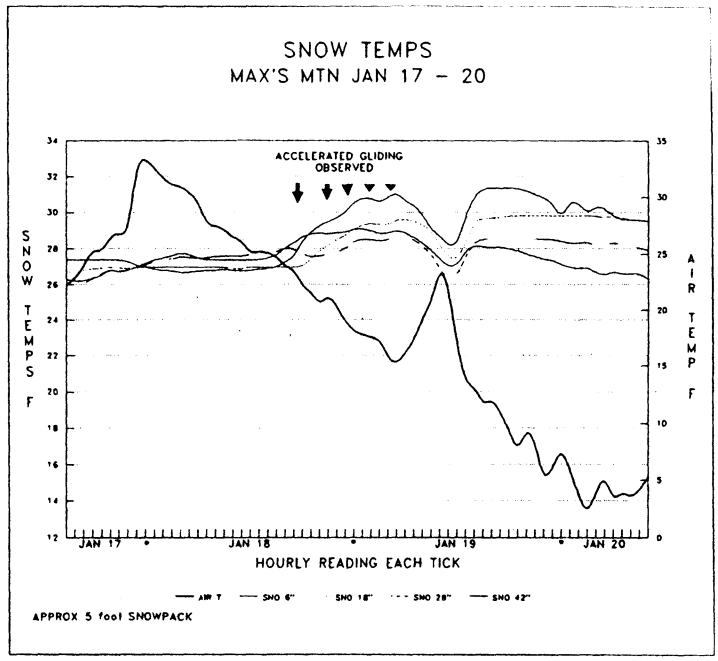
site has a series of thermistors or temperature probes at varying heights above ground level to record snowpack temperatures. Dataloggers record hourly temperatures for each thermistor by averaging ten interrogations per hour. Data was reviewed for periods of observed gliding slabs in the area. In the cases of accelerated glide and gliding slab avalanches occurring with the onset of cold weather the sites showed significant rises in snow temps.

In one example, this year in January after several days of steady air temps (25° to 32°F) and occasional snowfalls, the skies cleared, the air temperature dropped 10 to 15 degrees in about twelve hours and area-wide gliding slabs accelerated, some avalanching. In this same twelve-hour period at the 3300' site in the five-foot-deep snowpack temperatures warmed rapidly as follows:

6 in. above ground	26.9° to 31.4°F
18 in.	27.0° to 29.8°F
28 in.	27.5° to 28.7°F
42 in.	27.4° to 29.1°F

The sensors at this site have a history of not being calibrated right on the money so correction factors have to be used, but the change in temps is the important consideration, not the absolute temperature, which does not seem to be affected. The two other sites use newer, reasonably accurate C.S.I. temperature probes that show the same data trends. The sites used for data are not immediately adjacent to glide areas but do reflect changing conditions of the snowpack that seem to be occurring area-wide.

I'll leave it up to the snow scientists out there to put full strings of thermistors in their gliding slabs to help solve another snow mystery. For me, I'm gonna quit scratching my head and from now on anticipate that there are going to be full-depth gliding slab releases, with maybe a regular slab or two popping out because when the weather turns cold the snowpack heats up and starts moving. ❄



Counterintuitively, snow temperatures rise when air temperature drops and vice versa. Glide avalanches seem to occur after air temperatures have droppped.

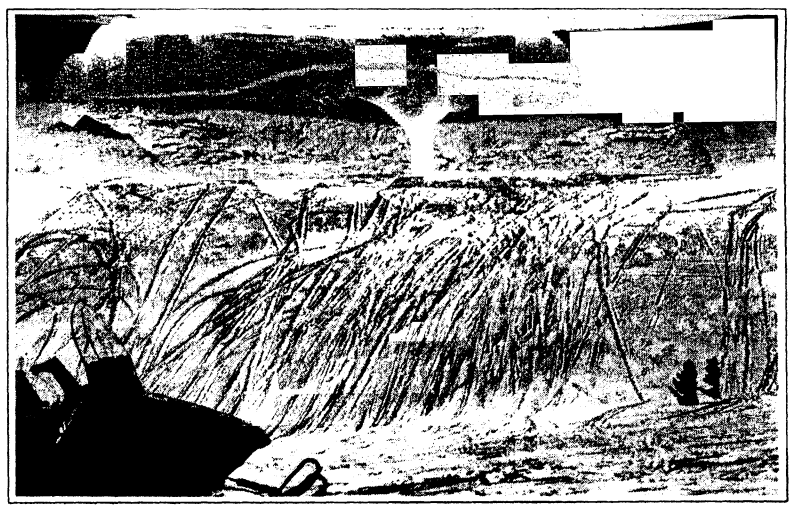
Anatomy of a Snowmobile-triggered Avalanche Fatality

by Karl Birkeland

Southwest Montana had its first avalanche fatality in two years when a snowmobiler was killed in a small slide near Cooke City, Montana, on February 4, 1992. Clear cold nights and dry weather throughout the latter half of December and the first half of January led to the creation of a weak layer of recrystallized snow topped off by large surface hoar crystals throughout southwest Montana. Four days of light snowfall from January 16th to 19th (with a water equivalent of 0.9 inches) buried this layer largely intact.

A larger storm, accompanied by significant winds, deposited 1.3 inches of water at a nearby SNOTEL site from January 24th to 26th. Several natural avalanches ran during this storm, and many small slides were triggered in the days following it. In the next week, there was little or no wind or precipitation reported from the area, but the weak layer in the snowpack was persisting and only gaining strength slowly. The surface of the snowpack was hard, making snowmobiling on steep slopes possible.

On February 4th, about a week and a half after the last major loading event on the snowpack, twenty-five-year-old Kent Biermeister went out on a snowmobile ride with five friends. The group was from Minnesota, and they had rented their machines in Cooke City. No avalanche rescue equipment was carried. The group headed up to Henderson Mountain and passed right by a recent avalanche before beginning to play "high point" on an adjacent slope. Kent got his machine stuck and, when a friend came up the slope to



This small slide killed a snowmobiler on February 4, 1992. The northeast-facing slope is located on Henderson Mountain near Cooke City, Montana (photo by Ron Johnson).

friend managed to ride out of the slide, Kent was totally buried.

The party established a last-seen point and one rider headed to Cooke City where he gave a fairly sketchy description of the accident site. This led the local search and rescue group to head to the wrong site. A second rider coming for help hit a tree on the way out, injuring his shoulder. A thorough interrogation of this person by the Incident Commander established the correct location of the accident, and that information was radioed to the rescue group. They responded to the accident site, but 25 valuable minutes had been lost.

The small rescue group quickly set up a probe line between the machine, which the debris, and the last seen point. The seven-person probe team located the victim in approximately 15 minutes and he was dug up in 5 minutes from under about 3 1/2 feet of snow. He had been buried for about 1 hour and 20 minutes and did not respond to resuscitation efforts.

Typical of many of the avalanches that kill people in North America, this was a small slide. It was 1 to 4 feet deep, 300 feet across, and ran only 120 vertical feet. The slope angle at the top of the starting zone varied between 37 and 42 degrees. This accident also typifies the avalanches that snowmobilers often trigger in our region. These riders did not carry rescue equipment, and did not have enough awareof a recent avalanche on a similar nearby slope. Additionally, this accident involved a stuck snowmachine with a person coming to help. This scenario of having one or more stuck snowmachines, and more than one person on the slab at the time of release, is also a common one for snowmobile-triggered slides.

Since that slide, many more avalanches have been releasing on the same surface hoar layer. One other fatal slide occurred on that layer on February 22nd when a mountain lion researcher snowshoeing by himself triggered a small slide that shallowly buried him in a gully in the northeast part of Yellowstone National Park. ❄