

**CASE REPORT:
 AVALANCHE ACCIDENTS FOR RECREATIONAL USERS
 2005-6 WINTER IN JAPAN**

Azusa Degawa * , Shinji Ikeda, Yukinori Saotome
 Japan Avalanche Network

ABSTRACT: An average number of people who killed by avalanches each year in Japan is approximately ten. This season, however, we had more than ten people killed. We recognized that there were 44 avalanche accidents which involved people. In these cases, 128 people were caught, 50 injured, and 19 died. In backcountries, 26 accidents involved recreational users, injuring 19 and killing 17. This report is regarding case histories of some avalanche accidents happened to recreational backcountry users which we investigated this winter in Japan.

KEYWORDS: avalanche accident, avalanche incident, avalanche rescue and survival

**1. OUTLINE OF AVALANCHE ACCIDENTS
 IN 2005-2006 SEASON**

1. 1. Avalanche cycle

This winter (2005-2006), Japan had a big year for snow fall. In November, as a beginning of the season, its snow fall was on average.

On November 23, at Mt Tateyama area in Toyama Prefecture, very popular backcountry skiing destination, there was an avalanche accident which killed a backcountry skier. After that accident, heavy snow fall started from mid December, and it continued to snow till the beginning of January. It broke the record for height of snow pack in many places in Japan. This heavy snow fall in short period of time caused many avalanche accidents which buried roads, constructions, and cars.

And at some ski areas, there were accidents that ski patrols and/or users were caught in avalanches.

* *Corresponding author address:* Azusa Degawa, Japan Avalanche Network, 2-37-14-201 Nishiterao, Kanagawaku, Yokohama 221-0001, Japan ; tel: +81-(0)45-430-5736; fax: +81-(0)45-430-5731; email: degawa_a@nifty.com

In backcountries, a lot of people who enjoy yearly holiday skiing in Christmas and New Year, avoided to be in backcountry for this Christmas season. As the result, number of people to be in backcountries was decreased, and as well as number of accidents for this period was decreased to only one case.

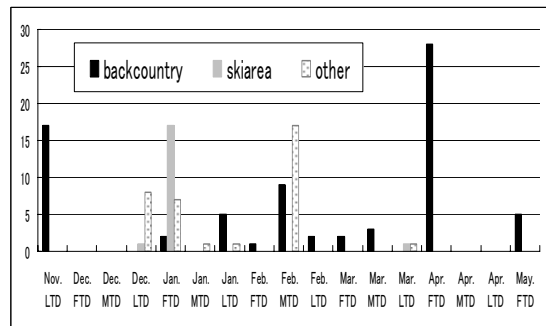


Figure 1: number of people who caught avalanche in months



Figure 2: activity type

Table 1: main accidents

date	area	involved	caught	injured	death	skier	snow-boarder	climber	behavior
2005.11.23	Mt. Jodo	13	13	2	1	6	7		resting, during preparation for skiing
2006.01.04	Mt. Myojin	2	2		1			2	descending
2006.01.28	Myoko Maeyama	7	4	3		7			ascending by skins
2006.02.11	Mt. Ioudake	9	8	4	1			8	ascending, descending
2006.02.26	Mt. Karamatsu-dake	2	2	2				2	descending
2006.03.06	Mt. Sandan-yama	1	1		1	1			ascending by skins
2006.04.08	Mt. Hakuba Norikura-dake	4	4	1	3	4			during preparation for ascending
2006.04.09	Mt. Kotoomi-yama	12	7	3	2	12			durring travel to main terrain
2006.04.09	Anagedani	4	4		4	4			ascending by skins
2006.04.09	Mt. Abousan	4	2		1	4			just started to ski on main terrain
2006.04.09	Mt. Senjogatake	2	2	1				2	desending
2006.05.01	Mt. Harinoki-dake	5	5	2	3	5			asending by skins
		65	54	18	17	43	7	14	

In mid January, the weather cycle had changed and some low pressures came through in Japan with warm air from the south causing rain fall in many places. Snow pack had already been deeper than average year and a lot of glide cracks appeared, and avalanches from the ground happened in many places. In the beginning of February after changeable weather cycle, we had typical Japanese winter weather pattern with another dumping of snow in short period. Around this time, one avalanche swept an outdoor hot spring packed with many people just aside of hotel, injuring 16 and killing one.

It had been changeable air temperature from late February to March, and we had had snow every week ends since late March. The weather cycle was changed.

We finally had date of April 9 on Sunday (Black Sunday) that many accidents happened for just one day, after dumping snow on previous day of April 8 on Saturday.

1. 2. Victims of avalanches in 2005-2006

In backcountries, we recognized (only from news by mass media, or direct reports to JAN) that there were 26 avalanche accidents. 74 people caught, 19 had injuries and 17 died. 1 out of 19 who had injuries was a member of rescue team while they were working on a rescue mission.

In ski areas, 6 avalanche accidents were happened, 19 people caught, 12 injured (2 among them were ski patrols). The accidents involved 2 ski patrols who had injuries were happened during their avalanche control work. One of them was rescued by transceivers without injury, but the other had damage in his spinal cord.

The accidents for users were happened while they were in the opened area when avalanches came from above them. The accident in the building here is as same as the case of hot springs that it has already been described. There were 6 accidents which involved cars.

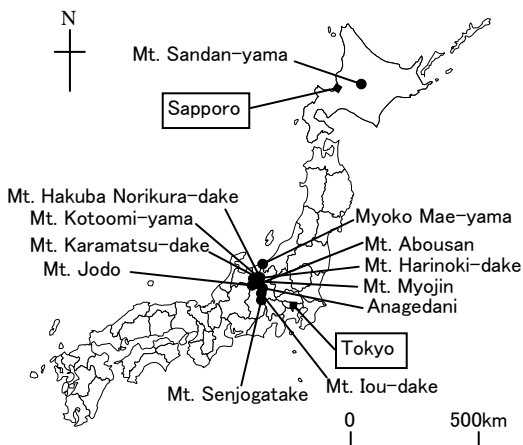


Figure 3: main accidents in backcountry

2. FEATURE OF AVALANCHE ACCIDENTS IN BACKCOUNTRY

We found out following three features of avalanche accidents in backcountry in 2005-2006 season.

1. Accidents happened when it expect instability of snow pack
2. Accidents happened when people do something except descending
3. Accidents that almost all people in the group caught in avalanche

2.1. Accidents when it expect instability of snow pack

The case of Mt. Karamatsu-dake in February 26, climbers were descending with poor visibility after it had had gusty wind for all night. It released wind slab when they walked off from the ridge route. The case of Anagedani valley in April 9, people were climbing up by skins in the valley route that has multiple start zone above after it had a lot of snow fall in previous day. This valley had one of the biggest an avalanche in Japan in year 2000 (it's about 1600 vertical meter run). The case of Mt. Harinoki-dake in May 1 was also happened it in the valley route that is known where has a lot of snow left until late spring, and has enjoying spring ski. Air temperature in many places in Japan had high that is like in summer. It was foehn phenomenon.

2.2. Accidents happened when people do something except skiing

According to the Table 1, many accidents happened when people took a break or were ascending. For example, the case of Mt. Hakuba Norikura-dake, when victims were traveling in storm with gale force wind, they recognized that was wrong route. They caught in avalanche and lost all their gears while they put skins on to return to right route. They were survived from this avalanche but it was difficult to survive without their survival gears.

Three people died for hypothermia, a man survived who had no pulse and no breath for 2 hours 45 minutes. This is a new record in Japan that people survived under the situation for such long time.

The cases of Anagedani valley and Mt. Harinoki-dake were accidents that happened while people were ascending with skins in the valley floor. The case of Mt. Abousan was happened when they were approaching to main slope to get more enjoyable and aggressive line to descent. We pick up three cases in next section.

2.3. Almost all member were caught

According to the Table 1, almost all member were caught by avalanche at the same time. The group of Mt Maeyama was divided into two groups when the accident was happened.

3. CASE HISTORY

We pick up three cases as typical situations of avalanche accidents in Japan. They were happened at Mt.Jodo in Tateyama mountain region, Mt.Maeyama at Myoko area and Mt.Kotomi in Hakuba area. The case of Mt. Kotomi was happened in April 9 when many accidents were happened.

3.1. Mt. Jodo

3.1.1. Summary of the accident

Date of the accident: 23 November 2005

Time of the accident: 11:25 AM

Accident site: North aspect bowl of Mt. Jodo

Elevation: 2650m

Harm: 13 people caught, 8 people were partially buried, 1 person was totally buried. 1 person died, 2 people injured.

Type: soft slab avalanche

Size: 2

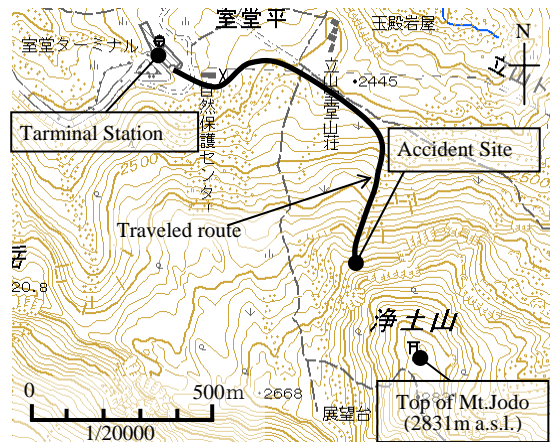


Figure 4: accident site of Mt.Jodo

An Avalanche was happened at the north aspect bowl of Mt. Jodo. 13 people all together in 3 different groups who were preparing for descent or taking a break when they were caught. Mt. Jodo, a part of in Tateyama mountain region in Toyama prefecture, is known to have a lot of snow during winter, and people can have an easy access to the altitude of 2500m above sea level by a public transportation. Mt. Jodo is the closest mountain from the terminal station. This area is very popular for skiers to start off the season and for spring skiing. The day of the accident was on Wednesday, but it was a national holiday, it meant that many backcountry skiers, snowboarders and telemark skiers came into this area.

3.1.3. Weather

The depth of snow pack around in Tateyama area was an average then. It had been snowing for two days, on November 19 and 20th, and the next day (it was on November 21), it had clear sky and many people were skiing around on fresh powder. It snowed again in November 22, and it was heavily snowing with graupel since mid night. November 23, some people recognized that there was a weak layer about 50 cm deep from the surface. The weather forecast in November 23 was to be clear, but it was foggy, visibility was variable from about 20 m to far away.

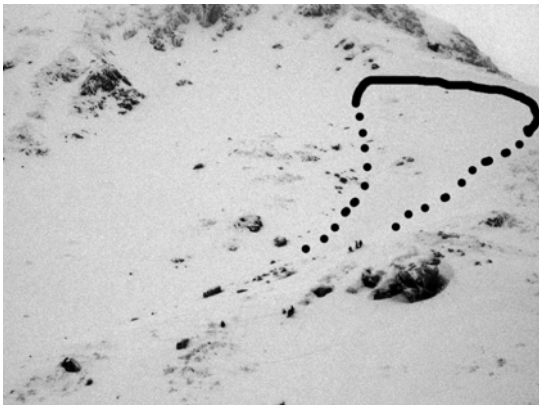


Photo 1: Accident site in the late afternoon of that day ©eldorado2

3.1.4. Accident Description

Three different groups were involved in this accident. Group A was 2 telemark skiers who had 4 years backcountry ski experience came up here for 2 days. Group B was 7 people all together who were telemark skiers, snowboarders, climber (has done for over 20 years) and some inexperienced people. The accident day was last day for Group B, their 3 days ski touring in Tateyama, so that they skied around the terminal station. Group C was 4 snowboarders who came up here for a day. Their experience in backcountry was for a few years.

All these groups had chosen Mt. Jodo area where was easy access from the terminal station. It was about knee deep snow with snow shoes, when they broke the trail. They had been moving around in poor visibility, and they didn't recognize where they were.

The front group which is group A had stopped in the steep slope due to feel too hard

to skinning up. They took a break for a while to make decision whether to keep going up or starting ski from there. At the same time, 7 people of group B which was right behind group A were got close to Group A, and stopped there to prepare for decent. People for Group C which was right behind group B had a break for waiting a person who was walking up slower than others.

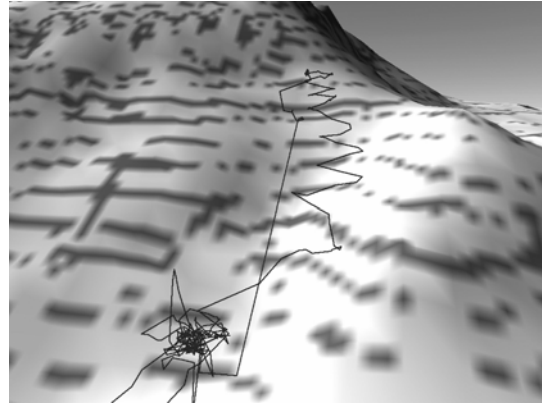


Figure 5: GPS data (recorded every 30 seconds) that is a person had an accident

Avalanche was happened where was around group A or was above group A. People in group A felt that it like coming off their legs. Then, someone yelled "AVALANCHE". People in group B looked up the slope, and saw the Avalanche was coming toward to them. The Avalanche took all the people in group A, B and C down on the slope.

When it stopped moving snow in the avalanche, 4 people were not buried. 1 person was totally buried, and 8 people were partially buried. 5 of them were buried whole bodies except their hands, and 3 of them had only their face out of snow to get airways. The debris was very soft.

People who could get out by themselves started help for digging out other people around. They were buried close together. After finished digging out all people who were partially buried, they recognized that one person was still missing, and they started search by transceiver. It was difficult to manage that all the people from different groups must turn to receive. After while someone found out backpack of missing person in the crack on snow, and dug a person out. This person had already had no breath and no pulse. Lifesaver and doctor together in these groups gave this person CPR, but it could not save this person's life.

3.2. Mt Maeyama in Myoko

2.2.1. Summary of the accident

Date of the accident: 28 January 2006

Time of the accident: 13:00

Accident site: about 500m away from out of boundary, on the way up to Mt Maeyama from Top of chair lift in the Myoko Akakura ski area

Harm: 4 backcountry skiers caught it, and 3 people had injured.

Activity: climbing up with skins

Avalanche data

Type: slab avalanche

Size: size2

Width: 100m

Slab thickness: 60cm~100cm

Length: 400m

Elevation at start zone: 1760m

Aspect: South

Incline at start zone: 38

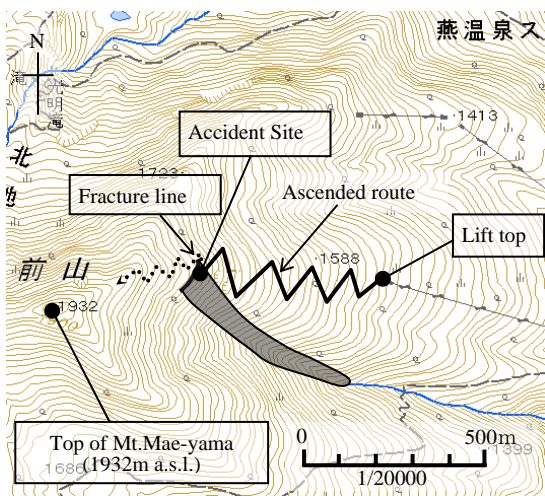


Figure 6: Accident site of Mt. Maeyama

3.2.2. Activity of the day

A group of 7 people started skinning up from top of ski area to Mt Maeyama. The climbing route was already made by someone before this group came up. The leader decided taking the same route due to deep snow pack, but the group was divided 2 small groups which one was 3 people include sub leader who going faster, another was 4 people include leader who going slower.

When the slower group got point A (incline is over 30), they tried to kick turn. One of them had hard time to do, and two people behind this person got point A, and leader had already passed through point A came back for help. It's finally 4 people got together at point

A, and leader had some jumping to make platform for them. Then, the avalanche occurred. All of them (4 people) caught it, but leader grabbed a tree near his as soon as the slab started moving. Leader escaped from the avalanche, but it took three others down.

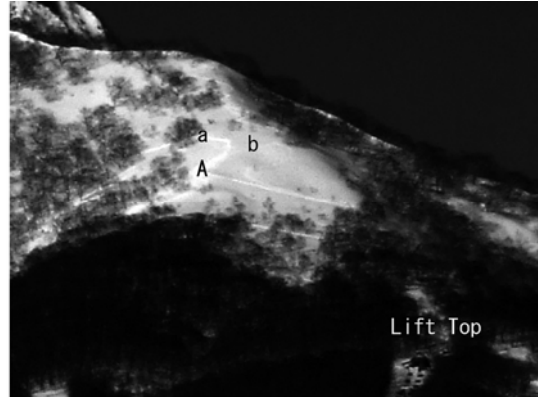


Photo 2: view for accident site with ski area

As the rescue for them, leader and other people who didn't catch the avalanche skied down about 20-30 m for search with loud voice, then found out 2 people who were hanging on trees. Both of them had broken femur. Some people continued the search with transceiver, and found third person who were partially buried at upper run out zone where was down about 200m from the place where 2 people were found. Third person had broken collarbone. It took about 20 minutes until all people were found. It took about hours for taking all of them out from there to hospitals. Ski patrols helped them for carrying out.

3.2.3. Comment

The leader had skied at Mt Maeyama more than 10 times. He knew that normal climbing route is more right hand side than he took the route. We investigated next day and found out that It was different snow pack structures where the south aspect and the east aspect.

3.3. Mt. Kotomi

3.3.1. Summary of the accident

Date of the accident: 9 April 2006

Time of the accident: 1255

Accident site: North aspect Mt. Kotomi

Elevation: 1750m

Harm: 7 people caught, 2 person died, 2 people had injuries.

Type: slab avalanche

Size: 2.5

3.3.2. Introduction

Accident site was about 40 minutes walk up from the Hakuba Goryu Ski Area where is located in Hakuba village that had “Nagano winter Olympics” before. This backcountry area is introduced the ski magazines as easy access backcountry skiing. Because it is short walk up from the ski area and you can have about 1000m vertical ski down.

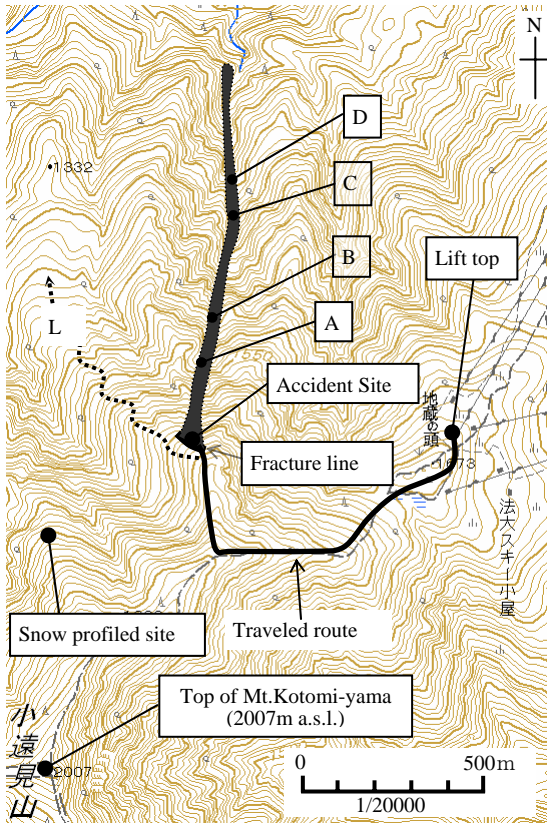


Figure 7: accident site of Mt. Kotomi

3.3.3. Weather

Low pressure passed through in Japan from west to east in April 8. Strong south westerly wind brought sand in Japan from desert in China. After that, it had started snow and it continued to next morning.

The HST was about 40cm above 1500m. Next day, April 9, weather had changed quickly better due to that high pressure moved toward to Japan. In the morning, it was clear sky with light wind.

We have some snow profiles which had taken at similar elevation in about 13 km away from the accident site, and have another profile which had taken at the accident site in 10th (a day after the accident). The failure layer might be rounded snow that had fall in beginning of storm on old surface.

3.3.4. Accident Description

A group of 12 people who were owner of a hotel in village and customers for this hotel decided ski on the north ridge route where they can get for short walk up on main ridge from the top of Hakuba Goryu Ski Area. They started climbing up from the top of ski area soon after at 11:30. This group was not organized very much. They were moving their own speed. The accident was happened while they were moving on the way to point L after short break at top of north ridge.

The avalanche had run in the gully down about 700m vertical. When the avalanche stopped, 2 people were at point A, other 2 people were at point B (1 person died for head injury), 1 person was at point C (died, buried upper body), 2 people were at point D. The other 5 people who moved behind didn't realize this avalanche. They skied down on the ridge L until got phone call from one of them whom caught it.

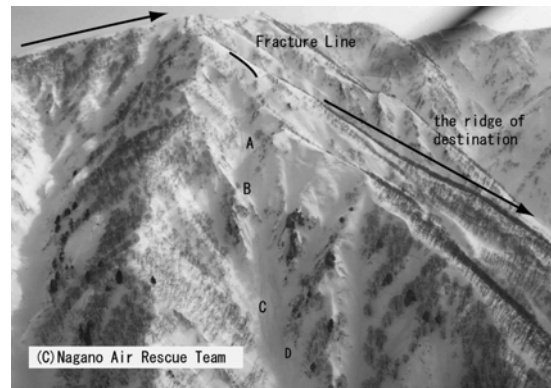


Photo 3: accident site of Mt. Kotomi ©Nagano Air Rescue Team

5. CONCLUSION

It was not so many accidents happened this season if it were finished the season before in April 8. This season had a lot of snow but it doesn't seem that number of accidents concern with amount of snow in backcountry.

As it's reason for many accidents happened in one day, in April 9, we think that the timing of avalanche cycle and national holidays got together and many people came in the mountains for enjoying spring ski. At the end, we found out something from this report that it is lack of terrain analysis skills, route findings skills and group management skills. It give us some important subjects what we work for avalanche education in Japan.