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| **[Avalanche]** |
| **DEFINITION:**  Mass of snow and ice falling suddenly down a mountain slope and often taking with it earth, rocks and rubble of every description.  **REFERENCE(S):** WMO (1992) International Meteorological Vocabulary, WMO-No. 182. Available at <https://library.wmo.int/doc_num.php?explnum_id=4712> Accessed on 18 November 2019. |
| **ANNOTATIONS:**  **Synonym(s):** Not Relevant  **Additional scientific description:**  An [avalanche](https://nsidc.org/cgi-bin/words/word.pl?avalanche) is a rapid flow of [snow](https://nsidc.org/cgi-bin/words/word.pl?snow) down a hill or mountainside. Although avalanches can occur on any slope given the right conditions, certain times of the year and certain locations are naturally more dangerous than others. Wintertime, particularly from December to April, is when most avalanches tend to happen. (U.S. National Snow and Ice Data Center, 2019)  **Metrics and numeric limits:**   * Loose snow avalanches   Loose snow avalanches start from a single point and form when snow is not well bonded. A loose snow avalanche consisting of dry powder generally requires a slope angle of 40°. In very steep terrain, as individual snow particles become loose, roll downwards and bump into more particles, they form an inverted-V-shaped avalanche. Because avalanches usually carry less snow and travel more slowly than slab avalanches, they are also less dangerous.   * Slab avalanches   [Slab avalanches](https://www.slf.ch/en/avalanches/avalanche-science-and-prevention/avalanche-types.html) can only form when the snowpack comprises multiple layers of snow. Slab avalanches are characterised by the simultaneous release of a cohesive snow layer (slab). Steeper than around 30°, slab avalanches are usually bigger (a typical skier avalanche is on average 50 m wide, 150-200 m long and 50 cm thick) and reach speeds of 50-100 km/h.   * Gliding avalanche   Like slab avalanches, gliding avalanches have a distinct, broad fracture line, but they differ in as much as the entire snowpack is released. The slope must be sufficiently steep, but gliding can occur at a slope angle of just 15°. They can occur only on a smooth substrata, typically consisting of flattened grass or slabs of rock.   * Powder avalanche   Powder avalanches arise mostly from slab avalanches. A powder cloud forms in the presence of a large altitude difference when a sufficient quantity of snow becomes suspended in the air. Powder avalanches can reach a speed of 300 km/h and cause tremendous damage.   * [Wet-snow avalanches](https://www.slf.ch/en/avalanches/avalanche-science-and-prevention/avalanche-types.html)   [Wet-snow avalanches](https://www.slf.ch/en/avalanches/avalanche-science-and-prevention/avalanche-types.html) are usually triggered naturally, most often by a big increase in temperature. Meltwater or occasionally rainwater penetrating the snowpack weakens the bonds between the snow crystals, thereby destabilising layers in which the water accumulates. Both loose snow avalanches and slab avalanches can consist of wet snow.  (WSL Institute for Snow Avalanche Research SLF, 2019)  **Key relevant UN convention/multilateral treaty:**  European Avalanche Warning Services (EAWS) – 29 avalanche warning services from 16 countries. (<https://www.avalanches.org/>)  **Examples of drivers, outcomes and risk management:**  Contributing factors  Some simple rules that can be applied when assessing the avalanche danger:   * [Fresh snow + wind = *avalanche danger*](https://www.whiterisk.ch/de/explore#u=01-03) * [Rapid and significant warming of the snow to 0 ° = *short-term increase in avalanche danger*](http://www.whiterisk.ch/de/explore#u=05-02-08-05) * [The *steeper* and shadier the slope, the *greater* the danger.](http://www.whiterisk.ch/de/explore#u=01-06)   Avalanche protection and control measures  1. Artificial avalanche triggering  By way of controlled explosions, the practice aims temporarily to safeguard possible starting zones, avalanche paths and deposition zones, and to prevent large avalanches and lengthy closures.  2. Structural avalanche protection (dam or snow shed)  Defensive structures prevent the formation of avalanches. In other circumstances, when an avalanche is released, it can be diverted or intercepted by a dam. Other means of protection against avalanches include physical structures for buildings and snow sheds.  In order to stop an avalanche completely, depending on its speed, a dam may need to be more than 20 m tall. Many dams have a dual function: they protect against avalanches in wintertime, and against flooding and debris flows once the snow has melted. Snow sheds are known as avalanche galleries or tunnels, snow sheds are the classic structures for protecting transportation routes. Among the typical measures for protecting buildings are wall reinforcement, the erection of a solid structure (Spaltkeil), rather like a log splitting wedge, to break the avalanche, and a building design (Ebenhöch) in which the roof seamlessly merges with the terrain or an embankment.  (WSL Institute for Snow Avalanche Research SLF, 2019, link: <https://www.wsl.ch/en/about-wsl/locations/slf-davos.html> )  **REFERENCE(S):**   * U.S. National Snow and Ice Data Center (2019) All about snow. Available at <https://nsidc.org/cryosphere/snow/science/avalanches.html>. Accessed on 18 November 2019 * WSL Institute for Snow Avalanche Research SLF (2019) Avalanche Protection. Available at https://www.slf.ch/en/avalanches/avalanche-protection.html. Accessed on 18 November 2019 * WSL Institute for Snow Avalanche Research SLF (2019) Avalanche Formation. Available at https://www.slf.ch/en/avalanches/avalanche-formation.html. Accessed on 18 November 2019 |
| **Coordinating Agency or Organisation:**  World Meteorological Organization (WMO) |
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