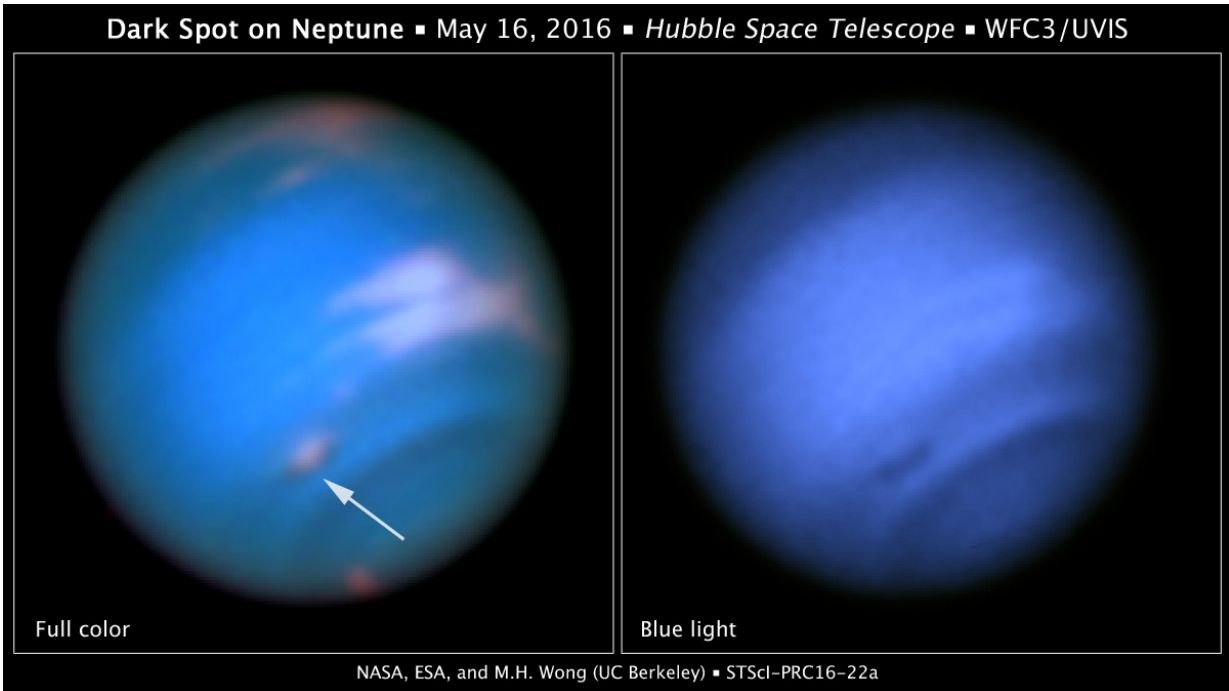


Hubble confirms new dark spot on Neptune

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This new Hubble Space Telescope image confirms the presence of a dark vortex in the atmosphere of Neptune. On the left, the full visible-light image shows a dark vortex near and below a patch of bright clouds in the planet's southern hemisphere. The dark spot measures roughly 3,000 miles across. On the right, Neptune's dark vortices are typically only best seen at blue wavelengths. Credit: NASA, ESA, and M.H. Wong and J. Tollefson (UC Berkeley)

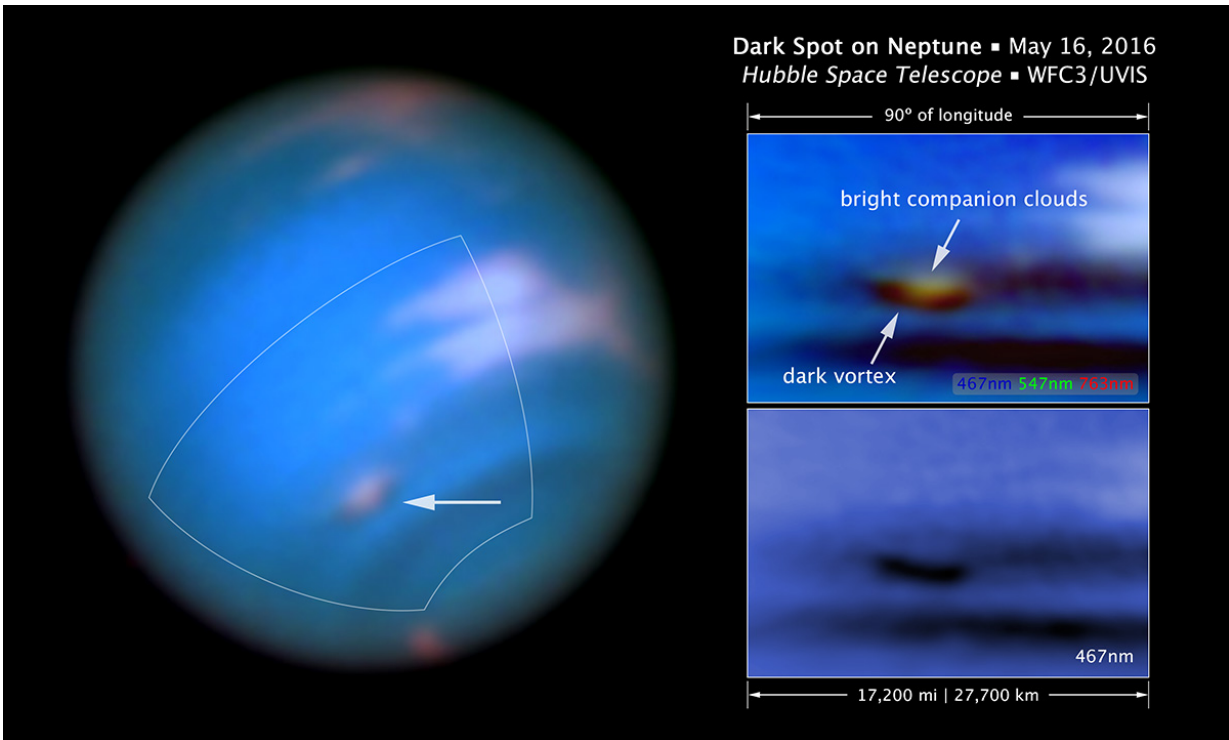
New images obtained on May 16, 2016, by NASA's Hubble Space Telescope confirm the presence of a dark vortex in the atmosphere of Neptune. Though similar features were seen during the Voyager 2 flyby

of Neptune in 1989 and by the Hubble Space Telescope in 1994, this vortex is the first one observed on Neptune in the 21st century.

The discovery was announced on May 17, 2016, in a Central Bureau for Astronomical Telegrams (CBAT) electronic telegram by University of California at Berkeley research astronomer Mike Wong, who led the team that analyzed the Hubble data.

Neptune's dark vortices are high-pressure systems and are usually accompanied by bright "companion clouds," which are also now visible on the distant planet. The bright clouds form when the flow of ambient air is perturbed and diverted upward over the dark vortex, causing gases to likely freeze into methane ice crystals. "Dark vortices coast through the atmosphere like huge, lens-shaped gaseous mountains," Wong said. "And the companion clouds are similar to so-called orographic clouds that appear as pancake-shaped features lingering over mountains on Earth."

Beginning in July 2015, bright clouds were again seen on Neptune by several observers, from amateurs to astronomers at the W. M. Keck Observatory in Hawaii. Astronomers suspected that these clouds might be bright companion clouds following an unseen dark vortex. Neptune's dark vortices are typically only seen at blue wavelengths, and only Hubble has the high resolution required for seeing them on distant Neptune.



This new Hubble Space Telescope image confirms the presence of a dark vortex in the atmosphere of Neptune. The full visible-light image at left shows that the dark feature resides near and below a patch of bright clouds in the planet's southern hemisphere. The full-color image at top right is a close-up of the complex feature. The vortex is a high-pressure system. The image at bottom right shows that the vortex is best seen at blue wavelengths. Credit: NASA, ESA, and M.H. Wong and J. Tollefson (UC Berkeley)

In September 2015, the Outer Planet Atmospheres Legacy (OPAL) program, a long-term Hubble Space Telescope project that annually captures global maps of the outer planets, revealed a dark spot close to the location of the bright clouds, which had been tracked from the ground. By viewing the vortex a second time, the new Hubble images confirm that OPAL really detected a long-lived feature. The new data enabled the team to create a higher-quality map of the vortex and its surroundings.

Neptune's dark vortices have exhibited surprising diversity over the years, in terms of size, shape, and stability (they meander in latitude, and sometimes speed up or slow down). They also come and go on much shorter timescales compared to similar anticyclones seen on Jupiter; large storms on Jupiter evolve over decades.

Planetary astronomers hope to better understand how dark vortices originate, what controls their drifts and oscillations, how they interact with the environment, and how they eventually dissipate, according to UC Berkeley doctoral student Joshua Tollefson, who was recently awarded a prestigious NASA Earth and Space Science Fellowship to study Neptune's atmosphere. Measuring the evolution of the new dark vortex will extend knowledge of both the dark vortices themselves, as well as the structure and dynamics of the surrounding atmosphere.

The team, led by Wong, also included the OPAL team (Wong, Amy Simon, and Glenn Orton), UC Berkeley collaborators (Imke de Pater, Joshua Tollefson, and Katherine de Kleer), Heidi Hammel (AURA), Statia Luszcz-Cook (AMNH), Ricardo Hueso and Agustin Sánchez-Lavega (Universidad del País Vasco), Marc Delcroix (Société Astronomique de France), Larry Sromovsky and Patrick Fry (University of Wisconsin), and Christoph Baranec (University of Hawaii).

Provided by NASA's Goddard Space Flight Center

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