INSIDE THE ISSUE

PACE Community Newsletter / January 2024 / Issue 7

WELCOME

We've finally made it – the week of launch! I can't describe the excitement from across the community and from NASA, and particularly the Ocean Ecology Lab at Goddard Space Flight Center where the idea for PACE was born more than twenty years ago. It's hard to believe that we're at this point, and we thank all of you for riding this amazing wave with us. After the excitement of launch passes, we enter a new phase – putting this incredible dataset to work for the science and applications that we're planning, and the science and applications we haven't even begun to dream up! We can't wait to watch and cheer on the launch with you all… then it's time to get to work!

- Natasha Sadoff
PACE Applications

Leading up to launch... and beyond!

After two decades of sharing ideas and pursuing concept studies, writing white papers, assembling and disbanding multiple science teams, formulating the mission, designing the instruments' and observatory's concepts, and seemingly endless engineering, building, and testing… we are less than ten days from PACE's launch at the time of this writing. What a long, strange trip it's been. On a personal note, this has been one of the most challenging, rewarding, and exhilarating experiences of my professional career. I am grateful for and appreciative of everyone involved. And, none of this would be possible without community support and energy for the mission. Thank you. What a gift this mission promises to be to further the study of our home planet!

*-**Jeremy Werdell,** PACE Project Scientist*

The countdown clock at the Kennedy Space Center showing excitement for the PACE launch. Credit: NASA/Cory Huston

To get us that final mile to launch, the PACE mission team has been with the observatory at Astrotech Space Operations, our payload processing facility, doing checkouts, final tests, and combined operations with Space-X to make sure that everything is ready. Schedules have been full of media engagements, too; stay tuned for lots of fun stories across magazines, news outlets, and other venues. Exciting things will be shared! For more on these processes, see the Mission Updates Story.

Mission Updates

After nine years of development, PACE launch is upon us. NASA's Science Mis-sion Directorate provided the final green light to launch PACE at 1:30am EST on February 6th (with Feb. 8 as the backup date). The approval took place at PACE's Key Decision Point-E (the launch "go or no go" review) at NASA Headquarters on the 9th of January. The ground operations team is making final preparations with the Space Network to track the PACE satellite during and after launch from space and ground. In addition to the many launch site activities preparing the PACE observatory for encapsulation within the payload faring and ultimately onto the Falcon-9 rocket, PACE engineers and scientists have been preparing for the 60-day in-orbit commissioning when the spacecraft and all three instruments are sequentially and meticulously checked out to ensure that all are functioning optimally to collect science data. The PACE mission operations center (MOC) is ready to keep an eye on the PACE satellite through commissioning and operations.

PACE and team members inside a cleanroom at the Astrotech Space Operations Facility near the agency's Kennedy Space Center in Florida. Credit:. NASA/Ben Smegelsky

Shortly after PACE begins science operations in late March, the largely autonomous MOC will function with minimal staff. On the science end of the mission, project scientists are fine tuning the PACE data products and posting timelines for their availability on the website. By day 45, we'll have science first light – getting our hands on the very first images from each of the instruments. At that time, we'll do a full media release and though it's not science data vetted for quality yet, we'll finally get to see the first imagery from PACE.

For anyone seeking to test drive PACE data products before April, the latest version of the PACE OCI simulated data (PyTOAST) version 11 are available on the Ocean Color web as well as simulated data for SPEXone and HARP2. To ensure PACE data will be ready to flow to the world by late March, the project continues end-to-end data processing simulations as well as software and algorithm refinement and evaluation. Preparations for PACE data product validation activities are moving forward with the PACE-PAX airborne campaign and recent selection of the PACE Validation Science Team. *Are you ready for PACE data?*

PACE CoP

Interested in joining a growing group of researchers & applied scientists who are excited about everything PACE!?

The PACE Community of Practice fosters new partnerships and collaboration, generates new knowledge and innovations, and promotes interdisciplinary research using PACE data.

SIGN UP NOW

PACE Early Adopter Program

Do you have an existing application or system that could leverage PACE data for societal benefit?

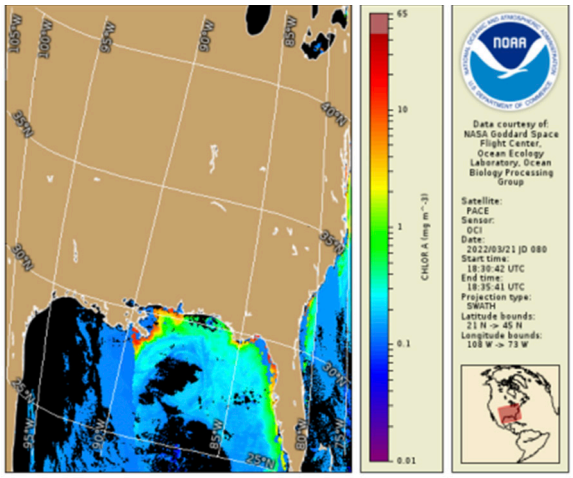
The Early Adopter Program promotes applied science designed to scale and integrate PACE data into activities that directly benefit society and inform decision-making.

LEARN MORE

NOAA CoastWatch Eager to Apply Hyperspectral Data

NOAA CoastWatch is a NOAA-wide program headquartered within the NOAA National Environmental Satellite, Data and Information Service (NESDIS). Coast-Watch exists to help people find, choose, access, and use observations from satellites for ocean, coastal and inland water applications that inform and benefit society.

NOAA has been excited for PACE, expecting that the hyperspectral data will improve information needed to execute NOAA missions in fisheries, ocean services, research, weather and climate. NOAA is readying NESDIS and CoastWatch platforms needed for bringing over NASA data products for NOAA use and for NOAA development of new algorithms and applications in support of NOAA mission activities. The ability to differentiate phytoplankton assemblages in ecosystems, to improve detection of harmful algal species, better diagnostics for water quali-ty are among the top expectations. CoastWatch Central Operations has updated CoastWatch Utilities, the free data processing and visualization software pack-age, to handle the OCI data for smooth integration across our catalog. Coast-Watch is collaborating with NOAA National Ocean Service's National Centers for Coastal Ocean Science (NCCOS) to incorporate PACE data into legacy multispec-tral algorithms to evaluate consistency with existing products before developing new algorithms to leverage hyperspectral data.

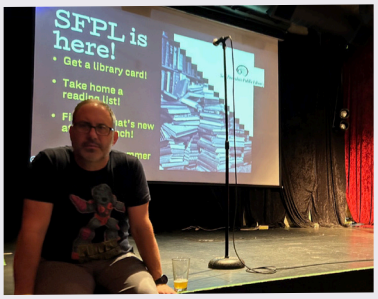


Chlorophyll data from the PACE Level-2 sample dataset is demonstrated to be compatible with CoastWatch Utilities software and standard CoastWatch processes.

Also in partnership with NCCOS, we are contributing to the Early Adopter Applied Research Topic, "Discriminating Algal Blooms in Turbid Coastal, Estuarine and Large Lake Environments." For the Great Lakes, we are involved in the ROSES proposal, "Developing a PACE Hyperspectral Bio-Optical Algorithm Framework for Detection of Freshwater Harmful Algal Blooms." On the West Coast, we have the Early Adopter Applied Research Topic, "Applying PACE Products to the California Harmful Algae Risk Mapping (C-HARM) System." These projects are just the beginning of what CoastWatch will be doing with hyperspectral ocean color data from PACE.

Taking PACE to the Nerds!

PACE took over San Francisco's Nerd Nite in December with presentations from PACE's own Jeremy Werdell and Kirk Knobelspiesse, and Early Adopter Marcela Loria Salazar. With the audience mostly made up of local science afficionados, it was a



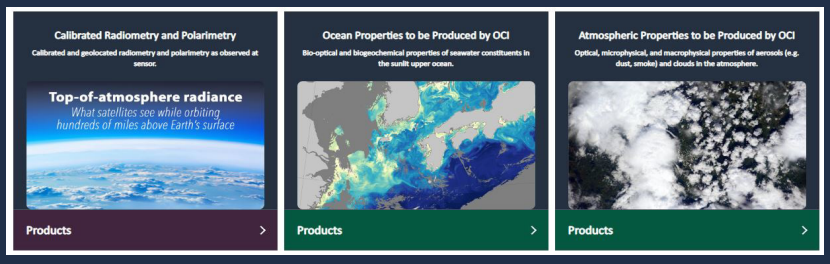
great opportunity to talk about PACE from a public interest perspective with drinks in hand.

Above: Nerd Nite presenters in the venue's green room and on stage; December 13, 2023.
Credit: Mia Knobelspiesse and Carina Poulin

PACE Spotlights

User Corner: Did you Know?

One of the most important sources of information on the PACE mission website is on the DATA tab, and lately there have even been some new additions to this important destination. First, there's a new Data Products Overview page! This is a more accessible, visual way to explore products according to thematic area (e.g., ocean properties, atmospheric properties, land products) and by instrument (Ocean Color Instrument (OCI), HARP2, or SPEXone).



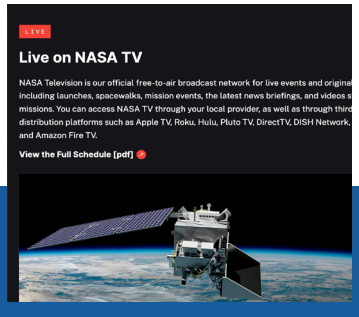
For more detail in a table-format, head to the Data Product Table, where a new stoplight color coding system has been added. This new color-coding features helps users understand what products will be available at what time once PACE launches. Standard products are marked green and will be available at launch. Other products are considered "test" products and could be available at launch, 1-3 months post-launch, or even after that without a set date.

Remember that implementation of the data products follows the Science Data Product Implementation Plan (see the QR code to access), which includes a stepwise approach for algorithm implementation, testing, evaluation, and maturation. If you have an idea for a new algorithm or data product, reach out to discuss!

Recently added is also a list of questions and answers (above) related to access, documentation, quality, and other key areas to help you get started. Check out this helpful new addition to the website as you prepare to use PACE data!!

PACE Launch Live Broadcast

Can't make it to launch in-person? Monitor NASA TV to see a live broadcast, interviews, and other launch-related content.



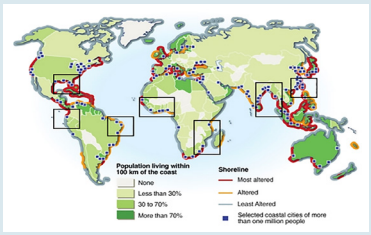
Tuesday, February 6, 12:45 AM

www.nasa.gov/nasatv

Sign-up *to receive updates about the launch*

Early Adopter Spotlight

Biothreats are defined as biological agents that pose a significant threat to the well-being of human communities and include harmful algal blooms (HABs) and water-borne infectious pathogens. Pathogens in the global oceans are on constant move all of the time and are impacted by a changing climate and changing oceanic conditions.



Population distribution and water-borned disease outbreak. Rectangles represent regions with reported disease epidemics.

Early Adopter Antar Jutla is seeking to understand and distinguish major biothreats along global coastal and oceanic waters with emphasis on Chesapeake Bay and coastal Florida. The result will be a prediction model for cholera, integrating plankton species and health information into algorithms.

Learn more about this project!!

People of PACE

Dave Baran | PACE Observatory Manager

It has been an honor for David to work with the PACE, OCI, HARP2, and SPEXone teams as the Observatory Manager in July 2023, filling in for Beth Weinstein as she began her detail assignment with a Mansfield Fellowship in Japan. By this time, the PACE Observatory was lined up with the runway and on final approach as the entire team came together for multiple Comprehensive Performance Tests (CPTs) before, during, and after the thermal vacuum test campaign. Following these highly successful tests, the team seamlessly transitioned to transport PACE to the launch site and support launch site I&T while simultaneously preparing for commissioning and mission operations. Outside of work, David spends time on home projects, performing his own auto maintenance, cooking, outdoor activities, and watching his kids' sporting activities.

Chuanmin Hu | PACE Science & Applications Team (SAT) Member

Chuanmin is a professor of optical oceanography at the University of South Florida who uses laboratory, field, and remote sens-ing techniques to study algal blooms, oil spills, marine debris, coastal and inland water quality, and global changes. He will use PACE's hyperspectral and polarimetry capacity to improve algorithms and data products for algal blooms and oil spills. He plays musical instruments in his spare time.

Susanne Craig | Project Science

Susanne is the lead for system vicarious calibration (SVC) for PACE and has been a member of the PACE science team since 2014. Her role is to ensure that OCI remains well calibrated while on orbit using high quality in situ radiometric measurements. All of PACE's ocean color data products are derived from radiometric measurements of light scattered by the ocean and atmosphere, so it's crucial that the calibration so carefully performed on Earth remains stable throughout the mission. Susanne also has a strong interest in phytoplankton ecology and works on machine learning approaches to predict phytoplankton community composition from ocean color and on the development of autonomous platforms to allow rapid measurement of ocean and atmosphere optical properties. When she's not counting photons, you'll find her competing in dog sport competitions or throwing barbells about in Olympic weightlifting and CrossFit gyms.

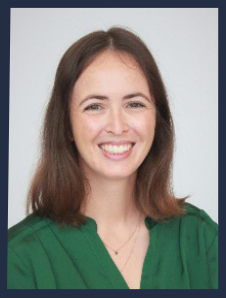
Jessie Turner | PACE Early Adopter (EA) Member

Jessie is a postdoc at the University of Connecticut. Her research as a PACE Early Adopter focuses on water clarity in coastal waters like the Chesapeake Bay, where water clarity is not improving in tandem with watershed cleanup efforts. The size and type of particles in surface waters may affect that mismatch. Jessie is interested in what PACE data can show us about the size and type of particles that impact water clarity, not just from hyperspectral ocean color data but also using polarimeter data from HARP2 and SPEXone. She also loves fly fishing.

PACE "In the Know"

This newsletter is brought to you by the PACE Applications Team!

Natasha Sadoff | PACE Applications Program



Carina Poulin | Scientific Designer

CONTACT US

Original newsletter design by Erin Urquhart

STAY CONNECTED

Follow @NASAOcean on social media!

NEW PACE PUBLICATIONS

- *Assessing the utility of high spectral resolution lidar for measuring particulate backscatter in the ocean and evaluating satellite ocean color retrievals.* (Collister et al. 2023). Read More
- *Simultaneous retrieval of aerosol and ocean properties from PACE HARP2 with uncertainty assessment using cascading neural network radiative transfer models* (Gao et al. 2023). Read More
- *Assessing the relationship between cyanobacterial blooms and respiratory-related hospital visits: Green bay, Wisconsin 2017–2019.* (Murray et al. 2024). Read More
- *Unifying radiative transfer models in computer graphics and remote sensing, Part I: A survey.* (Salesin et al. 2024). Read More
- *Spectral correlation in MODIS water-leaving reflectance retrieval uncertainty* (Zhang et al. 2024). Read More

Do you have a PACE related publication that you'd like featured? Let us know!

UPCOMING EVENTS

Ocean Sciences Meeting 2024 | Febuary 18-23, 2024 | New Orleans, LA, USA

- **OT23A** and **OT24F** - Ushering in an Era of Daily, Global Hyperspectral Radiometry and Multiangle Polarimetry with the NASA PACE Mission

European Geophysical Union (EGU) General Assembly 2024 | April 14-19, 2024 | Vienna, Austria & Online

Ocean Optics XXVI | October 6-11, 2024 | Las Palmas de Gran Canaria, Spain