AvH6-31-1, 2010
6th Alexander von Humboldt International Conference

Study of the quasi-tragic snow-avalanche event occurred on August 2009 at Aconcagua Provincial Park, Mendoza, Argentina

J.C. Leiva (1), A. Casteller (1), H. H. Martínez (2), F.A. Norte (1), and S.C. Simonelli (1)

(1) Instituto Argentino de Nivologia, Glaciología y Ciencias Ambientales, Unidad de Nivoglaciología, Mendoza, Argentina (jcleiva@lab.cricyt.edu.ar), (2) Facultad de Ingeniería – Universidad Nacional de Cuyo, Mendoza, Argentina

Snow avalanches commonly threaten people and infrastructure in mountainous areas worldwide. Winter precipitation events in the Central Andes are caused by the interaction of the atmospheric general circulation and their steep orography. Almost every winter season snow storms and winds cause the blockage of routes and lead to the snowpack conditions that generate avalanche events.

The amount of winter snow accumulation is highly variable and is one of the most important factors for assessing the impacts of climate change not only on the water availability, but also to plan future mitigation measures to reduce the avalanche hazard.

The authors have conducted studies on snow avalanches that regularly affect the international route linking Mendoza (Argentina) with Santiago de Chile (Chile) but none of them was done at the Aconcagua Provincial Park

The park is nearby this route, about 13 km kilometers east from the international border, which in this sector of the Andes coincides with the continental divide. On the night of 17 August 2009, seven people were caught by an avalanche that hit the Aconcagua Park rangers refuge (32º 48' 40" S, 69º 56' 33" W; 2950 masl).This paper describes the meteorological and snow precipitation conditions originating the event.

On August 14 th. the synoptic surface and upper-air conditions from NCEP reanalysis were those associated with a severe Zonda wind occurrence in the region, that is: a 500 hPa level trough, a deep low-pressure surface system located over the Pacific Ocean close to the Chilean coast, approximately over 48 ˚S and 80˚W, and a jet stream at middle upper-air levels. The avalanche event occurred during a new and very heavy snowfall a while more than two days later of these extreme episodes.

The topographical characteristics of the avalanche path, the snow storm intensity and the snow accumulation on the avalanche starting zone allowed the authors to simulate the avalanche flow. Snow storm intensity and snow accumulation data from Los Penitentes ski resort (about 10 km east of the Park entrance) were used as input data for the avalanche modeling. However, an additional snow mass was considered due to the fact that the starting zone is in a leeward slope. Vertical aerial photographs (1974), topographic profiles, a DEM generated from ASTER images and the snow accumulation data enabled the authors to simulate the avalanche flow using a bi-dimensional and a three-dimensional avalanche dynamics model.

Our results indicate that the studied avalanche event was originated by two main factors. Firstly, prior to the studied event, the snowpack had gone through several cycles of high and low temperatures, thus producing a highly metamorphosed snowpack that facilitated the slide of the new snow. Secondly, the high intensity of the new snow precipitation did not allow for its good settlement.

This study is the first step towards an avalanche hazard map of Aconcagua Park and will serve as a basis for advising the Park authorities in regards to the definition of the location of a new refuge and the necessary building structure requirements to be fulfilled.