2. The weak layer, starting point for slab avalanche release

Slab avalanche release results from a failure (by a combination of collapse and shear) of the weak layer (WL) located at the interface between the slab and older snow layers, followed by a fast expansion of the collapsed zone.

Surface hoar is made of superb ice flakes that grow in humid atmospheres at the surface of a colder snow cover during cold and clear nights. These well known shiny flakes provide incredibly smooth ski sliding. If they are buried during a snow fall before transformation into stronger structures, they become a layer (still named "surface hoar") on which the slab may possibly slide down very easily.

On the opposite, facets and depth hoar grow under thermal gradients at the interface between slabs and old snow: during clear nights, the external temperature goes down, whereas deep snow layers keep warmer, due to the thermal flux from the ground (geothermal flux). This process preferentially occurs on north slopes (at least in the northern hemisphere!), colder than south ones. Under this temperature gradient, water molecules evaporate from the top of the warmer old layers, and condense on the colder bottom part of the slab, resulting in a lace of delicate crystals.

In all cases, the WL consists of granular aggregates of low density polyhedral ice grains bonded by brittle ice bridges. They are recognized to play a key role in snow avalanche triggering processes. It is therefore of interest to understand the details of the *WL* behavior, in order to be able to predict which conditions may favor avalanching instead of simple "whumpfing". They can easily collapse as a house of cards, even under a moderate and brief loading, as a skier impulse, and transform into a fluid-like material. As the same collapse takes place in surface hoar under skis, the resulting loss of cohesion being responsible for the incomparable glide feeling experienced in such conditions, it can be guessed that the slab may easily slide down on such a collapsed material.

These collapsed zones, named basal cracks, can extend at large distances under slabs, and lead in some conditions to avalanche triggering. Since such collapses can also occur on horizontal terrain, avalanches may be released during skiing or walking on such zones, provided they are close to significantly slanting slopes.

The next notes will give more details on the role of such collapse processes on slab avalanche triggerings.

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