

The NASA Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) Mission

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<http://pace.gsfc.nasa.gov>



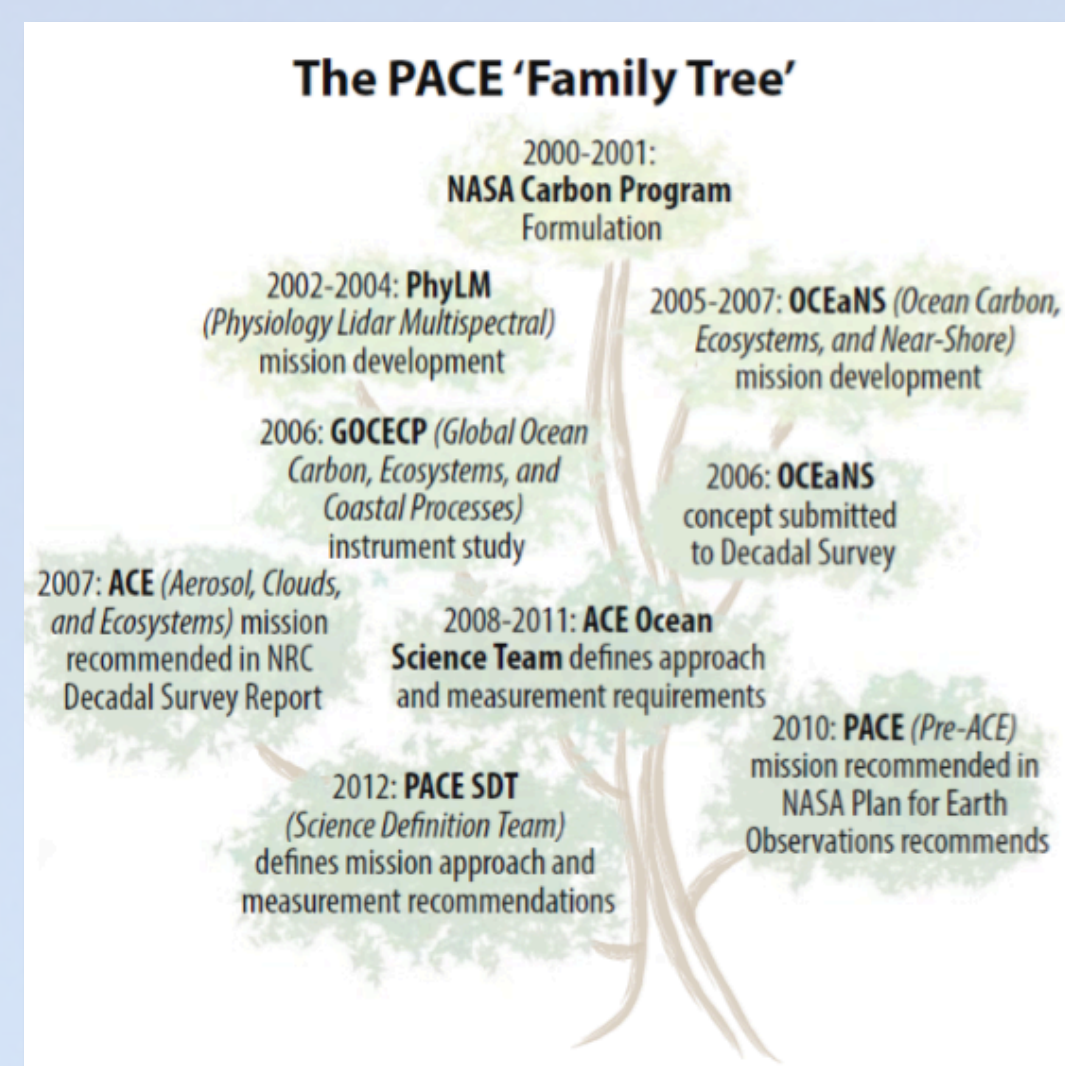
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Background

PACE is a strategic climate continuity mission that was defined in the 2010 document *Responding to the Challenge of Climate and Environmental Change: NASA's Plan for Climate-Centric Architecture for Earth Observations and Applications from Space* (science.nasa.gov/about-us/science-strategy).



PACE science follows recommendations from the PACE Science Definition Team (2011-2012) Report (pace.oceansciences.org/docs/pace_sdt_report_final.pdf)

Key Mission Characteristics

- Hyperspectral ocean color instrument & possible multi-angle polarimeter
- 2-day global coverage to solar & sensor zenith angles of 75° & 60°
- Sun-synchronous, polar orbit with a local Equatorial crossing time of ~13:00
- 675-km altitude & 98° inclination
- Class C (limited redundancy) for 3-years of operations & 10-years of fuel

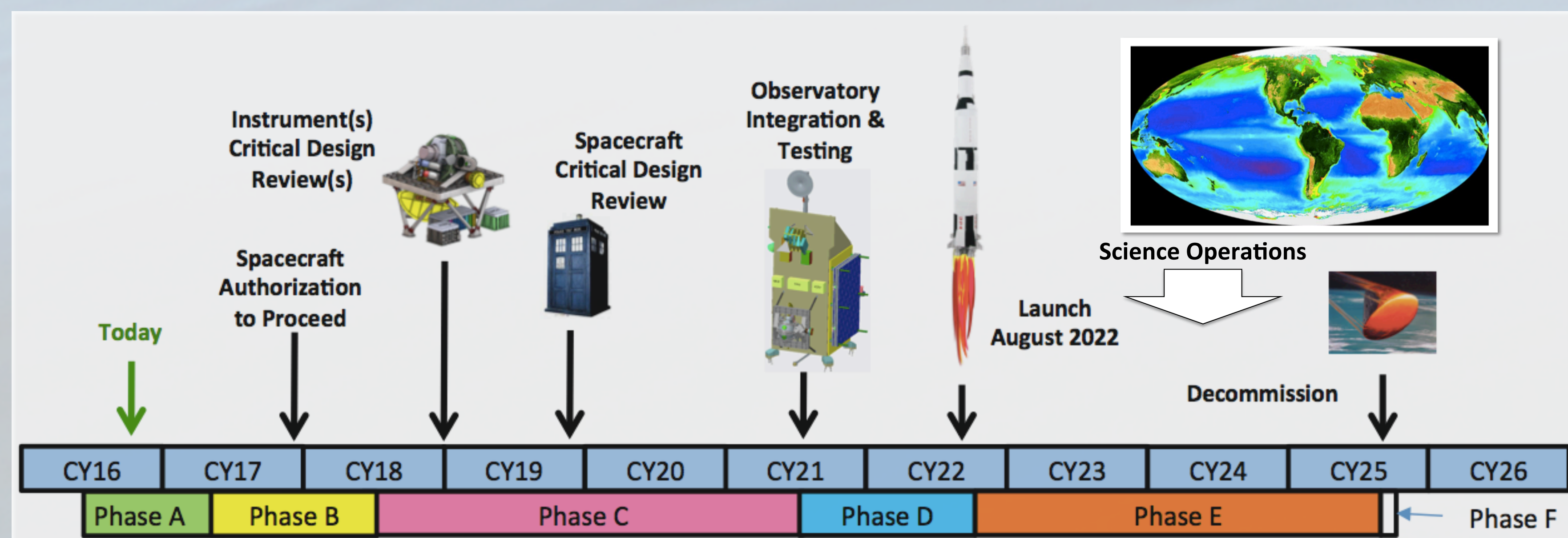
Potential for Multi-Angle Polarimetry on PACE

Improved characterization of aerosol particles from a polarimeter will improve the quantification of Earth's energy budget, produce data products for the aerosol and cloud communities, and improve atmospheric correction for ocean color.

GSFC will pursue the procurement of a multi-angle polarimeter, per the direction of the NASA HQ PACE Acquisition Strategy Meeting held in August 2016. This procurement opportunity is expected to begin in Winter 2016.

Mission Elements & Schedule

Mission Management:	Goddard Space Flight Center (GSFC)
Hyperspectral Ocean Color Instrument:	Goddard Space Flight Center
Multi-angle Polarimeter (optional):	To be procured
Spacecraft/Mission Operations:	Goddard Space Flight Center
Science Data Processing:	Ocean Biology Processing Group
Competed Science Teams:	NASA Earth Sciences Division



Science – PACE is intended to:

- continue NASA's multi-decade record** of satellite ocean color, clouds and aerosol particles observations from SeaWiFS, MODIS, and VIIRS (and MISR), and
- provide new measurements** of aerosols, clouds, aquatic ecosystems and biogeochemistry through the spectral resolution of the Ocean Color Instrument (OCI) and the possible addition of a multi-angle polarimeter.

PACE will be NASA's most advanced global ocean color & aerosol mission to date, particularly with the inclusion of a multi-angle polarimeter.

Science – ocean color instrument requirements (& goals):

- 5 nm resolution from 350-800 nm (315-890 nm & finer spectral sampling (e.g., 0.625, 1.25, or 2.5 nm) over limited, programmable spectral ranges)**

- Spectral channels at 865, 940, (980), (1020), 1240, 1380, 1640, 2130, & 2250 nm**

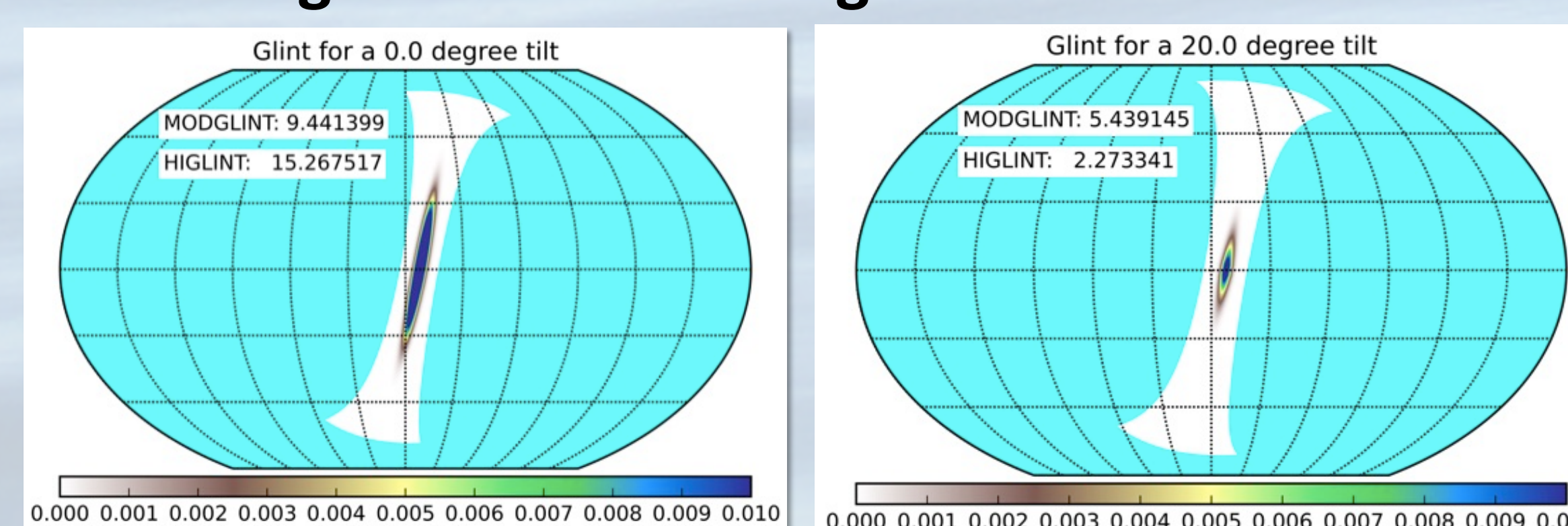
Support for aerosol & cloud data products, plus ocean color atmospheric correction

- 1-km² ground sample distance at nadir (minimal pixel growth at scan edges)**

- Monthly lunar calibration of all science detectors through Earth-view port**

Required to achieve mission-long 0.1% temporal stability. To be complemented by daily & monthly solar calibrations (and spectral solar calibrations).

- ±20-deg tilt to avoid Sun glint**



- No image striping**

The instrument will be a single-science-pixel rotating scanner to avoid striping, much like SeaWiFS.

- ≤0.5% total image artifacts**

Defined as the quadrature error of instrument linearity, response versus scan angle, polarization sensitivity, radiometric and spectral temperature sensitivity, high contrast resolution, saturation, saturation recovery, crosstalk, relative spectral response, and radiometric and band-to-band stability, to name a few.

Mission Science Points of Contact

Jeremy Werdell (Project Scientist), Antonio Mannino (Deputy Project Scientist), Brian Cairns (Deputy Project Scientist), Gerhard Meister (Instrument Scientist), Bryan Franz (Science Data System Manager), Paula Bontempi (Program Scientist), Hal Maring (Deputy Program Scientist), Woody Turner (Applied Sciences Lead)

