

# Loose Dry Avalanches

## Introduction

Loose dry avalanches are usually confined to surface layers, and therefore are often small. They contain loose cohesion-less dry powdery snow. They start from a point and gather mass progressively in a fan-like shape. They are often referred to as “sluffs” or “point releases.”

## Development

Loose dry snow avalanches occur in cohesion-less surface snow such as, newly fallen snow or old surface snow that has faceted.

### **Time of the Season:**

Loose avalanches of faceted snow are most common in early to mid-winter. Those related to newly fallen snow can occur at any time of the season.

### **Weather Patterns:**

Dry fresh loose snow avalanches associated with new snowfall generally occur during or shortly after a storm before surface layers of new snow have settled and gained strength.

Dry faceted loose snow avalanches are associated with extended periods of clear weather, which causes the surface snow to become sufficiently faceted to lose cohesion.

### **Snow Climates:**

Loose snow avalanches occur in all snow climates.

### **Spatial Distribution:**

Loose snow avalanches require sufficiently steep slopes to initiate, generally at least 35 degrees and typically 40 degrees or more. Loose snow avalanches often start in steep, rocky terrain but can also be triggered in smaller steep glades and slopes.

Dry loose fresh snow avalanches are generally larger and more common at higher elevations where snowfall accumulations are greater and the snow that falls is less dense.

## Avalanche Activity Patterns

### **Seasonal Timing and Persistence:**

Dry loose new snow avalanches can occur at any time of the season. They generally persist only for a few hours although in cold, clear, dry conditions they may persist for several days after snowfall.

Similarly, dry loose avalanches of faceted snow can occur at any time. This condition can persist for days or perhaps a week if dry, cold, clear weather remains entrenched. It is important to note that surface facets that produce loose snow avalanches are likely to become a persistent weak layer once buried.

### **Size and Propagation:**

Loose dry avalanches are generally small, usually less than a size two and tend to involve only small portions of the avalanche path.

Loose snow avalanches do not propagate as a fracture line, but start at a point and then collect more snow and get wider as they move downhill. It is common for multiple loose snow avalanches to start at different points and then join together.

### **Spatial Distribution and Variability:**

Loose avalanches triggered by solar radiation are most prevalent on southeast through west facing slopes. Early in the season, slides are more common on high elevation, steep inclines, while later in the season less steep slopes at lower elevations can also be triggered.

Loose avalanches due to new snow are generally widely distributed over elevations and aspects.

Loose avalanches due to faceting are often more prevalent on shaded north through northeast aspects.

In all cases, a very firm, smooth layer below the loose snow on the surface tends to enhance instability.

### **Triggering:**

Loose snow avalanches can often be triggered easily by ski cutting or started accidentally while skiing or traveling in steep terrain. Loose snow avalanches are generally not triggered remotely and are usually triggered at the point where the snow is disturbed, not involving snow from above.

Weather conditions that promote natural triggering include:

- Storms with high precipitation intensities (>4cm/hour) and significant new snow accumulations (>50cm in a 12 hour period).
- Sudden warming of the snow surface, rocks, or trees due to solar radiation (e.g. sunrise, dissipating cloud).

Avalanches triggered by solar radiation or warm temperatures often go through a diurnal cycle in which stability decreases significantly (and often rapidly) as the sun comes up and temperatures rise, followed by an increase of stability late in the day and overnight as solar radiation drops off and temperatures fall.

## Recognition and Assessment in the Field

### **Avalanche Activity:**

Loose dry avalanches often occur in cycles associated with accumulations of storm snow, periods of surface faceting, and to an extent diurnal temperature and solar radiation effects.

### **Snowpack Layering, Tests, and Observations:**

The weak layer is on the surface and is readily observed. Generally, loose snow avalanches are limited to depths of 50cm or less.

The ease of triggering, size, and power of loose snow avalanches can often be assessed by observing natural activity and by observing the results of careful ski cutting. Slopes can be tested by applying a trigger such as a rock, small cornice, or even a snowball.

Evidence of loose snow avalanching in fresh storm snow is often considered a positive sign indicating that the storm snow is not reacting as a cohesive slab.

Early signs of instability include:

- Pinwheeling.
- Snowballing.
- Spindrift.

### **Surface Conditions:**

Surface conditions are highly indicative of instability. When loose, unconsolidated snow is observed, especially during periods when new snow or surface faceting, the potential for loose snow avalanches and their consequences should be considered.

## Risk Management Strategies

Slab avalanches are perceived as being much more dangerous than loose snow avalanches, but loose snow avalanches can be large enough to pose a threat to people. Even smaller loose snow avalanches can be a danger if the snow accumulates in a tree well or other terrain trap or if the moving snow carries a person into obstacles or over cliffs.

### Timing:

Exercise increasing caution as storm snow accumulations rise and as the depth of surface faceting increases. Consider the likelihood that a diurnal avalanche cycle may be underway due to fluctuating temperatures and solar radiation. Consider the timing of solar radiation on slopes high above, where the sun may be strong much earlier and for much longer than in shaded valley bottoms.

### Human Factors:

Because loose snow avalanches are considered less hazardous than slabs, there may be a tendency to underplay the consequences. In conditions conducive to dry loose avalanches, the lure of powder snow on steep terrain may over-ride the risk assessment process that should take into account factors such as terrain traps, which can significantly magnify the consequences of being caught. Skiers and boarders tend to underestimate the hazard of loose snow avalanches when skiing in trees where treewells exist.

### Terrain:

To manage the risk of loose snow avalanches, avoid situations that could result in being caught in a terrain trap or carried into obstacles or over cliffs. Loose snow avalanches can often be started by careful ski cutting and the slopes below can then be descended more safely after much of the loose snow has been cleaned off.

When descending large steep slopes, be aware of sluffs that gain size and speed from behind you. Travel on ribs and high ground to avoid sloughs that accumulate in gullies, and avoid situations that expose people to avalanches triggered by people above, especially if there are terrain traps (e.g. gullies or tree wells) in the area.

If the loose snow avalanches are too large and fast moving to manage safely, then avoid terrain that is capable of producing large loose dry avalanches until things settle down.

Small loose avalanches can be managed by a process of slough management. By descending a slightly diagonal fall line, any loose avalanches that are triggered will slide beside instead of above you. If caught in a small avalanche that is gaining mass, pull out to the side (ideally onto high ground) as soon as you begin to feel loss of control or manoeuvrability.

## **USE AT YOUR OWN RISK**

This content of this document is intended for personal and recreational purposes in combination with the field book "Decision Making in Avalanche Terrain: a field book for winter backcountry users" only. The content provided in this document is provided "as is" and in no event shall the Canadian Avalanche Centre be liable for any damages, including without limitation damages resulting from discomfort, injury or death, claims by third parties or for other similar costs, or any special incidental or consequential damages arising out of the use of this publication.

Mountain travel is dangerous and can involve exposure to avalanches and other hazards. The advice and decision guidelines provided in this field book cannot eliminate these hazards, but they can help you understand and manage them. This field book is no substitute for training, experience, and choosing skilled and responsible travel partners.

To find an avalanche training course near you, visit [www.avalanche.ca](http://www.avalanche.ca).

## **CITATION**

Please cite the content of this document as: Haegeli, P., Atkins, R., and Klassen, K. (2010) Auxiliary material for Decision making in avalanche terrain: a field book for winter backcountry users. Avalanche Canada, Revelstoke, B.C. Accessed at [www.avalanche.ca](http://www.avalanche.ca).