

COLUMN

Changes on the ice

Diverse faces are appearing on a frozen continent, says **Robin Bell**.

KEVIN EMERY

To measure gravity from the sky, you need a calm day and a steady aircraft. Often, the instruments involved do not need much tending to, even when flying at low altitude over the frozen Weddell Sea off the Antarctic Peninsula. As a graduate student in 1986, I was lucky: my experiments mostly worked well. In moments of peace, I could sneak to a window in the aircraft's belly.

As my equipment collected data that would reveal the hidden sea bed, I would spend hours watching the sea below. My fellow scientists and I were far from any place that a wheeled US Navy P-3 Orion aircraft could safely land. The polar ice, floating and flowing, was beautiful. Leopard seals looked like slugs from 150 metres up. They gathered around the large tabular icebergs where our pilots planned to ditch if our plane lost an engine.

During these expeditions, I avoided stories of polar explorers such as Shackleton, Scott and Amundsen. It seemed impossible to relate to these all-male teams. The other graduate student on the trip was also a woman, geophysicist Carol Raymond. She now co-leads NASA's Dawn mission, which is orbiting the proto-planet Ceres. We wore paratrooper boots and helmets like the rest of the team, and were still mistaken for secretaries. Both of us experienced what would today be considered harassment.

As students, we dared not utter a word. Such behaviour by male colleagues was considered part of the job, or the woman's fault.

Role models were few and far between back then. There were no female Earth-science faculty at Columbia University in New York where I did my PhD and work today. Marine geologist Marie Tharp, who was the first to map the mid-ocean ridge, would occasionally appear on campus. Deep in mourning for her life partner and collaborator, who had died in a submersible at the bottom of the Atlantic Ocean, she had little time for students such as Carol and me. Outside Columbia, we looked to geophysicist Marcia McNutt, who was said to file her nails on the fantails of research ships before tossing dynamite overboard to blast through the ice.

But just as geophysicists' instruments have captured changes in the ice sheets, we are seeing changes in the scientific establishment. Women now routinely lead expeditions. Institutions take

“We wore paratrooper boots and helmets, and were still mistaken for secretaries.”



Geologist Christine Siddoway maps faults in Marie Byrd Land, West Antarctica.

harassment seriously. The rising generation of scientists is unwilling to accept the hostility that drove many of my friends from science. Female scientists are speaking up; they are being heard, and they are getting work done.

These days, when I look out of the aircraft that carries an imaging system built by my research group, I still see ice — flowing, folding and rotating in its many beautiful forms. But if I close my eyes, I do not picture the frost-encrusted beards of an all-male expedition.

FEMALE FACES

I see palaeoclimatologist Dorthe Dahl-Jensen on the Greenland ice sheet, sheltering in a tiny tent while running a winch that drags an instrument through a borehole. She has drilled ice cores in Greenland and Antarctica to assemble spectacular records of the changing climate.

I see geologist Christine Siddoway, who is trying to figure out how the Antarctic continent tore off from New Zealand. She once spent a sleepless night in her camp as hurricane-force winds lifted snowmobiles into the air and shredded tents.

I see microbiologist Jill Mikucki, with a satellite phone glued to her ear, leading an international team to study ecosystems under the ice.

And I see so many more: glaciologist Helen Fricker, installing Global Positioning

System base stations on the Amery Ice Shelf in Antarctica; Indrani Das, who was drawn by the beauty of snow to leave astrophysics; and Adrienne Block, whose PhD dissertation took her to a remote camp in East Antarctica. It brings me great joy to see so many women among the ranks of polar scientists.

Last November, my team was deployed to Antarctica to launch a programme called ROSETTA-Ice. We used gravity to map the Ross Ice Shelf and to uncover its tectonics, an idea that Siddoway and I thought of more than a decade ago. The fieldwork was led by Kirsty Tinto; I met her eight years ago at McMurdo Station, the main US base in Antarctica. I had been lost in logistics — how to get my team safely atop the ice sheet, along with the fuel — when Tinto walked down the hall that serves as the main street of that small science town. The young geophysicist had just returned from weeks on the ice. Her laughter and confidence caught my eye: she fit my idea of what a scientist should look like.

Now, I don't have to shut my eyes to see scientists in all shapes, sizes, nationalities and genders. It is this rich array that buoys me as I watch the ice sheet shift. ■

Robin Bell is a research professor at the Lamont–Doherty Earth Observatory of Columbia University in Palisades, New York.