

# Avalanche Analysis for France 2011-2012

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The 2011-2012 season in France saw 23 avalanche fatalities in 15 incidents. The figures were skewed by the death of 9 climbers on Mont Maudit in July in a single accident. Since 1990 only 3 seasons have seen less fatalities and 1992/93 fewer accidents. However the perception in the public mind was a season of avalanches hitting ski runs and infrastructure culminating in a huge slide that destroyed an operating chairlift at Saint François Longchamp on the 2<sup>nd</sup> of March, 2012.

## ***Weather Conditions***

Just as the weather was the author of the Saint François Longchamp avalanche it was also responsible for the low number of avalanche fatalities and injuries. Despite the usual short-lived snowfall in September and October the autumn in the Northern Alps was one of the warmest and driest on record. The driest since 1937 in Chamonix. In the Southern Alps a storm in early November was enough to get the ski touring season underway with “stable, spring like conditions” for the rest of the month. By December only about 25cm of snow remained on shaded slopes above 2300 meters altitude in the Northern Alps, this had largely transformed into a weak layer of hoar crystals.

The first skiable snow fell in the Northern Alps on the 5-7th of December and this was followed by tropical storm Joachim which brought over a meter of snow at altitude over the 15th -16th December. In total there was up to 3 meters of snow during December giving resorts the best Christmas conditions for 30 years. Below 3000 meters the snow fell directly onto the ground, still warm from the autumn. Only on shaded slopes and at altitude did it fall on a layer of hoar crystals but with enough quantity to bury this weak layer for the rest of the season.

Fresh snow was often accompanied by strong North Westerly winds which compacted the snow surface hindering the formation of weak surface layers. As a consequence skiing conditions off piste were often variable but stable. New Year was the hottest since 1947 with rain falling to 2400 meters. There was a lot of natural avalanche activity with the avalanche risk at maximum. Some highways were blocked. The 5/6<sup>th</sup> January saw another storm with very strong winds and there were regular storm cycles throughout the month.

The fresh snow (at most 30cm) at the end of January accompanied by a week of strong North-Easterly winds created dangerous conditions at the start of February at all altitudes. This surprised a number of skiers creating a cluster of avalanche incidents from the 29/1 to the 5/2

An anticyclone over Russia/Scandinavia from the beginning of February brought arctic air to Europe. The period 1st – 13th of February saw an intense cold spell, the 5th coldest since 1947. Bourg St Maurice recorded -18.8°C on the 5th, not far from the -19.6°C set on 11th February 1986 and -29.5°C was recorded at Tignes. The cold brought misery to diesel car drivers as fuel lines froze.

From the 20th temperatures were largely above average. Two periods: the 24/25 February saw 40 year records broken in Tignes with +10.7°C then from the 29/2 to 2/3 with temperatures in double figures at Tignes. It was one of the driest February's for 50 years and overall -4°C colder than average although some areas received 50cm of snow mid-month.

The warm dry trend continued into March. In the Chartreuse it was the 2<sup>nd</sup> driest and the warmest for 50 years. There were a couple of small snow falls in the first to second week of March. The exception were parts of the Western Pyrenees which saw significant snowfall at the start of the February, over 200cm in Aspe-Ossau for example. After an early start the Southern Alps were extremely dry with some respite at the start of March.

The start of April continued the warm dry trend with some ski resorts closing early. Relief came mid month and a period of unsettled, cooler weather continued to early summer with fresh snowfall on the 13<sup>th</sup> of June to mid-altitudes. After a very hot late summer it snowed to mid altitudes at the start of September and towards the end of the month although the fresh snow was very short lived even at altitude.

## **Snowpack**

According to Daniel Goetz, a researcher with Meteo France *”the snow cover during 2011-2012 was not exceptional compared with the first half of the 20th century but you have to go back to 1981-1982 to find similar conditions. At the start of January the snow pack had twice its normal depth in the Northern Alps and was 50% above average in the Hautes-Alpes”*.



*Illustration 1: Full depth avalanche crosses open ski runs*

The periods of heavy snowfall and thaw brought very high avalanche risk (5/5) but these episodes were limited in scope. The 16 and 31<sup>st</sup> December then the 5-6<sup>th</sup> January when heavy snowfall led to large fresh snow avalanches on known avalanche paths with road closures in the Savoie, Isere and Hautes-Alpes then on the 24/25<sup>th</sup> February followed by the 29<sup>th</sup> February – 3<sup>rd</sup> March where the thaw led to

many wet snow slides, often with unpredictable trajectories, some of which crossed open ski runs or hit infrastructure. There were a number of full depth avalanches from the end of January, particularly where glide cracks had already been seen.



*Illustration 2: Glide cracks preceded full depth avalanches*

These slides were characteristic of last winter and were aggravated by the depth and weight of the snow-pack on sunny slope aspects and the fact that the ground was still warm at the end of autumn. This ground was then covered by an insulating layer of fresh snow and because the interface with the ground was not frozen it melted the bottom layer of snow, the humidity facilitating sliding. The slides generally occurred on slopes with grass or smooth rocks.

This type of snow-pack is very resistant to artificial triggering both by skiers and by explosives as part of the work carried out by the piste patrol to secure slopes. As a consequence the number of skier triggered avalanches was very limited, the first fatal incident only occurred on the 29<sup>th</sup> of January. It also meant that an unusually large number of slides crossed open ski slopes, culminating in the Saint François Longchamp incident of the 2<sup>nd</sup> of March in which an open ski lift was destroyed by a slide. Ski resorts were aware of the potential risks (glide cracks, previous slides) but were unable to predict when and where the slides would occur.



*Illustration 3: Ski lift, St Francois Longchamp*

## **Incidents**

The first avalanche incident occurred 10<sup>th</sup> December, 2011 when a skier had a lucky escape after being buried for 20 minutes in Puy St Vincent. The skier had separated from his partner for a section of the descent when he triggered a small slab. The victim escaped with minor injuries. On the 2<sup>nd</sup> of January two climbers were injured in the Ecrins. 20 to 30cm of fresh snow had fallen during the day. The rescue services pointed out that the area above the ice climb is an avalanche funnel dominated by a snow field and it was risk 3/5 at the time. On the 21<sup>st</sup> January a piste patroller was injured in Praz sur Arly during control work. There had been half a meter of fresh snow followed by rising temperatures.

We had to wait until the 29<sup>th</sup> of January for the first fatality when well liked Chamonix local, Felix Hentz, was caught by a slide in the Couloir des Cosmiques. There had been some fresh snow, the avalanche risk was 2/5. Despite skiing with friends and wearing a beacon it took the rescue services 2 hours to find the victim. This incident was the start of a small cluster of 6 reported incidents. On the 1<sup>st</sup> February a group of five soldiers were caught on an exercise above Valloire, injuring one and killing another.



*Illustration 4: Small skier triggered slab avalanche Pravouta, Chartreuse range*

On the 4<sup>th</sup> a snowboarder was killed at Thollon and a ski instructor seriously injured at nearby Sommand. The 20-30cm of fresh powder that had fallen prior to the incidents had been transported by a strong NE wind. The wind was also responsible for an avalanche in the Vercors on the 5<sup>th</sup> that killed one ski tourer and injured another and there were avalanches in the nearby Chartreuse. Avalanche fatalities in these areas are infrequent. It was the first such incident at Sommand for 40 years.

The series finished with a lucky escape for a ski tourer in the Taillefer range to the south-east of Grenoble. Caught and buried by an avalanche he was rescued by his girlfriend after half an hour under the snow. She reportedly had difficulty digging in the rock hard debris. She then found his mobile phone was off so, after administering emergency first aid and leaving him in a snow hole covered with clothes she skied down to the nearest village to call the rescue services. A helicopter rescue crew found the man alive an hour later.

The 16<sup>th</sup> to 21<sup>st</sup> saw a cluster of a dozen incidents with 3 deaths following around 15cm of fresh snow accompanied by strong winds. On the 16<sup>th</sup> an off piste skier was killed on Mont Joly above les Houches when he was taken 30 meters over cliffs. On the 17<sup>th</sup> a lone skier had a lucky escape after being buried by a slide in the Chartreuse. Passing skiers spotted blood on the surface of the snow and checked the debris with their beacons and were able to rescue the victim. At l'Alpe d'Huez a man suffered serious injuries after being completely buried under 150cm of snow.

On the 18<sup>th</sup> another lucky escape in the Bauges when a ski tourer was taken several hundred meters by

a slide that stopped above cliffs. The victim suffered minor injuries. In the Pyrenees a lone skier was killed by an avalanche at la Mongie. His tracks were spotted leading into avalanche debris by a ski instructor. The final incident was in the Chablais massif in the Haute-Savoie when two men were carried over cliffs after triggering an avalanche in the couloir they were ascending. One of the skier was killed by the fall, the other seriously injured.



*Illustration 5: A skier had a lucky escape from this slide in the Chartreuse (photo CRS des Alpes)*

At the end of February a lone snow-shoer was killed by an avalanche in the Bauges, her body was only found several days later after an extensive search. A ski tourer was also seriously injured by an avalanche on the col d'Artigasou in the Pyrenees. A Swedish skier suffered critical back injuries in the notorious Posettes gulleys on the 19<sup>th</sup> March above le Tour (Chamonix) after being taken over cliffs. He succumbed to his injuries later.

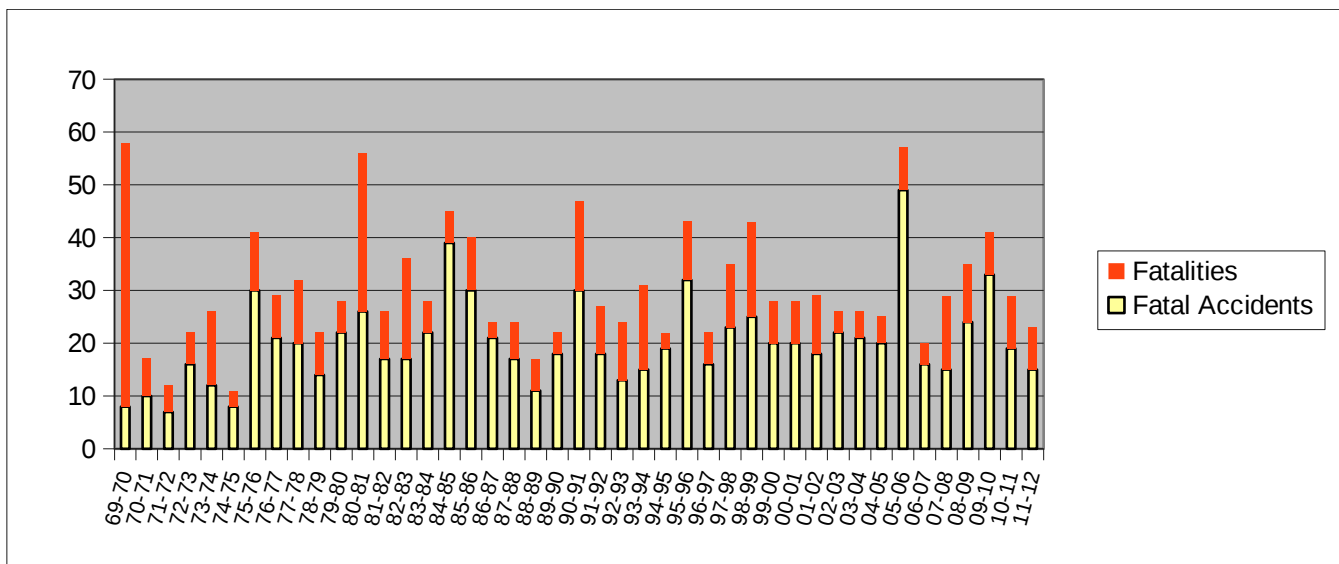
April saw a number of incidents spread over the month, generally following fresh snow or rising temperatures. In the late afternoon on the 4<sup>th</sup> a group triggered a large slide descending from the Col de Passon above le Tour. One of the skiers was taken hundreds of meters over cliffs. This was followed by a walking incident the next day in the Vallée du Lys close to Luchon in the French Pyrenees. A group was hit by a slide in the afternoon crossing avalanche couloirs. On the 9<sup>th</sup> an experienced ski tourer was killed climbing the Roche Noire above Valmeinier. The avalanche was triggered as he changed slope aspect. Following fresh snow on the 17<sup>th</sup> a snowboarder was killed descending the Mont du Borgne (3153m) above Val Thorens in the early evening. His body was found by a dog team. Finally at the end of the month a Norwegian climber was taken by a slide on the glacier du Milieu in the Mont Blanc

range. Initially he complained of sore ribs and a leg injury. Due to a storm the rescue helicopter was unable to reach the man. Guides were able to get him to a nearby refuge at 22h00 but despite efforts of a German doctor he didn't survive the night.

In one of the most serious incidents of recent years 9 climbers were killed on Mont Maudit on the 12<sup>th</sup> July when a serac collapse triggered an avalanche. The groups included celebrated British guide and avalanche expert Roger Payne who was guiding two clients.

## Analysis

The 2011/2012 season saw 23 fatalities in 15 incidents. The number of fatalities and incidents are significantly less than the median figure<sup>1</sup> of 28 (ave 30.9) and 20 (ave 21.7). In all a very good result due in large part to the particular weather and snow conditions but also to the efforts of trainers educators, greater prudence by participants and continued improvements in equipment.



On average there were 1.53 fatalities per incident, above the average of 1.46. However if we exclude the Mont-Maudit avalanche the figure drops to 1, that is there were no incidents with more than 1 victim. This reverses a recent trend towards more serious incidents. This can be explained by the snow pack. With a stable snow-pack the skier triggered slides were relatively small, taking just a surface slab formed by prevailing winds or fresh snow. Mont-Maudit reminds us that climbing groups have far fewer options for escape compared to off piste skiers and boarders and on glaciated terrain rimayes and crevasses are serious terrain traps.

The number of fatalities over the last decade has increased slightly (30.9) compared to the preceding decade (30.3) with a larger increase in the number of fatal incidents (22.8 versus 20.1).

## Avalanche Risk

Where a full avalanche bulletin was issued (roughly from the second week of December to mid April there were 13 fatal accidents in France. 62% at risk 2 (av. 8%), 38% at risk 3 (av. 49%) and 0 at risk 4 (av. 38%).

<sup>1</sup> All statistics since 89/90 unless otherwise stated, this time frame is used as it marks the start in the growth of off-piste skiing due to the introduction of new ski shapes



*Illustration 6: Slabs were often localized and not deep*

### **Activities**

60% of fatal incidents were to ski touring/snow shoeing or walking groups (ave 45%). 27% off piste skiing or snowboarding (ave 43%) and 13% climbing (ave 12%). Ski touring etc are more dangerous than off piste skiing due to the time that participants are exposed during climbing and the difficulty in escaping a slide once triggered. Ski touring continues to figure strongly in the statistics but significant was the drop in off-piste incidents.

### **Area**

8 of the fatal incidents were in the Haute-Savoie, that's double the average. 4 of the incidents were in the Savoie, half the average. This reflects the preponderance of ski touring and climbing incidents in the figures. These activities are more prevalent in the Haute Savoie which consequently has more severe accidents, 1.65 deaths per incident compared to the average of 1.46.

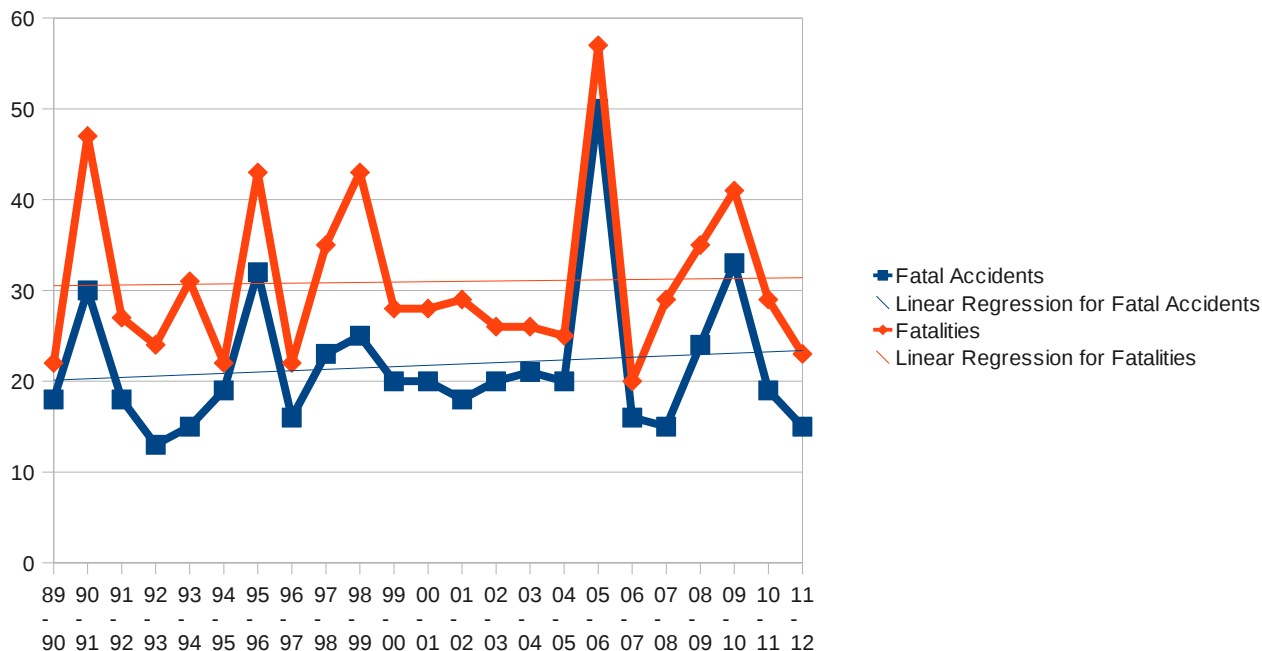
There was a rare fatal avalanche in the Drome department, the first recorded this century. There were no fatal incidents in the Southern Alps (average 5.58). After a good start in the Hautes-Alpes the region had poor but stable snow cover.

There were a couple of fatal incidents in the Pyrenees, this is around average. Conditions were generally good in the Pyrenees with a lot of snow towards the end of the season where the two incidents occurred.



## Time

The most deadly month was February which saw 47% of fatal incidents followed by April with 33% of incidents. January and March had 7% of incidents each, well below average. February and early March are the main winter holiday period and normally see a lot of off piste incidents.



## Conclusions

One season follows another but is never the same.

2012 saw the introduction of a new graphical avalanche bulletin by Meteo France. This bulletin is by mountain range. For example the Isere is split into the Chartreuse, Vercors, Belledonne, Grandes Rousses and Oisans. Although information for each range was given in the old bulletin the avalanche risk as well as the slope aspects and altitudes are much clearer.

It is interesting to note that all the French fatalities were at risk 2 or 3 last season. Normally risk 2 in France only sees 8% of fatalities, last season the figure was 62%. Is this linked to the new bulletin and a change in the way the avalanche risk is evaluated? It will be interesting to see if this trend is continued. Due to the conditions risk 2 and 3 days were more frequent last season, a reminder that risk 2 days still present a danger, especially when skiing above terrain features such as hollows, trees and cliffs.

The good snow stability with respect to skier triggered avalanches is due to a number of factors:-

- Dry autumn, limited and localized depth hoar layer (>2300m on NW to NE slopes)
- Heavy early snow fall bridged weak layers at the base of snowpack
- Snowfall almost always accompanied by high winds which limited the formation of weak layers on the surface of the snow-pack
- Limited snowfall during the main winter holiday period. This partially accounts for the low number of off-piste fatalities.

## Lessons Learned

Once again we see a pattern avalanche incidents

- People out alone
- Poor route choice given the conditions: overall avalanche risk, prevailing wind, terrain traps
- Adverse weather conditions making group communication, route choice and rescue more difficult.
- Poor organization of companion rescue leading to delays

The Taillefer accident mentioned above offers some interesting points. In a detailed article in the ANENA house magazine “Neige et Avalanches” the couple made smart choices when ascending, using a ridge line and roping up to limit the risk from avalanches and falls. On the descent they had good spacing and skied one at a time on suspect areas. However they were on a high route (the summit is close to 3000 meters) on a risk 3 day and were skiing slopes loaded by the prevailing wind, the very slopes they had avoided when climbing.

When the avalanche occurred the remaining skier was careful to note where her companion disappeared under the snow. However she did not have her own mobile phone to call for assistance. Of interest was that she was unable to descend through the “boulder like” avalanche debris and instead skied to the edge of the slide with her beacon in receive mode to the point where her companion was covered by the snow. Don't underestimate the time to climb back up to a victim or the difficulty in searching over avalanche debris. She kept a cool head to locate her companion and make him comfortable although digging him out alone took some time. Unable to get a phone signal at the accident site she skied down but then didn't know the PIN code for the phone. It is important to note that you can always dial the emergency services (112) with a mobile even without a SIM card. Her descent route took her through similar terrain that had already avalanched exposing her to risk. In her account she noted the difficulty of digging avalanche debris. A reminder of the need for metal shovels. In exercises completed by the author this year older people complained about tiring quickly with short handled shovels. Group sizes should be from 3 to 6 so that there are sufficient diggers on the surface and a couple left to go for aid if necessary.

## Falls

Avalanches are not the only danger to face backcountry enthusiasts. Falls, both over cliffs and into crevasses are a persistent danger. In January 2012 there were six deaths in a single week in the Pyrenees alone. Particular attention is needed on routes where it is difficult to turn back once committed such as couloirs, which can transform into ice falls on lower sections. The rescue services at la Grave ran a “taxi service” for skiers trapped in the couloirs that lead down to the main road. On icy routes skiers should not rely on ski crampons but go on foot using good steel boot crampons. Timing is important. North and West sector slopes hardly see the sun in January. South-east to south facing slopes are a better bet in this case. Ropes, ice axes and helmets complete the safety gear needed to cross exposed routes in relative safety.

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