

Science Focus

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COVERT NARCISSIST

SOMETHING IS WRONG WITH OUR MODEL OF THE UNIVERSE...

...THE CLOSER WE LOOK, THE WEIRDER IT GETS



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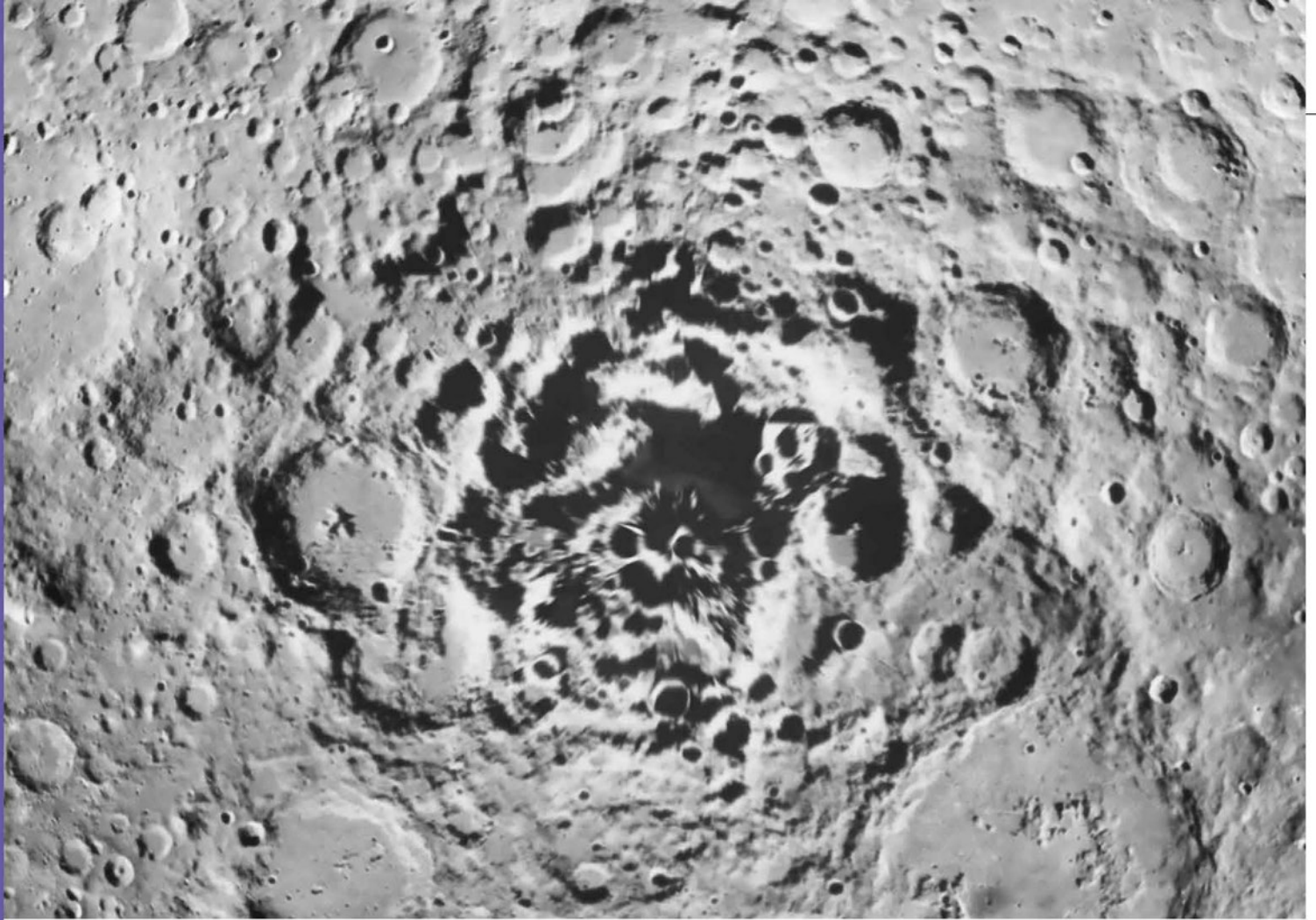
The race to safeguard the Moon's pristine surface

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ANALYSIS

The Moon's secrets could be lost forever

Experts are calling for legal protections to safeguard scientifically significant lunar sites from being irreparably damaged

There's a new space race underway, with missions to the Moon beginning to increase at a significant pace. In February, a spacecraft built by the company Intuitive Machines became the first from the US to land on the lunar surface since the last Apollo mission in 1972.

China is due to launch Chang'e 6, its latest lunar mission, in May, and it's hoped that it will return the first rocks from the far side of the Moon. One NASA study even predicts that as many as 22 international missions could reach the lunar surface by late 2026. Astronauts could well leave their bootprints on the Moon again before this decade is out.

Yet, according to researchers Dr Alanna Krolikowski and Martin Elvis, there's a danger that gets overlooked in the clamour to explore. In our renewed and expanded rush to reach the Moon, we could ruin some of its most pristine and interesting spots, areas known as 'sites of extraordinary scientific importance' (SESI).

They argue that these spots need protecting, just as we carefully guard 'sites of special scientific interest'

here on Earth. "The matter is urgent," says Krolikowski, a researcher at the Missouri University of Science and Technology. "We face a rapidly closing window during which we can implement SESI protections to avert some of the worst forms of irreversible harm."

A few areas in particular stand out. The first is the far side of the Moon, which always points away from Earth. "It's probably the best place for radio astronomy in the Solar System because it's shielded from Earth's artificial radio noise," says Prof Ian Crawford, from Birkbeck, University of London, who has also argued for careful management of our activities on the Moon.

A radio telescope positioned on the far side of the Moon could help astronomers peer into the cosmic dark ages – the first few hundred million years after the Big Bang, before the first stars and galaxies had fully formed.

The telescope would be able to pick up ultra-long radio waves that are reflected by Earth's atmosphere and therefore impossible to study from the ground. "This means spacecraft operating on the far side will

ABOVE Numerous missions are headed for the area around the Moon's south pole and could irreparably alter its surface

NASA X3

“It’s important that contamination doesn’t occur before we’ve had a chance to examine these regions in their pristine states”

need to minimise radio transmissions and have their electronics well shielded,” says Crawford.

The other areas of concern are the lunar poles. They are home to particularly cold and shadowy regions that sunlight never reaches. These regions trap chemicals (known as volatiles) that would normally breakdown and escape into space; chemicals that arrived by asteroid and comet impacts billions of years ago. As such, they



LEFT The interior of the Shackleton Crater at the lunar south pole is perpetually in shadow

BELOW With the right protections in place, the far side of the Moon would be an ideal spot for a radio telescope



provide us with an unparalleled snapshot into the history of the Solar System. The trouble is that one of those volatiles is water ice, which is also celestial gold dust for human space exploration.

The ice can be melted for water to drink and clean with, but also split into hydrogen for rocket fuel and oxygen for breathing. NASA’s Artemis programme, which aims to return humans to the Moon in the coming years, is targeting the lunar south pole for this very reason. And about half of all upcoming Moon missions are also heading to the region.

“The main thing is to avoid contaminating volatiles trapped in permanently shadowed regions with rocket exhaust gases and excessive dust generation,” says Crawford. “It’s important that such contamination doesn’t occur before we’ve had a chance to examine these regions in their pristine states.”

So what do we do? Krolikowski and Elvis are proposing a two-part plan. “First, scientists must make an urgent priority of identifying and characterising lunar SESIs in need of protection,” says Krolikowski. “Second, scientists must join policymakers to ensure that rules protecting these sites are enshrined in national space policies and in international processes that govern outer space activities. The best time to protect lunar SESIs is now.”

Crawford agrees. “Activity on the Moon is ramping up quickly, so now is the right time to consider these issues before it’s too late,” he says.

Not that it’s a straightforward task. Different countries, space agencies and now even private companies are exploring the Moon. Then there’s the fact that international diplomacy is often a difficult balancing act. “Negotiations will have to be carried on under UN auspices and there are often geopolitical obstacles to such international discussions,” Crawford says. “However, this isn’t a reason to not start these negotiations, which I think are essential.”

Further exploration and exploitation of the Moon is inevitable, but we only have one chance to preserve its unique habitats and hidden secrets.

by COLIN STUART

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