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Wildfires

Australian fires burned a record amount of forest

Adam Vaughan

RECENT wildfires in Australia have burned an area of forest unmatched anywhere else in the world, according to the most authoritative analysis yet of the devastation.

By early January, the fires had swept through around 5.8 million hectares of forest in the states of New South Wales and Victoria, including the biggest ever single bush fire, which affected more than 500,000 hectares near Sydney.

Matthias Boer at Western Sydney University and an international team found that the extreme fires burned around 21 per cent of the forest biome in eastern Australia between September 2019 and 13 January 2020 (*Nature*, doi.org/dnd6).

Over the past two decades, losses to fire in this area usually amounted to less than 2 per cent a year, says Boer. The extent of the recent fires also eclipsed the proportions of continental forest biome burned annually anywhere in the world over the same period, most of which were well below 5 per cent.

"This percentage of burning in forests is unprecedented nationally and globally," says Boer.

A fifth of eastern Australia's forest being burned is probably an underestimate, as the analysis doesn't cover the entire fire season or include Tasmania, which was hit by fire after the study's cut-off date.

"The proportion of forest burned in Australia's bush fires eclipses that of blazes anywhere in the world"

Most of the affected forests are dominated by eucalyptus trees, which are excellent at surviving fire, but losing such a large proportion of the forest isn't sustainable, says Boer. Animals also face "significant consequences", he adds, because the huge areas burned may increase the distance to their food sources. ■

Space exploration

InSight into Mars mysteries

NASA's latest mission to the Red Planet has made a host of discoveries, says **Leah Crane**

DEEP under its surface, Mars is quaking. The team behind NASA's InSight lander, which reached the Martian surface in November 2018, has released the data from its first 10 months on the planet. Here are some of the mission's most fascinating discoveries so far (*Nature Geoscience*, doi.org/dnd3).

1 Big marsquakes

InSight's main goal is to measure marsquakes, which can be caused by underground seismic activity or objects hitting the planet's surface. So far, it has detected 24 relatively major quakes of magnitudes between 3 and 4.

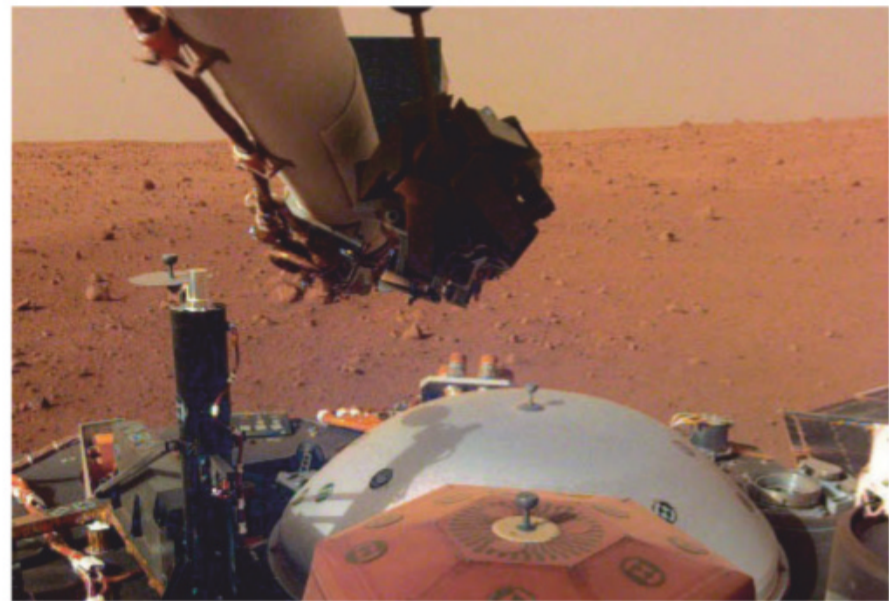
These marsquakes occurred deeper underground than most earthquakes, said team member Philippe Lognonné at the University of Paris during a press call. This means that even though they are by no means puny, they would probably be barely noticeable if you were standing on the surface of Mars.

Two of the quakes occurred near an area called Cerberus Fossae, where the fractured ground indicates there was volcanic activity within the past 10 million years or so. This seismic shaking could come from the remains of that volcanism, said Sue Smrekar at NASA's Jet Propulsion Laboratory (JPL) in California, also an InSight team member.

The lander has yet to detect any truly powerful quakes, though. "The larger quakes at this point seem to be less frequent than we had expected," said Bruce Banerdt at JPL, the mission's principal investigator.

2 Little marsquakes

The rest of the 174 quakes discovered during InSight's first



The lander's seismometer is housed in its copper-coloured dome

10 months were relatively small, making it harder to figure out exactly where they occurred and what caused them. Since then, the lander has spotted further small marsquakes that weren't included in this data release.

3 Water

The way in which seismic waves propagate through the ground depends on its structure and how hydrated it is, so the quakes are telling us about the distribution of water on Mars. The top layers of crust seem to contain minerals with water in them, said Banerdt.

The crust is drier than Earth's, but significantly damper than the moon's. If InSight detects larger marsquakes from deeper down, they should tell us more about where to find water.

4 Magnetic fields

Mars doesn't have a constant magnetic field like Earth's, although it probably did billions of years ago. Instead, it has small areas of magnetic fields caused by rocks that have maintained

their magnetisation over the millennia. We have measured some of those fields from satellites, but InSight has the first magnetometer ever placed on the Martian surface.

"We unexpectedly see that there's a steady field that's about 10 times stronger than that predicted from satellite observations, and that means that there are magnetised rocks at InSight's landing site," said Catherine Johnson at the University of British Columbia in Canada, another InSight team member. These rocks are probably deep underground.

5 Dust devils

The surface of Mars is covered in more dust devils – mini-tornadoes that loft particles into the air – than we thought.

So far, InSight has detected more than 10,000 spinning vortices passing over its pressure sensors, said Lognonné. Despite that, it hasn't taken a single photo of a dust devil, which is surprising.

That may be because the vortices are simply not strong enough to carry much dust, but it isn't clear why that would be the case. ■