combines data from hundreds of stations around the world to build a picture of global climate.

The Nepal observatory is perfectly positioned to study how the climate in the Himalayas is being influenced by pollution — such as anthropogenic emissions from biomass burning and agriculture — transported from South Asia, says Paolo Bonasoni, the observatory's research leader and a scientist with the Institute of Atmospheric Sciences and Climate at the CNR in Bologna.

Atmospheric scientist Oksana Tarasova, who heads the GAW network, says that various kinds of pollution travel up the sides of the Himalayan mountain chain and then mix together. When pollutants such as ammonia and oxides of nitrogen interact with other airborne chemicals and sunlight, they create compounds known as secondary aerosols, which alter the climate and affect the weather, she says.

The Nepal observatory is one of the few that can simultaneously measure aerosols, reactive gases and other compounds, she says. Its instruments have shown that the air surrounding the Himalayas changes quickly from clean to polluted when pulses of dirty air travel up from urban centres; when this happens before the monsoon period, it triggers bursts of cloud condensation.

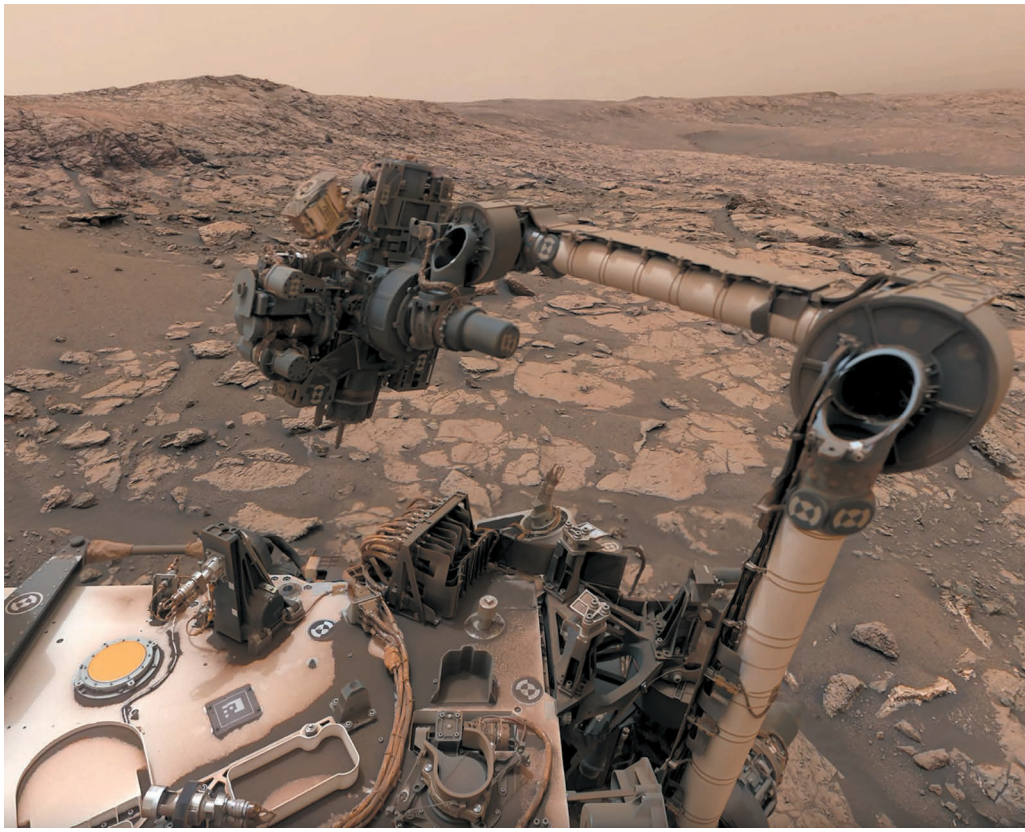
SELF-FUNDED

Since 2014, members of the Ev-K2-CNR Association have donated their time or money to maintain the observatory at a vastly reduced capacity. Most of the instruments are not being used, and have been turned off to prevent them from deteriorating in the extreme winter conditions. Less than two months ago, the group feared it would have to close the station altogether, as its members struggled to secure a new source of money to update and run the instruments.

The observatory's reduced capacity has hampered scientists' ability to study complex environmental problems, says Bhupesh Adhikary, who models chemical transport at the International Centre for Integrated Mountain Development in Kathmandu.

Some researchers have suggested that satellite monitoring could fill the data gap. But Adhikary says this will not be sufficient. Satellite-based air-pollution detection is still rudimentary, and most sensors have problems over mountainous areas, he says. "Whatever tool you use to study the problem, whether it's satellite or computer, you need ground validation."

Tarasova is excited that the observatory could soon resume full data collection again. "This is an important station, a rare one and a real treasure in our programme," she says. ■



The Curiosity rover has tracked methane in Mars's atmosphere since it landed on the planet in 2012.

NASA/JPL

PLANETARY SCIENCE

Clues emerge to Martian mystery

Warming power of the Sun could help to explain why the level of methane in the atmosphere changes with the seasons.

BY ALEXANDRA WITZE IN KNOXVILLE, TENNESSEE

Planetary scientists are getting closer to solving the puzzle of methane on Mars. New calculations could help to explain why NASA's Curiosity rover detects peaks of methane gas in the Martian atmosphere during the planet's northern summer. As winter gives way to spring, the idea goes, the Sun's heat begins to warm the soil — allowing methane to percolate up from the ground and into the atmosphere, said John Moores, a planetary scientist at York University in Toronto, Canada. He presented the work on 24 October at the American Astronomical Society's Division for Planetary Sciences meeting in Knoxville, Tennessee.

Curiosity's methane measurements have been tantalizing researchers for years. The rover, which landed near Mars's equator in Gale crater in 2012, at first found mysterious spikes in atmospheric methane during the northern spring[1]. Earlier this year, mission scientists reported that methane levels waxed and waned with the seasons, peaking in northern summer[2].

FROM THE DEPTHS

Finding methane in Mars's atmosphere is intriguing because chemical reactions should destroy the gas after about 300 years. Its presence today suggests that something on the planet is still sending the gas into the atmosphere. The source could be geological, such as reactions between water and certain types of rock — or, more intriguingly, buried microbes or other forms of life. Most methane in Earth's atmosphere comes from living things.

Researchers have chased every whiff of methane they can find on Mars. Telescopes on

Earth and spacecraft orbiting Mars have spotted the gas around the red planet from time to time — including an intense plume reported in 2009 (ref. 3). Curiosity was supposed to help solve the puzzle by measuring methane levels directly, but instead it has complicated it.

Now, it seems the answer might lie under Mars's surface. Moores and his colleagues analysed how methane might seep upwards through cracks and fissures in the Martian soil until it enters the atmosphere. Warming the soil could allow the gas to leak into the air, their calculations show. Seasons on Mars are complex, especially at Curiosity's location so close to the planet's equator. But the highest methane levels do appear just after the warmest time of the year, suggesting that heat spreading downward allows more of the gas to be released.

The amount of gas that the scientists estimate is entering the atmosphere is a good match for the measurements Curiosity has made at Gale crater, Moores said. The methane's ultimate source is still a mystery. But the work could help to explain the gas's seasonal ebb and flow, he added.

GAS LEAK

The idea builds on earlier suggestions that methane could be seeping out of Sun-warmed cliff faces on Mars, said Michael Mumma, a planetary scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland. When he and his colleagues reported[3] on the intense methane plume in 2009, they suggested that pores in the Martian soil might open up on cliffs or crater walls during certain seasons, allowing methane to make its way from the subsurface to the atmosphere.

More discoveries could come shortly. A European–Russian probe, the ExoMars Trace Gas Orbiter (TGO), has been hunting for methane and other gases in Mars's atmosphere since April.

At the meeting, project scientist Håkan Svedhem of the European Space Agency in Noordwijk, the Netherlands, hinted to the audience that the spacecraft's first results would be published soon. TGO measures methane all around the planet and at a range of altitudes, going far beyond what Curiosity can measure on the ground. The orbiter could help to settle some of the methane-on-Mars questions once and for all.

"There will be surprising results," said Mumma, who is part of the TGO team. He declined to elaborate. ■

1. Webster, C. R. *et al. Science* **347**, 415–417 (2015).
2. Webster, C. R. *et al. Science* **360**, 1093–1096 (2018).
3. Mumma, M. J. *et al. Science* **323**, 1041–1045 (2009).

CORRECTION

The News story 'Scientists criticize handling of animal-welfare charges' (*Nature* **558**, 13–14; 2018) stated that Nikos Logothetis was indicted on 20 February for allegedly violating animal-protection laws, and that a court had not yet considered those charges. In fact, on 20 February, the public prosecutor in Tübingen announced that earlier in the year, the district court had issued Logothetis with a penalty order — an accusation of a minor offence combined with a fine, which automatically becomes a conviction if the accused does not appeal — for alleged mistreatment of animals. Logothetis immediately appealed. The appeal will be heard in court, but no date has been set. The story also said that Stuttgart prosecutors had overturned an earlier settlement granted by the Tübingen court and pursued the case against Logothetis, leading to the indictment. In fact, the Stuttgart attorney general asked Tübingen prosecutors to reconsider their settlement decision, and it was these prosecutors who pursued the case, leading to the penalty order.