

UNITED STATES

ICE AVALANCHE

Alaska, Denali National Park, Moose's Tooth, Root Canal Glacier

On April 24, Ben Kiessel (27), Chris Scharf (38) and Chris Lackey (39) landed on the Root Canal Glacier below the South Face of the Moose's Tooth with the intention of climbing the "Ham and Eggs" route. On April 27, they had climbed up to the eighth pitch and turned around due to thin ice conditions. Upon returning to camp, they met two guides, Kevin Mahoney and Larry Cote, who had set up camp immediately next to theirs.

About 0115 on April 18, the climbers heard the crack of a serac wall collapsing and moments later were engulfed in the blast of an avalanche while in their tents. All five were blown out of their tents and two were partially buried by debris. After he came to a stop, Kiessel took inventory of the scene and said that Mahoney and Cote seemed to be ok. He then found Scharf buried from the waist down and Lackey buried head down with just his feet sticking out of the snow, still in his sleeping bag. They were able to get him out and found him to be breathing, but unresponsive, with blood in his mouth and nose and a "beat up" face. They placed him in sleeping bags with pads on the ground and were able to find a sat phone on which the called NPS for assistance at 0130.

The rescue was not able to launch until 0650. By that time, Lackey had succumbed as a result of traumatic injuries.

Analysis

Ice avalanches (serac falls) result from tensile failure within the ice due to ice flow (creep) within the ice mass and/or glide at the bed surface. It is inherently difficult to predict the timing of this type of failure. Unlike the situation with snow avalanches, there is very little correlation to time of day, aspect, elevation or weather. This leaves few tools available to the practitioner for use in the field. Avoidance and limiting the time of exposure continue to be the best practice. I once overheard a seasoned avalanche professional trying to describe timing of ice avalanches say, "And as for seracs... all I can say is if it looks like it is going to fall it is probably going to fall."

The run-out distance for an avalanche is the farthest point to which debris can reach. Currently, the best methods for determining run-out distance are "...by long-term observations of avalanche deposits; (2) observations of damage to vegetation, ground or structures; or (3) searches of the historical record as preserved in newspapers, old aerial photos, or other written material" (McClung and Schaerer, 2006). Unfortunately very few of these are available for the mountains of the Alaska Range, so we must use other methods.

The debris from this event traveled 1,920 feet out from the point

of impact on an average slope angle of six degrees. This is a substantial distance on a shallow slope angle, and thus it retained enough energy to hit the camp with impressive force. Similar to water, the main flow channel followed the path of least resistance. A subtle depression channeled the majority of the debris (up to feet deep) and deposited it directly through the area of the campsite.

Another significant terrain feature that contributed to this event is the nearly vertical avalanche path. The vertical fall of approximately 743 feet allowed for an almost “free fall” environment for the ice to travel, increasing the speed at which it fell. This appears to have created an explosive impact that broke ice into small pieces allowing them to travel greater distances, also resulting in a substantial air blast that traveled in front of the debris. The air blast hit with such force that it ejected all five climbers from their tents, hurling them into the air ahead of the debris, accounting for their position mostly above or shallowly buried in the debris.

The timing of large avalanche events are sometimes described in terms of “100-year events”, indicating that events this large only happen once every 100 years much like a 100-year flood. They are in effect rare events. This is a dangerous assumption in this case. The hanging glacier that produced this event is capable of producing a much larger one and this size event seems to happen on a more regular basis. Based on interviews, a Google Earth image that captured a similar debris zone and this event, it appears that the return period for this size event is much more frequent than 100 years. It may have a return period as frequent as every five to ten years or less.

An additional component was the guides’ decision to place their camps in this location. Historically, camps on the Root Canal have been used on both sides, up and down the entire airstrip. The approximate campsite location where the accident occurred is a popular area often used by many climbers each year for its view of the entire “Ham and Eggs” climbing route and proximity to plane access. Interviews indicate that there were previous campsites from this season in this location and none in other locations. Choosing camping locations in this area is difficult due to the large scale of terrain and multiple potential hazards (rockfall, snow avalanches, weather, and serac fall) that threaten the basin. At times one may trade one for the other, making decisions difficult, even for experienced guides.

Professionals often rely on experience to help guide their decision making process. However, experience-based decisions are not always flawless. Studies have shown that novices and professionals make decisions using “heuristics” or mental shortcuts (Tremper, 2008). These shortcuts allow for quick decisions during complex tasks and are based on limited information. Two heuristics that professionals are especially prone to are “social proof” and “familiarity” (McCammon, 2002). In this case the existing campsites and historical use of this area may fall into McCammon’s “social proof” category. “The social proof heuristic

is the tendency to believe that a behavior is correct to the extent that other people are engaged in it” (McCammom, 2002). One of the two guides had also been to the area many times and camped in a similar location on seven previous trips without incident. His decision may fall into the “familiarity” category. “The familiarity heuristic is the tendency to believe that our behavior is correct to the extent that we have done it before” (McCammom, 2002). An additional heuristic that I will add is potentially a calibration problem regarding snow avalanches and ice avalanches resulting from the possible assumption that they behave like the same animal when they do not.

Complex terrain in the Alaska Range demands attention to detail every step of the way, and timing will always be a part of it. Using all of our tools to avoid and reduce exposure will help to reduce the risk but cannot take away all of the risk. The decision to camp in this location worked for many people for many seasons, but not this time. (Source: John Leonard, South District Ranger, and Peter Armington, Investigating Officer.)

(Editor’s Note: Request bibliography from Denali National Park.)

FALL ON SNOW, FATIGUE, FROSTBITE, EXPOSURE

Alaska, Denali National Park, Mount McKinley, West Buttress

On May 12, during a Mountain Trip expedition led by guide Dave Staehli (56), Jeremiah O’Sullivan (40) suffered a fall while descending Pig Hill at approximately the 19,700-foot level, below the summit of Denali. During the fall, he broke his leg and others suffered minor injuries. A different client in the same party had descended with another guide earlier in the day due to signs of frostbite. Staehli and two climbers, Beat Niederer (38) and Laurence Cutler (45) left O’Sullivan near the location of the fall and descended towards the high camp at 17,200 feet on the West Buttress route. Along the way the group was separated and Niederer died from exposure. O’Sullivan was rescued via helicopter. Staehli and Cutler were treated for injuries including frostbite at high camp and flown off on subsequent days.

The forecast for this period of days was for high winds and party to mostly cloudy skies, but both groups observed generally good weather and inaccurate forecasts. On May 11, both groups decided to try for the summit. Mountain Trip 2 (MT2) left high camp at 1121 and Alaska Mountaineering School (AMS 1) left at 1145. When MT2 arrived at Denali Pass (18,200 feet), Staehli noticed that climber Tony Diskin had frostbite on two fingers of both hands and sent him back to high camp with guide Henry Munter. Diskin was wearing gloves and a lightly insulated jacket and reported having had cold fingers and toes all morning.

After receiving an initial call for assistance from Patrick Ormand (Alaska Mountaineering School and AMGA Mountain Guide) at the 17,200-foot camp regarding missing clients high on the mountain from another expedition, a major Search and Rescue operation was