

# AVALANCHES

## **JANET SUMNER:**

Avalanches! They're all about snow and mountains. Not things we have so much of here in the UK...but we do get landslips and landslides. But since landslides work in a very similar way to avalanches, looking at how and why avalanches happen might help us be more aware of the possible dangers on our doorstep.

In the mountains, snow falls at different times, so the temperature and moisture conditions are different for each snowfall. Now that in turn, affects the shape and the properties of the snowflakes, so each new snowfall becomes a new and different layer. In addition, the older layers of the snow lying on the ground, change their properties as the snow melts and refreezes. And all of these effects help to create a layered snowpack.

Avalanches occur due to the weight of the snow overcoming the strength of the snowpack and the most obvious element in triggering an avalanche is the angle of the slope. As you might expect avalanches don't occur on shallow slopes, so even though we've got separate layers, the books are still tending to stick together. In fact you have to get above 25 degrees for the snowpack to fail.

The final push can be triggered by external factors - skiers or loud noises for example - but it can also occur naturally if the load on the snow pack is increased by further snowfall or if the snow pack is weakened due to melting. But it's also the physical properties of the snowflakes in each layer and how well they do, or don't, bind together, that can have a crucial effect.

These ones stick together really well, but flat platy icy snow flakes like these cause problems, because they don't have any hooks or jagged

edges. They can't hold onto the layers of snow above and below, and they form a slippery sliding layer called a weak layer, which I'm going to mimic with these salt crystals.

Okay, make up my snowpack again and let's see what happens. It slides off much more easily along the weak layer. And that is pretty much how avalanches work. Now you can try this experiment yourselves using different thicknesses of books and try to find different weak layers. Is a pile of thin books more or less unstable than a pile of a few thick books? And what difference does the texture of the book cover make? So get experimenting and send us your results.

Now let's try creating a more realistic looking avalanche using some of the stuff I've got lying around in the kitchen. I'm making this snowpack out of icing sugar, which is made up of particles that do stick together pretty well. So that's my first layer, which I'm just going to tamp down.

And now I'm going to add a layer of chocolate Ovaltine which I hope is going to behave as my weak layer, because the particles of dry Ovaltine don't stick together nearly as well. Then I'm going to top the whole thing off with some more icing sugar. And I'm going to gently tamp that down so I've got a nice solid snow pack. Now I'm going to lift it up to a critical angle and we'll see what happens.

And because the icing sugar's so sticky, I'm having to go to really quite a steep angle but it is beginning to fail. Oh... and the top slab has just slid right off along the Ovaltine layer, which was, as we suspected, my weak layer, which in a real snow pack, would be those flat, platy icy snow crystals.

As I said at the beginning, landslides of rock, mud and debris behave in a similar way to snow, with the weak layer often being a layer of clay or a platy, shaly type of rock and both of these are prone to failing, especially if they get water logged in rainstorms.

You could experiment further by layering some different materials, maybe something like flour or sugar and seeing if you can get a landslide or avalanche to occur and at what angle it happens. And don't forget to send us a photograph or even a video of your best results.