

AvaBlog 5 april 2023

Survey on danger level subdivisions – initial results

First things first: thank you very much for completing our questionnaire and for the complimentary messages in your comments! Within a two-week period, 3,403 people took part in the survey. The large majority of respondents who indicated their satisfaction with the Avalanche Warning Service reinforces our commitment to continue providing you with the best possible information. We have started to evaluate the survey and wish to take this opportunity to present the initial findings.

Why danger-level subdivisions?

A desire to subdivide danger level 3 (considerable) was expressed many times on the occasion of our previous survey nine years ago, but the European Avalanche Warning Services collectively are unable to accommodate the sixth danger level which would have resulted. We therefore responded to the desire for further differentiation by conceiving the [subdivisions](#). After many years of internal testing, we introduced the new approach this winter.

Usefulness

Most people who have had little or no prior exposure to the subdivisions quickly recognise their usefulness, as demonstrated by a survey in Austria (conducted live during the [avalanche update lecture](#), which prompted more than 2,000 responses), in which the concept was welcomed by 81% and condemned by only 3%. But the question is, is the concept proving helpful in practice too? That's precisely what we are hoping to establish by way of our survey.

At the end of this first winter, most of you still take a positive view of the new subdivisions: 85% recognise that they offer added value (59% "helpful" and 26% "partly helpful"). The remaining 15% regard the subdivisions as either "unhelpful" (4%), "confusing" (5%), or even "dangerous" (5%) (Figure 1). We see these responses as confirmation that we are on the right track.

I consider the subdivisions to be generally...

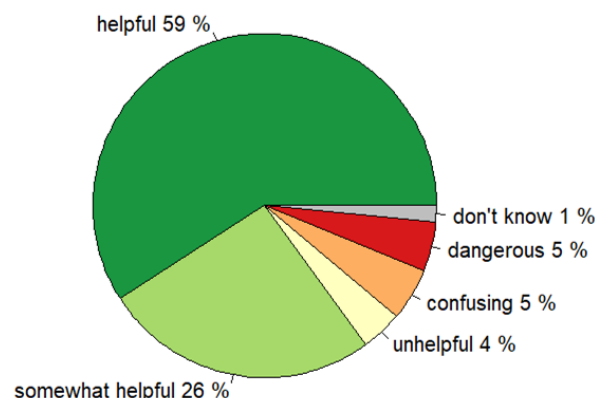


Fig. 1: Responses to the statement: "I consider the subdivisions to be fundamentally...".

Many of those who responded negatively gave their reasons in the space provided for comments:

- insufficient clarity or liable to misinterpretation,
- risk of a 3-minus being taken lightly or treated as if it were a 2,
- feigned projection of unrealistic precision.

We will return to these aspects later.

Understanding

Two of our questions were designed to examine whether the subdivisions are being understood the way we intended. The following interpretations are correct:

- “moderate, 2+” is more dangerous than “moderate, 2=”, and “moderate, 2=” is more dangerous than “moderate 2-”
- “considerable, 3-” means that the danger is towards the bottom end of level 3

Of those who engage in winter sports mostly in Switzerland or Liechtenstein (n=2,871), 94% answered both questions correctly (dark green and light green sections in Figure 2). As a rule, therefore, the subdivisions are being understood correctly, already in the first year of their use.

Understanding of the subdivisions

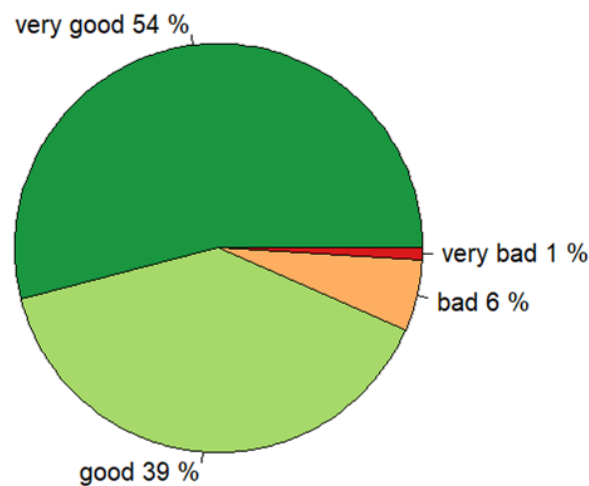


Fig. 2: Understanding of subdivisions (all three correct -> very good; only the two main questions correct -> good; one of the main questions incorrect -> poor; both main questions incorrect -> very poor) by all persons who engage in activities predominantly in Switzerland or Liechtenstein.

We formulated an additional question to draw attention to the subtle difference existing between forecasts indicating a “2” and a “2=” respectively. Our analyses had shown that we can forecast subdivisions with a good degree of accuracy only in the case of dry avalanches. For this reason, we do not indicate any subdivisions for wet snow avalanches. Thus, “moderate, 2” describes a danger “somewhere within danger level” (Figure 3). The correct answer was therefore:

- There is a difference between 2= and 2. The 2 describes a danger somewhere within the level “moderate”, and the 2= a danger at mid-level of Danger Level “moderate”.

This question was likewise answered correctly by the majority (56%) of respondents (dark green in Figure 2). The difference was not apparent to 38% (light green), but in practice this is probably irrelevant.

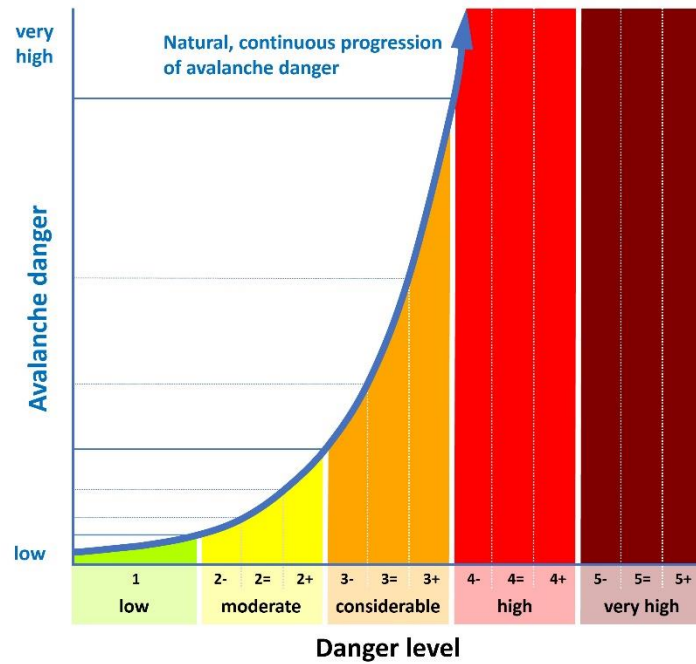


Fig. 3: The European Avalanche Danger Scale has five levels. In reality, the avalanche danger does not change abruptly but steplessly variably from one level to the next. In other words, within each level the avalanche danger fluctuates between certain boundaries. The subdivisions (-, =, +) allow the unfolding danger situation to be tracked more accurately. Unless a subdivision is stated, the danger lies somewhere within the indicated danger level; in the case of “2, moderate”: somewhere within the yellow band. In such a situation, the danger level can actually be slightly greater than “low” or , on the other hand, close to “considerable”.

Our Austrian and German neighbours were concerned that the subdivisions could be misinterpreted because of the system applied when school grades are being awarded in their countries (from low to high): 3+, 2-, 2, 2+,.... Fortunately, the survey reveals a good understanding of the subdivisions, including among those who engage in activities predominantly in those countries (n=296). The combined score of 88% for the dark and light green sections does reveal, however, that the understanding is not quite as good as it is in Switzerland (Figure 4). We are unable to establish at present whether this difference is attributable to the grading system applied in schools or arises simply because those who engage in winter sports in Austria and Switzerland are currently less aware of the subdivisions.

Understanding of the subdivisions Germany and Austria

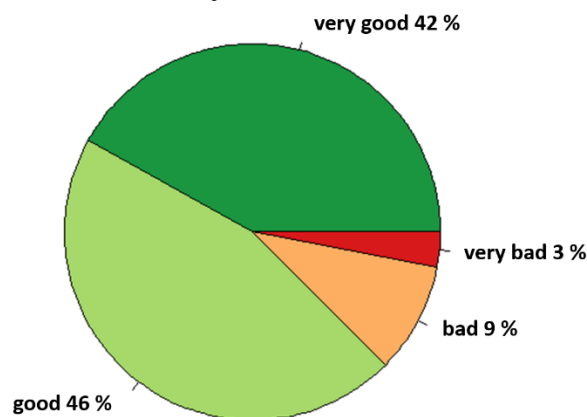


Figure 4: Understanding of the subdivisions (all three correct -> very good; only the two main questions correct -> good; one of the main questions incorrect -> poor; both main questions incorrect -> very poor) by persons who engage in activities predominantly in Austria or Germany.

Those who have a good understanding of the subdivisions also consider them to be more helpful (left column in Figure 5). It is therefore expected that, by sharing more information and thus improving understanding in the next few years, the benefits of the subdivisions can be further amplified.

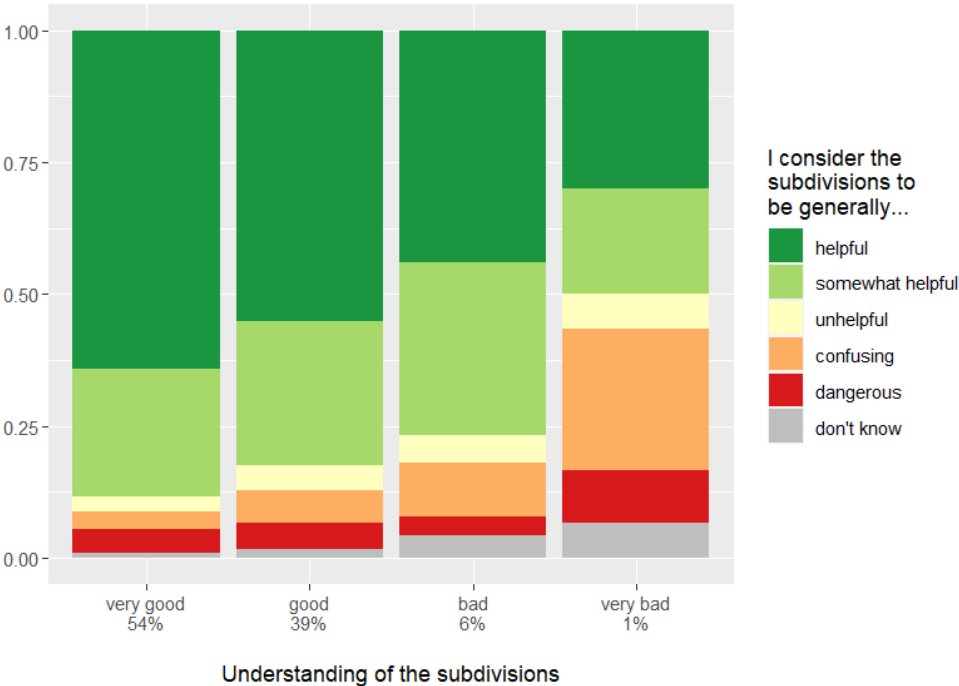


Figure 5: Usefulness of the subdivisions (colours as per Fig. 1) broken down according to the extent to which they are understood (column colours and definitions as per Fig. 2). The better the understanding of the subdivisions, the more helpful they are considered to be.

Touring behaviour modified

Almost half (45%) of you stated that, having formerly considered tours acceptable in conditions described as level 3, you now no longer undertake those same tours when subdivision “3+” applies (Figure 6). Conversely, a quarter (26%) stated that they now undertake tours when subdivision “3-” applies that they formerly considered unacceptable in conditions described as level 3.

This clear difference between the behavioural change occurring in case of a “3+” on the one hand and a “3-” on the other is good and reflects the way in which the danger situation changes, as illustrated in Figure 3. The risk not only increases by a factor of 4 from one danger level to the next, but also rises within each individual level. A stronger commitment to aligning backcountry touring activities with prevailing conditions therefore represents a wise improvement in decision-making.

From a safety perspective, a behavioural change that takes place only when the subdivision indicates a lesser danger is problematic. This concerns the 3% who, compared with their former behaviour in conditions described as level 3, are now less cautious when subdivision “3-” applies but not more cautious when “3+” applies. Fortunately, the 3% contingent is smaller than the group who become more cautious only when “3+” applies (12%).

There can be various grounds for answering this line of questioning with “No behavioural change”. Some of you do not, as a matter of principle, align your behaviour with the subdivisions. Others have a track record of recognising different danger levels – those who have always deduced from the description where the danger exists, within the relevant level.

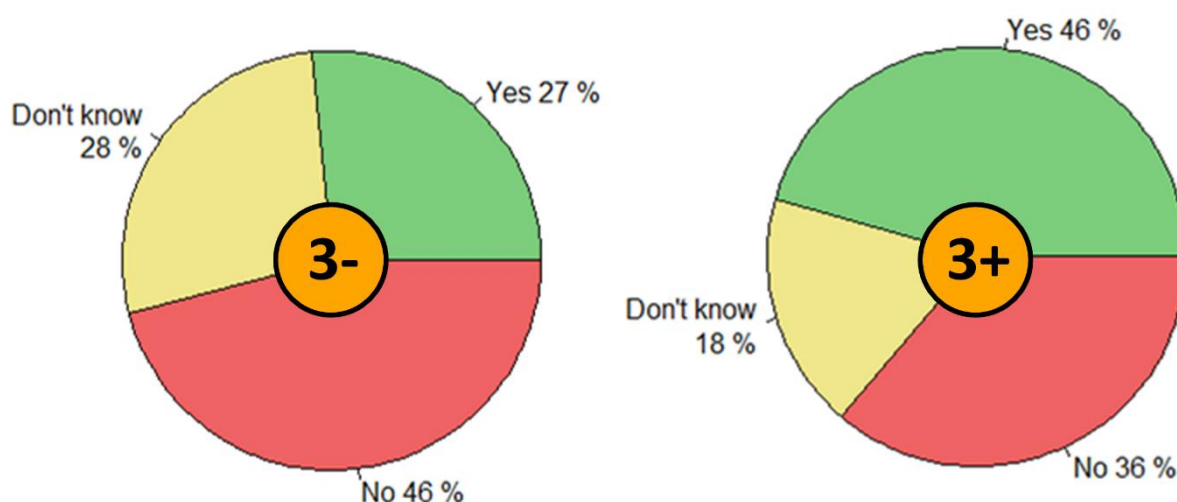


Figure 6: Modification of touring behaviour in case of subdivision “3-” and “3+”. The chart on the left shows the answers to the question: “Are there tours that you would not have undertaken earlier if danger level 3 was forecast, but now, in light of a forecast of subdivision 3-, you would certainly undertake?” The chart on the right shows the answers to the question: “Are there tours that you would have undertaken earlier if danger level 3 was forecast, but now, in light of a forecast of subdivision 3+, you would not undertake?”

Reliability of the subdivisions

Do subdivisions project a feigned unachievable precision? Yes and no.

When an avalanche bulletin is being produced, each of the three forecasters make their own assessment. These individual appraisals are then compared and discussed. In the vast majority of cases (91% according to an analysis performed within the SLF), the disparity between the three assessments is no greater than one subdivision. In other words, our assessments are highly consistent.

On the other hand, forecasts, including those contained in the avalanche bulletin, are sometimes inaccurate – such is the nature of forecasting. In addition, the higher the resolution of the scale, the more often errors tend to occur. But measured against an incorrectly forecast danger level, if real-world conditions vary from a forecast by just one subdivision, the error is clearly smaller. “2+” and “3-” are contiguous subdivisions and therefore far closer to each other than not only “2+” and “3+”, but also “3-” and “3+” (Figure 3).

In order to measure our reliability or accuracy, we examined the frequency and extent of disparities between forecasts contained in the Avalanche Bulletin and actual observations reported from the field. This showed that the [disparities are significantly smaller](#) when subdivisions form part of the picture. A [second study](#) provides evidence that the magnitude of risk increases from one subdivision to the next. In conclusion, yes, as a general rule we are accurate, but no, the correct subdivision is not always forecast absolutely correctly.

The actual conditions prevailing on the ground can be more favourable than those that were forecast and, at the same time, an individual slope can be more dangerous than its neighbours. The Avalanche Bulletin cannot give consideration to such small-scale local differences; it remains your responsibility to assess the conditions on-site. You can be sure, however, that we make every effort to provide you with the best possible forecast. And because the subdivisions demonstrably increase accuracy, they are now being stated in our forecasts.

Why are the levels “moderate” and “high” subdivided as well?

The call for a subdivision of danger level 3 (considerable) originated from our users. Why are we now also subdividing level 2 (moderate)? Quite simply because our internal trials revealed that we could improve our accuracy by applying subdivisions to level 2 as well. Why should we choose to not pass on this improvement?

When the danger level is described as “high”, the subdivisions no longer have much relevance for winter sport participants because the off-piste conditions are too hazardous in any case. But the Avalanche Bulletin is also a crucial source of information for local avalanche services that are responsible for transportation routes and settlements. For these users, it is of little interest whether danger level 1, 2 or 3 applies, but all the more important to know how to rank the avalanche situation when it lies within level 4.

What happens next?

Although our analysis has only just begun, we are eager to share the key findings with you in this AvaBlog – and to thank you for taking part in the survey.

In view of the very positive outcome, we will certainly continue to publish the subdivisions. We will disclose the comprehensive findings of the survey at a later date and, of course, act upon them to every degree possible as we continue to improve the bulletin.

Q&A

We received 1,016 free text responses to our final question: “Would you like to reach out to the Avalanche Warning Service with any comments or wishes?” These contained expressions of thanks and praise above all, but also questions and wishes. In this section we seek to address some of your queries in more detail.

1. *What is the meaning of “about one level lower on other slopes” (when describing avalanche prone locations in the bulletin)? Does it indicate a reduction from 3+ to 3=, or from 3 to 2?*

The statement “about one level lower” disregards subdivisions. If level 3+ applies to the stated aspects and altitude zones, the approximate danger level existing on all other slopes is a (high) 2.

Please note, however, that conditions in the field vary continuously and not abruptly. Neither the boundaries of the aspects concerned nor the stated altitude are to be regarded as precise. Instead, the bulletin describes a [large marginal area](#) that cannot be clearly assigned to either the more or the less favourable situation.

2. *Why are conditions regularly (more) dangerous above the tree line?*

More wind, larger exposed slopes, lower temperatures – we can give many reasons for conditions being more dangerous at higher altitudes without being aware of the exact influence of the specific parameters. Although the accuracy of the general rule *“The higher the altitude, the greater the danger”* is undeniable, it has often been overlooked in the past. From 600 m below to 600 m above the altitude limit stated in the Avalanche Bulletin, the avalanche risk increases by about two danger levels on average, in other words by a factor of around 16!

3. *Is there any source that publishes the daily feedback on avalanche releases, danger signs and other observations by people on-site?*

Unfortunately no, not yet. We endeavour to share relevant feedback with you promptly on our social media channels and in the AvaBlog. In the future we intend to include this kind of information in the WhiteRisk app.

We wish to take this opportunity to express our gratitude for all the feedback we receive throughout the year. These observations serve as an important piece of the puzzle when we are making our assessments. Incidentally, observations relating to safe conditions (e.g. the absence of whumpfung sounds) are also useful.

4. *Can you please order some snow?*

Of course, we have reliably done so 😊. As of now, a first delivery has been made: [2.5 m since the survey closed](#) on March 15, at least at the Glacier de Saleina measuring station at 2800 m in the Trient region of Valais .

Answers to some of your questions are to be found online, including in the items: [SLF Tag der offenen Tür 24.06.2023 \(open day\)](#), [bulletin archive](#), [avalanche danger terminology](#), [geographical names](#), [graphical reduction method](#), [understanding snow profiles](#), [new snow maps](#), [glossary](#).

If your question or wish has not been addressed in this blog, there's no cause for concern; we have collected all of your comments and will examine them with our team.