Girose Glacier Ski Descents and Persistent Slab Problem in La Grave, France
February 8th, 2019 ; Southeast Corner of the Girose Glacier, Col Girose, La Grave.

Situation / Overview

A week after a significant storm and avalanche cycle, on February 8th, a guided group of skiers skied two avalanche slopes with a present, but stubborn and borderline dormant persistent slab avalanche problem. From the top of the Girose Glacier Teleski in La Grave, France, the group made a high traverse moving East along the top of the Girose Glacier. The first ski descent started at an elevation of 11,300 feet and dropped to 10,900 feet. This descent has a maximum slope angle of 45° and an average of 41° and is a NE aspect. The group then made an uphill transition and traversed across the bottom of an avalanche debris pile from a R2.5, D3 avalanche that released naturally 5 days prior. The skiers continued a traverse line and eventually began an ascent up the second ski line, East of the recent avalanche. This ascent and descent has a high point of 11,490 feet and significantly flattens out at an elevation of 10,650 feet. This run has a maximum slope angle of 40° and an average slope angle of 30°.

The group skied these slopes without incident or identifying any red flags. The first ski descent (Run 1) on the looker's right side had seen about a dozen ski tracks before the guided group

skied the slope. There was no new or old skier traffic present in the traverse across the recent avalanche or on the second ski descent (Run 2) on the looker's left and there were no known ski descents of this second run yet this season. Though the group accessed the high traverse from a Teleski lift, the terrain is unmitigated and avalanche-prone. The question that has yet to be answered is, how close was the group to triggering a similar avalanche to the one between their ski descents?

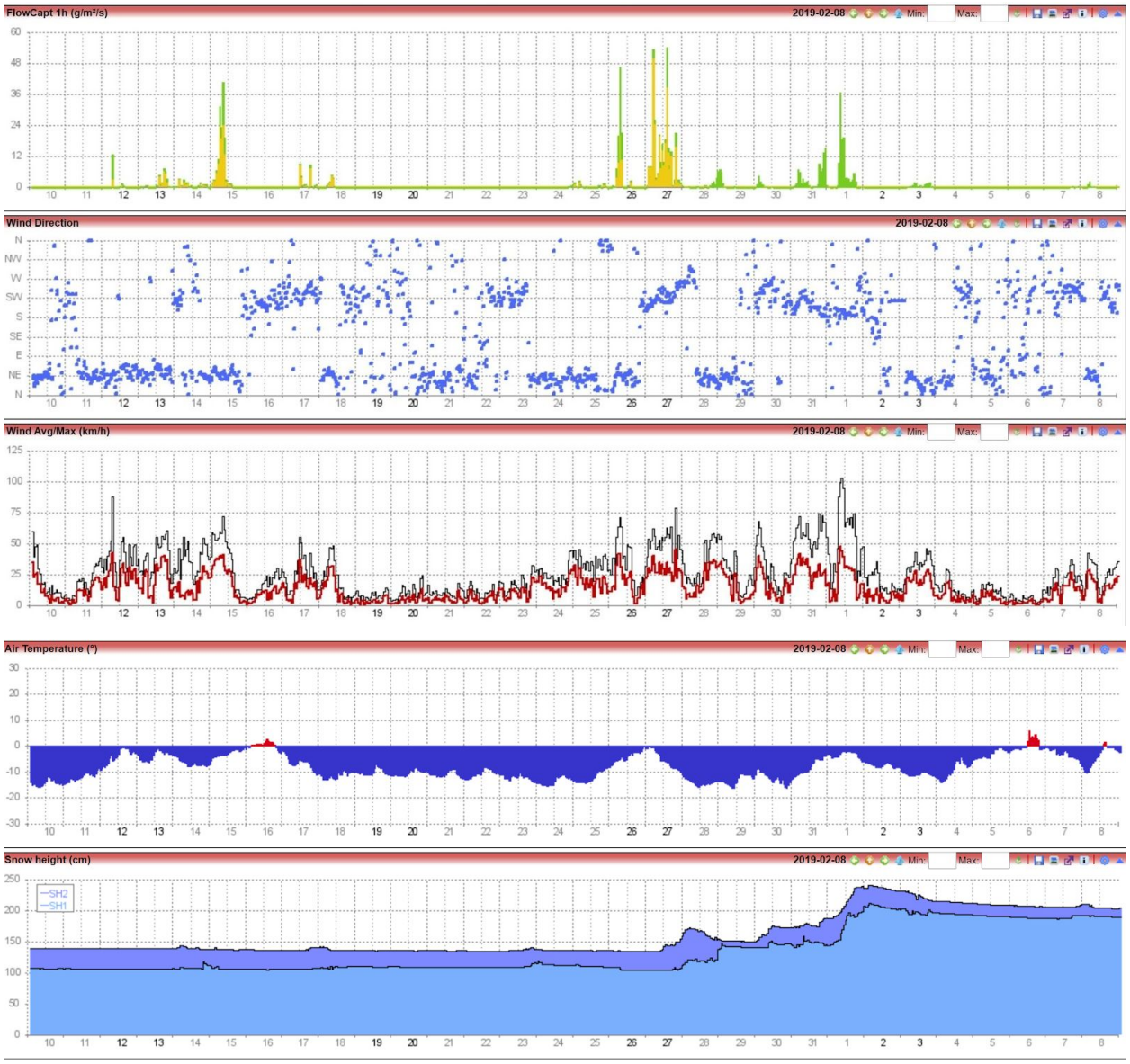
Weather

January 2019 in La Grave was characterized by lower-than-average snow totals and correlating shallow snowpack, and lasting early season snow in the mid and upper elevations, more widespread on northerly aspects. January had multiple multi-day high pressure systems with an unseasonable lack of precipitation. One of these high pressure systems came on the tail end of a significant warming event on January 16th. The subsequent low temps created a crust on this top layer of the snowpack. On January 27th, significant snow began to accumulate in the mountains. A low pressure system began to steadily increase the snowpack on the 27th, and 28th, and on the 29th - 31st snowfall rates became more significant as the storm gained strength and moisture.

This data was recorded from the 3200 lift station. The station does not publish historical weather data online. This data is from the guide's AM and PM forms but was published by MeteoFrance and Téléphérique de la Grave.

Date	20190204	20190205	20190206	20190207	20190208
Elev. (feet)	10500	10500	10500	10500	10500
Wind (mph)	E 10 - 15	E 10 - 15	SE 5 - 10	W 20-25	NW 25-35
Sky	CLR	CLR	CLR	OBS	FEW
High Temp (F)	16	24	28	22	18
Precip (inch)	0	0	0	4	0
ISO (feet)	6050	7200	9200	7800	7200
Rating	Consid. (3)	Consid. (3)	Consid. (3)	Consid. (3)	Consid. (3)

Below is data from the FlowCapt Chambon ridgetop weather station at 8000 feet located about 3.5 miles northwest of Col Girose for the 30-day period prior to the Col Girose ski descent. This station is specialized to measure snow depth and wind transport of snow. Note the wind directions and associated snow transport.



Snowpack and Avalanches

The January 27th - January 31st storm deposited between 2 and 3 feet of snow around La Grave/La Meije and the Northern Ecrins. Higher snow totals were seen in elevations above 10,000 feet. The new snow fell on a weak existing snowpack roughly 2 feet deep at elevations below 9000 feet and about 4 feet deep at higher elevations. A buried near surface facet layer adjacent to a buried crust in the mid snowpack was present and widespread from the January high pressure systems, which is the primary layer of concern. A basal facet layer was also present and widespread in higher elevations and on north aspects that held on to early season snow. Mild temperatures and significant warming on solar aspects allowed the overall snowpack to gain some strength over the course of the period leading up to the day of the group's Col Girose ski descent.

Between the late January storm period and the group's Col Girose ski descent, many avalanches were recorded with a notable spike on January 31st. These are recorded on an informal basis by observation submission and many slides in the area go unrecorded. This spread is representative of a big loading event and followed by persistence of a stubborn weak layer with some wet slides on solar aspects mixed in as well. Avalanches occurred on all aspects but a majority occurred on North through East aspects and were up to D3 in size.

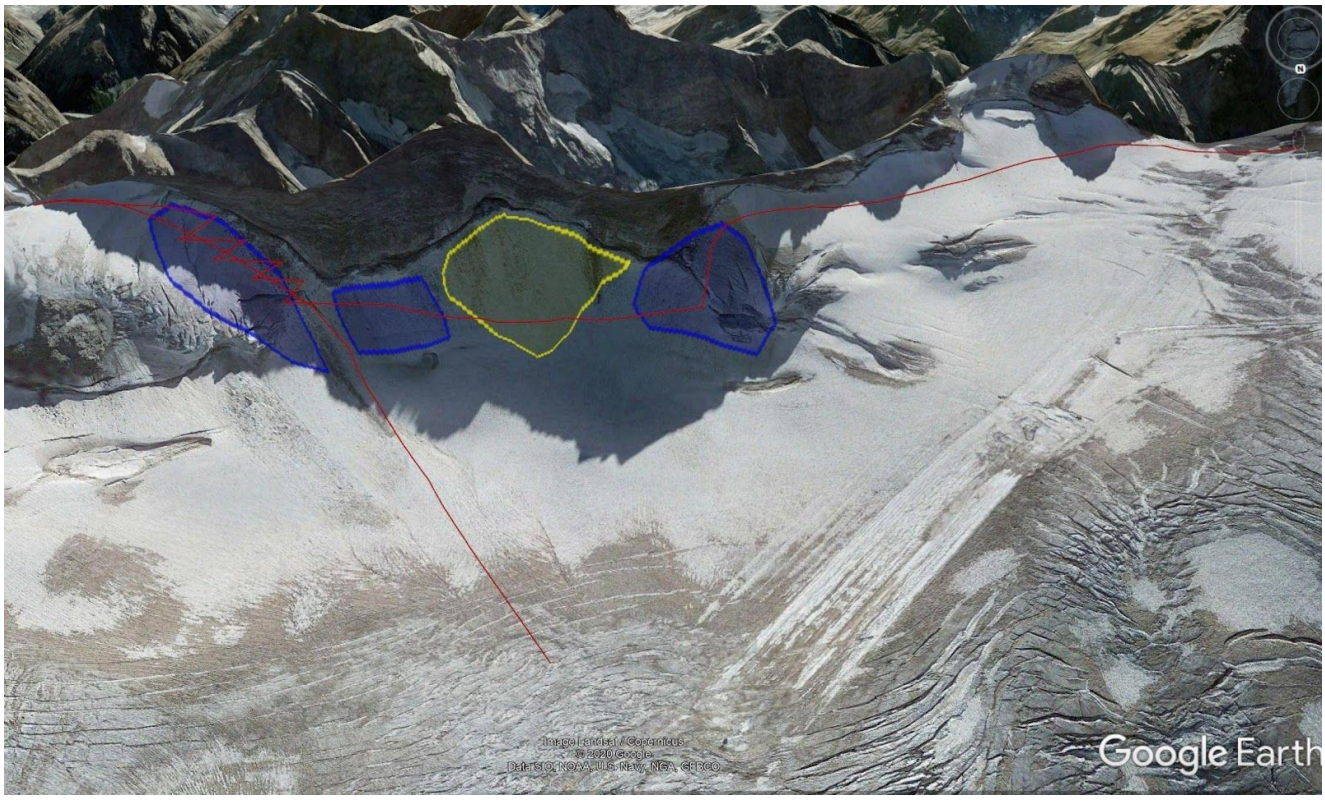
Date	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6	2/7	2/8
#	3	25	10	2	9	3	6	0	1	2

The recent avalanche that the guided group of skiers crossed underneath was a natural trigger that likely released 5 days prior during the February 1st - 3rd storm event. This avalanche is classified as SS-N-R2.5-D3. The crown depth ranges from 4 - 6 feet, the length is 500 feet wide and the avalanche ran 300 feet. A deeper crown line can be seen on the right side of this photo which corresponds to the loading patterns from the previous two weeks as seen in the weather charts above. This right side of the crown faces NNE, while the other side is tilted more directly north.

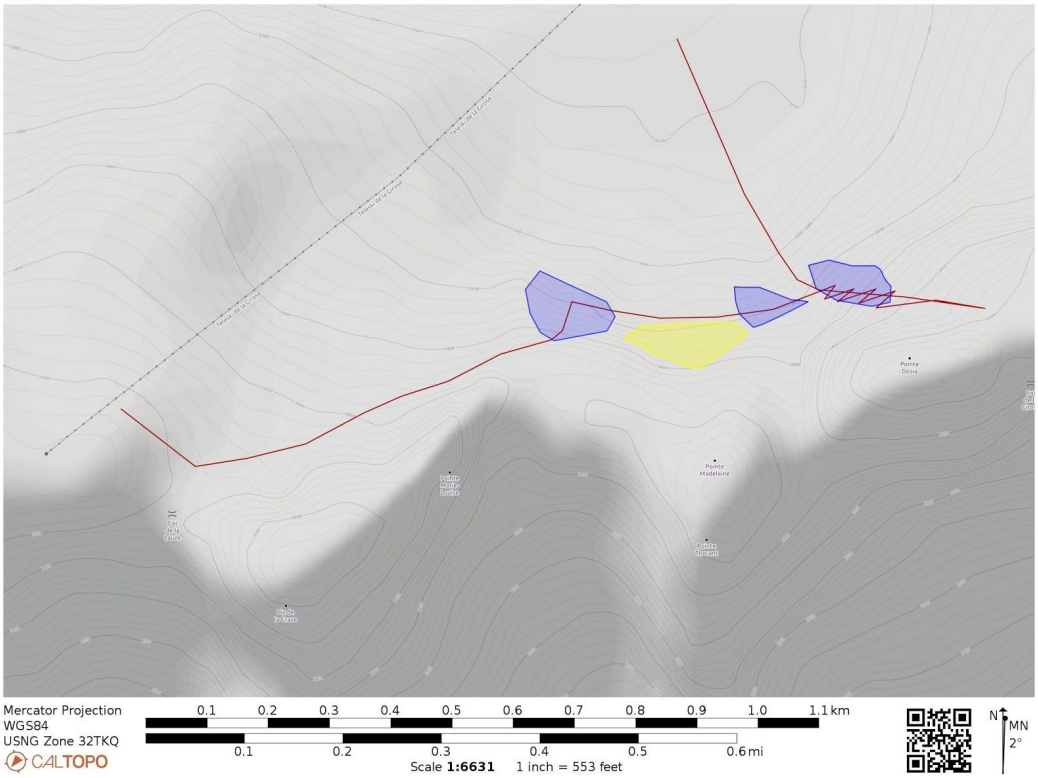
Terrain:

This situation takes place in glaciated avalanche terrain on largely north-facing slopes. The individual slopes have some west or east tilt to them, but the terrain is largely north-facing. The traverse is on the top of a glacial slope that steepens near the bergschrund and where the ice meets the rock face of Pic de La Grave, Pointe Marie-Louise, Pointe Madeline, and Pointe Dosia. The initial traverse from the lift is low angle and planar until the terrain rolls over on a convexity at Run 1 with an average slope angle of 41°. After the convexity, the slope is planar in nature and void of any terrain traps, with the exception of buried crevasses. After skiing Run 1, the skiers are on the same slope as the recent avalanche. This slope is planar with an average slope angle of 42° (measured from the top of the ice to the traverse track). An R5 avalanche would encompass this entire slope underneath Pointe Madeline.

Top of First Ski Slope: 0283985E, 4986471N ; 11,300' ; Aspect NNE
Crown of Crossed Avalanche Path: 0284255E, 4986430N ; 11,526' ; Aspect N
Top of Second Ski Slope: 0284751E, 4986504N ; 11,490' ; Aspect NW



This Google Earth image gives a visual representation of the group's ski tour, an outline of the recent avalanche (yellow), and other avalanche paths crossed (blue).



This Caltopo map shows the ski tour overlaid onto a topographic map. The yellow area represents the recent avalanche while the blue areas represent adjacent avalanche paths that are significant to this ski tour. Keep in mind that the tour is at the top of a glacier and the slopes above the glacier are too steep to hold significant snow.

A skier descending Run 1. Another skier can be seen on the low traverse and the lead guide can be seen waiting underneath the old avalanche.

*The group gathers before heading up Run 2. *Skiers are below a bergschrund, not an old crown line**

Discussion

The hounding question is, did the guides accurately assess the avalanche hazard on these particular slopes and their ability to trigger an avalanche on the buried weak layers, or did they get away with it.

The recent avalanche in this zone was important feedback that gave insight to the strength of the persistent weak layers and how they reacted to a significant new load. With five days between the avalanche event and the group's Col Girose ski descent, there was potentially enough time for some strengthening changes to happen within the snowpack. Unfortunately, the group did not dig down to investigate the specifics of these layers and their reactivity. The strength of these bonds was assumed based on previous field observations in different locations and an increase of confidence with stepping out into more and more aggressive terrain in the days following the storm. There had certainly been a strengthening trend around La Grave over this week - some of that snowpack healing was happening faster in some areas than others. There had also been a significant decrease in avalanche activity as shown in the chart above. In lower elevations and on solar aspects, there is no question that the heat input into the snowpack was actively stabilizing the new load, rounding old facets, and bonding layers together. However, in higher elevations, and on northerly aspects, it is unclear how much stability was gained in those 5 days. Arguably, it would have been smart for this group to investigate the strength of this high-elevation, north-facing snowpack before committing to it. There were a few strategies that the guides used to manage this problem, which were met with a confirmation bias and we will never know how close the group really was to triggering another avalanche.

There were a few terrain characteristics and group strategies that acted in favor of this group. The first ski descent had already a dozen tracks on the slope since the storm. It is possible that this slope was also skied before the storm and sustained some degree of skier compaction or a disruption of the persistent layers. Additionally, this slope faces Northeast - the slight change in aspect from North, where the majority of recent avalanches were recorded and where the avalanche problem may have been less active. The second ski descent has a Northwest aspect. All pieces of terrain in this ski tour had clean avalanche run-outs and do not feature any significant terrain traps. The group used good tactics for travelling through this terrain, they had the skill to move quickly through avalanche terrain one-at-a-time and they stopped in areas that were outside of avalanche run-outs.

Author : Patrick Scanlan

Author's Note:
I was the "tail guide" on this 10-day trip to La Grave with Carrabassett Valley Academy high school ski athletes, working with a highly experienced and local IFMGA Mountain Guide. This program has been traveling to La Grave since 2001 and in those days was skiing with Doug Coombs, Miles Smart, Ptor Sprecineicks, and other high-level, high-profiles skiers and guides. The guide we currently work with is a descendent of this lineage in a way - a mentee of Doug Coombs, a close friend to Chad Vanderham, and a very, very experienced and talented ski guide. However, on some level I feel like when the CVA van rolls into town, there is pressure on this person to perform and to keep pushing the realm of possibility with this group, since the athletes are all very talented skiers and the program has a bit of a pedigree in La Grave and in other parts of the world.

I know that my coworker had some good rational for skiing these runs today, and his experience in this area is matched only by a few people. This day of skiing was awesome - unbelievable snow and terrain that we delivered to our clients. In hindsight, though, and all factors considered, I wonder how close to the line we really were. At the time, our margins felt good and our management strategies seemed appropriate, even conservative. A couple funny feelings when transitioning to go up Run 2 and then looking back on the day, which led to more reflection on how big our margins were on this day. With a group of students, I think our margin was too thin on this day.

There are some personal factors that go into this as well. Having already gone through the AMGA Ski, Alpine, and Rock guide courses as well as a Pro 1 avalanche course at this point in my career, I was well into my guide education but found myself getting caught up in "expert halo" quite a bit, especially when working with super high-level guides like in this scenario and in a couple other scenarios with 2 other IFMGA guides that I have found mentorship in. After this non-event and a couple other close calls in the mountains with these people, I have really found myself bringing more to the conversation and putting out my opinion more when it comes to risk and hazard assessment, even when those I am working with have significantly more experience.

I would like to note that historical weather and snowpack in this part of France is rare to find and old government avalanche and weather forecasts are not publicly available. I regret not taking better field notes and recording of observations, but I feel that I was still able to paint an accurate picture of the situation for the purposes of this report.