Horizon
The EU Research & Innovation Magazine

European Commission

Dawn breaks in Antarctica

Scientists at Concordia, Europe's only permanent research station on continental Antarctica, saw their first dawn on Saturday after three months of continuous night.

13 August 2013 - By BEN DEIGHTON

Since May, the crew have endured the Antarctic winter, with temperatures falling as low as -84 degrees Celsius, making the research base one of the coldest places on Earth.

On Saturday 10 August, the 15-person crew at Concordia finally got their first glimpse of the sun as dawn broke over Antarctica.

'We'd almost forgotten what it looked like,' Glaciologist Albane Barbero wrote in a blog post following the sunrise. 'Some of us didn't go far, just to the roof of the base to welcome the sun and take photos ... others, like me, took the opportunity to go for a short walk.'

During the Antarctic winter, the position of the sun is indicated by a faint glow on the horizon, except in June, the deepest point of winter, when it disappears completely from view. Then it slowly reappears, until finally breaking over the horizon in mid-August.

'Suddenly you see light again, it is kind of connecting you back to sunlight and everything that means,' said Oliver Angerer, a coordinator at the European Space Agency (ESA), which sponsors medical researchers at the station. 'You can finally see in real colours the environment again.'

By December, the base will have entered high summer, where temperatures rise to -25 degrees Celsius and the sun stays above the horizon 24 hours per day.

The joint French and Italian station was opened in 2005 and sits 3.2 kilometres above sea level and almost 600 kilometres from the nearest living beings, at the Russian Vostok research base. It's one of only three bases built on the Antarctic continental ice, along with Vostok and the U.S. Amundsen-Scott Station, although many other countries have research stations around the edge of Antarctica, including Britain, Belgium and Ukraine.

The base is so isolated that it is only accessible during the short summer which runs from the end of November until the beginning of February, leaving the crews cut off for months on end.

Its remote location makes it useful for research. The EU-funded ANTARCTIC HONO project used it to measure nitric acid emissions from snow to see the effect on the atmosphere, while ARENA, another EU project, worked with Concordia to help lay the groundwork for an Antarctic observatory dedicated to infrared light.

Concordia was also used by EPICA, a long-term EU-funded project, which drilled deep into the ice in order to study the Earth's atmosphere thousands of years ago.

Almost as desolate as space

The remoteness of the base also means that the European Space Agency (ESA) has taken an interest in the station as it is poses similar challenges to those that astronauts would face during a long space mission.

'The impossibility to resupply, the extreme danger and harsh conditions, the need for autonomy, and the small multinational crew … all of these characteristics are analogue to what we would expect in future human exploration missions, for example to Mars,' said Angerer.

The atmosphere at the base is also similar to one that might be used in a potential base on Mars, allowing researchers to see how astronauts might respond to such a situation.

The Concordia research base on the first dawn for three months. © IPEV/PNRA-A.Litterio
The Concordia research base on the first dawn for three months. © IPEV/PNRA-A.Litterio

The Concordia research base on the first dawn for three months. © IPEV/PNRA-A.Litterio

'People are thinking about having planetary habitats on Mars, or other planets, at a lower atmospheric pressure, which then, in order to reduce the risk of fires, need to also have a low oxygen content in the air,' said Angerer. 'So, for all of these reasons, Concordia is a very nice analogue for human exploration.'

Scientists have developed a number of techniques to counteract the effects of prolonged darkness. Bright lamps are used help regulate the crews' body clocks, while some crew members have to take medication after falling into a state called 'free run' where their bodies fail to regulate sleep. 'With the Concordia crews you see that there is really a slowdown,' Angerer said. 'They feel more sluggish, they have even more trouble to sleep than they had to begin with.'

Thanks to their studies on the crews at the isolated research base, scientists have discovered that blue light can help to synchronise people's body clocks.

'There are specific fluorescent light tubes brought to Concordia which are blue-enriched,' said Angerer. 'Those were used during the winter time at Concordia and it has been shown that the people did indeed feel much better with that blue-enriched light.'

More info

Concordia research base

ESA

Chronicles from Concordia blog