ABSTRACT

WINTER SEASON 2010-2011

M. Valt, P. Cianfarra

Winter season 2010-2011 was characterized by good snow conditions in autumn months, ranging from scarce snowfalls in the central period of winter (mid-January-mid-February) to abundant snowfalls in March in western Alps and then followed by fast spring thaw.

Noteworthy are temperatures of winter season, as very low temperatures, like in mid-December, were followed by mild temperature that caused rainfalls even at high altitudes and/or rapid snow melting (first half of February and April). Wind phenomena were not so frequent like in the winter season 2009-2010 but they affected, especially in late February, snowcover stability mainly in Eastern Alps, where on 26 February 7 avalanche accidents occurred. Avalanche casualties were 17 (also including the Apennines), a little less than average. The periods with the most frequent spontaneous avalanche phenomena nearly always coincided with the periods with heaviest snowfalls. The most critical days were in the first and third ten days of February, and mainly in the second ten days of March, when several large avalanches affected many areas of Italian Alps. As for avalanche risk, the prevalent hazard rating was moderate (rating 2). The early and final periods of winter, mainly in Western Alps, were characterized by considerable hazard rating (rating 3), whereas in the central period of winter there were many days with low avalanche risk (rating 1).

CISA IKAR 2011

S. Pivot

The annual meeting of CISA-IKAR took place in Sweden, in Åre, a ski resort that hosted the Alpine World Ski Championship in 2007. This year, too, the meeting was attended by a number of mountain rescue specialists from 41 countries in the world; the Italian organization F.I.S.P.S. (Italian federation for safety on ski runs) proposed its candidature, which was unfortunately rejected, as there was no representative.

SNOW IN PIEDMONTESE ALPS
Typical synoptic patterns of heavy snowfalls observed in the last 40 years

C. Ronchi, M. Nicolella

The aim of this study is to provide a weather chart of snowfalls in Piedmontese alps, using the long climate series available. After having determined and analyzed the heaviest snowfalls of the last 40 years, the aim of this work is to characterize the main weather charts that determine snowfalls in the areas examined. The climate variability of these events was studied in relation with large-scale variability of air circulation in the Atlantic-Mediterranean region using principal component analysis and clustering techniques. Findings show that seven different main configurations of the pressure field above sea level and on the ground are associated with the most significant events, which determine different effects in terms of amount of snow measured in Piedmontese Alps.

AN INTEGRATED SYSTEM FOR MITIGATION AND CONTROL OF AVALANCHE RISK –THE LIVIGNO CASE HISTORY

A. Bariffi

Following the catastrophic events of winter 1951, which became notoriously known as "*the year of avalanches*", the Livigno territory, like many others in the alpine region, was overcome by events. There were casualties and wrecked dwellings and the village was isolated for several days.

In the years between 1960 and 2004, several safety works were built in the areas considered most critical for avalanche releases, n. 212 (Costaccia) and 220 (Blesaccia) of the C.L.P.V. (Location map of probable snow avalanches), through the installation of active barriers that included snow bridges, wind baffles and snow nets. In all, 3651.5 linear meters of active works are installed in both areas, while wind baffles amount to 315 meters.

According to what planned in the last mitigation avalanche project (2002-2004), based on restoration of damaged structures but also improvement of existing ones, one of the fundamental aspects leading to approval of critical valley floor areas on behalf of by Technical Bodies was the arrangement and starting up of an Integrated risk management plan, based on a Monitoring plan, an Emergency plan and a Programme for control and maintenance of avalanche barriers, which is the subject of this article.

A MODEL FOR SOIL EROSION CAUSED BY SNOW AVALANCHES: The Lavancher, Morgex (AOSTA) CASE

C.Gabriele, M. Maggioni, M.Freppaz, D. Bocchiola

Snow avalanches carry a considerable bearing upon the dynamics of soils in mountain environment. Avalanches exert considerable erosive forces on soils, leading to soil tearing and sediment removal, especially in the transition zone. Sediments mix up with the avalanche body and they may be found within the runout snow deposit, potentially contributing to unique landforms. The quantity of soil material entrained within the avalanche body depends upon the avalanche characteristics (e.g. full depth dry or wet avalanches) and their morphological features (e.g. either gullied or unconfined avalanches, slope angle, etc..), as well as upon soil properties and vegetation cover.

By way of soil erosion avalanche activity contributes to redistribution of nutrients, which are made available by vegetation during the growing season. Moreover, the formation of differential soil patterns (by erosion/deposition) within avalanche tracks contributes to the development of unique pedo-environmental conditions.

Based on a previous campaign carried out by the personnel of Turin University aiming to quantify the amount of sediments trapped within avalanche bodies for the study site of Lavancher, in the Aosta Valley, NW-Italy, we developed here a soil erosion model, which we preliminarily applied to that site. An already developed and tested 1-D avalanche dynamics model was modified to include soil erosion. Soil removal was triggered according to two different mechanisms, namely i) excess of shear and ii) critical velocity. We used equations from the available literature to model the shear stress exerted by the avalanche flow upon the ground underneath.

Critical threshold for soil removal of either shear or velocity were also retrieved from the available literature, possibly depending upon soil texture and geotechnical properties. The model performed well in depicting soil removal from three sample events in the avalanche study site.

Albeit more accurately measured events of soil eroding avalanches seem necessary to test its performance, the model can be used henceforth as a basis for further refinement concerning geo-morphological contribution of avalanches.

EFFECTS OF ARTIFICIAL COVER TECHNIQUES ON THE ENERGY BALANCE ON THE PRESENA GLACIER (TRENTO)

G. Diolaiuti, A. Senese, B. Mosconi, C. D'Agata, C. Mihalcea, C. Smiraglia, A. Trenti

Since summer 2008, investigations to reduce snow and ice ablation have been carried out on the Presena Glacier with very satisfying results. Presena is a mountain glacier in the Adamello Group (Trentino) used for ski activities.

During the last two decades this glacier experienced a strong area and thickness reduction, thus suggesting to apply strategies devoted to reduce the magnitude of glacier ablation and preserve part of the winter and spring snow cover. In this study we show the field investigations carried out during the hydrological year 2009/ 2010.

In particular, an artificial cover (76,400 m2) was spread over the glacier surface at the end of June 2010 and removed at the beginning of September 2010.

To evaluate the role played by the artificial coverage in reducing snow and ice ablation and particularly in modifying glacier energy budget, an Automatic Weather Station (AWS from here) was located on the glacier surface; moreover a second AWS was installed on the surface of the artificial cover.

The AWS on bare ice measured all the meteorological parameters, instead the second one measured only the incoming and outgoing energy fluxes.

On the glacier sector covered with artificial coverage the mean absorbed solar energy amounted to 36%, whereas it amounted to 57% on the not-modified glacier surface.

The impact on snow and ice melting of the reduced energy input is a global reduction of ablation of about 52%.