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NASA PACE Community Newsletter / June 2022/ Issue 1

WELCOME

"We came all this way to explore the moon, and the most important thing is that we discovered the earth" – **Apollo 8 astronaut William Anders**

Beyond its well-known space program, NASA hosts a fleet of Earth-observing satellites that monitor our home planet. Up next is PACE – NASA's latest investment in the combined study of sea, land, and sky. With its uniquely advanced and complementary instrument payload, PACE will usher in an era of unprecedented Earth science. And, despite the challenges the mission has faced, all systems are "go" as we approach our January 2024 launch date.



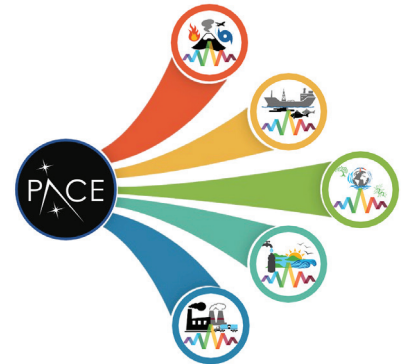
On behalf of the mission, we're excited to have you along for the ride.

- Jeremy Werdell
PACE Project Scientist

PACE Community of Practice

The PACE community includes a global group of applied scientists, researchers, decision-makers, members of the public, and other stakeholders. What does this diverse group have in common? An interest in applying PACE data from the ocean, atmosphere or land to benefit their own target audiences. The PACE Applications team has recently ramped up efforts to grow this community – now formalized through the new [PACE Community of Practice \(CoP\)](#).

The CoP includes anyone interested in the use of PACE products before and after launch, including for individual research, applications, or model development. [PACE Early Adopters](#) (EA) as well as [PACE Science and Application Team \(SAT\)](#) members are included. We want the CoP to be a place of networking, information sharing, and collaboration – a place to foster new partnerships and generate new interdisciplinary knowledge. Members of the CoP will hear about our PACE Applications events; PACE observatory updates; simulated, proxy, calibration and validation data; and have access to lessons learned throughout the community. We will offer opportunities for engagement, networking, and sharing – and we're open to your feedback on additional ideas to build bridges and expand this community.



We hope you will join us, share your work, meet PACE peers, and contribute to this exciting new community.

PACE Mission Updates

Despite a lingering pandemic, the past nine months offered many of the PACE mission's most exciting times. To start, two major element-level Integration and Testing (I&T) programs began at NASA Goddard Space Flight Center (GSFC)– home of the PACE mission – in September 2021. This represents the milestone within a flight project lifecycle where major individual mission elements, such as the instruments and spacecraft, are assembled and integrated into complete systems, which are then verified, validated, and delivered. As you'll see in the "Newsworthy" feature below, the I&T programs for both the Ocean Color Instrument and spacecraft are nearing completion. The two PACE polarimeters are following suit, with [SPeXone](#) already delivered to the Project and [HARP2](#) expected to be delivered in Fall 2022. Observatory-level I&T, where the instruments are integrated onto the spacecraft and the full system is tested, characterized, and readied for launch, will begin in Fall 2022. Launch is planned for early January 2024 from Kennedy Space Center in Florida.

The mission has also enjoyed significant community engagement during this timeframe. The [PACE Applications Program](#) hosted its 2nd annual workshop in September 2021, a very successful event with over 750 registrants from over 70 countries. The 3rd annual workshop will be held from September 14-15, 2022. [Registration for the workshop is available online.](#)



PACE Project- December 2021 at NASA Goddard Space Flight Center (GSFC).

Members of the PACE Science and Applications Team (SAT), whose NASA-funded research grants are well underway, solidify existing – and spark new – collaborations through monthly meetings. In late 2021, the SAT also participated in a fruitful meeting at the University of Connecticut, and has since contributed to an ever-expanding number of PACE-related [publications](#).

Lastly, the mission had representation at several society meetings, including the Fall 2021 American Geophysical Union meeting, 2022 Ocean Sciences Meeting, and ESA 2022 Living Planet Symposium.



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

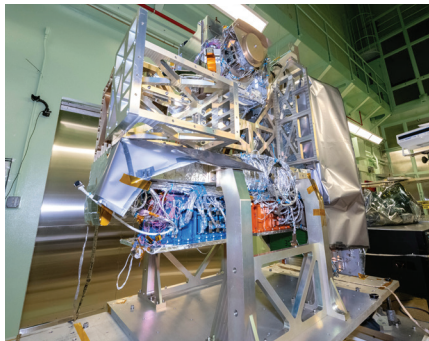
Do you have an existing application or system that could leverage PACE data for societal benefit?

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

Testing of PACE's Ocean Color Instrument

Assembly of PACE's primary instrument, a hyperspectral scanning radiometer named the Ocean Color Instrument (OCI), has largely completed and is now undergoing environmental testing at GSFC. This testing is used to characterize and calibrate the completed instrument system under a variety of space-like conditions before it is delivered to the Observatory Team for integration onto the PACE spacecraft. Results from these tests will inform algorithms and approaches used to retrieve geophysical variables of interest. Despite its name, OCI is capable of providing key scientific information about the atmosphere and land, as well.



PACE OCI ready for environmental testing at NASA GSFC. Katie Mellos/NASA

[Learn more about PACE OCI.](#)

PACE Spacecraft Assembly is Underway

Assembly of PACE's spacecraft is also underway at GSFC, as is its characterization and testing. This process includes not just mechanical assembly of the spacecraft structure, but also integration of the propulsion system, GPS receivers, antennas and transponders, solar panels, batteries, computers, data acquisition systems, flight software, and much more. Before its science instruments are added, the PACE spacecraft undergoes testing in space-like environments. Instrument integration is expected to begin this coming Fall.



[Find PACE satellite animations online.](#)

(Left) Spacecraft external structure prior to addition of external components, including instruments, electronics, batteries, and solar panels. Denny Henry/NASA

PACE Air Quality & Applied Atmospheric Sciences Focus Session



PACE Air Quality & Applied Atmospheric Sciences Focus Session

Virtual Event
May 11th, 2022

PACE Applications hosted the Air Quality and Applied Atmospheric Sciences Focus Session on May 11, 2022. This was the first PACE event focusing on this thematic area. With 200 registrants, the event provided an overview of the PACE mission, presentations by PACE scientists, breakout sessions to understand data end user needs, and a panel discussion on how PACE can work together with three other upcoming missions to more effectively meet those end user needs.

[Access event recordings.](#)

This is Ryan

Occupation: Air Quality Specialist

Age: 35

Location: Duluth, MN



Goals

- During wildfire incidents, provides timely, science-based information related to smoke impact and forecasts.
- Communicate impacts to incident teams, air quality regulators, fire personnel and the public.

NASA Applied Science Area



Technical Characteristics

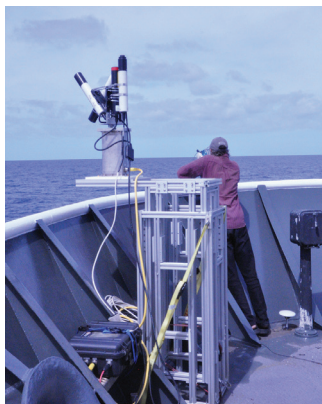
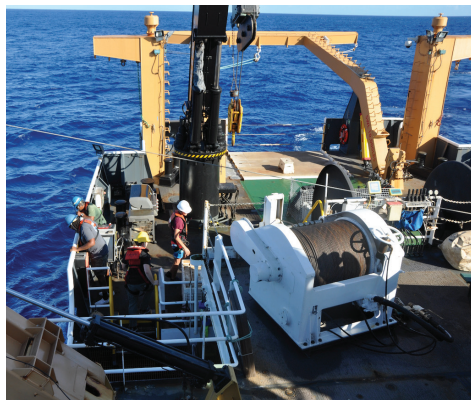


Bio/ Backstory:

Ryan is an air quality specialist and Air Resource Advisor with the U.S. Forest Service where he monitors air quality before, after, and during prescribed burns and unplanned wildfires. He communicates results for air pollution advisories and public alerts. Ryan's expertise is in air quality science, including monitoring, smoke modeling, pollutant health, thresholds and smoke risks and mitigation. In his spare time, he enjoys cross-country skiing & sailing.

Focus session attendees explored PACE community needs, challenges, and ideal data experiences through "User personas".

Getting Ready for Launch Isn't All About Hardware



(Left) Scientists & crew keeping an eye on optical instruments deployed from the ship off the coast of Hawaii. instruments. (Right) GSFC's "pySAS" instrument. J. Chaves | GSFC/SSAI

As PACE's early 2024 launch date approaches, the PACE project is performing various "Day In The Life" simulations to be ready for launch. The ground systems team is testing the transfer of PACE simulated data that will be downlinked to remote ground stations around the world and made available in the cloud. The PACE Science Data Segment is practicing pulling raw PACE data files from the cloud into its servers to process simulated PACE instrument data and spacecraft telemetry into science data product files. To evaluate data product performance, PACE project science personnel are developing and implementing the end-to-end tools for routine validation (evaluation) of the PACE science data products.

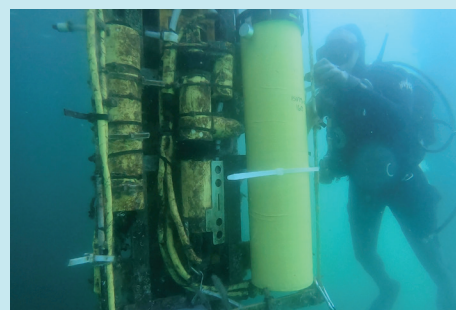
Contributing to this effort are several sea-going oceanographers who recently participated in a field campaign off the coast of Hawaii to improve our estimates of measurement errors from field instruments that will be used to validate PACE's OCI data products. By reducing the errors from field measurements, we can improve and quantify the quality of PACE's data products. In the end, it's all about the science and applications accomplished with PACE data.



(Right) NASA GSFC/SSAI & EPA oceanographers on the NOAA Oscar Elton Sette. Left to right, Declan Farr, Scott Freeman, Joaquin Chaves, & Harrison Smith. Joaquin Chaves | GFSC/SSAI

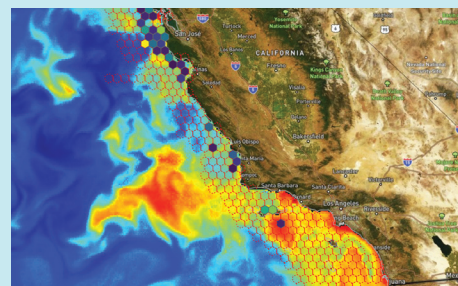
EA Spotlight: C-HARM

The West Coast of the U.S. is experiencing harmful algal blooms, threatening human and ecosystem health. PACE Early Adopter Dr. Clarissa Anderson's [California Harmful Algae Risk Mapping \(C-HARM\)](#) system is helping stakeholders understand when and where toxic blooms occur.



Deployment of an Imaging FlowCytobot at Newport Beach Pier, collecting real-time plankton images for the C-HARM System. Clarissa Anderson/ SCCOOS

C-HARM generates nowcast and forecast products that inform shellfish growing operations, marine mammal rescue decisions, public health decisions, and broader environmental management and information dissemination.



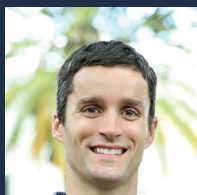
Map of C-HARM nowcast Domoic Acid probability (Feb. 22); CA crab pot locations overlaid.

Dr. Veronica Pinnick | PACE Integration & Test (I&T) Manager



As the PACE I&T Manager, Dr. Veronica Pinnick is focused on getting the PACE spacecraft components mechanically and electrically integrated into the system, and testing them to make sure all the components work well together. Once the three PACE science instruments are delivered and installed onto the spacecraft, it becomes the “observatory” and the team tests the code that controls PACE as it flies. While she’s an engineer now, she started at Goddard as a Mars chemist where she learned about the incredible complexity of scientific instruments.

Dr. Brian Barnes | PACE Science & Applications Team (SAT) Member



Shallow coastal waters encompass some of the most productive marine environments (coral reefs, seagrass meadows, kelp forests, microalgae beds, etc.). As part of the PACE SAT, Dr. Barnes is developing methods to assess the water and the seafloor in such environments, and to ensure accessibility of these data to the public. Despite spending his entire life around the water – barefoot skiing, fishing, SCUBA diving – and years of marine science education, Brian struggles to maintain his fish tank.

Dr. Aimee Neeley | PACE Project Science (Field Support Group)



Dr. Neeley is a member of the Field Support Group. She collects in situ optical and biogeochemical data for climate and other data records used for ocean color satellite vicarious calibration, data product validation, and bio-optical algorithm development. Her expertise includes phytoplankton ecology, photosynthetic pigments, measurements of particle absorption and retrieval of phytoplankton community composition from remote sensing. She has traveled to both the Arctic and the Antarctic and loves penguins (the inspiration for her penguin tattoo).

Maddy Anand | PACE Early Adopter (EA) Member



Maddy Anand is one of PACE’s newest EAs. His project addresses a lack of air quality data in India and globally through a mobile app that provides free micro-air quality and pollen information, utilizing PACE’s aerosol and land surface data products. He hopes the app will scale to 10 million users over the next 5 years. He believes that data can drive action toward improving air quality and health and reducing emissions! He is inspired by his son whose respiratory condition turned him into a data scientist and entrepreneur 6 years ago.

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



Erin Urquhart | Project Applications Coordinator



Natasha Sadoff | Project Applications Deputy Coordinator

[CONTACT US](#)

STAY CONNECTED

Follow @NASAOcean on social media!



NEW PACE PUBLICATIONS

- ★ *QWIP: A Quantitative Metric for Quality Control of Aquatic Reflectance Spectral Shape using the Apparent Visible Wavelength* (Dierssen et al. 2022) [Read More](#)
- ★ *Ocean color algorithms to estimate the concentration of particulate organic carbon in surface waters of the global ocean in support of a long-term data record from multiple satellite missions* (Stramski et al. 2022) [Read More](#)
- ★ *Variability in oceanic particle size distributions and estimation of size class contributions using a non-parametric approach* (Reynolds and Stramski 2021) [Read More](#)

[Want to share your PACE publications? Contact us!](#)

UPCOMING EVENTS

[APOLO 2022](#) | Aug. 9-12, 2022 | Silver Spring, Maryland, USA

[2022 PACE Applications Workshop](#) | Sept. 14-15, 2022 | Virtual



[EUMETSAT Meteorological Satellite Conference](#) | Sept 19-23, 2022 | Brussels, Belgium

[Ocean Optics](#) | October 2-7, 2022 | Quy Nhon, Binh Dinh, Vietnam