April's total solar eclipse promises to be the best yet for experiments

By Marcia Dunn
The Associated Press

CAPE CANAVERAL, Fla. — April's total solar eclipse promises to be a scientific bonanza, thanks to new spacecraft and telescopes — and cosmic chance.

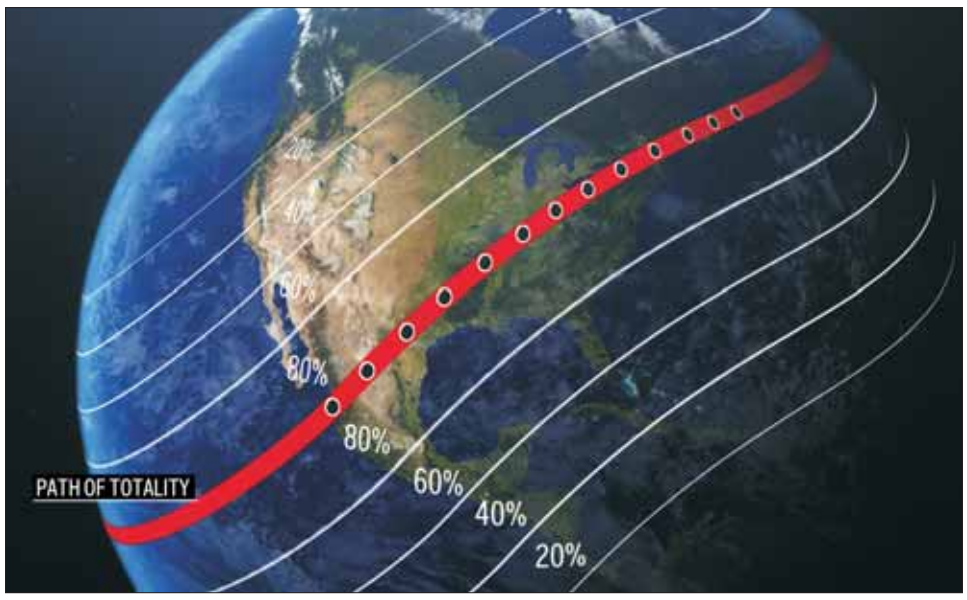
The moon will be extra close to Earth, providing a long and intense period of darkness, and the sun should be more active with the potential for dramatic bursts of plasma. Then there's totality's densely populated corridor stretching from Mexico to the U.S. to Canada.

Hundreds if not thousands of the tens of millions of spectators will double as "citizen scientists," helping NASA and other research groups better understand our planet and star.

They'll photograph the sun's outer crownlike atmosphere, or corona, as the moon passes between the sun and Earth, blotting out sunlight for up to 4 minutes and 28 seconds on April 8. They'll observe the quieting of birds and other animals as midday darkness falls. They'll also measure dropping temperatures, monitor clouds, and use ham radios to gauge communication disruptions.

At the same time, rockets will blast off with science instruments into the electrically charged portion of the atmosphere near the edge of space known as the ionosphere. The small rockets will soar from Wallops Island, Virginia — some 400 miles outside totality but with 81% of the sun obscured in a partial eclipse. Similar launches were conducted from New Mexico during last October's "ring of fire" solar eclipse that swept across the western U.S. and Central and South America.

"Time for the biggie! It is pretty exciting!!!" Embry-Riddle Aeronautical University's Aroh Barjatya, the rockets' mission director, said in an e-mail.



EPIC ECLIPSE. *The total solar eclipse this month promises to be a scientific bonanza, thanks to new spacecraft and telescopes — and cosmic chance. The eclipse will begin in the Pacific and make landfall at Mazatlan, Mexico, heading up through Texas and 14 other U.S. states before crossing into Canada and exiting into the Atlantic at Newfoundland. Those outside the 115-mile-wide path will see a partial eclipse. (AP Photo)*

NASA's high-altitude jets also will take to the air again, chasing the moon's shadow with improved telescopes to study the sun's corona and surrounding dust.

"Dust sounds boring," acknowledged NASA's eclipse program manager Kelly Korreck. "But at the same time, dust is actually really interesting. Those are the leftover remnants from when the solar system was forming."

More than 600 weather balloons will be launched by college students along the track, providing livestreams while studying atmospheric changes. Cloudy skies shouldn't matter.

"Lucky for us, the balloons flying to 80,000 feet and above don't care if it's cloudy on the ground," said Angela Des Jardins, an astrophysicist at Montana State University who's coordinating the nationwide project.

And if the Federal Aviation Administration approves, a 21-foot kite will lift a science instrument three miles above Texas in an experiment by the University of Hawai'i's Shadia Habbal. She, too, wants to get above any clouds that might hamper her observations of the sun.

Normally hidden by the sun's glare, the corona is on full display during a total solar eclipse, making it a prime research target. The spiky tendrils emanating thousands of miles into space are mystifyingly hotter than the sun's surface — in the millions of degrees, versus thousands.

"In terms of the value of total eclipses, science still cannot explain how the corona is heated to such extreme temperatures," said retired NASA astrophysicist Fred Espenak, better known as Mr. Eclipse for all his charts and books on the subject.

The U.S. won't see another total solar eclipse on this scale until 2045, so NASA and everyone else is pulling out all the stops.

April's eclipse will begin in the Pacific and make landfall at Mazatlan, Mexico, heading up through Texas and 14 other U.S. states before crossing into Canada and exiting into the Atlantic at Newfoundland. Those outside the 115-mile-wide path will see a partial eclipse.

Scientists got a taste of what's to come during the 2017 total solar eclipse that stretched from Oregon to South Carolina. This time, the moon is closer to Earth, resulting in more minutes of darkness and a wider path.

"Any time we can observe for longer, that gives scientists more data," Korreck said.

Another scientific bonus this time: The sun will be just a year away from its maximum solar activity, as opposed to 2017 when it was near its minimum. That means lots more action at the sun, possibly even a coronal mass ejection during the eclipse, with massive amounts of plasma and magnetic field blasted into space.

Plus there are two new spacecraft out there studying the sun: NASA's Parker Solar Probe and the European Space Agency and NASA's Solar Orbiter. They'll join other spacecraft on eclipse duty, including the International Space Station and its astronauts.

Closer to home, April's eclipse, unlike previous ones, will pass over three U.S. radar sites typically used for monitoring space weather. The stations will tune in to what's happening in the upper atmosphere as the skies dim.

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More than 100 iconic cherry trees in Washington are being cut down. So long, Stumpy.

Continued from page 7

cherry trees' roots. The $133 million project to rebuild and reinforce the sea wall will take about three years, said Mike Litterst, National Park Service spokesman for the National Mall.

"It's certainly going to benefit the visitor experience, and that's very important to us," Litterst said. "But most of all, it's going to benefit the cherry trees, who right now are every day, twice a day, seeing their roots inundated with the brackish water of the Tidal Basin." Litterst said entire stretches of trees to the water, as wide as 100 yards, have been lost and can't be replaced "until we fix the underlying cause of what killed them in the first place."

Stumpy remains alive, if in rough shape.

Plans call for 140 cherry trees — and 300 trees total — to be removed and turned into mulch. When the project is concluded, 277 cherry trees will be planted as replacements.

The mulch will protect the roots of surviving trees from foot traffic and break down over time into nutrient-rich soil, "so it's a good second life" for the trees being cut down, Litterst said.

The National Cherry Blossom Festival is widely considered to be the start of the tourist season in the nation's capital. Organizers expected 1.5 million people would view the pink and white blossoms this year, the most since the coronavirus pandemic. Large numbers of cherry blossom fans were already drawn to the area as the trees entered peak bloom on March 17, several days earlier than expected.

Stumpy became a social media star during the pandemic fever dream of 2020. Its legacy has spawned t-shirts, a calendar, and a fanbase. News of Stumpy's final spring has prompted people to leave flowers and bourbon and had one Reddit user threatening to chain themselves to the trunk to save the tree.

The good news on Stumpy is that the National Arboretum plans to take parts of the tree's genetic material and create clones, some of which will eventually be replanted at the Tidal Basin.

The regular flooding at the Tidal Basin — sea levels have risen about a foot since the seawall was built in the early 1990s — is just one of the ways climate change has impacted the cherry trees. Rising global temperatures and warmer winters have caused peak bloom to creep earlier in the calendar.

This year's peak bloom, when 70% of the city's 3,700 cherry trees flower, was originally predicted to start around March 23 but ended up being declared on March 17. By comparison, the 2013 peak bloom began on April 9. Leslie Frattaroli, national resources program manager for the Park Service, told The Associated Press in February that peak bloom could regularly come in the middle of March by 2050.

"All the timing is off." he said. "It's a huge cascading effect."

Another weather side effect: A mid-March cold snap in the D.C. area should actually extend this year's bloom past the predicted April 9 ending.

For visitors and cherry blossom enthusiasts, the annual tradition of a stroll on the Tidal Basin under the flowers is a core D.C. experience.

Jorge and Sandra Perez make a point of coming every year from Stafford, Virginia.

"Yes, we have cherry blossoms in my community, but it's a completely different feel when you see all of them bloom together," Sandra said. "And you can walk through, you know, the trees under it and smell it. And it's just it's a beautiful view."

They also came looking for Stumpy, having heard the legend and knowing this would be its final spring.

"It's actually beautiful," Jorge said. "So it's sad to see him leave."

Associated Press journalist Nathan Ellgren contributed to this report.