

Crossing the icy unknown, hunting climate clues

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Tom Neumann, expedition leader of the Norwegian-American Scientific Traverse of East Antarctica, poses in front of a module, at the Troll Research Station, Antarctica, in February 2009. The Norwegian-American Scientific Traverse of East Antarctica was one of the longest research treks ever undertaken in one of the least-explored parts of the southernmost continent. (AP Photo/Charles Hanley)

(AP) -- On the 27th day of their trek, a dozen "black specks" of humanity crawling across Antarctica's vast white silence, Lou Albershardt heard a sound she'd never heard in two decades on the ice.

The cable powering her drill, a \$100,000 piece of equipment cutting through [ice](#) 302 feet (92 meters) below, snapped without warning and vanished down the dark, frigid borehole.

"I felt my whole body drop," she said. "I couldn't believe it."

Her U.S.-Norwegian scientific team was 500 miles (800 kilometers) from the [South Pole](#), their starting point, and 900 miles (1,500 kilometers) short of Troll Research Station, their destination. They sat atop the 2-mile-high (3-kilometer-high) East [Antarctica](#) plateau, amid "diamond dust" clouds of ice crystals, with temperatures dropping below zero Fahrenheit (minus 20 Celsius), the wind biting, and their most vital research tool, their deep-coring drill, lost - locked in an instant icy grip far beneath their feet.

The expedition faced a wrenching failure. Albershardt knew no one ever retrieved a drill from so deep a hole. "No way."

It was Jan. 18 and the Norwegian-American Scientific Traverse of East Antarctica was already one of the longest research treks ever undertaken in one of the least-explored parts of the southernmost continent.

An ambitious effort to probe the planet's oldest, thickest ice sheet for clues to past climate, it was the first major scientific expedition across the Queen Maud Land region in a half-century. Its goal was to help science better understand how Antarctica and future climate might interact in an age of [global warming](#), how much ice might melt into the sea, how high the oceans might rise.

The first leg was a two-month journey to the South Pole in the [Southern Hemisphere](#) summer of 2007-2008 from this Norwegian outpost in East Antarctica, 150 miles (235 kilometers) inland from the [southern ocean](#).

This summer, the 12-member crew, half veterans of the first leg, left the U.S. South Pole station on Dec. 23 for the return trip, following a more westerly route back north, creeping along, in their cherry-red snow tractors, at the speed of a lawn mower.

The new, Swedish-built tracked vehicles may have been slow, but the transport was "fabulous," said expedition leader Tom Neumann.

A century after explorers first reached the South Pole on skis and dogsleds, these 21st-century scientists were crossing the forbidding icescape while working at laptops, linking to the Internet via satellite, eating three daily meals in one big, boxy, heated module, and sleeping in stacked bunks in another, all pulled along atop outsized skis.

"The whole concept was that we spend as little time as necessary on surviving and as much time as possible to do science," said Neumann, 35, a NASA geophysicist.

He had the team to do it - five Ph.D.s in glaciology and related fields, including Ted Scambos, 53, a leading U.S. ice expert and member of nine previous Antarctic expeditions.

Their dedication, spending four months away from home, was self-evident. Dartmouth College's Zoe Courville, 31, Eskimo-like in her knowledge of ice, had been married for less than a month when she packed up and headed south last October.

"I tend to get excited about snow, and people don't understand," she laughed. Luckily her bridegroom did.

Just as crucial to the team's progress were its Norwegian nonscientists, from Ole Tveiten, the tall physician watching over them all, to Svein Henriksen, a compact, intense former Volvo truck repairman who

followed a simple credo as expedition mechanic: "I never give up."

On Jan. 18 it was Henriksen who saved the day - and the drill.

"Before I knew it, Svein was already working on a `hook'," Albershardt recalled for a reporter after the team reached this station Feb. 21.

In his workshop, a small red module on skis, Henriksen, 40, fashioned a contraption from plate steel and bolts that team leader Neumann likened to "an upside-down tulip." Spitting on it for luck, the mechanic lowered it into Albershardt's 4-inch-wide (10-centimeter-wide) borehole, down 203 feet (62 meters) to where it found the tangled cable.

Swinging and yanking this hook, the team snared the cable, began hoisting it up, but then lost it down the hole again. Over 36 hours, they repeatedly hooked, then lost the cable, until they raised it to 11-foot (3.3-meter) depth. It would go no higher.

They then dug deep into the snow, grabbed the cable and reattached it to Albershardt's winch. But the real prize remained stuck far below. To melt the borehole walls imprisoning the drill, they needed ethanol, and they had none.

Late that Thursday, 4 1/2 days after the drill stuck, a Twin Otter airplane from the South Pole station landed on the ice to deliver 11 gallons (40 liters) of ethanol.

Henriksen now improvised a plastic bottle whose spout would open when it was lowered to the right depth and its cord was jerked, spilling the solvent around the drill. By Friday morning, they were lifting the drill, undamaged, from the hole.

The scientific caravan set off again, with "Lasse" in the lead and

"Sembla" taking up the rear. Scambos had dubbed the four snow tractors with the names of early explorers' favorite sled dogs.

Driving Lasse, Stein Tronstad of the Norwegian Polar Institute monitored a radar mounted like a prow on his ice "ship," searching ahead in the blinding white landscape for crevasses, the deep fissures that wrecked earlier expeditions.

Far to the rear, towed along 300 feet (100 meters) behind Sembla in a black-painted, sun-heated wooden cabin on skis, British scientist Kirsty Langley, also of the Norwegian institute, tuned in the low-frequency deep radar trailing behind on a boom, measuring ice-sheet depth and the topography of East Antarctica's mountainous surface, a mile or more down through the ice.

Buried in wool blankets, her cabin creaking along the ice, she also tuned her headphones in to her favorite rock music.

"You can sit back by yourself," she said. "Time for reflection" - on how ice crystals, for example, are minute, insignificant, but together form giant ice sheets, and "yet we're nothing. We're just little black specks on the ice sheet."

Langley, like others, would ski off alone during breaks, to listen to the boundless silence. Or the team would gather together in the warmth of the living module to watch movies - all three "Godfathers," all three "Lord of the Rings."

Toilet, shower, big-screen entertainment, heated and comfortable vehicle cabins - compared with past expeditions on snowmobiles, pitching tents, digging pits for latrines, the Norwegian-American Traverse was a "luxury trip," said Finnish glaciologist Anna Sinisalo of the University of Oslo.

At their science stops, "it would take just 15 minutes to run wires from the generator, drop the stairs, and you'd have warm space you could count on," said Neumann. Resupplied by air drops of fuel drums, the caravan could cover 70 miles (120 kilometers) on a good day.

One bad day reminded them, however, that Antarctica remained a perilous place.

On Feb. 11, at the last of seven science stops, 8,900 feet (2,700 meters) high on the plateau, the wind reached over 30 mph (50 kmh) and the wind chill factor dropped to minus 85 Fahrenheit (minus 65 Celsius) - instant frostbite to exposed skin. But they had to work outside: The tractors were immobilized, wind-whipped snow freezing the engine compartments.

Henriksen took charge, turning the blast of a stand-alone industrial heater on each engine, taking eight hours to get all four "dogs" revved up. Meanwhile, "five or six of us got frostbite," Scambos said.

Back in action, they drove through the night, to keep the engines warm and get on schedule.

"We drove 24 hours," Courville said, adding of her close-knit team, "There was a feeling we could do anything."

What they did do in two months over the ice, combined with the findings of 2008's first leg, was to create the basis for many months' more work at their home laboratories and computer screens, collating and analyzing data, collaborating and consulting, writing and rewriting.

The last mission of the Norwegian-American Traverse, a \$10-million, four-year project funded by the Norwegian Polar Institute, the Norwegian Research Council and the U.S. National Science Foundation,

was to deliver their four tons of ice cores, 80 boxes, to a Russian freighter that sidled up to the edge of the Antarctic ice shelf north of here, for shipping to the U.S. and Norway.

Analyzing the chemistry of annual layers of ice, looking back 1,000 years, they'll learn how much snow fell under what temperature conditions, detect climate trends, see how carbon dioxide, the chief global warming gas, built up in the atmosphere. Snow accumulation rates are important, indicating how much sea moisture balances out Antarctic ice melting into the oceans, raising their levels.

Surveys by their five "lookdown" radars, besides profiling the underlying landscape, mapped ice layers between coring locations, without chemical detail but showing how layer thickness - and therefore accumulations - varied along the traverse route.

The team left behind two Global Positioning System stations, whose shifting coordinates, read via satellite, will help tell how fast sections of ice sheet are moving toward the sea.

"This really had been a blank spot on the map, geologically and glaciologically," said Neumann.

Most intriguing, perhaps, were the Recovery Lakes, four or more huge bodies of water lying below the 1-to-2-mile-thick (2-to-3-kilometer-thick) ice sheet, lakes up to 600 square miles (1,500 square kilometers) in size, discovered only in 2006 by satellite radar. From gravity readings, the expedition determined the lakes' waters are apparently more than 300 feet (100 meters) deep.

Are they lubricating the ice sheet's flow toward the sea? It's a question investigators are pondering.

For now, the 2008-09 Traverse may have helped answer another key question, whether temperatures are rising in East Antarctica. Preliminary data suggest "we may be seeing a slight warming the past 30 or 40 years," said Scambos, lead scientist at Colorado's U.S. National Snow and Ice Data Center.

That would upend a long-held belief that East Antarctica has cooled in recent decades. And that, in turn, would raise the prospect of more ice, someday, slipping into the sea, raising ocean levels worldwide.

Such conclusions await one, two or more years of analysis and publication, in those peer-reviewed journals whose gray columns discuss the meaning of work carried out, with some risk and great effort, in the field.

That effort, like Svein Henriksen's in the numbing cold of the plateau, isn't always evident in the dry prose of science, but this mechanic finds his satisfaction elsewhere.

"It's a great experience, when everything is going good and you're coming back with all the vehicles," he said. "It was good to turn off the key for the last time, and relax."

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