

ENERGY

New energy source found hiding under Earth's surface

Experts are divided over how useful it could be

How much energy we use and where it comes from is the central problem of the climate crisis. A new discovery of vast reserves of hydrogen hiding under Earth's surface could help address that problem, but it's unclear how much of a difference it could make.

Geologic hydrogen is formed during natural geochemical processes inside Earth and, so far, has been discovered in just a few places, including Albania and Mali. But a new study estimates these reserves stretch all around the globe.

The researchers behind the study suggest that if we were able to extract just two per cent of this geologic hydrogen, it could provide us with 1.4×10^{16} joules of energy. This may sound impressive, but it's only equivalent to 35 minutes of the global population's energy consumption.

Still, it's twice as much energy than there is in all the natural gas reserves on Earth and the researchers say it could help policymakers meet net-zero carbon targets. Extracting

geologic hydrogen is a relatively low-carbon process, although currently, Mali is the only place where this is being done.

The new study, carried out by the US Geological Survey, estimates the global size of these underground reservoirs and suggests they may contain as much as 5.6×10^6 tonnes (the equivalent weight of 3.7 million cars) of hydrogen.

Experts are unsure whether we should make the effort required to extract it, however. "To suck up hydrogen at a scale to tackle the climate emergency would require an enormous global initiative for which we simply don't have time," Prof Bill McGuire, a climate scientist at University College London (UCL) who wasn't involved in the study, told *BBC Science Focus*.

"There's more than enough free energy available from wind and the Sun, and the technologies are straightforward, well tested and well established, so I really don't see the need for exploiting what is, ultimately, another finite resource."



HEALTH

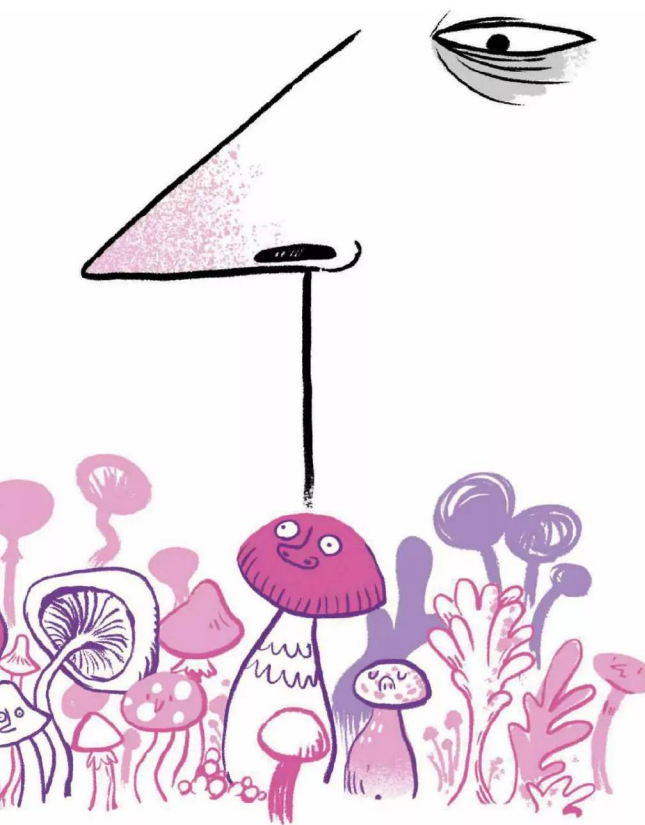
Your nose fungi could be to blame for allergies

People with allergy-induced sniffles have different fungal colonies in their noses

An estimated 25–40 per cent of people worldwide suffer from allergic rhinitis, a condition that causes inflamed nasal mucous membranes. Now, scientists think they know the cause of this perpetual sniffing: people with allergies have different fungi in their noses.

This may be somewhat repulsive to hear, but we all have nose fungi. They make up our nasal mycobiome – the community of fungal microorganisms found in our nostrils and sinuses. Our bodies rely on microscopic organisms for essential roles such as boosting our immune systems and fighting off harmful pathogens.

ILLUSTRATIONS: ADAM GALE



"Participants with respiratory diseases had richer, more diverse nose fungi"

To study the nasal mycobiome, scientists took nasal swabs from 214 patients with allergies and 125 healthy participants. These swabs revealed that the most common types of nose fungi were noticeably different between the two groups and that participants with respiratory diseases had richer, more diverse mycobiomes.

The research also found that certain chemical processes, called metabolic pathways, were more common in the fungal communities of participants with allergic rhinitis. If further studies confirm this link, these processes could be used to sniff out future allergy treatments.

SPACE

'Extreme' solar radiation storm could hit Earth

Sun-like stars may have tantrums far more frequently than we thought

Every so often, the Sun throws such a furious tantrum that it hurls highly damaging radioactive atoms towards Earth. These so-called 'superflares' release more than one octillion (one followed by 27 zeroes) joules of energy in one go – that's like 16 trillion trillion atomic bombs detonating simultaneously.

A new study suggests that these solar tantrums occur far more frequently than we thought and there's no telling when another might happen. Published in the journal *Science*, the study reveals that the Sun was at its most violent in 775 AD, with as many as eight other extreme solar particle events happening within the past 12,000 years.

But the study also suggests we could be underestimating the frequency and violence of these events, based on the behaviour of other stars in the Universe. Previous research estimated that superflares happen every 1,000–10,000 years, but this new data brings that estimate down significantly. The researchers now think one Sun-like

star produces a superflare about once per century.

The researchers collected existing evidence of the Sun's superflares from ancient tree trunks and glacial ice, as well as analysing levels of radioactive atoms. But when it came to direct data, what's available is only as old as the start of the space age, which began with the launch of the Soviet Union's Sputnik 1 satellite in 1957.

To get a better sense of longer-term frequency, the researchers studied thousands of Sun-like stars and recorded fluctuations in their brightness between 2009 and 2013.

The new study is the most precise to date, observing 56,450 Sun-like stars to give a total of 220,000 years of evidence. Researchers found that 2,527 of the stars observed produced a total of 2,889 superflares during that time.

"We were very surprised that Sun-like stars are prone to such frequent superflares," said Dr Valeriy Vasilyev, one of the study's authors.

