The avalanche risk ecosystem

An extensive and detailed understanding of the processes at work combined with continuous dialogue between researchers and a whole network of professionals to ensure that the right protective systems are designed, produced and implemented.

HOW DO AVALANCHES START?

Avalanches with single trigger points
These avalanches are started when the cohesive strength of the snowpack is no longer sufficient to guarantee its stability. This is often how wet avalanches or avalanches formed of fresh snow occur.

Avalanches that start along a fracture line
These avalanches are triggered when a "weak layer" with little cohesive force is located below a more cohesive harder layer. A simple overload, such as a skier crossing the snowpack or a fall from an outcrop, is sufficient to fracture the weak layer, destabilising the upper layer and triggering the avalanche.

AVALANCHE TYPES

① Wet dense flow avalanches
Wet snow avalanches contain at least 10 kg of water per m^3. When the water content rises above 30 kg per m^3, friction is greatly reduced and the avalanche can travel longer distances. Despite their generally slower speeds, these avalanches can exert very great pressures, especially where large volumes of snow are involved.

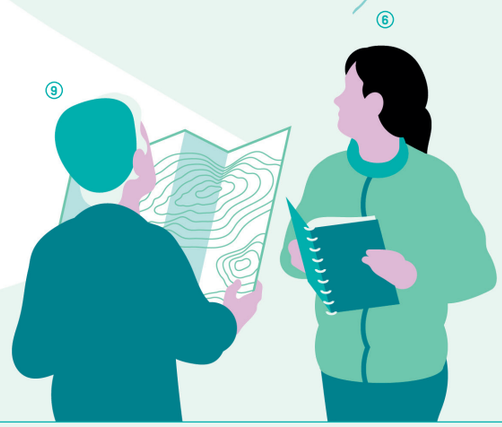
② Dry dense flow avalanches
The density of these avalanches is between 200 and 400 kg per m^3. They are capable of exerting extreme pressure on buildings when they travel quickly (they can reach speeds of up to 150 km per hour).

③ Powder (aerosol) avalanches
Here, powder clouds form from snow suspended in the air above dense snow avalanches. They can reach 50 metres in height and, unlike dense avalanches, can climb the opposite side of a valley.

PREVENTIVE STRUCTURES

④ Active preventive structures
Designed to prevent avalanches from forming, these structures include snow racks, screens or nets, windmill structures, jet roofs or baffles, and snow fences. They are installed in the starting zone to stabilise the snowpack or alter the distribution of the snow, thereby avoiding the overloading that could trigger an avalanche.

⑤ Passive preventive structures
These structures are intended to slow, divert or stop an avalanche. Examples are braking mounds, diversion berms, retention dams and snow sheds or tunnels.



WHO IS INVOLVED?

The IGE joint research unit ⑥ would not be able to carry out its mission to expand our knowledge of avalanches and develop avalanche control tools without strong synergies with other laboratories. Its closest partner is the French Snow Study Centre (CEN) at the French National Centre for Meteorological Research (CNRM), and its projects are delivered through a collaborative network across France, Europe and beyond. The unit works closely with all those responsible for managing natural hazards in mountain environments, providing a risk prevention service that takes the needs of all stakeholders into account. Managers and operational teams at the Directorate General for Risk Prevention (DGPR) at the Ministry for Ecological Transition (MTE) ⑦, members of the Mountain Landscape Restoration Service (RTM) at the French National Forest Office (ONF) ⑧, professional consultants ⑨, local communities ⑩ groups and associations are all involved.