reports the creation of a prototype device for finding the structure of small molecules, using the beam from an electron microscope and a compatible detector[1].

TRIVIAL BUT TRANSFORMATIONAL

The diffraction patterns are analysed by software that is already used in X-ray crystallography. "Everything is composed of parts which have existed before," says Grüne. "It's just really the smooth integration of the system." His team used its set-up to find the structure of the painkiller paracetamol from minuscule crystals formed of the powder used inside capsules. These crystals were just a few micrometres long — much smaller than can be analysed using X-ray diffraction.

And Gonen's group adapted the MicroED technique to solve the structure of small molecules instead of proteins[2]. Gonen says that making this shift was "trivial". The main tweaks concerned the preparation of the samples, he says: whereas fragile proteins need to be treated with care, in this case, all he had to do was grind down pharmaceutical powders. The team used this adapted version of MicroED to find the structure of powders of pharmaceuticals including ibuprofen and the anti-epileptic drug carbamazepine.

These crystals were some 100 nanometres wide — a billion times smaller than those required for X-ray crystallography — and their structure could be resolved in under 30 minutes.

Rubinstein says it's surprising that a technique already used in other fields hasn't yet been widely adopted by organic chemists. "It's this great solution that's been sitting almost in plain sight," he says.

Gonen puts the oversight down to a lack of communication between disciplines. It was only when he began speaking to chemists, he says, that he became aware that they struggled to grow large crystals in order to analyse small molecules, leading him to realize he had a solution for them. "As a protein crystallographer, I never really thought very carefully about small molecules," he says. "For us, small molecules are the things we try to get rid of." ■

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FACILITIES

Himalayan observatory close to resurrection

Negotiations with Italian funding agency foster hope for climate station's future.

BY LOU DEL BELLO

EVK2CNR

The Nepal Climate Observatory-Pyramid is located near the base of Mount Everest.

Scientists hope that a Himalayan climate observatory that had its funding cut four years ago could be back in action by early next year. Managers of the Nepal Climate Observatory-Pyramid station say they are close to reaching an agreement with the Italian National Research Council (CNR). The council helped set up the station near the base of Mount Everest in 2006 but stopped funding it in 2014 because of how its budgets were managed.

"For the first time in four years, I am extremely optimistic about the fate of the station," says philanthropist and climber Agostino Da Polenza, who heads the Ev-K2-CNR Association, a non-profit group that promotes research in mountain areas and helped to set up the Nepal Climate Observatory-Pyramid, one of the highest climate observatories in the world.

If the deal goes through, the observatory will resume collecting data on atmospheric processes at high altitudes. Climate researchers say these measurements are crucial for understanding how pollution influences climate patterns.

HOPE IN THE HIMALAYAS

Da Polenza says that a meeting in October between the Ev-K2-CNR Association and the CNR to discuss the observatory's future was overwhelmingly positive, and he hopes that, come March, technicians will be on their way to the station to switch on its instruments. But he declined to reveal any further details, saying he did not want to jeopardize a potential deal before it has been finalized.

Antonello Provenzale, acting director of CNR's Institute of Geosciences and Earth Resources in Pisa, which manages funding for infrastructure, says that it is too early to disclose details of the observatory's fate, but there is a strong motivation to reinstate funding. "We all feel strongly that the Pyramid must resume activities."

The Nepal Climate Observatory-Pyramid is part of the Global Atmosphere Watch (GAW) network, run by the United Nations World Meteorological Organization in Geneva, Switzerland. The programme ▶

▶ 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.

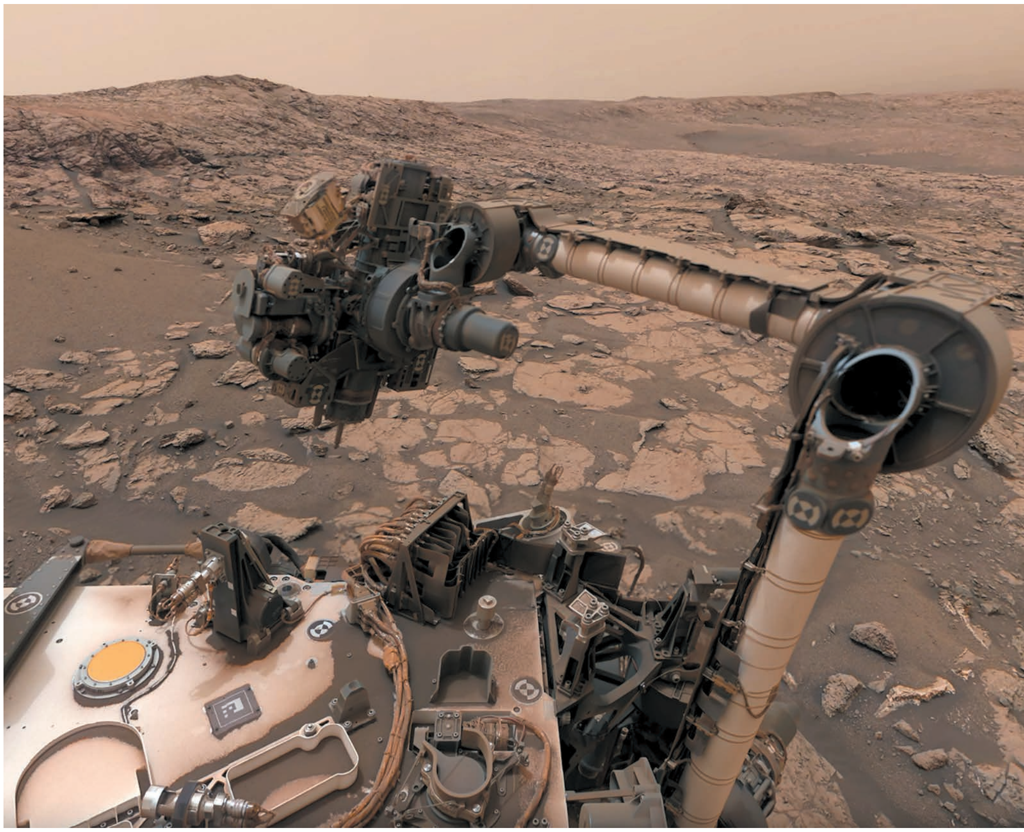
SELF-FUNDED

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