A 60 SECOND GUIDE TO . . .

the Causes of Avalanches

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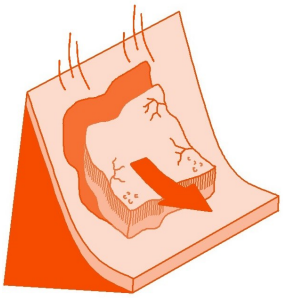
Definition

An avalanche is a sudden and often rapid mass movement of snow and ice down a mountainside.

Types of Avalanche

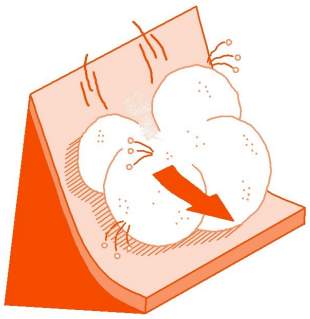
Slab Avalanches:

These avalanches involve large blocks of snow fracturing away from the main plain of the mountainside. They often come about due to high winds, which can force their way between the upper and lower levels of the slab. Of the annual fatalities caused by avalanches, ninety percent of them occur as a result of this type.



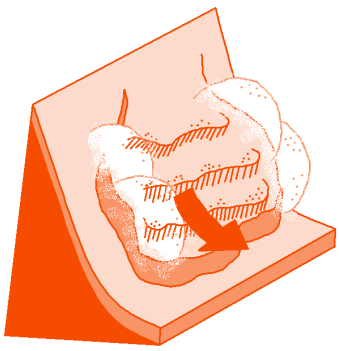
Powder Snow Avalanches:

When snow is very dry, these types of avalanche occur. The top layers of the snowpack mix with moving air and a cloud of snow can make its way very quickly (sometimes more than 300 km/hr) down a hillside. The speed of this type of avalanche is such that it can even cross valley floors and start travelling uphill on the opposite side. Though these are rare, up to ten million tonnes of snow can move in any one of these avalanche events.



Wet Snow Avalanches:

This type of avalanche occurs when the base of the snowpack become wet and a slip plain is made over which some snow slides as a mass while drier, more powdery snow on top forms a cloud which is similar to powder snow avalanches. These travel at slower speeds (around 60 km/hr) but are still highly destructive as they tend to move over a wider area.



Avalanche Processes

Snowpacks

A snowpack is a series of parallel layers of snow that build up over time. These layers become hardened and compacted by ongoing cycles of thawing and freezing. If there is any disruption to this cycle however then the snowpack is vulnerable to avalanche movement.

Each snow fall will have a different set of characteristics such as the size of the snow crystals, and their moisture content. Therefore if snow with a large and weak crystal structure falls onto of a layer that is more cohesive, the slope becomes more vulnerable to avalanches.

Slopes

The gradient of the mountainside is a critical factor in the ability of avalanches to form. The critical slope angle at which most snow will start to move is 38° but many also occur between 25° and 60°. This gradient is shallow enough for snowpacks to build but also steep enough for gravity to act on the snowpack too.

More avalanches tend to occur on the lee ward (facing away from the prevailing wind) side of mountains as there is likely to be a greater accumulation of snow there.

Pathways

Avalanches will commonly taken the already established paths of streams or rivers, taking rocks, trees and ice blocks with them. This creates what is known as a 'trim line': a visible break in the vegetation cover signifying the path of avalanches in the area.

Weather

Prevailing weather can create favourable or unfavourable avalanche conditions. Intense bursts of wind and rain can dislodge snowpacks as well as move extra snow weight to more unstable areas. Sunlight radiation can warm areas of snow and turn them into slip plains.

What triggers an avalanche?

At its most basic level an avalanche occurs when the load that the mountain is holding exceeds its ability to hold it up. However, while the conditions may be right for an avalanche to occur, a single event or trigger is usually needed to kick start the process. For example:

- A sudden increase in snowfall
- Skiers stepping onto fragile snowpacks
- Animals digging through the snowpacks
- Snow vehicles causing vibrations
- Earthquakes or tremors