

► fellowships in early January. The National Oceanic and Atmospheric Administration (NOAA) has taken widely used weather and climate databases offline. And at NASA, the shutdown threatens to disrupt preparations for upcoming spacecraft launches.

As *Nature* went to press, there was little sign of progress in budget negotiations between President Donald Trump and Democrats in Congress. The current shutdown began after stopgap funding for 75% of the government expired. Politicians on Capitol Hill are split down party lines over Trump's demand that any spending deal include US\$5.6 billion to construct a wall along the US border with Mexico.

"This is undermining our ability to go out and make a pitch to promising young scientists and tell them this is the place to be," says a researcher at the US Department of Agriculture (USDA), who asked for anonymity because he is not authorized to speak to the press. He is trying to hire people to fill several open positions in his lab — including one set to start on 21 January — but cannot make final offers until the government reopens.

Others worry that students and early-career researchers may be especially vulnerable to the effects of an extended shutdown. "I need to review an NSF proposal, but can't access it," tweeted Jen Heemstra, a chemist at Emory University in Atlanta, Georgia, on 29 December. "These shutdowns can disrupt funding, and thus livelihood of labs. It kills me to think how this impacts assistant profs. Tenure clocks don't bend for government shutdowns."

The number of employees who have been

furloughed — ordered to stay at home — during the shutdown varies by agency, depending on which activities the government has deemed necessary for protecting life and property.

Just 60 of the NSF's roughly 2,000 employees are considered "essential" and have been kept on the job, whereas about 5,500 of NOAA's 11,400 employees are still working; many are weather forecasters. And a few lucky science agencies have escaped the shutdown turmoil. The National Institutes of Health and the Department of Energy are unaffected, because Congress has approved funding for them until 30 September, the end of the 2019 budget year.

About 59% of the Food and Drug Administration's (FDA's) 17,000 employees can work during the shutdown

**"We're moving into fairly unprecedented territory if this goes beyond a couple of weeks."**

— in part, because about one-quarter of the agency's budget comes from fees paid by companies submitting drugs or medical devices for approval. The FDA can rely on user fees already collected to keep some programmes going, but it is barred by law from accepting further fees until the government reopens. Eventually, the agency could be forced to send more workers home, says Ladd Wiley, executive director of the Alliance for a Stronger FDA in Silver Spring, Maryland. "We're moving into fairly unprecedented territory if this goes beyond a couple of weeks," he says.

Other agencies have tried accounting tricks to minimize disruptions. The Environmental

Protection Agency had enough money on hand to stay open until 28 December, but it has now furloughed about 14,000 of its employees, leaving just 753 "essential" workers on the job. That could hamper the agency's ability to meet legal deadlines later this year for safety assessments of about 40 chemicals. It has already postponed at least one upcoming advisory-committee meeting related to the work.

No government employees are being paid during the shutdown — even those deemed essential and ordered to keep working. Congress has historically passed legislation authorizing retroactive pay after a shutdown ends, but that is cold comfort to many federal employees trying to survive without a regular salary.

"Today I had to apply for unemployment," Leslie Rissler, an evolutionary biologist and programme director at the NSF, tweeted on 3 January. "This is a ridiculous shutdown unnecessarily affecting thousands of federal employees and families. Wishing all of them, and this country, better days ahead."

Osborn, the Smithsonian marine biologist, is starting to worry that the shutdown will interfere with a trip to northwest Africa that she has planned for early February. She and her colleagues intend to pilot a crewed submersible around underwater cliffs off Cape Verde, at a time of year when the ocean is calm enough to allow them to search for deep-sea animals.

"I have thought about looking for a university position where things are more stable," she says. "But I am hoping this divisive political climate doesn't last for a long time. I hope that working for the government will go back to being a great opportunity." ■

## PLANETARY SCIENCE

# Far-flung world is a snowman

*Farthest object ever explored is relic of early Solar System, suggest images from NASA's New Horizons mission.*

BY ALEXANDRA WITZE

It's a snowman! Some of the first images from NASA's fly-by of the most distant world ever visited by humanity — space rock 2014 MU<sub>69</sub> — reveal that it has two asymmetrical lobes.

The space agency's New Horizons spacecraft captured the close-ups of MU<sub>69</sub> on 1 January, before it whizzed just 3,500 kilometres above the object's surface. The rock is a 'contact binary', formed by the gentle

merger of two objects.

"It's really, really cool," says Sarah Hörst, a planetary scientist at Johns Hopkins University in Baltimore, Maryland. "I was a little nervous it would be boring. It's not."

Contact binaries consist of two roughly similar-sized objects resting on one another, presumably after coming together very gently. The rubber-duck-shaped comet 67P/Churyumov-Gerasimenko, which the European Space Agency's Rosetta spacecraft explored between 2014 and 2016, is probably a contact binary.

MU<sub>69</sub> is 31 kilometres long and 19 kilometres wide at its broadest point. The spot where its two lobes join is marked by a collar of material that is lighter in colour than the rest of the space rock. That might indicate the material there is of a different chemical composition, or a different grain size. Small grains are more reflective than larger ones.

Data collected during the fly-by confirm that MU<sub>69</sub> is dark reddish, as scientists had suspected. The colour is probably a result of sunlight irradiating its icy surface for billions of years, says team member Carly Howett, a planetary scientist at the Southwest Research Institute in Boulder, Colorado. The brightest parts of its surface reflect about 13% of the Sun's light, whereas the darkest reflect about 6% — making them as dark as potting soil.

So far, the New Horizons team has not spotted any impact craters on MU<sub>69</sub>'s surface, although those might become apparent in higher-resolution images still being downloaded to Earth, says Jeff Moore, a planetary geologist at NASA's Ames Research Center in Moffett Field, California.

At nearly 6.5 billion kilometres from Earth, MU<sub>69</sub> is scientists' most distant exploration

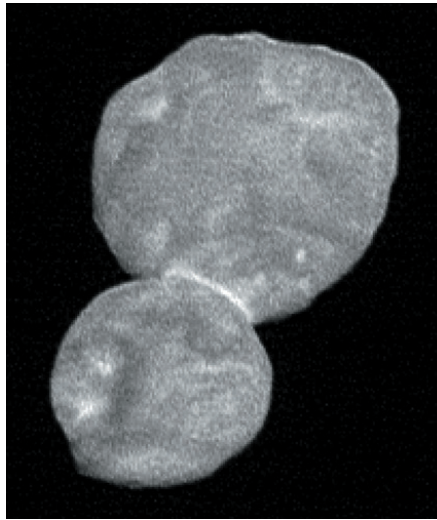
NASA/JHUAPL/SWRI target in the Kuiper belt, the realm of space rocks that orbit the Sun beyond Neptune. New Horizons visited its first Kuiper belt object, Pluto, in July 2015.

But MU<sub>69</sub> is special because it hails from an undisturbed part of the Solar System known as the cold classical Kuiper belt. Scientists think that objects there have been in a deep freeze since the Solar System formed, more than 4.5 billion years ago. Data from the MU<sub>69</sub> fly-by will give scientists their most direct look at these pristine relics of planetary formation.

"This is a perfect contact binary," says Michele Bannister, a planetary astronomer at Queen's University Belfast, UK. "Of all the hundreds of thousands of cold classicals out there, this is a gorgeous choice."

Its two lobes probably formed as innumerable small particles swirled together and lumped into larger objects, two of which eventually coalesced into what scientists see today, says Moore. "These are the only remaining basic building blocks" of planets, he says.

Even as New Horizons scientists celebrated



The space rock has two distinct lobes.

the first close-up images, they also came under fire over the rock's nickname, Ultima Thule. The team chose it in March 2018, after

a public naming contest.

Ultima Thule means 'beyond the known world' in Latin, and is commonly associated with the Arctic and exploration. But the Nazis also appropriated the phrase to describe the mythological homeland of the Aryan race, as *Newsweek* pointed out last March. A retweet of that piece on 1 January drew attention to the Nazi associations.

Asked about the issue, Alan Stern, the mission's principal investigator, said that Ultima Thule has been used for centuries to describe far-off lands. "That's why we chose it," says Stern, a planetary scientist at the Southwest Research Institute.

Like much of the US government, NASA remains shut down while Congress and President Donald Trump battle over federal spending and immigration policy. The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland, where mission control is based, has taken over releasing the scientific images and data to the public until NASA reopens. ■

## GEOPHYSICS

# Earth's magnetic field is acting up

*Erratic motion of north magnetic pole forces update to model that aids global navigation.*

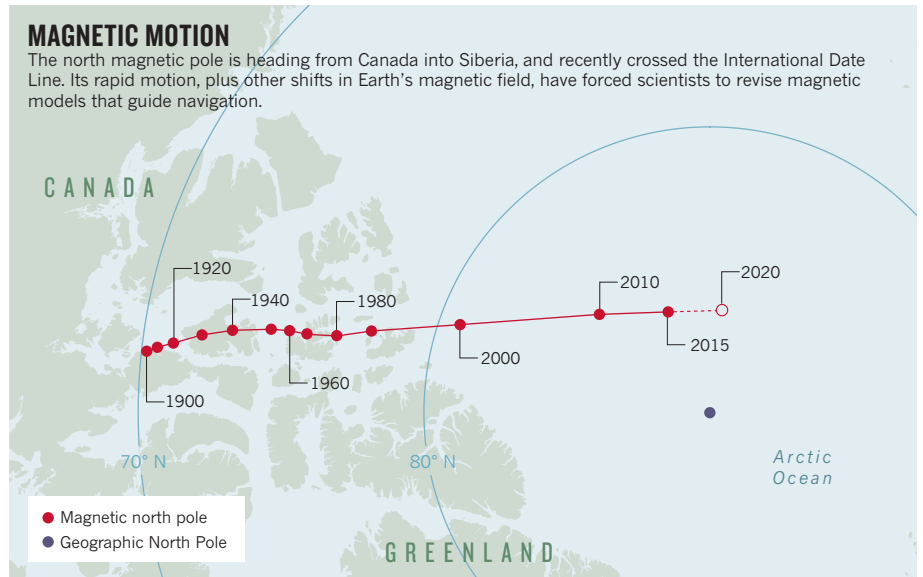
BY ALEXANDRA WITZE

Something strange is going on at the top of the world. Earth's north magnetic pole has been skittering away from Canada and towards Siberia, driven by liquid iron sloshing within the planet's core. The magnetic pole is shifting so quickly that it has forced the world's geomagnetism experts into a rare move.

On 15 January, they are set to update the World Magnetic Model, which describes the planet's magnetic field and underlies all modern navigation, from the systems that steer ships at sea to Google Maps on smartphones.

The most recent version of the model came out in 2015 and was supposed to last until 2020 — but the magnetic field is changing so rapidly that researchers have to fix the model now. "The error is increasing all the time," says Arnaud Chulliat, a geomagnetist at the University of Colorado Boulder and the National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Environmental Information.

The problem lies partly with the moving pole and partly with other shifts deep within the planet. Liquid churning in Earth's core generates most of the magnetic field, which varies over time as the deep flows change. In 2016, for instance, part of the magnetic field temporarily accelerated deep under northern



SOURCE: WORLD DATA CENTER FOR GEOMAGNETISM/KYOTO UNIV.

South America and the eastern Pacific Ocean. Satellites such as the European Space Agency's Swarm mission tracked the shift.

By early 2018, the World Magnetic Model was in trouble. Researchers from NOAA and the British Geological Survey in Edinburgh had been doing their annual check of how well the model was capturing all the variations in Earth's magnetic field. They realized that it was

so inaccurate that it was about to exceed the acceptable limit for navigational errors.

## WANDERING POLE

"That was an interesting situation we found ourselves in," says Chulliat. "What's happening?"

The answer is twofold, he reported last month at a meeting of the American ▶