

BASIC INFORMATION

Date: February 16, 2018

Location: Sheenmai Bowl (Southern path)

State: Kashmir, District Baramulla

Summary: 5 backcountry freeriders caught, 4 escaped, 1 buried and killed

Primary Activity: Ski

Total fatal: 1

ACCIDENT DETAILS

Description: Avalanche Comments

The avalanche occurred at 3517 m in the southern path of Sheenmai bowl outside of the Gulmarg ski area. The crown was approximately 100 meters wide (measured on Google Earth) and 60-150 cm deep. The slope of the starting zone ranged from 38-45° with a northwest to northeast aspect (330°-30°). The avalanche ran 660 linear meters and 315 vertical meters with a runout angle of 25°. The avalanche is classified HS-ASu-R2-D3-G.

Weather Summary

Snow depth, precipitation, wind speed and direction data were collected from the Gulmarg Ski Patrol SNOTEL site and the Indian department of meteorology (IDM) automated weather station (AWS) located at 3075m on the Kangdoori plateau, approximately 2 kilometers northeast of the avalanche site.

The morning of the avalanche the Gulmarg Ski Patrol SNOTEL site measured 0cm of new snow. Winds measured at the GSP AWS Gulmarg increased from 6 km/hr at 0800 to 18 km/hr at 10:30 then steadily decreasing. Winds were consistently from the South. Temperatures over the 24 hours leading up to the incident ranged from a minimum of -2.3 C to a maximum 5.1 C. Between 11:00 and 12:00 (the time of the accident) the temperature range was recorded as minimum 4.1 C to a maximum 5.1 C.

Snowpack Summary

At the time of the incident the Gulmarg region was experiencing an exceptionally dry winter. A shallow snowpack in November and December and cold temperatures formed a pronounced weak layer of depth hoar near the ground and across the Gulmarg alpine region. This layer was most prominent on north through east aspects of the alpine region and below treeline. Snowfall on February 12 combined with strong southerly winds produced wind slab in the mid through upper portion of the snowpack. The depth hoar in this case is referred to

as a persistent weak layer in the lexicon of international avalanche advisory standards. Deep persistent weak layers in the snowpack are typically hard to trigger, result in very destructive avalanches due to the large mass of snow involved, and can persist for months once developed. They are often triggered from areas where the snow is shallow and weak, and are particularly difficult to forecast and manage. They commonly develop when a persistent weak layer becomes more deeply buried over time. Deep Persistent slab avalanches are destructive and deadly events that can take months to stabilize. This type of avalanche can be triggered from well down in the avalanche path, and after dozens of skiers have crossed the slope. For this reason, the snowpack in the Gulmarg region is very dangerous by comparison to for example, the snowpack of the previous winter of 2017.

Snowpack analysis indicates the most likely failure within the snowpack was on a crust overlying developed depth hoar. Resting on top of this failure plane was a thick layer of wind slab. The Southerly winds introduced friction to reduce large storm snow particles to small particles forming a dense, deep and brittle slab on North and East aspects particularly at the uppermost, exposed ridgetops. This dense layer (slab) was the heavy, brittle load supported by the weak depth hoar layer near the ground.

At the time of the accident, the air temperature had risen more than five degrees Celsius over four hours. This further destabilizes the snowpack by increasing the deformation rate of the upper snowpack. On a steep slope angle, this deformation will work in a downward direction with gravity; essentially pulling on the snowpack, down the slope, from the surface.

The trigger of the avalanche was caused by adding the weight of four people in close proximity on the slope with a sudden, forceful load to the snowpack at a location where the slab was thin and could be fractured and collapsed into the weak facets below. An additional person traversing the slope down and to the location of the other four persons, and impacting into the slope in a fall caused this sudden force. The fracture in the thin brittle slab caused by the impact was transmitted up the slope in the direction to where the other four persons were adding their weight to the much thicker brittle slab near the top of the slope. The volume of snow slid initially on the crust. As it rapidly gained speed it immediately collapsed into the surface hoar and to the ground, creating an avalanche that contained the entire season's snowpack. A second avalanche was triggered sympathetically on the northern opposing paths by the flow of avalanche debris.

The most recent weather and avalanche advisory was issued Friday, February 16: "A single skier may trigger an avalanche containing the entire season snowpack due to weak persistent layer. Pay particular attention to sudden rises in temperature from late morning onward."

The international rating for avalanche risk in the same advisory was rated Considerable (3). Considerable risk advises backcountry skiers: "Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential."

Accident Summary

The group of riders numbering 9 left Gulmarg ski area from the top station of the gondola. They descended down the southern ridge of Sheenmai bowl one at a time, a technique used to avoid stressing the snowpack and exposing only one member at a time to any risk while others watched in case an avalanche was triggered and they needed to rescue the single group member. Upon reaching the point where the avalanche occurred, the position of the four known group members are indicated (yellow arrow) with the route of the fifth member (red arrow), the point where he impacted (x) and was carried in the avalanche (second red arrow). The fifth member was the trigger of the avalanche as described in the snowpack analysis. He was also caught in the avalanche. The fifth member was carried in the avalanche over rocks and into the gully.



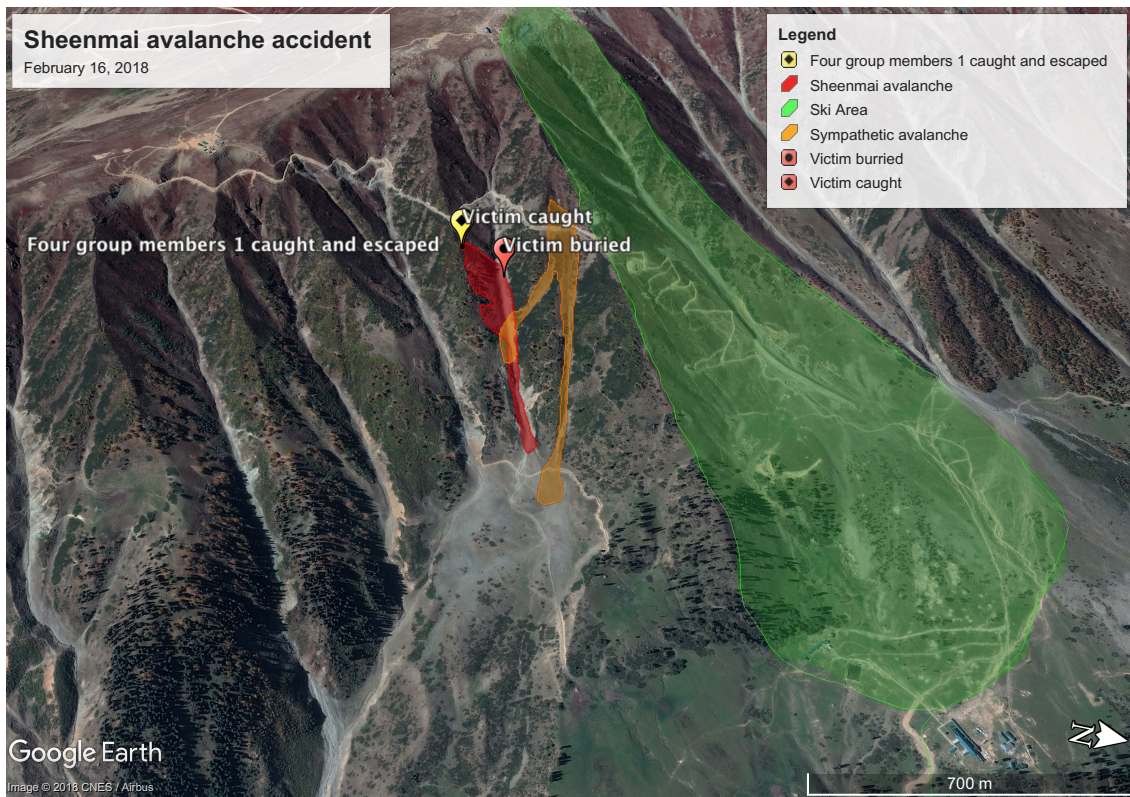
GAC photo of Friday's avalanche

After a short time (estimated by group members at 2 minutes), group members located the victim in the gully. His snowboard was visible on the surface. The victim was attached to the snowboard and buried head first in the avalanche debris. The group members dug out the victim who was unconscious and not breathing. They performed CPR but the victim never regained consciousness.

The victim was wearing an avalanche transceiver, a helmet and a non-ABS backpack which contained a shovel and probe. All group members had read and discussed the avalanche advisory. This was the victim's first visit to Gulmarg. He had not attended the avalanche awareness talk provided in English and in Russian as his arrival date had not coincided with either. This was the group's second run of the day. The first was inside the ski area. Due to his weaker riding abilities the victim was positioned in the middle of the group.



GAC photo of Friday's avalanche



Rescue Summary

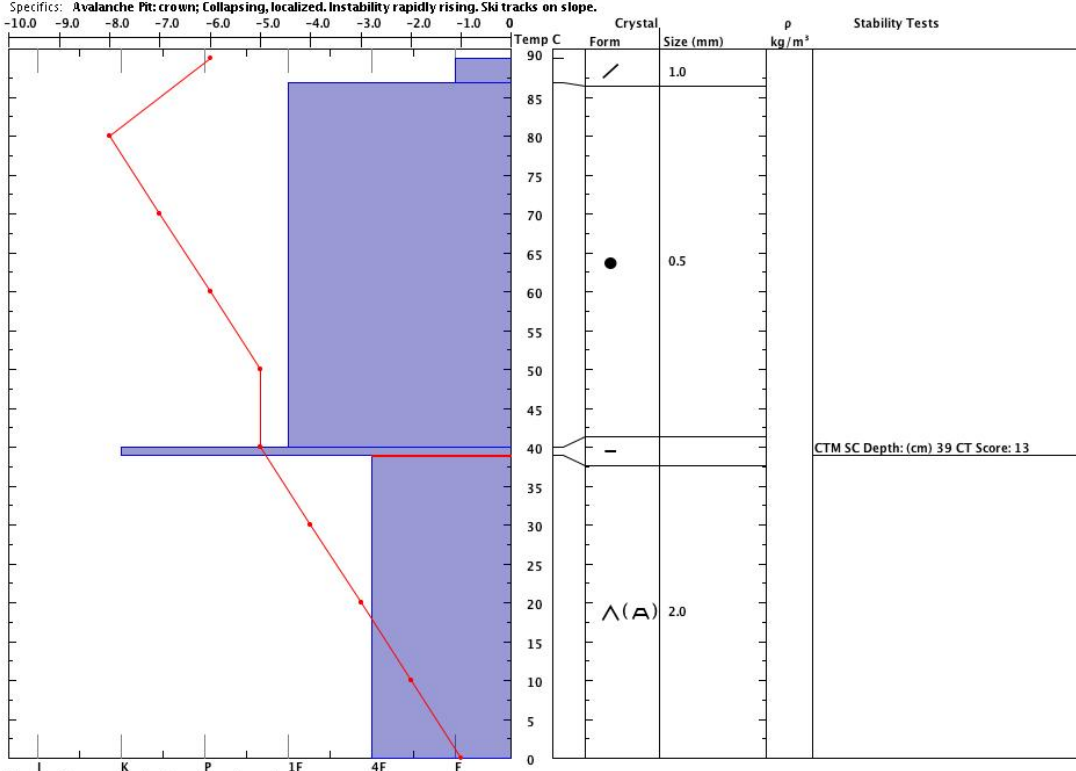
At 12:00 three ski patrollers witnessed the avalanche from the ski patrol base. The second phase of the gondola was immediately closed. Two rescue teams were sent from the Gulmarg ski patrol. The first team was sent from the top station of the gondola to the accident site, carefully descending the ridge of Sheenmai bowl. The second team including the Snow Safety Officer (SSO) and two ski patrollers were towed on skis near the base of the avalanche by snowmobiles belonging to the Gulmarg snowmobile association. One ski patroller from this group was posted as a guard with radio communication in case any additional avalanches might threaten the victims and rescue team. The first team arrived to the avalanche victims in ten minutes and conveyed the information that one victim had been dug out of the snow and that all other victims were accounted for. A second team of rescuers was then sent from the top station with a rescue sled to the accident site. A piston bully snow groomer was sent to make a path to the team at the base of the avalanche path and assist with transporting victims back to ski patrol base. At the avalanche site, the second team arrived and once the victim was secured in the rescue sled, able victims were sent to the awaiting team at the base of Sheenmai bowl. The rescue concluded after the difficult task of maneuvering the rescue sled and victim down the steep remainder of Sheenmai gully and to the piston bully for transport to ski patrol base. The incident was cleared at 14:15.

Comments

The onsite investigation was conducted on February 17, 2018 by Brian Newman of Gulmarg Avalanche Center (SSO of Gulmarg Ski Patrol), Mhmd. Anwar Sheik, Mhmd. Maqbool Sheikh, Mohd. Abbas Wani, and Bilal Ahmad Lone of the Gulmarg Ski Patrol.

Thanks to Colorado Avalanche Information Center for their support.

Snow Pit Profile Observer: **Brian Newman** Stability on similar slopes: **Poor** **PF30 HS90** Layer notes:
Sheenmai Bowl **Sat Feb 17 11:40:00 IST 2018** Air Temperature: **1 C** Stability Test Notes: **0-39: Problematic Layer**
Pir Pinjal, India Co-ord: **43 S 440429 3764501** Sky Cover: **Clear**
 Elevation (m) **3517** Slope: **35** Precipitation: **None**
 Aspect: Wind loading: **previous** Wind: **S Light Breeze**



GAC Forecaster investigating Friday's avalanche