

## RESEARCH

# Study of Antarctic ice has scary moments for Utahn

*Storm put scientific team in danger of losing costly equipment — and lives.*

**By Joseph Bauman**

Deseret News science writer

When a huge storm buffets the sea ice near Antarctica, the ice sheet begins to break up along a 100-mile-long fracture.



**Ken Golden**

Recently, a scientific expedition happened to be camped on the sea ice in such a zone. Its members, including a University of Utah associate professor, suddenly found themselves in a potentially deadly plight.

"What happened was, the floe that we were on — it started breaking apart," said Ken Golden, who returned recently from his second expedition to Antarctica.

He and other scientists had traveled aboard the research icebreaker Nathaniel B. Palmer for hundreds of miles within the Antarctic Circle. They had just camped on the ice, setting up half a

dozen huts with power lines, vehicle tracks and snowmobiles for transportation.

Beneath them, the ice was 10 to 20 inches thick, and below that was the stunningly cold ocean. If someone were to fall in a hole or a crack, the swift current would immediately drag him under the ice.

"A bunch of us were eating dinner," he said. "Somebody called from the bridge (of the nearby ship) that one crack had appeared . . . A half-hour later our main street was completely broken up."

To their consternation, they saw that snowmobiles were on the edge of big cracks, in danger of plunging 12,000 feet to the bottom of the Weddell Sea.

Open water showed in the camp's tracks. As the ice sheet shifted in the ferocious wind, the pressure of all those moving tons formed a big ridge of ice in the camp.

All hands scrambled back onto the Palmer and worried about the millions of dollars worth of equipment left in camp.

"Fortunately, things stabilized," he said. The next day was spent in carefully reloading all the gear aboard the ship.

The exception was a thermistor. Set up at a site remote from camp, it was a long tube set into a core



**Ken Golden sets up equipment to perform mathematical calculations on an ice floe near Antarctica.**

drilled out of the ice. It would freeze into the ice, and the instruments in the tube would measure temperatures at various depths, sending back the data.

"We lost the whole site," Golden said.

"It must have gotten ridged up, or that piece of ice dove down beneath another floe" when the area

was breaking up.

Golden was on a two-month cruise through Antarctica, in a project called ANZFLUX, Antarctic Zone Flux Experiments.

ANZFLUX journeyed to an area where warmer ocean water wells up so scientists from many disciplines could study changes in temperature and other effects as the

water moved in the ocean and warmed the atmosphere.

The icebreaker is leased by the National Science Foundation, and the cruise involved many different studies, besides the microwave survey work that Golden is doing.

Golden is working on a project called "ARI (for accelerated research initiative) on Sea Ice

Electromagnetics," which concerns the way that sea ice reflects microwave radiation.

A mathematician, he is the coordinator for the theoretical research of the program, which has enlisted about 15 universities and around 50 scientists.

Eventually, based on the models the mathematicians develop and the testing in the field, satellites or airplanes will be able to judge the quality of sea ice. They should be able to beam microwave radiation at the ice and know its thickness, texture and other properties by studying the reflections returning to their instruments.

"It's a major, five-year study being sponsored by the Office of Naval Research," Golden said.

As part of his research, a microwave transmitter was mounted on the Palmer's bridge. Golden could check the condition of the ice in person, to compare the returning echoes with actual conditions.

He left Salt Lake City on June 24 and returned Aug. 25. He was able to use a satellite link to keep in contact by e-mail with his friends, fellow scientists and fiancée.

The trip had many scientific and personal rewards. But at times the work was grueling. "You just get worn down," he said.

The toughest parts were times when he was tired and sleepy in his bed aboard ship, knowing that soon he would have to get up and go outside in freezing temperatures during a big storm and spend three hours getting blown around by the wind while he made measurements.