

Recent developments in avalanche risk management in Switzerland

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Since more than 50 years the Swiss Federal Institute for Snow and Avalanche Research SLF in Davos informs the public about the snow and avalanche situation in Switzerland. Avalanche warning has undergone a major change during the last decades from a simple, weekly avalanche bulletin to a comprehensive information service for snow and avalanches. This development has been caused by the importance of the Alps as a tourism and industrial environment and by the increasing mobility demands of the society.

Due to this growing demand for a timely and spatially more precise avalanche warning, the programme "Avalanche Warning Switzerland 2000" was initialized in 1996. The objective of this programme was to establish a network of automatic weather stations, the development of a database for storage of meteorological and snow data and observations, and the development of statistically and physically based models (Russi et al., 1998). Within this development the avalanche warning products have been continuously extended and adapted. They primarily address safety services responsible for safety in villages, traffic lines and tourist facilities and secondly winter tourists especially skiers and snowboarders. The most well known information is the national ("evening") avalanche bulletin issued by SLF daily at 5 pm and broadcasted via radio, phone, fax, a series of newspapers, WAP, and Internet. This text based information consists of the sections general information, forecast of the avalanche danger in different regions of the Swiss Alps, short-term development and tendency for the forthcoming two or three days. This evening bulletin is completed with a map illustrating the avalanche danger level in different hatchings or colours. Fifteen hours after the national ("evening") bulletins, at 8 am, regionally resolved ("morning") bulletins, which are easier to understand and which illustrate the danger level in a map are issued.

The avalanche bulletins are supplemented with maps for amount of new snow, three-day sum of new snow, total snow depth, and snowpack stability. The graphically based products are aimed for Internet requests. User statistics show that requests for avalanche warning products via Internet continuously increased during the last years (Bründl et al., 2003).

The analysis of the avalanche winter 1999 has shown that proper communication of high quality avalanche information between the national centre and safety services is not sufficient for an efficient handling of avalanche crisis situations (Wilhelm et al., 2000). Other important factors are efficient information fluxes between all partners involved in crisis management, well-defined tasks of the responsables and an up-to-date education and training state of authorities at a local level.

These issues were addressed in the project "Intercantonal Early Warning and Crisis Information System IFKIS" ("Interkantonales Frühwarn- und Kriseninformationssystem IFKIS"), a joint project of SLF and the Swiss forest agency. The results of this project were (a) a concept of unified training courses for local and regional avalanche safety services, (b) a checklist of necessary topics which must be regarded in

requirement specifications of avalanche safety services and (c) an internet based information system.

The training courses are offered at two levels: the Level A courses are addressed to members of safety services whose task it is to prepare information for decision makers, and the Level B courses are addressed to people in leadership position within safety services and from local authorities (decision makers).

The checklist includes the points purpose and definition of the area, tasks, organization, responsibility and spheres of competence of the members and of the leadership, liability and insurance, costs and finances, and the time period in which the compulsory booklet is valid.

The information system consists of two parts, the IFKIS InfoManager and the IFKIS Measure Information System. The password-protected IFKIS InfoManager (Fig. 1) is an information platform for safety services and provides data measured by automatic weather stations and at observer stations. It is also a wake-up tool in case that a critical avalanche situation is imminent. The early warning "Snow and Avalanche Danger" is issued when there is a high probability that the next 72 hours will bring at least 1 m of new snow and that the avalanche danger will increase to level 5 ("very large", the highest level). If a danger level less than level 5 is predicted, then an "Information Heavy Snow Fall" is issued. This information is accompanied by an SMS and/or pager alert addressing safety services with a request to consult the IFKIS InfoManager. The critical regions are displayed in a map, which indicates the probably affected regions in the Swiss Alps. Receiving this early warning enables safety services to prepare themselves for an upcoming critical avalanche situation. Because the IFKIS InfoManager is based on Internet technology, all information can be accessed from every computer connected to the Internet. No additional software needs to be installed. This is an improvement compared to the formerly used software InfoBox (Russi et al., 1998), which had to be locally installed on a computer. Because IFKIS InfoManager can easily be updated with new information it will makes it easier for safety services to access the relevant data needed for decisions e.g. on artificial release of avalanches, safety in villages, on traffic lines and in tourist facilities.

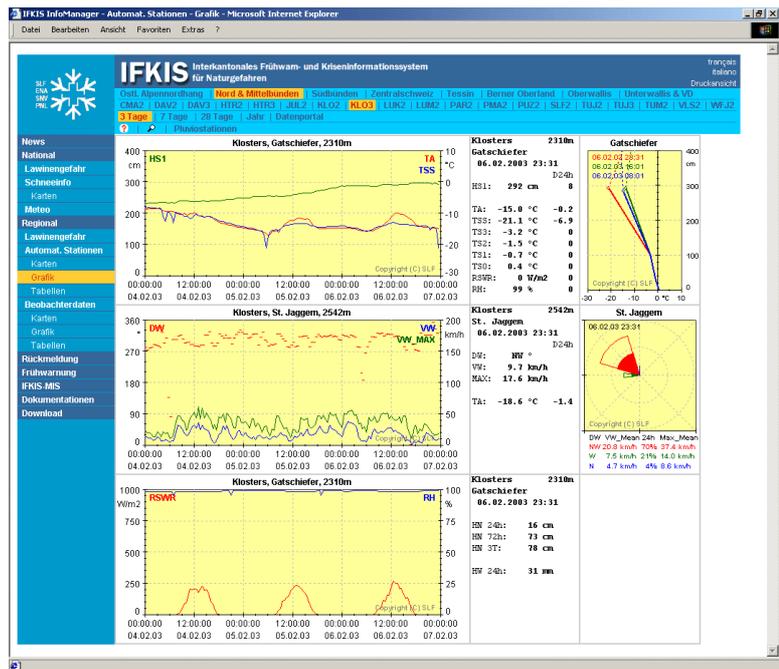


Figure 1: Screen shot of the IFKIS InfoManager.

The IFKIS Measure Information System IFKIS-MIS, based on a Content-Management System (CMS), supports the different organizations responsible for safety (road, railway, police, ski stations, etc.) in rapid mutual information about the situation and organizational steps. The most widespread means of communication, the telephone, is not always the optimal way, since both parties have to be available simultaneously. Bringing all



Figure 2: Screen shot of the IFKIS Measure Information System.

parties up to the same information level in a hectic situation takes too many telephone calls and therefore too much time.

The IFKIS-MIS system allows an easy-to-use input of decisions of safety services involved in management of a critical avalanche situation. The access to this system is password-protected and, at present, not available to the public. The information system is divided into two parts: a “read-only” part and another part for data input (“write access”). This allows a selective allocation of “read” and/or “write” access to different groups of users. The “write” access is also divided between the different organizations by means of different passwords so that every organization is responsible for their own content. The “read-only” part, which also contains frequently used telephone lists and other specific documents, is shown in the form of a screen shot in Figure 2.

Messages in the system lose their value if the user can't take note of them in cases of absence from their computer terminals. Therefore, an embedded alert system sends an SMS or an e-mail automatically as soon as a new message is saved by the system. In this way, the user is informed rapidly about new messages.

The information system was introduced on a test basis in the region Davos/Klosters in the canton of Grisons in February 2002. For the winter of 2002/03, the test in Davos/Klosters was extended. The region Bernese Oberland joined this project in January 2003 and the canton of Glarus in February 2003. Other regions are integrated in the future.

The combination of training courses, compulsory specifications of safety services and information systems for safety services proved to be successful during the last years and serves as basis for the risk management of other natural hazards in Switzerland.

References

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