

PHOTOS COURTESY: ALEXANDER KUMAR ESA/IPEV/ENEA



A doctor of Indian origin has braved nearly four months of darkness and temperatures of minus 80 degrees Celsius to understand the challenges of a manned mission to Mars

LIFE ON WHITE MARS



FREEZE FRAME: The research team at Concordia base is studying how human space travellers will cope with several months of isolation. Alexander Kumar (left) in his not-so-natural habitat



SUBODH VARMA
TIMES INSIGHT GROUP

When Curiosity landed on Mars earlier this week, it ended an epic 9-month, 567-million-kilometre journey through space. There were no humans on board, but sometime in the not-too-distant future, it is very likely that such a feat will be attempted. The technology can surely be developed but what is unknown is this: how will human space travelers cope with months of travel through an icy near-vacuum, dependent on a metal-plastic bubble for survival? Thirteen scientists and support staff have been attempting to answer to this question in conditions that mimic such long space flights. The place is Antarctica — the frozen continent that spans Earth's South Pole, where in a four-month-long night, temperatures dips to minus 84 degrees Celsius, and there is no possibility of any contact with the outside world except through electronic communication.

This is the Concordia base station, 1,200 km inland from the French coastal Antarctic station, Dumont D'Urville, which is located south of Australia. Concordia is perched 3,200 metres high on the Antarctica plateau, one of the most inhospitable places on earth. The icy winds often force you to feel as if the temperature is minus 100 degrees C because of the wind chill factor. The height reduces the oxygen content of the air to one-third the normal, making breathing even more difficult.

Concordia is a joint Italian-French project under the European Space Agency (ESA). The station (built in 2005) is run by the French Polar Institute and the Italian Antarctic Programme. Overwintering (spending the winter) there are seven French, four Italian, and one Russian crew member, apart from one British citizen of

Indian descent who is the sole doctor in Concordia — 29-year-old Alexander Kumar (he had his coldest birthday in Antarctica this May). TOI-Crest got an exclusive glimpse of life in these extreme conditions through several weeks of email exchanges with him...

DREAMS AND NIGHTMARES

Alex vividly remembers when the sun set for the last time back in February this year, and the last plane left the station. "You never know if you will see your friends, family or the rest of the world again. Anything can happen. That's Antarctica. There is a mystery to it and strange attraction. It is a place of dreams and nightmares," he says.

But Mattia Bonazza, an Italian glaciologist, was waiting for the dark nights of Antarctica. "I was waiting to see some Auroras and for this reason I didn't feel sad to say goodbye to the sun for these 90 days," he says. "I took some pictures but they aren't great due to my lack of knowledge in shooting pictures in this extreme environment," Bonazza adds.

What happens in unending darkness? "It becomes easier in certain ways as you adapt, but every day you feel less energised for the day ahead. It is strange to explain, but all we have left is distant memories of the sun and daylight. It will be extraordinary to see it again," explains Alex.

Sebastien Aubin, a marine chemist of the French Polar Institute, says about winter, "It was long, but I have begun to enjoy and prefer living in the dark — finding it both relaxing and magical".

"Whilst living in the dark, there is no perception of time — as if we have been living in space," he says.

A DAY ON THE ICE

It is easy to get depressed, Alex says, adding that the only way out is to keep busy and involved in a regular routine. On a typical winter day, Alex gets up at 8 am. After catching up with world news over breakfast, the first session of research begins — exercise, computer orientated tasks or even venepuncture (drawing blood from veins for monitoring

levels of various components), depending on the day.

Lunch is at 12.15 after which everybody helps to wash up. Concordia has an excellent chef in Giorgio Deidda who makes a different theme-based meal every evening. Flavours vary from Arabic to Roman. On midwinter day they had a gourmet meal themed around polar explorer Ernest Shackleton. Giorgio made a Sardinian delicacy called Pizzudos di Ovodda. It is "a large ravioli, stuffed with melted soft cheese and Pecorino, served with potatoes and a simple basil-tomato sauce and flakes of Parmesan", as Giorgio describes in his blog.

They have had a pizza night, and Mexican, Japanese, Indian as well as birthday dinners, says Alex who sometimes helps out in the kitchen. "I even made the crew mango lassi, before we ran out of fresh fruit," he says, displaying his Indian connection.

After chatting with fellow crew members about news and life and listening to some new music, the afternoon research session takes up the rest of the day. "If I am lucky I manage to finish early and spend time in the gym or help crew members with their research such as digging holes for glaciology or searching for a new exoplanet," says Alex.

On Saturday nights, the crew always

"We are lucky there are no monsters outside in the darkness, like in the film 'Pitch Black'. I often enjoy taking a stroll in the late evening, even though its minus 75 degrees C and dark — we have the most wonderful view of the universe you could imagine"

Alex being the only doctor around not only deals with medical problems but also does research on elements of psychology and physiology — pushing the human mind and body to the limit. His research focuses on the effects of complete isolation and sensory deprivation.

"The isolation here is real — that is an inescapable fact and draws out the most important challenges associated with a manned mission to Mars," he explains.

How does Concordia function in this isolation? A series of engines are run at different times to provide a source of electricity, in turn providing heat, communications, power to our research projects and the ability to cook. Excess heat generated from running the engines is fed around the station to heat it efficiently.

A Grey Water Treatment Unit recycles the waste water. A Black Water Treatment Unit handles human faeces and urine. A digester 'composts' organic waste from the station, which is then taken away from Antarctica.

Alex finds a parallel to India in this: very little is ever wasted and every product and item

that would otherwise be trashed or thrown away in the Western world, is 'reincarnated' — given further lives and uses in India.

"Equipment failure has become a common challenge of modern living in Antarctica as we become increasingly energy — and digitally reliant. Everything is conserved and shared — there is no excess — another lesson I learnt from living with my family in India," Alex says.

This winter there were several power cuts in Concordia. One went on for a long time, and the crew started to feel cold. So, were people scared? Alex says that they don't live in fear. "Any problem is solved calmly, rationally and as a team wherever necessary. Team work is vital — there is no other way to survive the Antarctic winter," he says.

It is incredibly tough, it is lonely, but the thirteen have got used to life in Concordia. They each have their stories to share and friendships to form. They help and support each other. It's the people that make the place.

"We have a lot of fun and keep each other smiling through the darkness," says Alexander Kumar. ■



finds a reason to celebrate with a fine meal and movie. Sunday morning is spent reading and in the afternoon Alex takes "le gouter" (afternoon snack/tea) while watching a documentary. He talks to family and friends in the evening by telephone.

People can use their spare time to do whatever they want — read up on polar history, learn new languages (French, Italian, English and Russian is spoken on Planet Concordia although English is the common language for communication), learn to cook, work out in the gym or observe the clearest night sky.

"We are lucky there are no monsters outside in the darkness, like in the film *Pitch Black*. I often enjoy taking a stroll outside in the late evening, even though it's minus 75 degrees C and dark outside — we have the most wonderful view of the universe you could imagine. It is one of the clearest views on planet Earth," says Alex.

LONELY PLANET

Concordia Station represents the closest space analogue environment available anywhere on earth. So, scientists at the base monitor and record everything, from outside weather to internal demons, if any.



COLD WAR: The wind chill factor makes the temperatures feel like minus 100 degrees C