# **INSIDE THE ISSUE**

Final Days at Goddard...PAGE 2 PACE Workshop Recap...PAGE 3 Suit Up Bunny...PAGE 3 New PACE Resources...PAGE 4 PACE Nerd Nite at AGU...PAGE 4 EA Spotlight...PAGE 4 People of PACE...PAGE 5 PACE Publications/Events...PAGE 6





PACE Community Newsletter / November 2023/ Issue 6

# WELCOME



After two plus decades in the making, PACE is less than 100 days from

launch! The successes of Sea-WiFS and MODIS in the early 2000's spawned ideas for a next generation ocean-atmosphere observatory that led to a series of concept studies conducted over the next decade. As concepts matured, momentum built for this observatory and PACE became a fully funded mission in December 2014. Fast forward nine years and we now stand less than three months away from smoke on the pad. The PACE observatory is readying itself for its multi-day journey from NASA Goddard Space Flight Center to Cape Canaveral, Florida. We hope you continue to follow along with this epic Earth science adventure. Because in late January ... the fun really begins ...

> - Jeremy Werdell PACE Project Scientist

## **Getting the PACE Kit & Caboodle to Florida**

This November, the PACE observatory will embark on its second most important journey (the first being its journey to orbit) – the trip from Goddard Space Flight Center to Kennedy Space Center (KSC) in Cape Canaveral, FL. PACE will ship by truck using a modular spacecraft shipping container system (MSSCS) over two days. The MSSCS includes clean/manufactured air and systems to maintain temperature and humidity – almost like a mobile clean room – so that the integrity of all the observatory systems is maintained. A convoy of personnel (including a camper!) and equipment will follow the MSSCS during the trip to ensure the safety of PACE.



MSSCS convoy that will transport PACE to KSC. Credit: Kevin Hughes| GSFC

Once the observatory arrives at KSC, there are very specific arrival logistics and procedures that must be followed, including transferring power from generators to the facility; staging equipment such as ladders, dollies, slings, carts, and lifts; and ultimately rotating the spacecraft (carefully!) to upright so that it can be moved and set up in a new clean room. In addition to the observatory, ground support equipment will also be sent to KSC, including fueling equipment, spare items, tools, and other specialized tables and fixtures. When the observatory is set up in its new clean room, a whole new series of integration and testing activities begin – as does the final countdown to launch!

# Final Days at Goddard

The PACE Project kicked into overdrive following release of our summer newsletter. In three quick months, we wrapped up thermal vacuum and thermal balance testing of the observatory, conducted three comprehensive performance tests on the observatory to verify functionality, executed two on-orbit commissioning simulations to exercise processes used in first days after launch, and conducted multiple end-to-end data flow tests, including orbit-in-the-life and day-in-the-life exercises, to ensure viable and effective commanding and observatory operations. We're grateful for the dedication and drive of our Project staff, as many of these activities required around-the-clock attention! As this is being written, a formal Flight Operations Review is underway to review ground system and mission control readiness. PACE is showing no signs of slowing down.



PACE in the thermal vacuum / thermal balance chamber known as the Space Environment Simulator. Credit:. Dennis Henry | GSFC

With that in mind, <u>here's</u> what one can expect in the next three months. End-to-end data flow tests, days-in-the-life simulations, and on-orbit commissioning simulations will continue. In the runup to departure for Cape Canaveral, Florida, the mission will undergo a formal Operational Readiness Review and Pre-ship Review. These milestone events ensure preparedness for transport to the launch processing center in Florida, launch, and flight operations. In mid-November, the PACE observatory will commence its two-and-ahalf-day drive from Greenbelt, Maryland to Cape Canaveral, Florida, where it will continue flight operations testing and begin the process of encapsulation onto a Falcon-9 launch vehicle. We expect to "light the candle" in late January and place PACE into low-earth orbit. Sixty days of commissioning will follow, with public data flow starting in mid-to-late March, after which... the real fun begins!



# 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.





### PACE Workshop: Exploring User Readiness

On September 6-7, the PACE Applications team hosted the 4th annual PACE Applications Workshop. 1000 registrants from 97 countries joined the virtual conversation on this year's theme, user readiness. The event highlighted how the PACE mission is preparing for launch, including the observatory and its hardware, Project Science disciplines, and the Ocean Biology Distributed Active Archive Center (OB.DAAC), as well as how users can prepare based on available resources and best practices available from NASA and beyond.

With PACE only months from launch, with data flowing soon after that, user readiness is a critical topic of conversation these days. The <u>PACE Application Program</u> refers to user readiness in terms of a few key elements: users are aware of the changes and updates being made to the PACE mission; training is readily available or being developed; participation and feedback for the various user readiness activities are well documented; questions from users are addressed; and user readiness information is easily accessible. Checking each of those boxes is a team effort and will involve PACE Applications, Project Science, OB.DAAC, the <u>Applied Remote Sensing Training</u> <u>Program (ARSET)</u>, and others. It'll also require users doing their part to understand the data and how to access, handle, analyze, and apply the information for their needs.



PACE User Readiness Checklist first presented at the 2023 PACE Applications Workshop. Credit: PACE Applications

The workshop also included presentations about simulated PACE data, with case studies on how applied researchers are preparing themselves for future data flows. The event ended with a plenary talk and panel that explored how users can transition their applications to operations, particularly with PACE data. Panelists gave a few shout-outs to early career scientists as well! Check out the recordings to hear all the details.

## Suit Up, Bunnies



Some members of the PACE Project Science team had an opportunity to have some fun (spelling out OCI above) inside a clean room at Goddard Space Flight Center where the PACE observatory is going through its final tests.



It's a long, careful process to change into specialized "bunny-like" suits which help keep the clean room free of dust, liquids, bacteria, skin cells and hair, perfumes, lint, fibers, and other potential contami-



Above: PACE Project Science team members inside clean room, in front of the PACE observatory; September 20, 2023. Credit: Dennis Henry | GSFC

# **PACE Spotlights**



### <u>User Corner: Did you Know?</u>

Whether you're new to ocean color or PACE, or just looking to review material as you get ready for launch, you can find resources on the <u>Ocean Color Web</u> – home of the Ocean Biology Distributed Active Archive Center (OB.DAAC).



The <u>Get Started</u> tab under DATA includes lots of resources and references on ocean color data (including descriptions of data algorithms, products, and file-naming conventions), services, and analysis and visualization options.

DATA	
How can I access and download ocean color satellite data?	۵
Is the long-term time series data provided in a consistent format?	۵
Are there documents available regarding ocean color metadata, products, quality flags, etc.?	۵
Is there information available about product validation and quality control?	۵
Are there methods to stay informed and communicate regarding the data, missions, and updates?	۵

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!!

### Nerd Nite SF + NASA!

Raise your glass & your IQ at Nerd Nite, where PACE & libations unite!

Wednesday, December 13 <u>Rickshaw Stop</u> -- San Francisco, CA <u>Tickets here!</u>



## Early Adopter Spotlight

The Louisiana coastal ecosystem is a critical ecosystem for the local environment and economy, but vulnerable to climate change and changing environmental and restoration-related conditions. PACE's newest Early Adopter team, led by Dr. Bingging Liu, is developing actionable science to understand how water conditions may change in the future so that coastal managers can make better decisions.



Mapping of high-risk areas for oyster beds using satellite water quality products developed for the Barataria-Terrebonne National Estuary Program in Louisiana. Credit: Bingqing Liu | University of Louisiana

PACE, combined with other bio-optical data, will help inform models that will allow researchers to assess aquatic biodiversity, habitats, water quality, and even identify natural and anthropogenic hazards like harmful algal blooms.

Learn more!



# **People of PACE**



#### Phill Blackwood | PACE Project Support Manager

Phill supports all aspects of the PACE Mission. Some of his primary tasks involve office space coordination, booking travel, Special Event planning, the PACE online store, property management & logistics and, of course the meatball sub sales! As the PACE team prepares to ship the PACE observatory to Florida, Phill is focused on supporting the work of getting all the hardware packed up and Launch Campaign personnel to where they need to be. In his free time he enjoys skiing, hiking, hanging out with his pets, and playing video games.



#### Dr. Snorre Stamnes | PACE Science & Applications Team (SAT) Member



Snorre is a polarimeter/lidar remote sensing enthusiast at NASA Langley Research Center. He believes that polarimetry can lead to better understanding of the Earth's aerosols, ocean, clouds and land, and is thus very excited about the PACE mission. Snorre is the principal investigator of the Microphysical Aerosol Properties from Polarimetry algorithm for the SPEXone and HARP2 polarimeters onboard PACE and NASA's airborne Research Scanning Polarimeter. In his spare time, he can be found on a ski slope, on the soccer field, or playing video games.

#### Dr. Anna Windle | Satellite Mission Postdoc Fellow

Anna is a postdoc at NASA GSFC working to support the upcoming PACE mission. Her research focuses on processing and evaluating existing satellite and field data with the goal of developing and improving satellite methods for derivation of metrics related to phytoplankton community composition and particle size distributions. She is excited to explore the capabilities of satellite hyperspectral data and enable continued and advanced insight into the world's global ocean. Anna enjoys searching for shark teeth on North Carolina beaches.



#### Dr. Veronica Lance | PACE Early Adopter (EA) Member



Dr. Veronica Lance is Program Manager for NOAA CoastWatch. She turned to using satellite observations to put in situ measurements and field experiments into environmental context and, as a novice, experienced first-hand some challenges in working with satellite data. NOAA CoastWatch exists to help people benefit from satellite data in aquatic applications through services, tools, training, research and innovation. Her experiment to grow peanuts was a success, thankfully NOT producing enough for homemade, homegrown peanut butter.



# PACE "In the Know"

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



Erin Urquhart | Project Applications Coordinator



Natasha Sadoff | Project Applications Deputy Coordinator



# **STAY CONNECTED**

I

П

L

Follow @NASAOcean on social media!



## **NEW PACE PUBLICATIONS**

- Synergies between NASA's hyperspectral aquatic missions PACE, GLIMR, and SBG: Opportunities for new science and applications. (Dierssen et al. 2023). <u>Read More</u>
  - A neural network approach to the estimation of in-water attenuation to absorption ratios from PACE mission measurements (Agagliate et al. 2023). <u>Read More</u>
  - *Phytoplankton composition from sPACE: requirements, opportunities, and challenges* (Cetinić et al. 2023). <u>Read More</u>
- Assessing potential of the Geostationary Littoral Imaging and Monitoring Radiometer (GLIMR) for water quality monitoring across the coastal United States. (Schaeffer et al. 2023). <u>Read</u> <u>More</u>

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

## **UPCOMING EVENTS**

International Ocean Color Science (IOCS) Meeting | November 14-17, 2023 | St. Petersburg, FL, USA

2023 American Geophysical Union (AGU) Meeting | December 11-15, 2023 | San Francisco, CA, USA

• **<u>GC080</u>** - NASA's Upcoming PACE Mission: Research and Earth Science Applications

<u>American Meterological Society (AMS) Meeting</u> | January 28-Febuary 1, 2024 | Baltimore, MD, USA

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

- <u>OT022</u> Ushering in an era of daily, global hyperspectral radiometry and multi-angle polarimetry with the NASA PACE mission
- **ED004** Communicating Ocean Observations from Space: