

EVALUATION TOOL FOR AVALANCHE COMMISSIONS

Nadalet R.*

Autonomous Province of Bolzano - South Tyrol, Agency for Civil Protection, Hydrographic Office, Bolzano, Italy

ABSTRACT: The web-based evaluation tool aims to support the avalanche commission members in systematically assessing the avalanche danger. Data from the measuring network of the Hydrographic Office or from own observations, representing five selected avalanche-promoting factors, and informations from the current weather forecast are graphically prepared in order to be evaluated with respect to their effect on the avalanche danger. The proposed method guarantees compliance with a minimum standard for all avalanche commissions operating in South Tyrol and ensures the traceability of the evaluation procedure.

KEYWORDS: avalanche commissions, avalanche danger, evaluation procedure, residual risk management, traceability.

1. INTRODUCTION

In South Tyrol (figure 1), almost half of the municipalities currently use an avalanche commission. The establishment and the tasks of avalanche commissions as well as the role of the public administration are regulated by Provincial Law No. 7/2013.



Figure 1: Map highlighting the location of the province of South Tyrol in Italy (in dark green).

In particular, avalanche commissions are charged with analyzing and evaluating the avalanche danger while the public administration is responsible for providing measuring networks, information platforms, forms and similar [1]. The mentioned legal framework combined with the operational need to fill the gap between the

avalanche bulletin (regional scale) and the existing instruments for the evaluation of the individual slope (local scale) prompted the development of a new tool (figure 2).

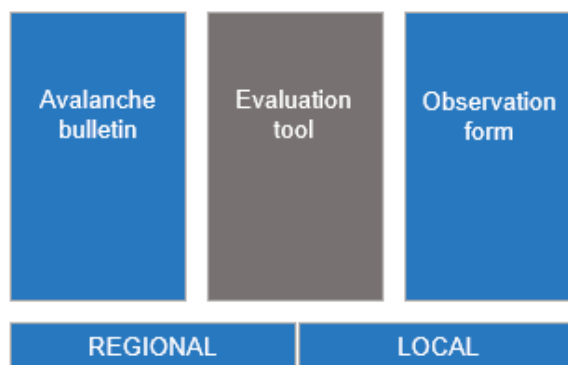


Figure 2: Strategic positioning of the new tool.

2. METHOD

The proposed evaluation procedure consists of two successive evaluation levels, namely the analysis of the current situation and the tendency of the avalanche danger. The analysis of the current situation is based on the evaluation of five basic avalanche promoting factors. In detail these are snow layering, depth of fresh fallen snow, air temperature, wind speed and snow depth. The selection and ranking of these factors is based on an expert survey [2]. Depending on the factor, data from selectable automatic stations or manual measuring sites, both stored in the central database of the Hydrographic Office, are automatically fed into the tool or, in case of own observations, hand-entered. For a clearer interpretation of the data, the trend of each factor on the previous days is displayed in graphical form. Option buttons beside each graph allow the evaluation of each factor with respect to its effect on the avalanche danger ("favourable", "no influence", "unfavourable" or "very unfavourable") (figure 3).

* Corresponding author address:

Nadalet R., Agency for Civil Protection,
Hydrographic Office, Viale Druso 116,
39100 Bolzano (BZ);
email: rudi.nadalet@provincia.bz.it

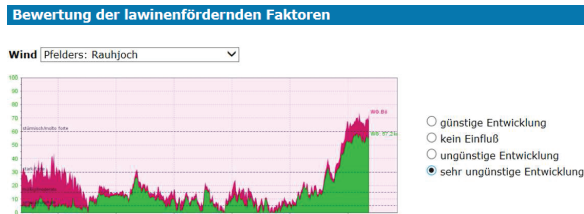


Figure 3: Detail of the user interface on the example of the evaluation of the wind factor through selectable input data and option buttons.

Starting from these evaluations, the current avalanche danger level for the corresponding warning zone (taken over via an xml interface from the avalanche bulletin) can finally be checked through dedicated option buttons ("ok", "too low", "too high") (figure 4).

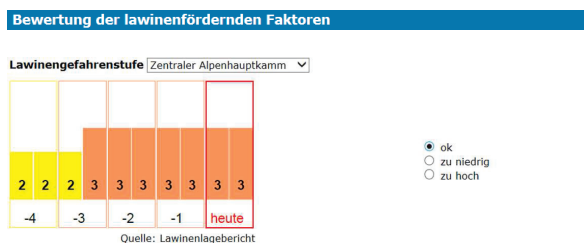


Figure 4: Avalanche danger level check. The system takes over the current day and four days before. The level is indicated both for the morning and during the day by two graphic bars per day.

Once completed the analysis part, the tool enables the assessment of the tendency by projecting in the future the actual state on the basis of the forecasted weather conditions. As with the avalanche danger level, the system automatically takes over the mountain weather forecast of the regional weather service, containing all essential meteorological variables, e.g. zero-degree altitude, snowfall level, snow forecast, wind speed. The assessment of the development of avalanche danger is again supported by option buttons ("rising", "constant", "decreasing"). If the avalanche danger tends to increase, the button "Peak during the next 24 hours" is also activated and aims at the correct planning of possible measures to be taken (figure 5).

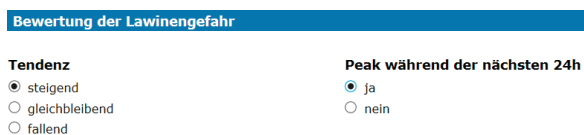


Figure 5: Assessment of the tendency.

Additional text fields allow the annotation of other relevant information. The entire evaluation is finally saved as pdf file, which is made available to the commission and the avalanche warning service (figure 6). In order to guarantee complete

traceability, the file name automatically consists of the creation date, time and user name, which is derived from the personal access data.

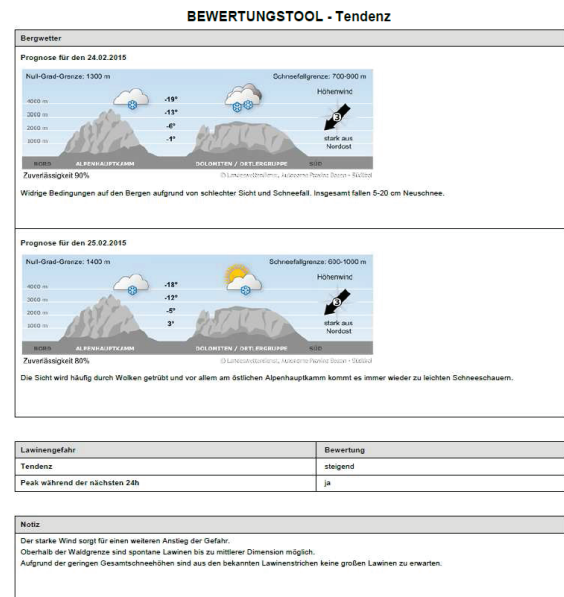
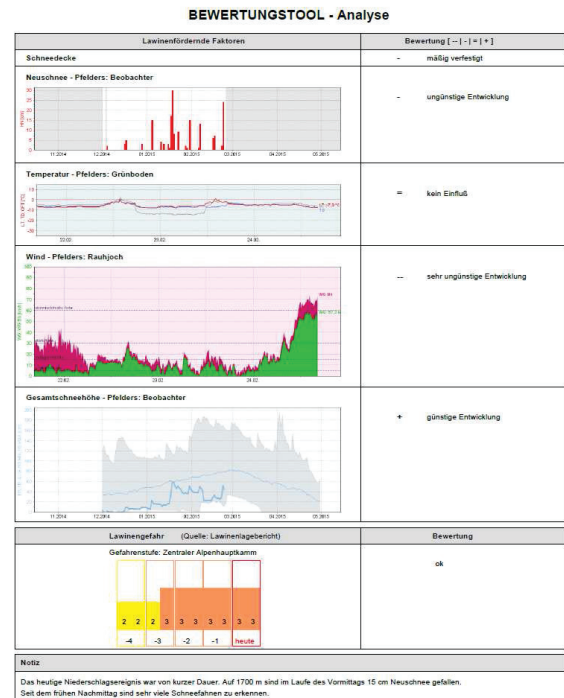


Figure 6: Created pdf file. The analysis shows the five factors with the corresponding evaluations and, as a result, the verification of the current danger level. According to the same principle the tendency part displays the weather forecast and the derived trend for the avalanche danger.

3. SYSTEM DESCRIPTION

The evaluation tool has been integrated into the data visualization platform "StationVis", a web application completely programmed in PHP. Incoming data are processed in a fixed interval and

stored in a MySQL database. The data are then visualized in the evaluation tool as plain data (numbers, text), charts or images (for the current weather situation).

4. CONCLUSION

In summary, the evaluation tool is designed as an easy-to-use online tool for avalanche commissions based on the approach of modern residual risk management. It serves as support for a traceable verification of the regional avalanche danger level and consequently as help for the correct planning of the commission's activities. Moreover, it is used as quick decision-making aid in critical situations.

ACKNOWLEDGEMENT

Many thanks to Christoph Pippan, Managing Director of Pippan Internet KG, for programming and support.

REFERENCES

- [1] Springeth, M. (2015). Rechtlicher Leitfaden für Lawenkommissionen, Autonome Provinz Bozen-Südtirol, 128 pp.
- [2] Andrecs, P., Hagen, K. (2011). Ergebnisse der Expertenbefragung des BFW im Rahmen des Alpinespace Projektes PARAMount