



Glacial and periglacial environment monitoring in Aosta Valley - Northwestern Italian Alps

Elena Motta (1), Edoardo Cremonese (2), Umberto Morra di Cella (2), Paolo Pogliotti (2), and Marco Vagliasindi (1)

(1) Fondazione Montagna sicura - Courmayeur . Aosta Valley - Italy, (2) Regional Agency for environment protection of Aosta Valley - Italy

Aosta Valley is a small alpine region of about 3.300 km² located in the NW Italy, on the southern side of the Alps and surrounded by the highest Alpine peaks such as Mont Blanc (4810m), Mont Rose (4634m) and Cervino (4478m), More than 50% of the territory has an elevation above 2000 metres asl. High mountain, glacial and periglacial environments

cover a significant part of the territory. As the cryosphere is strongly sensitive to climate change, global warming effects are particularly evident in this alpine region, and they often affect environment and social and economic life, thus representing a key issue for politicians and people working and living in the valley. Among these effects, some of the most important are the decrease of water storage due to glaciers retreat and the increasing natural hazards as a consequence of rapid environmental dynamics.

Hence the importance of monitoring glacial and periglacial environment, in order to quantify effects of climate change, to detect new dynamics and to manage consequences on the environment and the social life.

In Aosta Valley the understanding of these phenomena is carried out by means of several actions, both at a regional scale and on specific representative sites.

A multi-temporal analysis of aerial photographs, orthophotos and satellite imagery allows to detect glaciers evolution trend at a regional scale. All this information is collected in a Regional Glacier inventory, according to the World Glaciers Inventory standard and recommendations. Analysis of the information collected in the Inventory show that the total area presently covered by glaciers is about 135 km²; area changes occurred in the past has been about -44.3 km², and -17 km². between 1975 and 2005.

Glacier inventory also gathers - for each of the about 200 glaciers - morphological data, information about events and photos both historical and present.

Glacier mass balance (the difference resulting from the mass gained by the glacier through the winter/spring precipitations and the mass lost during the summer by snow and ice melting) strictly depends on climatic condition, so its long-term monitoring is a very reliable indicator. In Aosta Valley, yearly mass balance of some important glaciers that have lost significant mass since 2000 is measured. Timorion Glacier (0,5 Km² , 3.100 – 3.450 m, north face, Gran Paradiso Massif) is monitored since 2001; Rutor Glacier (8 Km², 2.700 – 3.400 m, north face) since 2004. Two more glaciers, in the Mont Rose and Mont Blanc Massif respectively, have been recently added to this measurement. The traditional method (with ablation stakes and snow pits) is applied.

Glacier is a fundamental water reservoir and climate change can negatively affect water availability. The temporal evolution dynamics is an issue of increasing importance. For this reasons from 2006, ARPA VdA has developed modelling activities to monitor Snow Water Equivalent (SWE) distribution and glacier evolution at the medium basin scale (120 Km²) for hydro-power production optimization.