

Review of ISSW 2009

Almost 550 experts engaged in scientific research, natural hazard management and mountain sports attended Europe's first hosting of the International Snow Science Workshop (ISSW) to discuss topical issues and promising solutions concerning snow and avalanches. In view of the event's popularity, the varied conference programme and the large contingent of practitioners, the organisers were delighted with the success of the ISSW's European premiere.

The International Snow Science Workshop (ISSW), which took place in Davos from September 27 until October 2, 2009, was attended by nearly 550 experts – many more than anticipated. For the first time in its history, the foremost snow and avalanche congress for practitioners was held in Europe. It was organised by the WSL Institute for Snow and Avalanche Research SLF and Science City Davos. Researchers, engineers, safety experts, mountain guides, education and training officers and practitioners from 24 nations travelled to Davos, which is acknowledged as the cradle of modern avalanche science. The systematic investigation of snow and avalanches was initiated on the Weissfluhjoch above Davos in 1936.

The ISSW is not a conventional academic congress on snow and avalanches, but serves as a meeting place for researchers and practitioners. This underlying objective is reflected in the workshop's official billing as "A merging of theory and practice". The ISSW in Davos was the fifteenth congress in the series and the most international one to date. It has been held in North America every two years since the 1970s.

An extensive range of presentations and discussions took place during the five-day event. Experts addressed congress on current problems relating to avalanches and possible solutions. Academic lectures dominated the morning sessions, while the afternoon events, in the form of workshops and excursions in the Davos region, focused primarily on practical issues. About half of the more than 100 speakers were practitioners – chiefly safety authority representatives, mountain guides and avalanche forecasters. The afternoon workshops covered artificial avalanche release, avalanche forecasting and rescue, avalanche dynamics (computer simulation of avalanche movement), avalanche education, quantitative stratigraphy, and the role of snow as a natural resource for winter tourism. An extra whole-day workshop, on the subject of building on permanently frozen soil or permafrost, proved especially popular.

In most disciplines, remarkable progress has been made recently in the quantification of key processes, including snow metamorphosis and transportation by the wind. Modern visualisation methods (computer tomography), image processing and remote sensing now provide a far more detailed view of the snowpack than was possible just a few years ago, and new findings are certain to emerge in the near future. The capture of high-definition periodic images allows deformation and fracture processes in the snowpack to be quantified. For the first time, terrestrial laser scanners are capable of recording the complex patterns in which snow is deposited by the wind. Computer models simulating snow transportation, which is a key process in avalanche formation, can thus be validated.

Several presentations investigated the processes that take place in the snowpack and play a major role in the formation of wet snow avalanches.

In France, where avalanche warning is the responsibility of the national meteorological service, the computer models used by forecasters when issuing avalanche bulletins are very advanced. Such models facilitate not only an assessment of the snowpack's current condition at various altitudes and in different aspects, but also the forecasting of its development in the next day or two. Besides model data, current data gathered in the field are also crucial. The primary interest here lies not in the data delivered by automatic measuring stations, of which there are very many nowadays, but in observations of the snowpack and avalanche activity. By way of special, latest-generation mobile phones with integrated GPS, mountain guides, for example, can for the first time report such observations directly to the avalanche warning services. The SLF conducted a successful trial last winter. A significant improvement in avalanche warning is expected to arise, above all, from better communication of the information on which warnings are based. As illustrated by examples from the USA, the use of visual elements in particular, such as pictograms, images and even short films, can capture the attention of new user groups and make them aware of current avalanche problems. Similar projects have also been initiated in some European countries.

The focus on the prevailing avalanche problem (e.g. fresh snow or snow drift accumulations) is an important aspect of avalanche training – not least because of the recognition that proficient decision-makers in avalanche prone terrain assess the situation primarily by identifying patterns and then adopt a course of action according to their findings. The experts at the congress were unable to agree on how avalanche training should be structured to counter the influence of the "human factor" – feelings, intentions and attitudes – on decision-making. It became clear, however, that the assessment of the human factor depends largely on the accident analysis and the applied error model. The error model represents a hypothesis on the behaviour that caused the avalanche to be released; in other words, on the key factor of human influence. The type of inappropriate behaviour that predominates in avalanche accidents is, however, largely unknown. It must be borne in mind that the cause is not always an obvious lack of caution. Even when the prevailing avalanche danger is "considerable", the probability of release is in the range from 1:100 to 1:1000. If behaviour is adjusted accordingly, the probability is even lower.

In the densely populated Alpine region, hazard zone planning and the appropriate dimensioning of buildings and infrastructure facilities in danger zones are especially important issues. The congress took a much closer look at this topic, therefore, than the ISSW workshops held in North America. Presentations focused on the various computer models that simulate the movement of avalanches and their effects. Such avalanche dynamic models are much more detailed than they were 10 years ago. Progress in this respect has been achieved, in particular, by measurements taken in a variety of test sites in Norway, France and Switzerland (Vallée de la Sionne, Valais), chiefly by releasing avalanches artificially. An innovation unveiled at the congress was the prototype of a wireless sensor that is carried along by the avalanche and transmits relative positional data, so that the movement inside the avalanche can be tracked.

It was encouraging that the presentations at the congress were delivered not only by established researchers, but also by a large number of young scholars, eager to inject fresh impetus into the field of snow and avalanche science. Many practitioners, whose contingent constituted the largest group of attendees, were taking part in such a conference for the first time and expressed their great satisfaction with the event. A large number of delegates would not have attended, had the presentations not been simultaneously interpreted (German, French, Italian and English). This enabled the experts, in particular those from the major Alpine countries, to deliver presentations and engage in discussions in their mother tongue.

Swiss mountain guide Werner Munter, who has made a ground-breaking contribution to avalanche science over a period of decades, was presented with an award at the congress in recognition of his life's work.

A meeting of the ISSW steering committee broadly welcomed the proposal that the ISSW be held in Europe regularly in future. The successful debut made by the ISSW in Davos is thus likely to have a lasting influence on the congress.

Jürg Schweizer, Co-Chair ISSW 2009 Davos, WSL Institute for Snow and Avalanche Research SLF, October 2009