

Cissi Lin's 54 Weeks of Antarctic Exploration at -40°C

“I’m small, but I’ve never felt vulnerable.” Cissi Lin, who is less than 160 centimeters (5 feet, 3 inches) tall, was once blown down by an Antarctic storm which left her with fractured ribs. But that did not stop Lin from climbing roofs to set up scientific equipment, even in a heavy storm.

Antarctica is the land of pure silence. While McMurdo Station may be the largest station in Antarctica, only about 140 people are staying in the station during winter, not to mention the observation point on the hill where Lin reported for work is located a 15-minute drive away from the station.

Cissi Lin worked the night shift in Antarctica. The night in Antarctica is totally different from any other place in the world. Polar night is frozen in time; daytime no longer follows the usual rule of sunrise to sunset. Lin used to climb up the hill under the 24-hour night sky, looking up at an ocean of stars on an endless snowy expanse. No one was there with Lin, her only companion was the wind whistling through the freezing -40 Celsius air. Day after day, she continued her work for 54 weeks.

Waking up at night and collecting observation data

An experimental yellow laser streaks across the starry sky, with which Cissi Lin used to collect data on space. She came to Antarctica to study the effects of gravity waves on the upper atmosphere. In October 2019, Lin first set foot in Antarctica, she shot three beams of laser light into the sky every night through an optical radar, collecting more than 1,600 hours of precious first-hand observation data.

For a layman, the massive data Lin collected may look like some kind of secret code, but for a scientist, it could be the key to unlocking the mysteries of space. Since celestial objects are constantly moving, the observational data collected from Lin can help researchers grasp shifts and changes far across the universe and create space models, which build the foundation for the daily operations of space shuttles and stations.

“Many people think the job we are doing is easy. They think we just push a button and then wait for the results. It is just not true! It actually takes us nearly two hours of preparation before we start our observations every day.” Lin told us. Because Lin was so skinny, even just climbing up the roof on the top of the hill was hard for her. But

the more difficult part is to open a one-meter-wide iron hatch on the roof to allow the telescope inside can catch sight of the sky. Opening the hatch really took Lin a huge effort; “Every time I open it, I’m worried about what would happen if I slipped.” She said.



(Whenever the weather was good, Cissi Lin would drive a big truck to the hilltop hut, climb up to the roof, and open the big metal hatch on top to start her daily observation work. Courtesy of Cissi Lin)

After doing the heavy work such as setting up the equipment and warming up the machines, it’s time for the particulars. Lin had to carefully adjust the intensity of the laser light with a lens. She explained, “The laser light is very sensitive; every mirror and every button could make a small temperature difference.” During the 12 hours of night shift, Lin had to stay focused and to check the optical equipment over and over to make sure the data she collected is accurate.

Although Lin claimed she was always fear of falling off the roof, there is absolutely no doubt in her mind about working in Antarctica. When she sit next to me, with a red T-shirt and a boyish haircut, her passion almost drowned me. She talked energetically,

one minute gushing over how cute the penguin puppet she brought back from Antarctica, the next whipping out her homemade skeleton costume from the Halloween party she attended there. She is so passionate and energetic that I feel she can drive away the loneliness in that silent snowy expanse.

A lifelong adventurer in love with rockets

A self-proclaimed adventurer, at 39, Lin's eyes still twinkle with a curiosity toward life. "I'm always changing," she said, whether that means a change of focus or a change of residence. In college, she majored in Electrical Engineering, while for her Ph.D., she changed her focus to GPS algorithms. She spent her days in the research lab writing code to speed up the algorithms at UT-Arlington. Her eyes tightly locked onto microsecond differences, however her mind, constantly wandering away to the lab next door that was studying space rockets.

"Launching rockets and collecting first-hand data sounded like a more attractive way to know science to me," Lin said. Thus, she decided to switch her research area to the study of space rather than algorithms. She recalled the night she made up her mind "I could not sleep and spent all night thinking about it. The next day, I went to the professor next door, who later also became my boss, and he promised to accept me." It is the beginning of Lin's adventure in space.

As an adventurous traveler, Lin visited more than 30 states during her stay in the U.S., even some nature reserves in the Midwest with unpaved roads. She giggled "I immediately bring about what is in my mind!" Fear is something that always sets in too slowly for her; for example, she recalled, driving down those empty, unpaved roads alone, she finally began to think, she burst into laughter and said "If the car breaks down, probably no one will come and help me!"

Cissi Lin is in some ways still like an impulsive teenager. In 2019, Lin had already planned to go back to Taiwan to teach in a college after years of working as a researcher in Texas. However, when Lin knew there's an opportunity to work in the Antarctic, she immediately changed her original plan. She knew the opportunity to study astronomy, atmospheric science, and environmental science in the Antarctic was extremely rare, therefore she gave up her teaching position at National Central University in Taiwan, and joined the project with US \$350 million annual budget hosted by the National Science Foundation. She recalled, "I had no hesitation about going to an unknown territory to explore, I just say yes right way!"

Lin's optimism roots in her DNA. She told us she is a lot like her mother. Her mother, Ou Pi-yu, recalled the day receiving the happy news of Lin accepting the project: "I knew how badly she wanted to go to Antarctica, so I immediately gave her my support." Not until she hung up the phone with Lin did she realize, "How could I have been so impulsive? I didn't even think about her safety, and just went crazy with her!" As a retired high school teacher, Ou carried out her ideology of "making learning fun" in her relationship with her daughters. When Lin was still a kid, every time a storm hit, no matter how heavy the rain was, Ou grabbed their raincoats and headed out to the river to launch paper boats. "Well, there's no point to worry, I just have to let my daughter go." That is Ou's spirit.

Lin is like her mother, optimistic but not reckless—she was not clueless about how harsh the environment in the Antarctic is, but she said, "Even though it would be hard, it is only for a year, and I would be fine to go through a bit of hardship in order to realize my Antarctic dream."

Unfortunately, last winter, the Antarctic weather was particularly extreme, with snowstorms coming one after another. According to residents living in the Antarctic for more than a decade, they had never encountered a storm that was so strong, in which they could not leave their houses for three whole weeks. Lin came across the worst Antarctic weather in ten years. What happened next brought the nightmare to a new level—she was blown away by a gust of wind, smashed into a guardrail on the side of the road, and broke her ribs.

The shortage of medical supplies in Antarctica is a real problem, even treating a toothache needs to transport to other places. Worse, even if Lin wanted to leave to see a doctor, she had to wait for two months until summer came and planes could finally come in to pick people up.

However, when Lin saw the x-ray of her broken ribs, it was not injuries that she was worried about. Her first thought was, "What if they send me away?" The project was not ended yet, and she did not want to leave halfway.

Internet access in Antarctica is limited, so outside of being on duty, the most common thing she did to fill time was reading books. When her ribs were broken, she immediately thought of the book she was reading at the time, "The Worst Journey in the World." by Apsley Cherry-Garrard. It was a memoir of Robert Falcon Scott's

expedition to the South Pole in the 1910s. When cold winds almost wiped out the whole team as they first set foot in the Antarctic, at one point the book tells how one of the members of the expedition, suffering an illness but not wanting to be a burden to the team, told his partners he wanted to go for a walk, turned around and disappeared into the blizzard, and never returned.

Lin is clear-minded about the situation. “It is very realistic. This project burns a lot of money. Water, electricity, food, housing, the whole project is expensive, and if someone is injured, he is not producing anything for that investment.” She did not want to be sent away from Antarctica, so even though it hurt, she had to keep working. But with broken ribs, Lin could barely talk. She admitted that it was the worst injury she had ever got, and those memories still seemed like yesterday to her. Despite that, she never stopped working. It proves how strong Cissi Lin is.



(Three sets of optical radar systems are on the roof—two beams of ultraviolet light invisible to the naked eye and one beam of yellow laser light, shooting straight through the starry sky. Courtesy of Cissi Lin)

In fact, apart from the harsh weather, life in the Antarctic was not as difficult as it seemed in the book. It could even be described as lively. During the summer, many short-stay scientists and passers-through stop at McMurdo Station, with as many as 1,300 people.

The opportunity to work with scientists in different fields added some color to the experience. Lin recalled that a scientist with whom she shared her equipment on the roof was studying optical radar. She said, “He worked on the technical side and I worked on the space environment side, so we were coming from different fields to accomplish the same thing; we really complemented one another.”

That optical radar scientist she mentioned is TJ Yang. Before she met Yang, she had not spoken Mandarin for more than six months, so when she saw him with a T-shirt printed with Chinese characters in the staff restaurant, she almost screamed out loud and just went straight to him excitedly.

The two old friends recalled their time in Antarctica with great excitement. Yang said, “Antarctica is honestly very isolated, it gives the 1950s and 1960s vibes.” He smiled and added, “Compared to society nowadays, people there are super friendly and do not easily judge others. In the summer, I would often see cross-dressing parties where guys would wear girls’ dresses and walk around freely. That was really fun sight to see.”

Even in the winter, however, when the lively McMurdo became quiet, Cissi Lin never felt lonely. She knew only in that clear night sky with deadly silence, she could see the party Mother Nature was throwing. She climbed up the hill and followed the laser light, looking into the beautiful night sky with thousands of stars, and occasionally enjoying the dance of the aurora. At that moment, she knew in her heart, it was “the world’s most fantastic journey” for her.