THE NORWEGIAN AVALANCHE CARD
* Birgit K. Rustad

Norwegian Water Resources and Energy Directorate.
Middelthunsgate 29, 0301 Oslo, Norway

ABSTRACT: The Norwegian national avalanche bulletins include avalanche problems to improve communication of the current avalanche danger to the public. In order to give backcountry recreationists aid to better interpret and make use of the bulletin, NVE has produced and distributed so called “avalanche cards”. The Norwegian avalanche card is published in three different editions. The latest edition (2014) is a strictly, knowledge based decision-making tool based on a three-filter system: from trip planning, evaluating the touring area, down to single slope evaluation. Each filter includes a control question which aims to help the user to decide to continue or to abort the tour. The intention is to provide the user with specific tasks when planning the trip and while travelling in avalanche terrain. The focus is on terrain evaluation and safe travel routines. The card does not give information on how to evaluate the snowpack. The avalanche card strongly emphasizes evaluation of the avalanche problem(s) given in the bulletin. The given avalanche problem(s) tells the user where to expect the problem in the terrain, what could cause avalanches, and the potential size these avalanches might reach. We will present the development process of the avalanche card and its thought application. We then discuss its effectiveness in increasing avalanche awareness for backcountry recreationists and communicating the content of the avalanche bulletins.

KEYWORDS: Avalanche card, Avalanche decision-making tool, Avalanche problem, Avalanche risk

1. INTRODUCTION

The avalanche card from NVE has been published in three different editions. The first avalanche card was published in 2012, when the Norwegian Avalanche Service was still in its project phase. When the service went into its operative phase in January 2013, another avalanche card was published, a 2013 edition. Feedback from end users on the 2013 edition through a survey (Sæterbø, Russenes & Berntsen 2014), together with changes in the bulletin, resulted in a new layout, which was published in January 2014. The card’s aim is to aid the public in making safer decisions before entering the backcountry and whilst in the backcountry. We want to stimulate the users to discuss if the snow and weather conditions, together with the experience and capability of the tour group, have the appropriate conditions and ability to plan and conduct the trip. Another objective of the card is to transfer the regional bulletin to the scale of the touring area.

2. DESCRIPTIONS OF THE CARD

The card has evolved in the same manner as the bulletins, with more and more emphasize on avalanche problems. The first card was a rule-based decision making tool based on the “Stop-or-go” card (McCammon & Hägeli 2005). The 2nd and 3rd edition of the avalanche card are knowledge based decision making tools. It confronts the user with questions regarding trip planning, evaluating the touring area, down to single slope evaluation. All editions of the card have included a list of standards that should be followed before and when travelling in avalanche terrain. The standards are based on the list given in “Gelände” on the Stop-or-go card (McCammon & Hägeli 2005). The list has evolved from edition 1 to 3. All three editions have a tool for measuring steepness for maps in a 1:50 000 scale. The two latest editions also have a tool for measuring steepness when in the terrain.

The latest edition is translated to English; we hope to print an English edition of the 2014 avalanche card for the upcoming winter.
2.1 **Edition 1, published 2012**

The first edition of the card’s (fig. 1) focus lay on giving the end user a way to recognize typical signs for different danger levels, from avalanche activity to amount of load necessary for triggering avalanches. A table describing typical signs at different danger levels is given on the card. These can aid as a tool to learn what differs the different danger levels, what the danger levels mean and how to adjust the danger level to a more local scale (McCammon & Hägeli 2005). Another useful hint for the end user is the list “how much terrain should be evaluated for each danger level”. For avalanche danger evaluation is the list of danger signs given, based on the list from the Stop-or-go card (McCammon & Hägeli 2005). The meters given are based on Engler and Mersch (2001). Danger level 5 is not included in this list since backcountry travel should be avoided at that level.

What most differentiates this card from its descendants is the table where the risk is evaluated based on a combination of steepness and danger level. For example, backcountry travel into 40 degree slopes at danger level 2 would result in the highest risk level and is recommended as “no go”.

Page 2 on the 2012 card has a list of standards that the user should follow before entering avalanche terrain, and whilst travelling in avalanche terrain. We moved the first part of this list to the pre-trip planning section on the 2nd and 3rd edition since some of these standards belong to trip planning at home.

![Fig. 1: The first edition of the avalanche card. Published 2012.](image)

2.2 **Second edition, published 2013**

The 2nd edition of the avalanche card (fig. 2) is a knowledge based avalanche evaluation card built on Werner Munters 3x3 filter method presented in Landrø (2008). It includes trip planning (filter 1), evaluation of the area (filter 2) down to single slope evaluation (filter 3). The intention with this method is to aid the user in maintaining an acceptable risk while travelling in avalanche terrain. In each filter the terrain, the weather and snowpack, and the human factor is evaluated. With every filter the conditions are evaluated on an increasingly finer scale. This 2nd edition encourages a three filter trip planning: from trip planning at home to evaluate the trip area locally to single slope evaluation.

One or more lead questions are asked for each filter on the card. Filter 1 (translated from Norwegian): “How are the avalanche- and weather conditions?” followed by more detailed question or tasks on snowpack, trip planning and avalanche danger level. Filter 1 also has a question on “how is your tour group and the terrain?” This is to make sure that the human factor is taken into account when planning the trip. Answers to these questions are either happy or unhappy face. Unhappy face indicates an increase in risk, happy a decrease. As with the 2012 edition, this card has a table with information about the danger level and amount of terrain that should be evaluated at each danger level. There are two tools for measuring steepness on the card, one for 1:50 000 scale maps, and the other when out in the terrain.

A larger survey on how the avalanche card from 2013 affects users’ behavior in the backcountry has been conducted (Sæterbe, Russenes &...
Berntsen, 2014). 316 people answered the questionnaire. The result from the survey shows that filter 1, the trip planning filter, was hardly used. Filter 2 and 3, the area evaluation and single slope evaluation, was used more. An important feedback from the participants was that neither of the filters gave answers on how to handle and put into practice the given information from the bulletin, the weather, and answers about the tour group. The general feedback on the card from the participants is that they seek more yes or no answers on how to travel in the backcountry. However, the card works as a tool; it contributes to avalanche awareness and has increased the level of communication within the tour group.

A compressed version of the avalanche danger scale is given on the card, 62% of the respondents answered that they used the scale.

2.3 Third edition, published 2014

The 3rd and latest edition of the avalanche card (fig. 3) is a result of the survey described above and how we would like the users of the service to make use of the bulletin. This card is a strictly knowledge based decision-making tool. Through a 3x3 filter, the user is encouraged to gain knowledge for safer travel in avalanche terrain.

Important feedback from the end user on the 2nd avalanche card was the low usage of filter 1 – trip planning. This is against the principles for a thorough implementation of the 3x3 filter method (Kurzeder and Fesist, 2003, Landrø 2008). It was suggested by the participants of the survey that this part of the card could be an individual card with a comprehensive trip-planning scheme. We tried to provide that on page 1 of the latest edition of the avalanche card. We also gave a more comprehensive explanation of the danger levels on page 2. Page 3 deals with area and single slope evaluation, and page 4 is a “always remember” list together with tools for measuring steepness, both on maps and on slopes in the terrain.

Each filter has a control question to ensure that the user of the card has thoroughly assessed the risk before traveling into the chosen terrain with a certain tour group under the given conditions. For each filter, there is also a question about whether the avalanche problem is expected to be present or not.

A risk assessment between danger level and steepness is not present on the 3rd edition. Studies by Heierli et al. (2011) show that a fracture is equally difficult to trigger on steep slopes and gentle slopes. The card asks questions that emphasize the presence of avalanche problems: “Will you encounter the forecasted avalanche problem?” With an increase in danger level, the likelihood of avalanche problem(s), risk of triggering and/or the size of avalanches increase. We want end users to focus on avalanche problems and how to handle these instead of solely rely on steepness of the potential avalanche slope.

Fig. 2: The second edition of the avalanche card published 2013. Page 1 and 2 shown chronologically.
3. DISCUSSION

The latest edition of the avalanche card consists of two parts attached through a clip-on button that can be detached. Part 1 is a tour-planning card, part 2 should be used in the field. The card is a knowledge based decision tool. Through the avalanche card, we want to address that snow, avalanches and group dynamics are complex. We will not simplify these subjects through a rule-based decision scheme system. Through our bulletins, avalanche card and information given on avalanches on www.varsom.no we encourage the public to answer the control question: “Is this trip suitable for you and your tour group – under the forecasted conditions and in this terrain?” at an early stage. With the card, we also focus on an important aspect with avalanche risk assessment, as seen on fig. 3, page 3: “Travel in avalanche terrain requires the ability to identify possible avalanche problems and to cope with them”.

4. CONCLUSION

The use of avalanche problems in the bulletin and how it is emphasized in the trip-planning filter in the 3rd avalanche card is an attempt to use the ability of pattern recognition and thereby helping end-users making better decisions (Landrø et al., 2013). The human ability for so-called pattern recognition is very effective, and is used in evaluating avalanche risk (Harvey et al., 2012). Feedback on the use of avalanche problems show that they provide a useful and good starting point for pre-trip planning and also during the trip (Landrø et al., 2013).
For the coming winter season (2014/2015) we hope to print an English version of the 2014 avalanche card.

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6. REFERENCES


