ABSTRACT

TEACHING SNOW SCIENCE AT SCHOOL
Education on snow and avalanches in the Aosta Valley

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Scientists dealing with snow and avalanche research are more and more recognizing the need of spreading their knowledge and achievements to a wider public, not confined into the academic world.

The objective is to create a real education to snow and its problems, in order to raise consciousness about one of the most important elements of the mountain environment.

The Laboratorio Neve e Suoli Alpini (LNSA) of the University of Torino is engaged in a number of programs of popularization, education and training that act at various levels, from children of primary school to graduating students. All activities are performed in the Aosta Valley, thanks to an agreement with the local Ufficio Neve e Valanghe, in strict collaboration with AINEVA and METEOMONT.

The first experiment regards the children of the school of Gressoney-la-Trinité, where LNSA researchers introduced the pupils to the world of snow through face-to-face dialogue, slides and tales. They visited together an exposition on snow and avalanches prepared in collaboration with the Swiss Federal Institute for Snow and Avalanche Research (Davos) and then they applied and verified their new knowledge on field. It revealed an intense experience as testified by the colored and rich drawings produced by girls and boys.

The activity for graduating students was carried out in the ski area Monterosaski and was focused on the techniques for the production of artificial snow, on avalanche risk management and snow surveys.

CISA- IKAR 2005

F. Gheser and E. Filaferro

The 57th conference of CISA – IKAR, the International alpine rescue commission, took place from 12 to 16 October 2005 at Cortina d'Ampezzo, in the magnificent ring of the Dolomiti Mountains.

More than 200 technicians and experts, representing 30 European and North American rescue organisations, shared information and experiences with the aim of steadily improving the degree of efficiency and safety in rescue operations. CISA – IKAR is in fact an international open platform for know-how exchange among the various mountain rescue services. Within CISA – IKAR, rescuers have the possibility of meeting with experts in air, snow and avalanche rescue, first-aid doctors and suppliers of rescue materials. The aim is to maintain the degree of quality achieved in mountain rescue and go on promoting it in favour of all those incurring a mountain accident.

Information technology to help the search for missing persons
EUREKA FOR THE MISSING
The new information project set up to coordinate the search for missing persons.

S. Buricelli, R. Cantoni, S. Marcuzzi, G. Stefini

Firm Topotek Geomatica, Topographic Group of Engineering Faculty of Brescia University, Belluno Province, Corpo Nazionale Soccorso Alpino e Speleologico of Veneto and Friuli, have been the actors that made an agreement to study the right way for managing search missions. During this project, the software Eureka was made to support the teams organization along all the searching phases. Actually this instrument is in the test phase and as soon as possible will be used by searching teams. Next tasks of Eureka project are the integration with GPS technology for real time team localisation, and implementation of a tool to update the cartographic documents. One more interesting evolution of Eureka will be the research support for searching avalanche buried people, where is really important the coordination of intervention, because is well known that only within the first 15 minutes since when the accident has happened there is a higher probability of finding buried persons still alive.

AVALANCHE RISK ON ALPINE ROADS IN THE OLYMPIC MOUNTAIN AREA (SUSA AND CHISONE VALLEYS, PIEDMONT, ITALY)

M. Cordola, A. Cotti and E. Olivero

In the context of a project for weather and avalanche forecasting, the Forecasting and Monitoring Environmental Area of ARPA Piemonte (Piedmont Environmental Protection Regional Agency) has developed a nivo-meteorological monitoring system to forecast avalanche danger on the road network in the alpine Olympic system. Therefore it has effected a study about avalanche risk to support activities of "XXth Olympic winter games security planning group" established by the Turin Prefecture; within this group, the Turin

Province – Civil Protection Service had to define the risk scene in case of intense and extended snowfalls.

In relation to the core role of mobility during the Olympic Winter Games (10-26 February) and during the Paraolympic Winter Games (10-19 March), this study has identified stretches of road network most exposed to avalanches in case of critical snow conditions, referring to past avalanche events, to ground morphological features survey and to meteorological probabilistic evaluations.

Through the study in depth of bibliographical documentations, the aerophotogrammetry rendering and the ground surveys has been realised an Avalanche Probability Map (1:10000 scale and 1:25000 scale) using a GIS software (Arcview). It represents all the avalanches sites that affect the road network of a 300 Km 2 area; 6,5 km of road has resulted exposed to the avalanche risk probability.

A statistic meteorological database of twenty three years has been analysed for high Susa and Chisone valleys. Critical snowfall that could cause risk avalanche on road network has been defined by Gumbel processing; a critical snow condition of 60-80 cm of new snow in 24 hours has been assumed.

The local avalanche risk evaluation (the Avalanche Bullettin for the Olympic Mountain Area) was effactually realized at ARPA Piemonte Sestriere WLC (Weather Local Center) by consulting in real time nivo-meteorological data from the ground stations (a network of about 60 automatic weather ground stations) and referring to specific tests performed in the snow pack (layer and ram profile,

rutschblock) by specialized technicians and alpine guides.

The work has allowed to define risk scenes, due to intense snowfalls, that might affect the XX Olympic Winter Games mountain road network. Moreover, the project has defined alert procedures for civil protection purposes, in collaboration with Prefecture and Turin Province administration.

Piedmont avalanche alert system permits, in case of critical state warning, to activate a Civil Protection Plan that provides preventive road closure and a road re-opening when emergency ends; Civil Protection volunteers and agents performing the snow-clearing operations cooperate through a direct control of avalanches sites affecting the roads.

A remark: the preventive avalanche release, by using conventional or innovative explosives transported by helicopter, could permit an easier road re-opening management.

AVALANCHE DETECTION SYSTEM
An automatic avalanche detection system for mountain roads winter safety

A. Crotti, D. Alberto and F. Ramella Pezza
Four different types of avalanche protection systems are today available.

Avalanche nets are the most used prevention system: they prevent the creeping and sliding of the snow cover on the terrain which prevent the breaking away of the snow slide.

Their main advantages of the nets are the following: high effectiveness, adaptability to different sites, low maintenance costs.

On the other side, avalanches nets are quite expensive and have a relevant environmental impact.

The same problems plague structures such as artificial tunnels and reinforced ground walls.

Less expensive and with minimum impact are avalaunchers, cannons, powered by compressed nitrogen, used to break up unstable snow, allowing an artificial avalanche release and leaving more stable snow in place. They are not very suitable to protect roads because a continuous monitoring is necessary and during the avalanche release traffic has to be stopped.

In the past a few avalanches hit some links of the local road "SP 215" leading to Sestriere, one of the main sites of the Olympic games "Torino 2006".

Avalanches nets have been built in order to hinder a couple of them.

Another couple of avalanches present a very large detachment area. In order to minimize costs, environmental impact and stops of the traffic, an automatic detection system has been built to protect the road against these ones.

The system is made up by the following parts:

• four poles located in the detachment area: in each pole is installed a couple of sensors activated by the pressure of the avalanche;

• a remote unit (located near the sensors but outside the detachment area) which collects data from the sensors, analyses them and sends:

• a signal via radiomodem to four traffic-lights (equipped with a camera) along the road switching the light to red.

• a signal and a photo of the detachment area to a supervision centre (personal computer)

The supervision centre also receives photos from each of the cameras at the traffic lights and send an alarm (via SMS) to the people in charge of the road maintenance. If the avalanche is on the road snow-removing machines are ordered to intervene (if it's a false alarm, traffic lights are switched off).

NIVOLOG SOFTWARE
Potenzials and limits in avalanche forecasting

A. Russian and A. Bariffi
In the land and environmental planning

area, the concept of risk is used for the prevention of potential damages, with the aim of controlling all possible consequences within socially acceptable limits.

An avalanche is an undesired local event that may affect goods or persons with harmful and destructive effects: the main sectors of activity are affected (roads and railways), buildings (houses, mining sites, telephone and high-voltage lines, ski-lifts) and tourism. But not all avalanches cause damage to property or people.

Therefore there is the need to distinguish between danger and risk concepts. Danger means a condition, a circumstance or a process that may cause damage, risk is instead a concept that considers the event probability, the presence of men and damage.

Therefore if we consider a remote avalanche zone in the mountains, where there are neither people nor property, it appears clear that in a context like this, though danger exists due to the fact that an avalanche is very likely to occur, there is however no risk.

Avalanche warning bulletins usually mention hazard and not risk to objectively describe the situation: the user is then required to be able to compare the information provided with the actual situation where he operates; in this case the risk will ensue from his staying or operating in a dangerous zone.

Snow conditions greatly vary from a zone to another and even from a slope to another, and it is therefore important to exhaustively analyse local conditions.

Following the more and more widespread use of computers, it was possible for snow science experts to have recourse to the information technology to study avalanches.

Nivolog is one of the latest and most widespread systems for regional avalanche forecasting (being used mainly abroad). This software was devised by Robert Bolognesi with the aim of supporting the work carried out by the persons in charge for safety at ski resorts, roads, construction sites or installations when they have to decide how to intervene in case of high risk of avalanche release.

This article examines the application aspect of Nivolog, which was addressed by a specific thesis carried out in winter 2004/2005, at the Cancano construction site (Upper Valtellina).