Overnight SpaceX launch set for NASA Earth science probe

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A NASA satellite that will look at the tiniest parts of the air and ocean is set for an overnight launch from the Space Coast after a years-long path to the launch pad that staved off repeated attempts by the Trump administration to cancel the mission.

The Plankton, Aerosol Cloud Ocean Ecosystem (PACE) satellite was on

the chopping block of Trump's annual proposed NASA budgets several times as he sought to steer funds away from some climate-focused missions and shift money to deep-space efforts.

Now the nearly $1 billion PACE satellite sits atop a Falcon 9 rocket ready for liftoff from Cape Canaveral Space Force Station's Space Launch Complex 40 targeting a 1:33 a.m. Eastern time liftoff.

The early morning launch could also bring a loud surprise in the form of a sonic boom to the Space Coast and surrounding counties as the booster for the flight makes a return to Canaveral's Landing Zone 1 instead of downrange in the Atlantic.

High winds and cloud cover, though, could push the attempt at least a day with Space Launch Delta 45's weather squadron giving the attempt only a 40% chance for good conditions. A backup of 1:33 a.m. Wednesday has a 60% chance for good conditions.

If it launches, it will be the eighth from the Space Coast in 2024 during a year that could see as many as 111 launches.

The mission, which is being run out of NASA's Goddard Space Flight Center, has been in the works for nine years, although originally conceived more than 20 years ago, said Jeremy Werdell, NASA's PACE project scientist.

"What we're doing here with PACE is really the search for the microscopic, mostly invisible universe in the sea and the sky in some degrees of land," he said.

Its three instruments on board look at the interactions of sunlight with clouds, a whole catalog of aerosol particulates in the air and phytoplankton, which form the base of the ocean food chain, in the sea.

"It's as simple as that. We collect photons from the sun, just collect them, collect them, collect them," he said.

Werdell, whose main focus is on the oceans, and Andy Sayer, a PACE atmospheric scientist, outlined why a space-based view of this information would be beneficial.

Werdell notes there is both beneficial types of phytoplankton, such as those that help fisheries, or those that help absorb carbon dioxide, and harmful types as well, such as those related to red tide or blue-green algae that can cause fish kills and pollute the air.

"For the first time on global scale … we'll know where the harmful ones are, where the beneficial ones are, where the beneficial ones are moving to as the oceans are starting to change."

Sayer's focus on clouds and aerosols will have a wide-ranging use, he says.

"We have a pretty good handle from satellites on what is the total amount of aerosol, but we don't have such a good handle on how it splits down into all these different species," he said.

That ranges from industry-bred carbon emissions to sulfates to sea spray. Sayer said knowing where the various types are located can help inform public policy on air quality and human health, for instance. It can also potentially feed information on where beneficial particulate matter might prompt better agriculture or fishing.

As far as their role into how aerosols feed into cloud formation, some of that data can help feed the National Oceanic and Atmospheric Administration. That included tracking dust off the Sahara Desert.

"The interactions between the kind of dust heating in the atmosphere are thought to be able to help control cloud formation and how these storms move and how they grow," he said. "So the better we can get a handle on that, maybe the better we can predict these kinds of severe ends happening further and get better forecasts."

NASA's director of its Earth Science Division, Karen St. Germain, said the NOAA is a principal partner in the mission, and the data is expected could help predict hurricane intensification and track.

"They are an early adopter, for many reasons, ranging from weather prediction to long-range climate to the harmful algal blooms and the things that affect fisheries," she said.

The PACE satellite builds on parts of existing observations, but most are hyperlocal, ground-based sensing, and space gives a macro view of these microscopic phenomenon, Werdell said.

"We are studying the combined Earth system," Werdell said. "It is not an ocean mission. It's not an atmosphere mission. It's not a land mission. It's an all-of-those-things mission. And that is so incredibly important because you can't understand one without understanding the other."

He said the science to be determined from the mission, though, is partly unknown, but that's a good thing, "The scientific community with PACE has something they can grow into, and that hasn't happened in a really long time," he said. "This is a mission that we don't know what we're going to learn about. And that is so deeply exciting."

The PACE mission, which has a planned 10-year lifespan once on orbit, was one of the first targeted by Trump beginning with the 2018 fiscal year budget, but Congress restored funding to the mission with the final budget allocations. It is now set to join more than two dozen Earth

science satellites currently orbiting the planet.

"It has been a long strange trip as they say," an emotional Werdell said Sunday during a preflight press conference in response to the mission's several near cancellations.

"We were as confident as one can be that we would find ways to persevere. The community wanted all of this," he said.

"Not going to dive into policy or politics, but it's been a really remarkable journey and the support from the community, the support from the agency, the support from people like yourselves asking questions getting involved, we've kept our morale high."

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