# New Scientist

**WEEKLY** 28 June 2025

SPECIAL ISSUE

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THE TINY ISLAND WHERE QUANTUM MYTHS ARE MADE

**INCOMING ASTEROID COULD THREATEN EARTH'S SATELLITES**

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Physics

# Ice bubbles can be used to store information

James Woodford

**INFORMATION could potentially be stored in ice for millennia, simply by making subtle changes to the shape and position of internal bubbles.**

**Mengjie Song at the Beijing Institute of Technology in China and his team were studying the formation of ice when they realised they could influence the size and shape of the bubbles that formed within it. For instance, when freezing layers of water between plastic sheets, they found that changing the freezing rate created either egg-shaped or needle-shaped bubble layers.**

**The researchers then assigned bubble sizes, shapes and positions to characters within Morse and binary codes. Controlling the freezing rate of the water between the plastic sheets then created ice that spelled out a message via internal bubbles.**

**When they converted a photo of this ice into grey scale, the areas that appeared white represented regions of ice with bubbles, while black areas were bubble-free. From this, a computer could detect the size and position of the bubbles and decode the message (*Cell Reports Physical Science*, doi.org/psbd).**

**Only a few sentences of information could be stored in a standard ice cube using available technology, but it is possible that information could also be stored by manipulating bubbles inside materials such as plastics, says Song.**

**"I don't think it will be useful at all – unless a polar bear may want to tell us something"**

**He says the research has many applications, besides just the "novelty of being able to read a message encoded in an ice cube in a drink". "The advantage of this study is the capacity for long duration storage of information in a cold environment, such as in the north or south pole," says Song.**

**Understanding bubbles better means they could one day be made to contain ozone for food preservation or hold slow-release drugs, he says. He is particularly interested in how bubbles could help prevent ice forming on aircraft wings and learning how they will behave in lunar environments.**

**But Qiang Tang at the University of Sydney, Australia, is less convinced by the study's real-world potential, arguing that important information can be stored for a long time on hard discs or paper, which are easily backed up.**

**"It's a new way of representing a message and storing it in a new place, but from a cryptography or security perspective, I don't think it will be useful at all unless a polar bear may want to tell someone something," he says.** ▮

Icy environments could become a place to hide secret messages

ANTON PETRUS/GETTY IMAGES

Technology

# Dead NASA satellite suddenly reanimates

Alex Wilkins

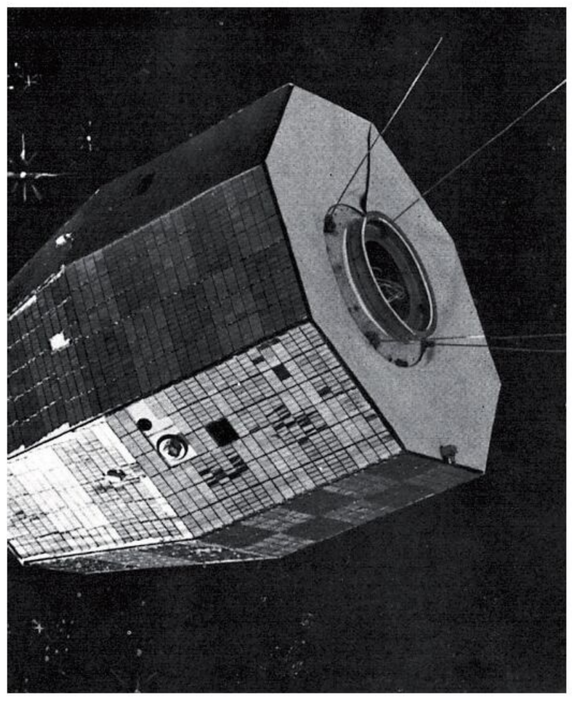
A SATELLITE that had been offline for decades unexpectedly blasted out a powerful radio pulse that briefly outshone every other object in the sky. The flash may have been caused by a freak micrometeorite impact or a random spark.

NASA's Relay 2 satellite, one of the first functioning satellites, was launched in 1964 as an experimental communications device. NASA stopped using it the following year, however, and the satellite's onboard electronics stopped working altogether by 1967, leaving the dead metal hull to orbit Earth indefinitely.

So Clancy James at Curtin University in Australia and his colleagues were perplexed when they detected a brief, powerful burst of radio waves coming from the satellite's apparent location.

James and his team were scanning the sky with the Australian Square Kilometre Array Pathfinder (ASKAP), an array of 36 radio telescopes, for signs of fast radio bursts, mysterious pulses of radiation that come from other galaxies. On 13 June last year, they saw a signal that seemed to be coming from within our galaxy. "If it's nearby, we can study it through optical telescopes really easily, so we got all excited, thinking maybe we'd discovered a new pulsar or some other object," says Clancy.

But on further inspection, the signal appeared to be so close to Earth that ASKAP couldn't focus all of its telescopes at once – like how a phone camera struggles to focus on nearby objects. This meant it must have come from within 20,000 kilometres of Earth, says Clancy. The researchers also found that the signal was very short-lived, lasting less than 30 nanoseconds. "This was an incredibly powerful radio pulse that vastly outshone everything else in the sky for a very short amount of time," says Clancy.



NASA

**An illustration of NASA's Relay 1 satellite, on which Relay 2 was based**

When they traced the signal to where it came from and compared it with known satellite positions in the sky, they found just one plausible explanation – the Relay 2 satellite (arXiv, doi.org/psg7). Since the satellite is no longer functional, Clancy and his team think it must have come from an external event, such as an electrostatic discharge – a build-up of electricity that causes a spark-like flash – or a micrometeorite that struck the satellite and created a cloud of charged plasma.

It would be very difficult to differentiate between those two scenarios, says Karen Aplin at the University of Bristol, UK, as the radio signal produced by both would look similar. However, it could be useful to monitor future electrostatic discharges from satellites, she says. "In a world where there is a lot of space debris and there are more small, low-cost satellites with limited protection from electrostatic discharges, this radio detection may ultimately offer a new technique to evaluate electrostatic discharges in space," she says. ▮