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Astronomy

Satellite streaks threaten Hubble telescope images

Alex Wilkins

TRAILS of light from satellites appeared on twice as many photos taken by the Hubble Space Telescope in 2021 compared with 2002. Although the unwanted light streaks haven't yet interfered with Hubble's scientific operations, they may do so in future – particularly as the number of communications satellites launched is rising.

Hubble orbits Earth at an altitude of about 535 kilometres, which is below many orbiting satellites. When taking long-exposure shots, where its

2.5 per cent in 2002 to 5 per cent in 2021," says Kruk.

Given the large number of additional satellites put into orbit since 2021, the proportion of images affected is likely to be even higher now, he says (*Nature Astronomy* doi.org/jzhk).

While a significant number of images have been affected by satellite trails, we have yet to see an impact on Hubble's scientific operations. Future satellite streaks could be mitigated using post-processing techniques, such as taking multiple images and then using comparison algorithms to filter out the satellite streaks, says Kruk.

However, this wouldn't work for rare events that happen only once and very briefly, says John Barentine at Dark Sky Consulting, a company based in Tucson, Arizona. If space companies launch as many satellites as they have publicly announced plans for, then the contamination rate of Hubble photos will increase by a factor of 10 over the next decade, he says.

"It's only a matter of time before the scientific productivity of the Hubble Space Telescope begins to decline somewhat as a result of data lost to satellite trails," says Barentine. ■



Satellite trails crossing an image of galaxy ARP 248, captured by Hubble

"It's only a matter of time before the scientific productivity of Hubble declines"

light-sensitive aperture is open for several minutes to gather more light, satellites that pass in front of it can leave a white streak on the resulting image.

Sandor Kruk at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany, and his colleagues noticed these streaks while analysing Hubble images for a citizen science project looking for asteroids.

They decided to analyse all images taken by Hubble that had an exposure time of approximately 11 minutes that had been taken between 2002 and 2021 – a total of more than 100,000 exposures – using a machine learning algorithm to detect when a satellite had crossed an image. "The fraction of images that were crossed by satellites has increased over the last 20 years, from about

Life

Insect thought extinct found in a Walmart

Corryn Wetzel



MICHAEL SKVARLA/PENN STATE

FOR the first time in more than 50 years, a giant lacewing (*Polystoechotes punctata*) has been found in eastern North America. The discovery raises new questions about the distribution of the Jurassic-era insect that mysteriously vanished from the eastern seaboard decades ago.

The giant lacewing was once abundant across North America, but the insect's eastern population began to plummet in the 1800s for unknown reasons – potentially due to the rise of urban development, invasive species and artificial light.

Giant lacewings had never been documented in Arkansas before, so when entomologist Michael Skvarla at Pennsylvania State University spotted an unusual insect with a roughly 50-millimetre wingspan on the facade of his local Walmart in 2012, he assumed it was from a more common group of insects called antlions.

"I picked it up and just walked around the store with it between my fingers as I did my grocery shopping and checking out, and then held it the entire way home," says Skvarla. He then killed and pinned it, hoping to take a closer look, but the insect sat in storage for nearly a decade before he examined it again. He didn't make the revelation until 2020 while teaching a university course on

Giant lacewings were thought to be extinct across eastern North America

insect identification over video, examining specimens from his collection under a microscope attached to his computer. "It was immediately apparent that it wasn't an antlion," says Skvarla, who noticed an unusually large number of veins in its wings.

Later in the lab, Skvarla tried to extract DNA from the lacewing's leg that could have helped pinpoint its origin population – whether it was just an interloper from out west or if it was from an eastern population – but was unable to.

Skvarla suspects his Walmart lacewing was a member of a relic population that has managed to hold on, potentially in the nearby Ozark mountains. Finding this giant lacewing "suggests there are likely other small populations of the insect holding on in wooded areas in the east", says Robert Dowell at the California Department of Food and Agriculture.

Locating the insect in a suburban area also demonstrates the adaptability of the species, which has lived through the extinction of dinosaurs and the industrial revolution, says Jessica Ware at the American Museum of Natural History in New York. ■