

INCIDENT REPORT: THE SOCIAL IMPACT OF MOUNT MASAGO AVALANCHE
IN THE TATEYAMA AREA (NOV 23, 2013)

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ABSTRACT: On Nov 23rd 2013, a size 3 avalanche occurred on Mount Masago in Japan, which involved 7 people from 2 groups. All were buried. Although immediate rescue was conducted by skiers and snowboarders who were near by, the incident resulted in 7 fatalities. This was the largest avalanche tragedy in the last two decades. The avalanche was a deep persistent slab, combined with melt-freeze crust and facets. This incident resulted in significant public discussion and commotion as 1) this happened in the Tateyama alpine area with easy public transportation access, 2) the area has become popular as the first skiing area in the at the start of the season, and 3) expansion of internet media such as social networking. In this article, we report the avalanche data such as terrain, snowpack and weather, human factors, as well as the intense interest by media and its correspondence. The accident gave a big impact to the local society. The local government started to provide a new guideline of usage for Tateyama area.

KEYWORDS: avalanche accidents, rescue, public safety, human factors, deep slab

1. INTRODUCTION

The Tateyama area is well known mountain range in Japan surrounded by 3,000m peaks. It is located in Toyama prefecture (Figure 1). Among these mountains, Mount Tsurugi, or “edifice of rock and snow”, attracts many hardcore climbers in Japan.

On the other hand, the Mount Masago area is easily accessible with public available transport to 2,500m in altitude and together with its bowl shaped terrain from the glacial age, the area has become popular for early season backcountry skiing. To date, over 1 million people used the public transportation to access the mountain range between Toyama and Nagano, and the area has become a major mountain tourism asset, especially for Toyama.

The mountain range in Tateyama is 30km from the Sea of Japan. This brings significant snowfall in winter, and the average snowpack depth usually

reaches 8m at 2,500m in altitude. Because of this, public transportation and mountain huts in the Tateyama area are closed from the end of November to mid April.

As backcountry skiing has become more popular over the last decade, many people visit the Tateyama area at the beginning of snow season as well as for the spring ski season.

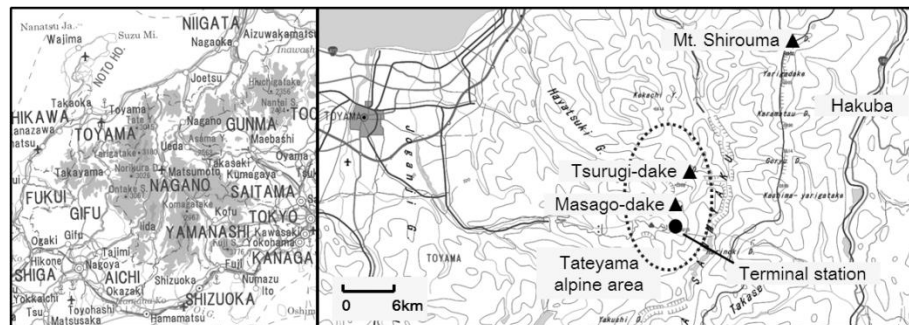


Figure 1: Location of Mount Masago and Toyama prefecture

Mountain huts are usually fully booked on the weekends at the end of November, just before they close for the season, and approximately 1,500 people (including day visitors from the valley) ski within an area of 20 square kilometers. In spring, up to 10,000 general tourists arrive at the terminal station in the alpine area, enjoying the alpine scenery with snow.

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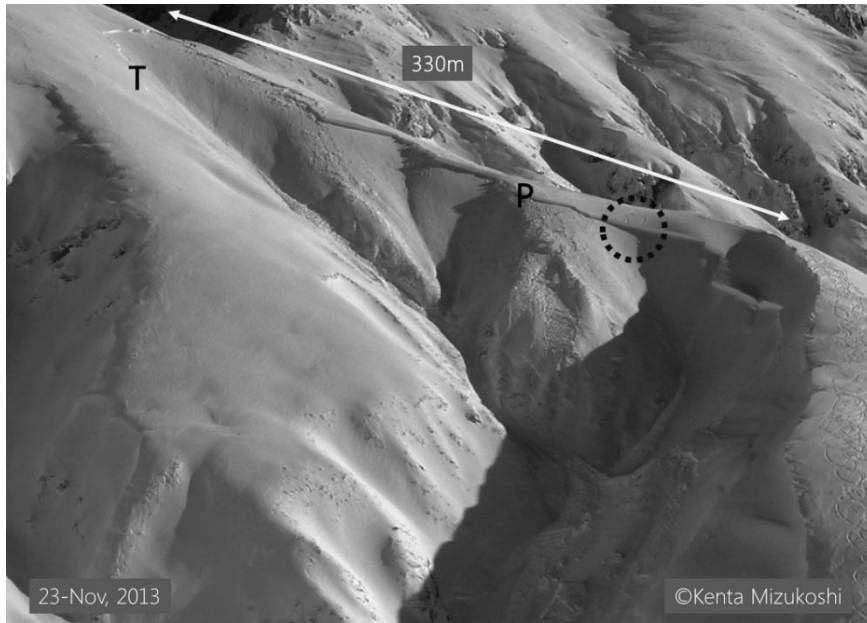


Figure 2: Avalanche start zone. T is the trigger point. P is a fracture line snow profile investigation location. The dotted circle shows ski tracks set before the avalanche.

2. AVALANCHE SUMMARY

On Nov 23rd at around 10:55am, a skier triggered a size 3 slab avalanche in the north-west facing gully of Mount Masago. The elevation difference was 480m (fracture line at 2,780m with debris ending at 2,300m). The avalanche involved 7 skiers from 2 groups, which all of them were fully buried 1.5-2m deep and died from suffocation.

The avalanche occurred when a skier near the upper ridge traversed the gully to check the slope and stopped at T in Figure 2. Both he and his wife

were caught in the avalanche. At the same time, a different group of 5 skiers were traversing in the avalanche run out zone at the bottom of the ridge (Figure 3, location R). As a result, these 5 skiers were caught in the avalanche and fully buried.

Their location was not visible from the trigger area due to the direction of the ridge. Prior to the avalanche, 2 snowboarders and 1 skier skied the same slope from the dotted circle in Figure 2, without triggering an avalanche.



Figure 3: Accident site. Five skiers took a rest at R. While they were traversing the run out zone, all caught in the avalanche.

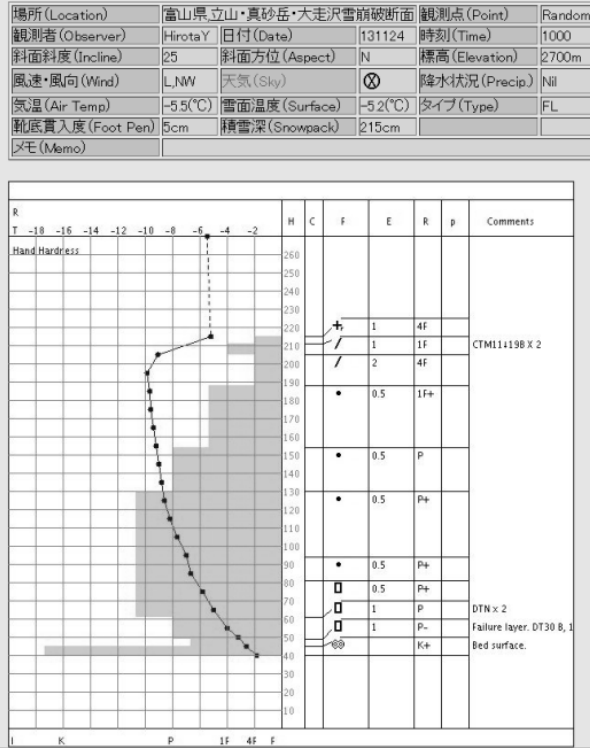


Figure 4: Fracture line profile

The fracture line investigation was conducted on Nov 24th. The weak layer was a 4cm thick layer of 1mm facets on top of a K+ hardness melt-freeze layer from the Nov 10th rain. The depth of the crown wall was approximately 150cm on average, ranging from 20cm at the trigger point to 300cm further down slope.

There were at least 30 skiers and snowboarders on the adjacent the ridge when the avalanche occurred. The initial search was conducted immediately by two professional mountain guides (Figure 5). Recreational backcountry skiers and snowboarders also voluntarily joined the searching and digging.

For many of the recreational users, this was their first experience of an avalanche accident. People helped with digging if they had limited skills in beacon search, or ran to the near by mountain hut to get an AED device. They were searching a wide area of debris without any information about the exact number of people involved in the avalanche.

All the people who were caught in the avalanche wore beacons. The 6th body was recovered within one hour or so, and at about the same time the mountain rescue team from the Toyama police arrived. The last body was located and recovered by the police team.

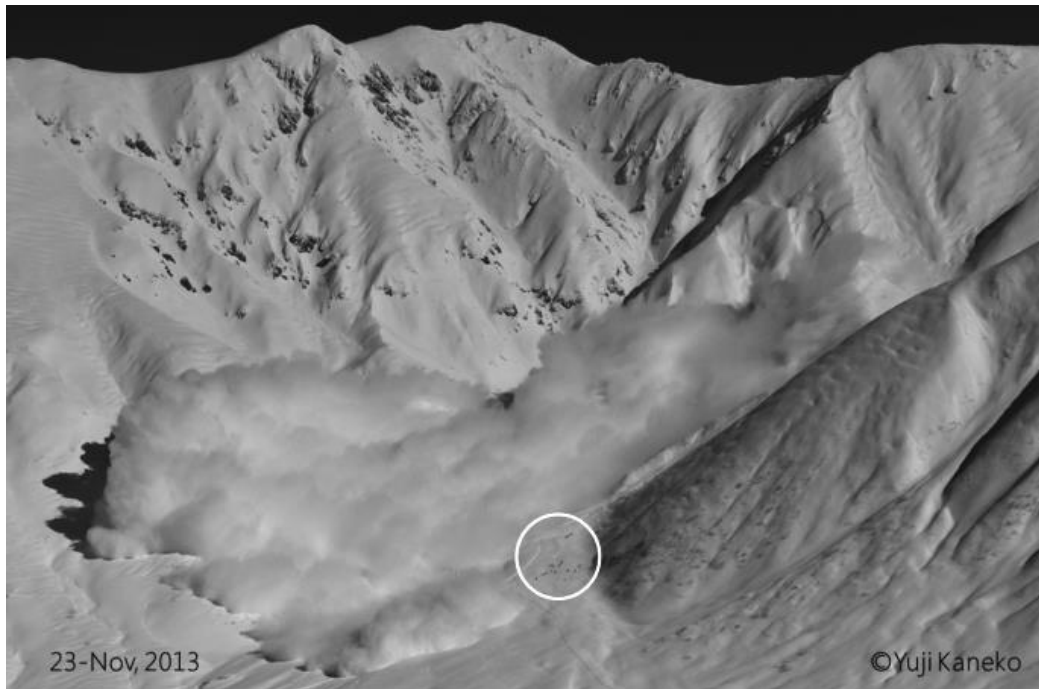


Figure 5: Powder cloud of avalanche. White circle indicates 2 guided tour groups.

3. WEATHER & SNOWPACK CONDITION

The first snowfall of the season was reported at 2,500m in mid-October 2013, which was earlier than usual. At the beginning of November, the snowpack depth was 30-40cm, allowing early ski though exposed rocks.

On Nov 10th, it rained up to 3,000m in altitude as low pressure passed by bringing warm air. This was followed by cold air, which brought significant snowfall in the urban area of Toyama. The weather became clear on Nov 16th to 17th, and the snowpack surface on the sunny slopes formed a melt-freeze layer, while recrystallization of snow and 2-3mm surface hoar were observed in shaded areas.

A weak typical winter pattern arrived on Nov 18th, and periodic snowfall was observed until Nov 22nd, with the main snowfall on Nov 20-21st. Over the 5 days of storm, 150cm of new snow fell at 2,500m. On Nov 23rd, the day of the avalanche accident, the weather was clear from the morning, with little wind. Prior to the incident on Nov 16th, instability due to the combination of the Nov 10th rain melt-freeze layer and facets above was reported in a test-snow profile (2,410m, NW, CTM (SC) down 45cm on FC 1-2mm, HS 60-90cm).

This result was reported on the Snow Bulletin Board, JAN's information sharing system for mountain snowpack. No avalanche activity related to this weakness was reported on either Nov 16th or 17th. Although Snow Bulletin Board contributors noted this weakness as a point of consideration, only limited observation were available due to the poor weather and visibility from Nov 18th to 22nd.

Avalanche sounds were heard and re-

ported on the Snow Bulletin Board during this period, however the location and detailed information was not available due to the limited storm visibility.

4. DECISION MAKING & HUMAN FACTORS

The two people who triggered the avalanche were frequent backcountry skiers, and they had received basic avalanche education in the past. It is assumed that they understood the avalanche risk after significant snowfall. There were multiple skier triggered avalanches on the same day (Nov 23rd). All the avalanches prior to the Mount Masago Size 3 avalanche were relatively small, size 1-1.5 storm slab avalanches in isolated areas. No natural avalanches were observed.

Nov 23rd was a good weather for skiing, and there were tracks everywhere on many slopes in the Tateyama area. Figure 6 shows Raicho-zawa gully (A), which is located to the west of Mount Masago. The campsite is located at the bottom, and the debris from the Mount Masago avalanche is visible on the right side of the picture. Looking at these ski tracks, even cautious skiers might have thought that the conditions on the day were not that bad.



Figure 6: Raicho-zawa gully and the camp site

5. MEDIA

This was the first avalanche in Japan where significant information was recorded in photos and videos, and shared broadly on the Internet mainly through social media such as Twitter and Facebook. The same information was used by the mass-media, and English information was also quickly distributed. Among this, there was some inaccurate information which spread domestically and internationally.

The media's interest was focused on the size of the avalanche, and JAN was asked by numerous TV stations and newspapers to provide commentary. As a result, JAN's avalanche size classification became widely known. We considered the importance of appropriate communication to those who are not accustomed to mountain recreation. For backcountry skiers the lesson learnt from this accident was on terrain selection after significant snowfall, and group management. But for those who are not accustomed to mountain activities, avalanches are considered scary and not well understood. Therefore, to make it easier to perceive the snow's weight and destructive power, we gave an example of snow shedding from a roof. Additionally, we explained why people suffocate when they are buried.

On the other hand, some guides and frequent backcountry skiers posted their comment on the social media without any professional thoughts & considerations, which triggered unnecessary criticism of the people who were involved in the avalanche. In other words, social media activity accelerated "Victim Blaming" that William Ryan described in 1971.

Under the circumstances, JAN organized 8 Avalanche Nights (awareness seminars for avalanche safety) in December 2013, and provided the investigation report as well as education to the audience, pointing out that this type of avalanche could happen to anybody, and that there is uncertainty in avalanches. The session held in Tokyo was webcast on the Internet to provide information for those who were not able to attend on site.

6. LOCAL GOVERNMENT RESPONSE

After this avalanche accident, Toyama prefecture has agreed to provide a guideline whereby mountaineers and skiers coming to the Tateyama area for skiing are asked to submit their plans and to wear a beacon. This guideline needs to be included in the local government regulations in order to

make it mandatory. The decision by Toyama has not yet been included in their prefecture law. However, it is a guideline with a strong recommendation and to the general audience, people felt that it is now mandatory to wear a beacon.

Local government regulations prohibit climbing two specific mountains during a certain period of the year. These are Mount Tsurugi in Toyama prefecture, and Mount Tanigawa in Gunma prefecture. This is due to an increased number of deaths during the popularity of mountaineering in the 1950 and 60's. However, these are extreme examples. Japanese mountains are in general open to mountaineers and skiers, with a long history and culture. Although some people suggested prohibiting entering the mountains in the Tateyama area after the Mount Masago's avalanche tragedy, the mountaineering community in Toyama stopped that from happening.

The decision made by Toyama came from the facts that 1) there has been an increase in the number of skier deaths during the last decade, and 2) the bullet train, Shinkan-sen, line will extend to Toyama in April 2015 (therefore increased tourism in Tateyama in the near future). Since the Tateyama area is Toyama's central tourist attraction, the prefecture needed to demonstrate a proactive attention to safety, especially after this high-impact avalanche accident.

7. REMAINING ISSUES

On the night of Nov 21st, there was an alert email sent to JAN's email distribution list regarding the conditions in Tateyama. The content included 1) multiple weakness have observed which could result in avalanches, 2) there is elevated avalanche hazard right after significant snowfall, with the report of avalanche sounds on Nov 20th and 21st, 3) the importance of a safety margin within the terrain, considering Tateyama is an alpine area, and 4) links to the past avalanche case reports in the same area.

JAN started providing avalanche bulletins in the Hakuba area using the same standard as in North America and Europe. Though we recognized the importance, we had not provided an avalanche bulletin for Tateyama due to limited resources.

There were 4 fatal accidents in the last 10 years, resulting in 11 deaths and 5 injuries. For all the accidents where JAN conducted a field investigation, persistent slab was identified as the cause of 3 of the 4 incidents (JAN was not able to conduct

the crown wall investigation for the remaining 1 accident, therefore the weak layer was unknown). Among these, the Raicho-zawa gully accident on April 18th 2007 occurred on the day after the Tateyama area was opened for spring season. The avalanche occurred in gully A (Raicho-zawa gully) in Figure 6, and it was a size 2.5 with a weak layer formation around the end of March.

On Nov 23rd, also around 15:30 when the avalanche rescue was ending, there was another size 2 skier triggered avalanche in adjacent Raicho-zawa gully. The slope was heavily tracked out. The triggering skier was able to escape, and a few hikers had their feet buried in the run out zone. There was no crown wall investigation; therefore the weak layer was not identified. As shown in Figure 6, this was a popular slope, therefore it could potentially have been another large avalanche involvement depending on the time of the incident.

8. CONCLUSIONS

The Mount Masago avalanche on Nov 23rd 2013 was the largest accident from the last 20 years in Japan. Uncertainty from persistent weak layers and bad luck caused the accident to even bigger. Then the local social system has been changed by this tragic accident. Toyama prefecture provides a new guideline of usage for Tateyama area. On the other hand, it is positive that many recreational users with avalanche gear and education helped with the rescue.

With regard to risk communication and avalanche education, it is obvious that there is a lack of understanding surrounding uncertainty of this type of avalanche problem together with instant information sharing through social media triggering a negative aspect to the social psychology.

As Tateyama is easily accessible by public transportation, different types of people visit this area frequently. This accident revealed an educational opportunity to improve understanding of risks and the behavior choices in the alpine area.

JAN has decided to provide an Avalanche Bulletin for the Tateyama area starting in Nov 2014 to contribute mountain recreation safety.

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