Avalanche Warning Service
Eduard-Wallnoefer-Platz 3
A-6020 Innsbruck

European Avalanche Warning Services

User Manual

These user instructions were drawn up by the Tirol Avalanche Warning Service. Please send all enquiries and comments to: **lawine@tirol.gv.at**.

FAQ

- *After typing in the coordinates and pressing the Enter key (Return) the SnoProfiler crashes and all data are lost. Why?*

We are currently experiencing some similar issues when using Internet Explorer v9. We recommend updating your web browser or switching to another browser (e.g., Firefox, Chrome, Opera).

- *The temperature entered is not accepted. Why?*

Only temperature values with decimal points are currently accepted. A temperature containing a comma will not be saved. The same applies to coordinates and all other numerical fields.

- *I made an entry error and noticed it only after it was saved. Can I subsequently alter my entered profile?*

No. Profiles can only be altered or deleted by the administrators. In urgent cases, please contact lawine@tirol.gv.at via E-mail.

- *My entry for snow hardness is not accepted. What am I doing wrong?*

In order to avoid incorrect entries, rules have been built into the snow hardness category. Layers with only round-grain snow crystals do not permit entry of Hardness 1 and Hardness 1-2; and for layers with only new fallen snow and/or decomposed snow, only Hardness 1, 1-2, and 2 can be entered.

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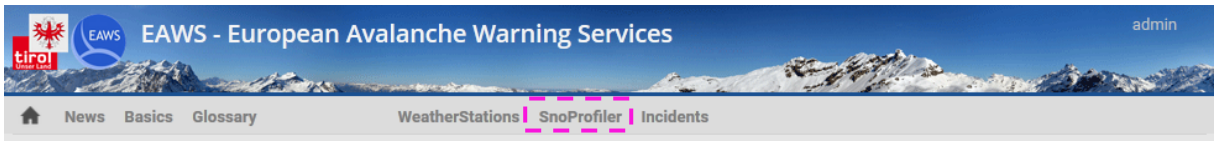
SnoProfiler

The EAWS SnoProfiler is a newly developed online tool for drawing snow profiles. Each profile is publicly available and can be uploaded through an intuitive, easy-to-grasp user interface. You can access the SnoProfiler via http://www.avalanches.org (see Fig. below) or directly via the LAWIS platform.

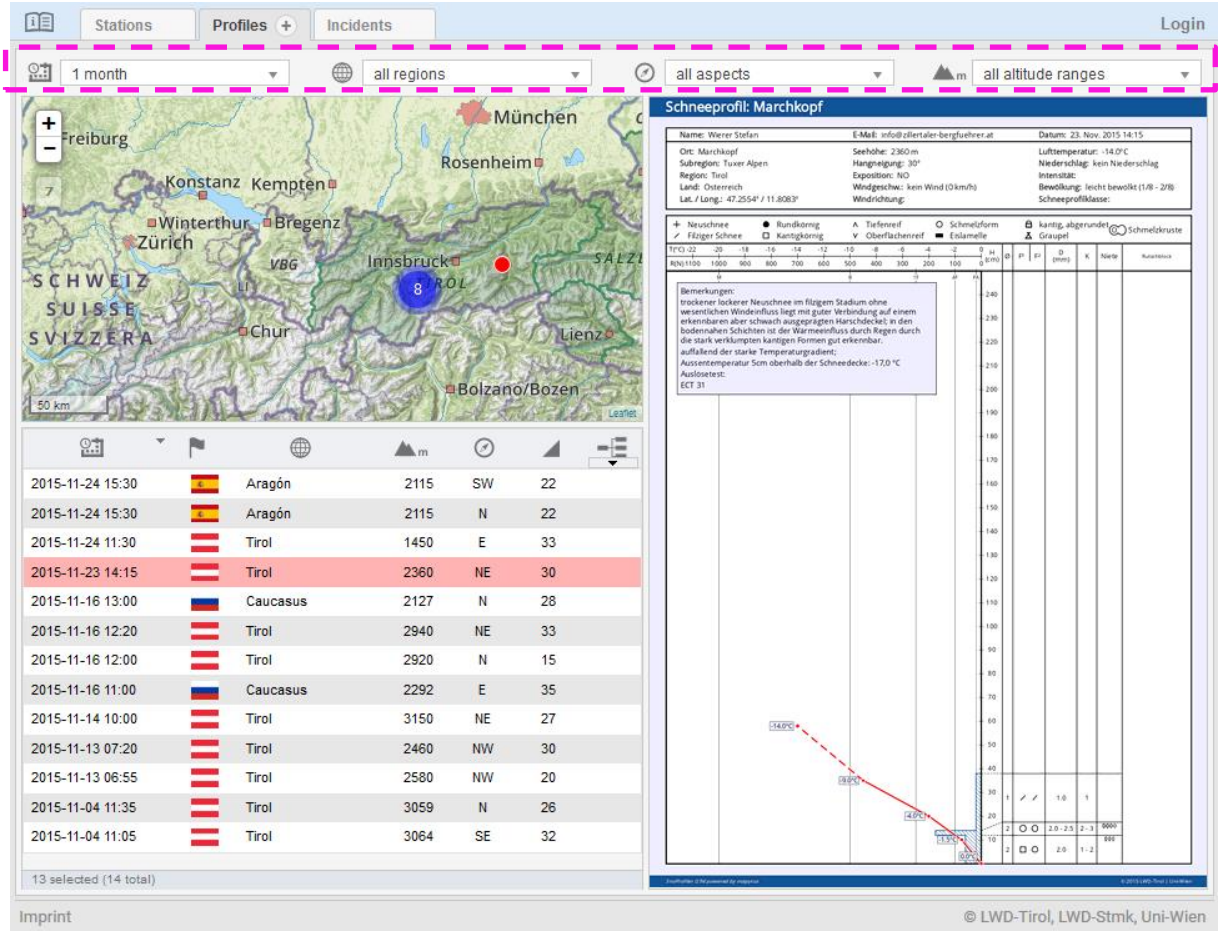


General Information

The SnoProfiler is among the information services *Weather stations* and *Avalanche incidents* part of the LAWIS (Lawinen-Informations-System) project. They all share a common layout and thus are similar to handle. There are four main fields of information in LAWIS: filter bar – map window – snow profile list – drawing window. Below you will find a few lines on each of these layers.

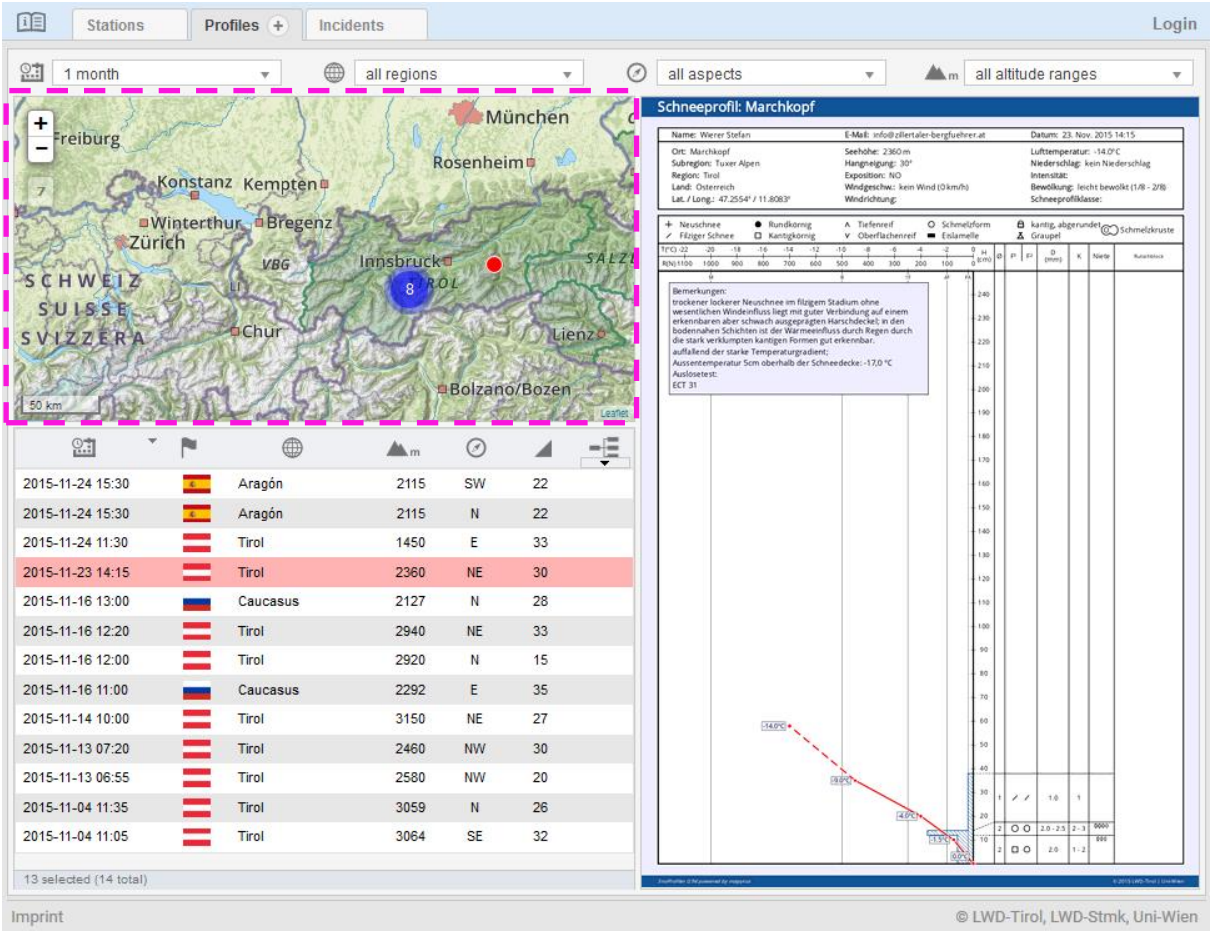
If you want to enter your own snow profile you can do so by clicking Profiles + in the Tab bar. We will explain this in detail in section 5 (Enter a new profile).

1 Filtering information:



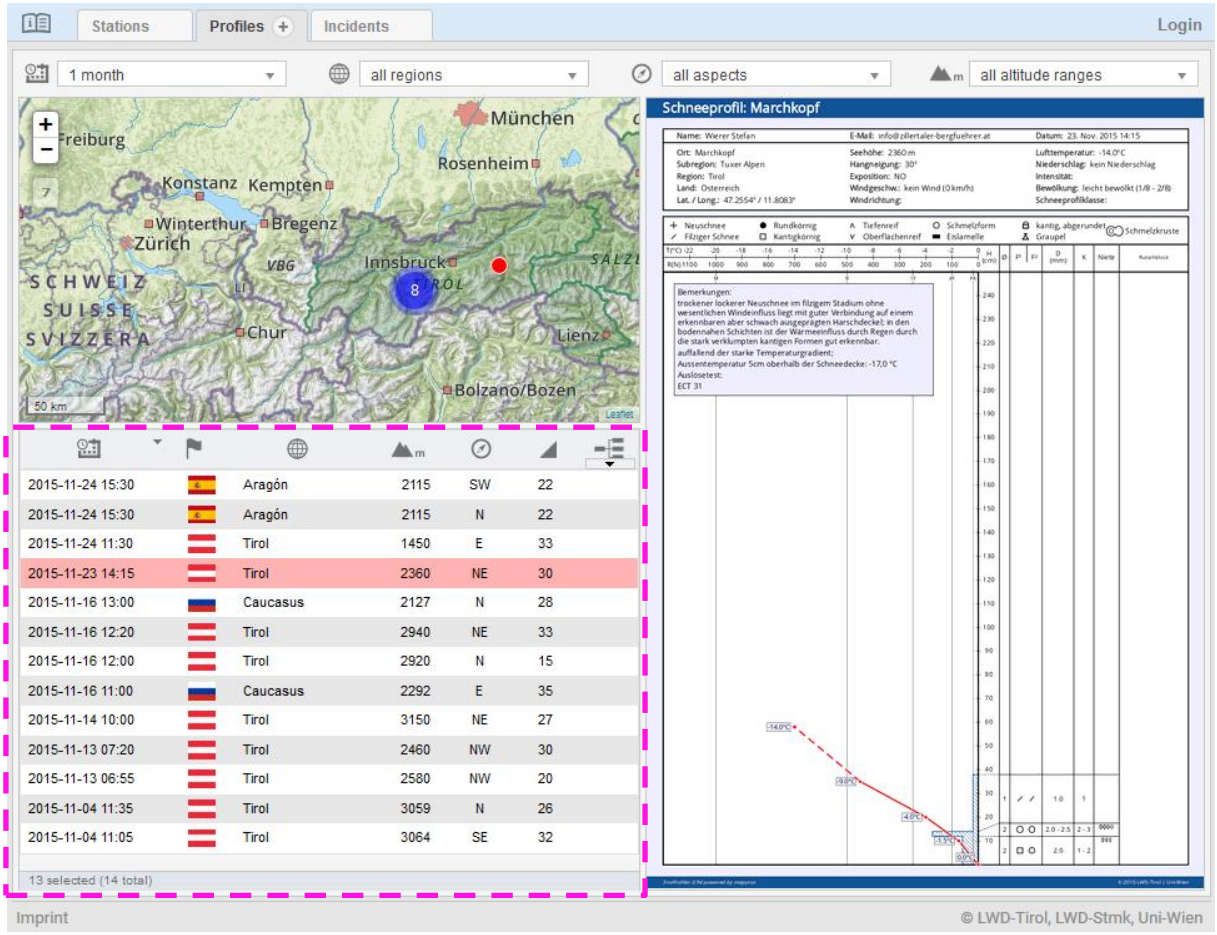
Above the map window you will find a section where you can filter existing snow profiles by period, region, aspect, and altitude ranges. Each selection will be applied on-the-fly without the necessity of confirming your choice. As a result, only your filtered selection of profiles is shown in both the map window and the list below.

2 The map window:



The map window serves as an overview of locations where recent snow profiles are available. Within this interactive map window you can shift and zoom the map scale using your mouse. You can also select any snow profile by mouse-click, resulting in the profile being marked in red and drawn in the right window (see figure above).

3 Existing snow profiles:

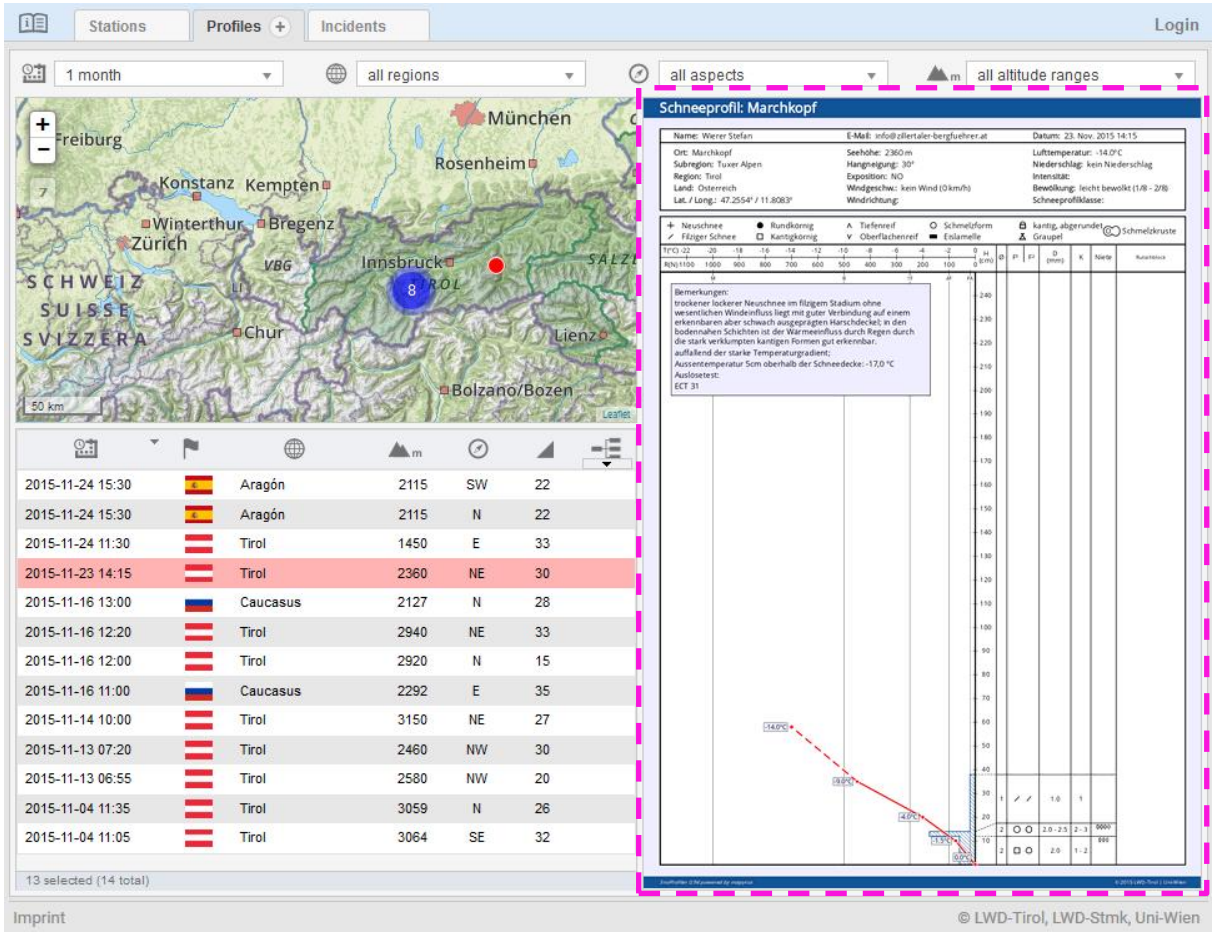


This is a list of all recently dug snow profiles. By clicking on the icons above the list you can sort this list by time of creation, country, region, altitude, aspect, and incline. Navigating the mouse over the symbols should result in a short pop-up description of each symbol.

When selecting a particular profile from the list it will be marked red in the map window and also drawn in the Profile viewer. You can navigate through the profiles in the list by using either your mouse or the up/down keys on your keyboard.

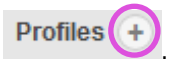
PLEASE NOTE: snow profiles are currently available only in the language the user has chosen beforehand. However, the drawing layout remains the same for all languages, so an experienced user will be able to read profiles in both English and German. We are currently working on that issue!

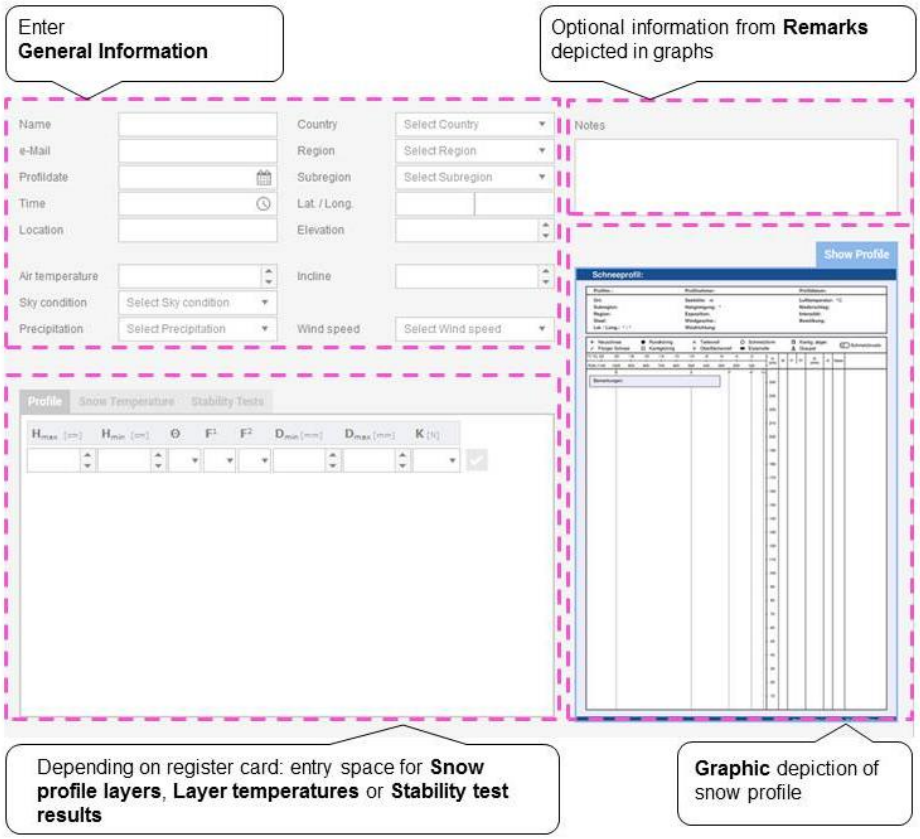
4 Profile Viewer:



The Profile viewer shows a detailed structure of each snow profile including general information in the upper part of the box and the different snowpack layers below. You can enlarge the drawing by clicking inside the box; then save the image by right mouse click – Save As…

5 Entering a new snow profile:

The entry form for a new snow profile is called up through the plus right of Profiles  . The entry form is sub-divided into four parts.



5.1 General information

Mandatory fields (as of 27 Jan 2015)	**Optional fields** (as of 27 Jan 2015)
Name	E-Mail
Profile date	Air temperature
Time	Comments
Location	
Country	
Region	
Subregion	
Lat. /Long. (Coordinates)	
Elevation	
Sky condition	
Precipitation	
Incline	
Aspect	
Wind speed	
Wind direction	

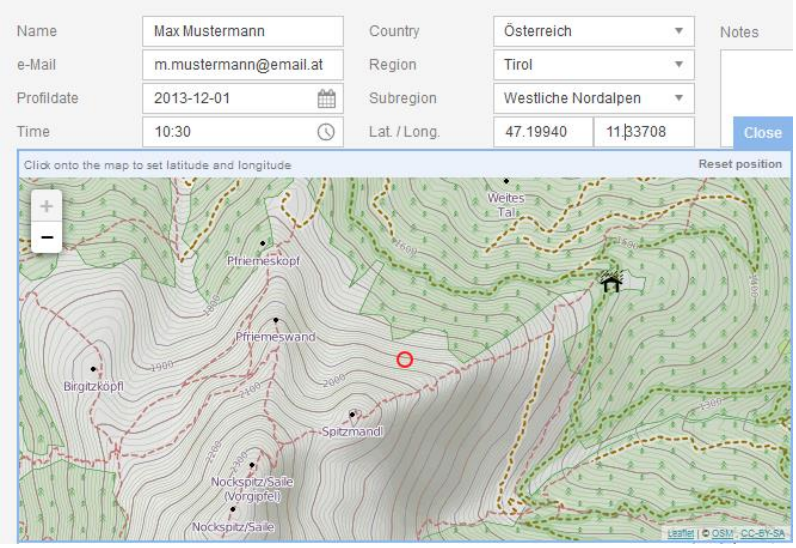
Please note that the input window for *Wind direction* is only available after filling the field *Wind speed*.

5.2 Coordinates (Lat. / Long.)

Coordinates can be entered in two different ways:

1. As soon as one of the spaces for entering geographical coordinates is clicked, a digital map appears; by means of the left mouse button the spot of the snow profile can be entered directly. That spot is then marked by a small red circle. You can navigate on the map in the customary way by using the mouse (left mouse click + dragging: map segment is moved; scrolling mouse wheel or clicking + / - symbols at the upper left of the map: zoom map)

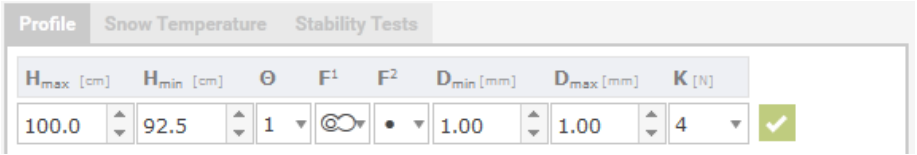
2. Directly entering geographical coordinates (geographical latitude and longitude) in case data are ascertained with GPS



5.3 New Profile

Enter Profile

To enter a new snow profile, select the tab Profile. Note that you have to insert each snow layer from **top to bottom**.



For each snow layer of the analysed snowpack, information on the depth of the layer boundaries (H_{max}, H_{min}), the moistness of the snow (θ), the kernel form (F^1,F^2), the kernel size (D_{min}, D_{max}) and the hardness of the snow ($K_{[N]}$) is required. Once all the required data pertaining to a snow layer have been entered, it is submitted by pressing the ✓ symbol. In order to make sure each of the snowpack layers is saved and uploaded it is recommended to

press Draw Profile after each layer. The note *"Visualisation not up-to-date"* will tell you when layers have not been drawn yet.

ATTENTION! By pressing the green check box in the navigation bar above the form you will upload the current snow profile. Therefore, make sure to have each snowpack layer included in your profile. Once a profile is uploaded, only the web admin (lawine@tirol.orf.at) can modify or erase this profile.

By pressing any of the symbols the entries about the layer you can **edit**, **delete** or add a **new layer**. If another new layer is added, a new entry block appears. Please note that a new layer can only be submitted if H_{min} of the previous layer is > 0 [cm] so make sure that you insert the layers from **top to bottom**.

Value	Range	Description
$H_{max\ [cm]}$ and **$H_{min\ [cm]}$**	0 to 1000	H_{max} → perpendicular distance between the **upper limit** of the layer **and the ground** in cm H_{min} → perpendicular distance between the **lower limit** of the layer and the ground in cm
θ	1 - 2 - 3 - 4 - 5	1 → **dry** snow below 0°C 2 → **weak** moist, sticky snow at 0°C 3 → **moist** water visible ; no drainage 4 → **wet** saturated; water drains off 5 → **very wet** soaked with water
F^1 und **F^2**	+ Precip. particles / Decomposing and fragmented precipitation particles • Rounded grains □ Faceted crystals ∧ Depth hoar ∨ Surface hoar ○ Melt forms ▬ Ice formations ◘ Faceted, rounded ⁂ Graupel Melt-freeze crust	**kernel forms:** F^1 – prevalent kernel form F^2 – subordinate kernel form *Note 1:* if only one kernel form is evident → $F^1 = F^2$ *Note 2:* If a melt-freeze crust is entered, F^1 is always for the melt form. With F^2 an additional kernel form can be entered.
$D_{min\ [mm]}$ and **$D_{max\ [mm]}$**	0,25 - 0,5 - 1,0 - 1,5 - 2,0 2,5 etc.	**kernel size:** D_{min} → size of the smallest kernels D_{max} → size of the largest kernels **typical sizes:** new fallen snow: 1-3 mm felt-like snow: 1-2 mm round kernels:0,25-0,5 mm angular kernels: 1-3 mm depth hoar: 2-5 mm surface hoar: 2-5+ mm melt form: 1-5 mm faceted, rounded: 0,5-3 mm graupel: 0,5-3 mm
$K_{[N]}$	1 to 6	**snow hardness** 1 → **fist** [FA] very soft 2 → **4-fingers** [4F] soft 3 → **1-finger** [1F] medium hard 4 → **pencil** [B] hard

	5 → **knife** [M] very hard 6 → **ice** [-] hard compacted

PLEASE NOTE: for each snow layer boundary the SnoProfiler will compute '**Lemons'** as a measure of snowpack stability: the lemon-shaped symbols are drawn into a separate column next to **snow hardness** and follow a simple pattern: the more lemons, the more unstable the snowpack; typically, 4 or 5 lemons correspond to a weak structure.

Enter Snow Temperature

To enter snow temperature data switch to the Snow Temperature tab:

For a snow temperature entry, the depth of the measurement spot ($H_{[cm]}$) and the temperature values ($T_{[°C]}$) are required. Just like with the snow layer entries, the entry is confirmed with the symbol, which can be changed at any time or deleted. A new snow temperature can be added by clicking the symbol.

PLEASE NOTE: Temperatures of the snowpack surface are ordinarily measured at points 10 cm apart.

Enter Stability Tests

The SnoProfiler currently supports three main types of Stability Tests: Slide block test ('Rutschblock test'), Compression Test (CT), and Extended Compression Test (ECT). A short introduction to the ECT including a How-to-video, for instance, is provided by the US National Avalanche Center: http://www.fsavalanche.org/stability-tests/.

Compression Test (**CT**)

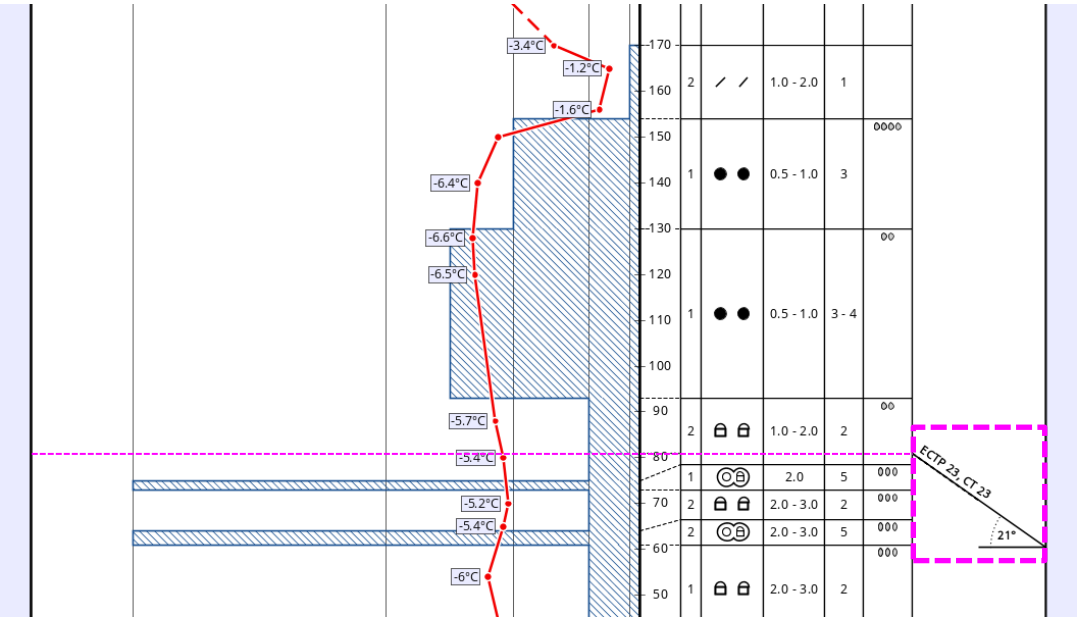
The CT primarily provides information about the existence of weak layer within the snowpack. You can run a CT rather quickly but it is less informative than the slide block test or the ECT, mainly because CTs provide no information about the propagation of a fracture in a weak layer.

To perform a CT a 30cm by 30cm snow column is isolated from the surrounding snowpack by using a shovel, snow saw, and/or a piece of knotted cord down to the weak layer of interest. The slope of your test location should be around 35° (but no less than 30°). Remember: your safety comes first, so always choose a representative but safe site location. After isolating the column, place your shovel on one end of the column and apply a series of compressive forces to the top of the shovel blade: 10 taps from your wrist, then 10 taps from your elbow, then 10 taps from your shoulder. The results of the CT should be recorded in the following manner:

CT0@… a fracture across the column occurs during isolation (very unstable result).
CT1-10@... a fracture occurs during the first 10 taps (from your wrist)
CT11-20@... a fracture occurs during the next 10 taps (from your elbow)
CT21-30@... a fracture occurs during the next 10 taps (from your shoulder)
CT31… no fractures occur after a total of 30 taps (generally a stable result)

The number after the CT (=Class) stands for the degree of instability (=Step); the value after the @symbol gives the height of the unstable layer within the snowpack (=$H_{[cm]}$) if a fracture occurs. Additionally, you should describe the characteristics of the fracture (=Result): partial break/whole block is gliding; the surface texture of the gliding block (regular/irregular fracture, rough/smooth surface); and the type of gliding movement (collapse/shearing/immediately/with resistance). The test will be submitted by clicking the ✅ symbol.

Example: CT23@81 describes the collapsing of a weak layer 81cm above the ground after the 23rd tap (3rd tap from shoulder). Both the depth of the fracture and the high number of taps executed would in this case indicate a generally stable snowpack.



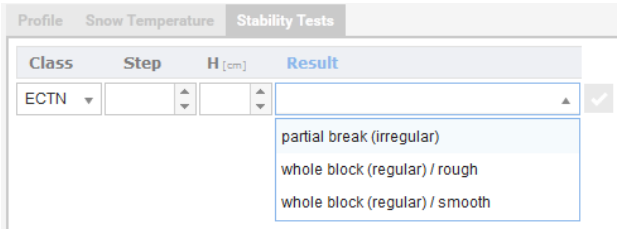
The Extended Compression Test (ECT) shows the same result for the initiation of the fracture (#23). ECTP (P for propagating) reflects the propagation of the initial crack and thus indicates the potential of a slab avalanche when disturbing this weak layer. For details, see below.

Extended Compression Test (**ECT**)

The Extended Compression Test is being performed in a similar fashion to the Compression Test: the way how to apply a series of compressive forces to the snow surface remains the same as for the CT. However, the ECT holds information about both the initiation AND propagation of a fracture within a weak snowpack layer. The isolated column for the ECT is therefore bigger, measuring 90 cm across the slope and 30 cm up the slope. These dimensions make it possible to create “mini-avalanches” on a very small model of the slope under investigation. Please note that you have to pay close attention to whether or not the initial fracture is propagating across the weak layer. The results of the ECT should be recorded as follows:

ECT0@... a fracture occurs across the entire column during isolation (very unstable!)
ECTP#@... a fracture occurs across the entire column (**p**ropagation) after # taps; to count as ECTP the propagation of the fracture has to occur by no later than the next tap after initiation
ECTN#@... a fracture initiates but does not occur across the entire column (**n**o propagation) after # taps; if the fracture propagates later than the next tap after initiation it will still count as ECTN.
ECT31… no fractures occur after a total of 30 taps (generally a stable result)

Additionally, when observing ECTP or ECTN you should also be able to describe the gliding surface of the block: (1) partial break/ whole block is gliding; (2) rough/smooth surface of gliding layer. The test will be submitted by clicking the ✅ symbol.



Example: ECTN14@80 describes a weak layer 80 cm above ground where a crack had been initiated after the 14th tap; however, the fracture did not propagate across the entire column even after the next tap (#15).

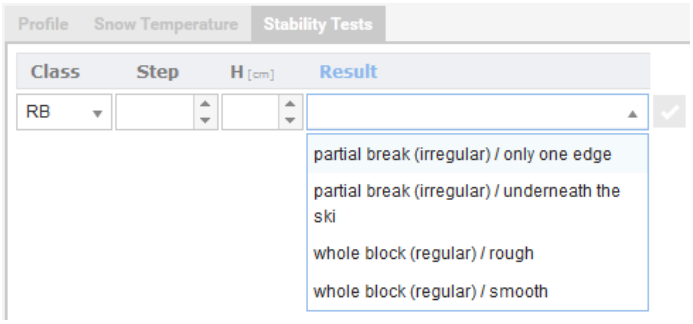
How to … perform an Extended Compression Test (ECT)

Slide block test ('Rutschblock test' **RB**)

The 'Rutschblock test' is the most informative but also most time-consuming method to test the stability of a given snowpack. It tests an isolated block that measures 2 m across the slope and 1,5 m uphill, and should be performed in "representative" terrain (typically steeper than 30°). Again, look out for possible danger zones across the slope and try to avoid these spots: your safety always comes first! To test the stability of the isolated block you apply a series of compressive forces to the slide block surface as follows:

RB 1@... fracture occurs during isolation (spontaneous release)
RB 2@... fracture occurs while gently leaning on the slide block with one ski
RB 3@... fracture occurs while firmly bobbing with your skis on the slide block three times
RB 4@... fracture occurs after jumping onto the upper third of the slide block with your skis
RB 5@... fracture occurs after the 2nd or 3rd jump onto the slide block
RB 6@... fracture occurs after jumping onto the upper third of the slide block with**out** your skis
RB 7 no fracture occurs (slide block stays stable)

For the SnoProfiler you should also be able to describe the gliding surface of the slide block: (1) partial break: only one edge of the weak layer is gliding/ only the area underneath your skis collapses; (2) whole block is gliding: rough/smooth surface of the collapsing block (=weak layer). The test will be submitted by clicking the ✅ symbol.



How to … perform a slide block or 'Rutschblock' test