atmosphere.

Plankton, Aerosol, Cloud, ocean Ecosystem

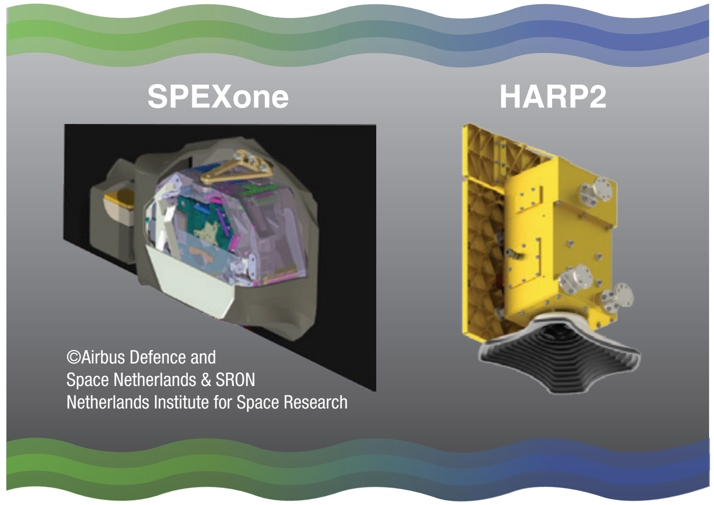
More wavelengths.

Unprecedented information.

OCI & Polarimeters

The primary technology planned for PACE is the Ocean Color Instrument (OCI). Being built at NASA's Goddard Space Flight Center, it will be the most advanced instrument for observing ocean color in NASA's history. Its state-of-the-art optical spectrometer will measure properties of light over broad portions of the electromagnetic spectrum: from ultraviolet to shortwave infrared wavelengths. Even better, the OCI will enable continuous measurement of light at finer wavelength resolution than previous NASA ocean color sensors and its cross-track rotating telescope will minimize image striping.

The OCI's unparalleled spectral coverage will provide first-ever global measurements designed to identify the community composition of *phytoplankton*, microscopic algae that float in our ocean. These data will significantly improve our ability to understand Earth's changing marine ecosystems, manage natural resources such as fisheries, and identify harmful algal blooms.



	OCI	SPEXone	HARP2
Spectral range *[bandwith]*	342.5 - 887.5 @ 5 nm steps *[5 nm]*	385 - 770 nm @ 2-4 nm steps	440, 550, 670 *[10 nm]* & 870 nm *[40 nm]*
Shortwave infrared (OCI) / Polarized bands (SPEXone, HARP2)	Seven bands centered on 940, 1038, 1250, 1378, 1615, 2130 & 2260 nm	Same range in 15 to 45 nm steps	All
Number of viewing angles *[degrees]*	Fore-aft tilt +/- 20° to avoid sun glint	Five [-57°, -20°, 0°, 20°, 57°]	10 for 440, 550, 870 nm & 60 for 670 nm *[spaced over 114°]*
Coverage *[swath width]*	+/- 56.5° *[2663 km at 20° tilt]*	+/- 4° *[100 km]*	+/- 47° *[1556 km at nadir]*
Days for global coverage	1-2	About 30	2
Ground sample distance	1 km at nadir	2.5 km	3 km
Institution(s)	Goddard Space Flight Center	SRON Netherlands Institute for Space Research, Airbus Defence and Space Netherlands, TNO	University of Maryland – Earth and Space Institute

PACE will also include two multi-angular imaging *polarimeters*, instruments that measure how reflected sunlight oscillates within a geometric plane. When light interacts with clouds or suspended particles – known as *aerosols* – it comes away from that interaction changed. By measuring changes in the light's polarization or color, we can infer properties of the clouds or aerosols themselves. This type of data is crucial to deciphering the way sunlight is reflected and absorbed by our planet and how aerosols affect cloud formation.

PACE will be NASA's most advanced ocean color and aerosol mission to date.

Why do we need PACE? To continue climate data records and unveil new insights on life in our ocean.

The PACE polarimeters, Spectro-Polarimeter for Planetary Exploration (SPEXone) and Hyper Angular Rainbow Polarimeter (HARP2), will sample visible to near-infrared bandwidths over various angles within the OCI's coverage *(see table)*. Their compatible spatial coverage and measurement accuracies will lead to a comprehensive set of aerosol and cloud science products. In addition, polarimeter data will improve OCI results by helping to "clear away" portions of the atmosphere that obscure ocean color signals.

Together with the OCI, SPEXone and HARP2 will continue systematic records of key atmospheric variables needed to improve forecasts of air quality, weather and climate. As a result, PACE will be a major advance in satellite observing technology. Its instrument suite will provide new opportunities to monitor and respond to changes in our environment, while clarifying interactions between the ocean and atmosphere with exceptional detail.

Plankton, Aerosol, Cloud, ocean Ecosystem

Learn more at pace.gsfc.nasa.gov