PACE Community Newsletter / February 2023/ Issue 3

WELCOME

With less than one year from launch, the PACE Project is buzzing!! The PACE observatory was fully assembled on December 2nd with the integration of the Ocean Color Instrument (OCI). It was an incredible experience seeing the fully assembled observatory through the observation windows of Goddard's Integration and Test Facility. PACE has been working relentlessly on integration and testing to ensure that equipment is functioning optimally and data flows smoothly from each instrument to the spacecraft. In this issue, you'll read a little more about various exciting activities happening in this year of launch. Join us for the countdown to PACE's launch, now T-minus ~11 months!!

- Antonio Mannino
PACE Deputy Project Scientist

Year of Launch!

The PACE observatory will launch 337 days from the date of publication of this newsletter!! That's right, with just 11 months to go, we've entered the year of launch. While a year can seem like a long time, it's not in the context of flight project lifecycles. There's a lot left to do, and all mission elements are running full throttle to be ready for launch on January 9, 2024 from Kennedy Space Center in Florida, USA. Our instruments, spacecraft, and integration and testing (I&T) teams are currently focusing on comprehensive performance assessments of the full observatory to ensure that mechanisms work properly and data flows seamlessly from the instruments to the science data processing system. In April 2023, ambient (room) temperature testing will conclude, including vibration and acoustics tests that simulate the launch environment. The observatory will enter several months of thermal vacuum tests that simulate the space environment. In November 2023, the PACE observatory will begin its journey to Kennedy Space Center, where it will ultimately be integrated onto a SpaceX Falcon 9.

Exciting (and, admittedly, exhausting) times ahead and the countdown is on!!
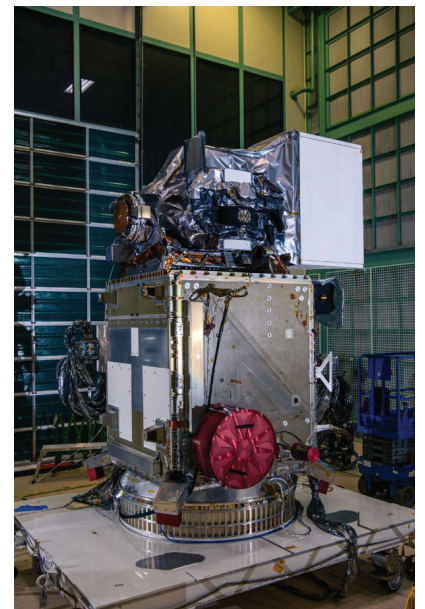
Full observatory (minus solar panels). Flight direction is into the floor. Nadir view is out of the page. Credit: Dennis Henry | NASA

PACE Mission Updates

We're only one month into the new year and much has happened since our last newsletter. When we last wrote, only SPEXone had been integrated onto the spacecraft. Since then, the mission accepted delivery of both HARP2 and OCI in October and December 2022, respectively. Houston, we have an observatory!
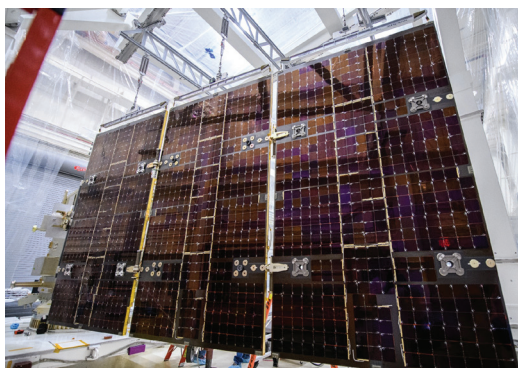

Spacecraft with panel open, revealing the propulsion tank and controlling electronics. Credit: Desiree Stover | NASA

PACE also passed its System Integrations Review, the major milestone that welcomes in the final pre-launch phase of a flight project, namely, final observatory testing, delivery to the launch site, and launch itself. Following the integration of HARP2 and OCI, mechanical and electronic testing of the observatory dominated our focus in December and January. Our first official comprehensive performance test was underway at the time of writing and several end-to-end data flow tests – from the instruments to the science data processing system – and "orbit in the life" tests have been executed. In other words, we're now busy characterizing the performance of the combined instrument-spacecraft observatory and practicing post-launch operations, all to ensure high quality and efficient data flow to the public right after post-launch in-orbit commissioning of the observatory, which will occcur within 60 days of launch.

Our community science teams continue to develop advanced approaches to generate science data products from all three instruments and the mission has begun formulating plans for post-launch

Flight solar panels. Credit: Barbara Lambert | NASA

science data product validation and performance assessment activities. We plan for this to include both a PACE Post-launch Validation Science Team (see more here) that collects ground-truth data on land, sea, and air, as well as a large-scale post-launch aircraft campaign called PACE-PAX. It's been an exceedingly busy 2023 so far, and now that we're officially in the year of launch, there's no indication that anything will slow down!

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

Tiny Change Makers Matter A Lot

"Just like plankton, you all matter a lot!", says Dr. Bridget Seegers (Ocean Ecology Lab scientist, NASA|MSU) who recently gave a TEDx Miami talk where she highlighted plankton – tiny change-makers – and how they influence everything in our environment from our food to Earth's climate. Luckily, we have Earth observing satellite missions – like PACE! – that can help us study plankton and their role in the ecosystem. Dr. Seegers uses satellite data to study water quality and communities of plankton, i.e., microscopic ocean life.

Watch the talk online and learn about how you too can be a global change-maker!

(Left) Dr. Seegers live at TEDxMiami May 2022. Credit: Elena Perez

PACE-PAX: Ensuring Data Harmony

To collect accurate and actionable data in space, satellite missions like PACE need field-based validation campaigns here on Earth. Satellite validation ensures that the information is accurate and reflects what is happening on land, in the air, and in the water. PACE-PAX, or the PACE Postlaunch Airborne eXperiment, is being developed for this exact purpose. About nine months after launch, the team will collect airborne measurements using two planes in California to confirm retrieval properties, assess spatial and temporal scale, focus on specific phenomena or processes, and carry out other activities that can only be accomplished with an airborne campaign. This campaign is a part of a larger PACE validation effort, which will include more field and ocean-based measurements and a PACE Validation team that will be selected in a competitive process.
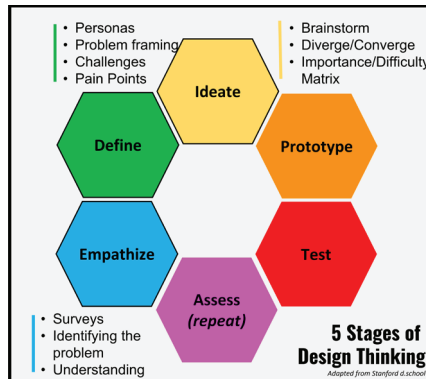
PACE-PAX

GOT GEAR?

PACE STORE

Store will be open Feb. 10-26, 2023

EA Spotlight

Lake3P

Leveraging Design Thinking for PACE Applications

Leading up to our 2024 launch date, the PACE Applications program has been hard at work diversifying our PACE Community of Practice and connecting with new users. By utilizing Design Thinking, we can achieve this in a holistic, creative manner. Design Thinking is a non-linear, iterative process used by teams to understand stakeholders, challenge assumptions, redefine problems, and prototype, test, and eventually implement innovative solutions. Putting users at the forefront of our programming ensures better data services/tools for the PACE community and helps to promote actionable, accessible, and usable Earth observation data for all.

Lake Geneva Algal Bloom 06.09.2021. from the Datalakes portal. Credit: M. Werther | EAWAG

PACE Early Adopter, Mortimer Werther leads the the Lake3P project focusing on deep Swiss lakes experiencing eutrophication leading to algal blooms and other negative ecological impacts. Lake3p uses satellite data, including future PACE ocean color data, to understand changes in aquatic primary production rates. That data are made available via an online mapping portal, Datalakes. Stakeholders, including lake managers, use this information for lake management and preservation. The public monitors the data for recreation, fishing, transportation, boating, and other activities.

User persona developed for 2021 PACE Water Quality Community Focus Session.

You may have noticed a couple Design Thinking activities in practice during one of our PACE Applications Workshops, Focus Sessions, and/or quarterly community webinars. To better understand our stakeholders'/users' perspectives and needs, we deve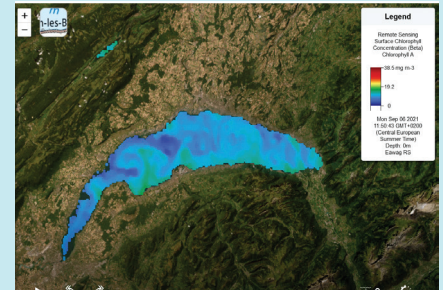loped and defined user personas representing diverse user groups; we brainstormed on emerging topics during community meetings; and we prototyped during our annual workshop and community focus sessions. We're even using activities to explore and "get to know" new stakeholders and non-research partners within industry, the private sector, and other non-traditional communities. Check back later this year for a manuscript detailing our approach and lessons learned, as well as further updates on how PACE Applications leverages Design Thinking!

Learn more!

Screenshot of brainstorming session focused on understanding the needs of the PACE community hosted during the 2022 PACE Air Quality & Atmos. Focus Session.

Measurement platform LéXPLORE on Lake Geneva (Switzerland-France). Credit: M. Werther | EAWAG

People of PACE

**Kimathi Tull |** PACE Deputy Integration & Testing Manager

As part of the I&T team Kimathi helps to ensure the assembly of all PACE components. Kimathi's primary focus is managing the "day to day" activities of I&T, coordinating support resources like personnel, equipment, and facilities. Now that the I&T of PACE is complete, Kimathi and the rest of his team are busy preparing PACE for environmental testing. Kimathi enjoys exercising, bicycling, and traveling; he has been to every continent except for Antarctica! He's a native Washingtonian and enjoys volunteering and mentoring in the city.

Dr. Alexei Lyapustin | PACE Science & Applications Team (SAT) Member

Designed for detailed study of the global ocean, PACE OCI will also deliver a wealth of information on the state of the land surface and on properties of atmospheric aerosol. As a SAT member, Alexei focuses on characterization of aerosol height, amount and spectral absorption from OCI data and hyperspectral atmospheric correction over land, which will support the Air Quality and Land Application communities. As one of activities to maintain his black belt in taekwondo, he nurtures the garden next to his house.

Dr. Lachlan McKinna | PACE Project Science Lead for Bio-optics

As the PACE Project Science Discipline Lead for Bio-optics, Dr. McKinna focuses on how marine absorption and scattering properties can best be derived from data collected by the hyperspectral OCI. He works with members of the PACE Science and Applications Team to develop, integrate, and test next-generation bio-optical algorithms and is preparing for post-launch data product validation. When not working on science, Lachlan enjoys building electric guitars and working in his garden.

Dr. Marie Smith | PACE Early Adopter (EA) Member
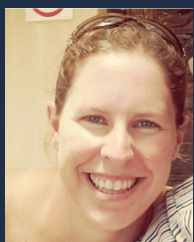
Dr. Smith is an oceanographer specializing in the use of satellite ocean color to identify phytoplankton types and harmful algal blooms (HABs) in the coastal waters of South Africa. Together with her collaborator, Dr Lisl Robertson Lain, their EA project will use hyperspectral data from PACE to provide HAB early warning and operational decision support to the aquaculture and fisheries industries of southern Africa. In her free time Marié is either playing with her fur-babies or enjoying long-distance swimming in the chilly ocean off of Cape Town.

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

✦ *Validation of Remote-Sensing Algorithms for Diffuse Attenuation of Downward Irradiance Using BGC-Argo Floats.* (Begouen Demeaux & Boss 2022). Read More

✦ *Remote sensing of aerosol water fraction, dry size distribution and soluble fraction using multi-angle, multi-spectral polarimetry* (van Diedenhoven et al. 2022). Read More

✦ *Integrating phytoplankton pigment and DNA meta-barcoding observations to determine phytoplankton composition in the coastal ocean.* (Catlett et al. 2022). Read More

✦ *Quantifying the Ocean's Biological Pump and its Carbon Cycle Impacts on Global Scales.* (Siegel et al. 2022). Read More

✦ *Optical classification of an urbanized estuary using hyperspectral remote sensing reflectance.* (Turner et al. 2022). Read More

✦ *Instantaneous photosynthetically available radiation models for ocean waters using neural networks.* (Aryal et al. 2022). Read More

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

UPCOMING EVENTS

American Association of Geographers (AAG) | March 23-27, 2023 | Denver, Colorado, USA

Ocean Visions Summit | April 4-6, 2023 | Atlanta, Georgia, USA

2023 NASA-USFS Joint Applications Workshop | April 25-27, 2023 | Salt Lake City, Utah, USA