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EVOLUTION OF GLACIERS AND RELATED GLACIER LAKES IN THE WESTERN ITALIAN ALPS

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The Alpine cryosphere is experiencing significant variations because of the climate change: glaciers are retreating and, in some regions, disappearing while new glacier lakes are forming. Monitoring these phenomena is very important for better understanding present-day dynamics of the glacial environments and for outlining evolutionary scenarios of the geomorphological landscape.

Glacier lakes are also of considerable significance for several reasons: 1) their potential economic value (e.g. for hydropower production and tourism); 2) their environmental role for high mountain ecosystems; 3) the related natural hazards (e.g. outburst and consequent flood). In this framework, a phD research is currently underway to study glaciers and glacier lakes of the Western Italian Alps (Piemonte and Aosta Valley) by using a multiscale (regional and local), multitemporal (past, present and future) and multidisciplinary (geomatics, geomorphology and geography) approach.

To improve the knowledge of the present-day phenomena at the regional scale, an updated inventory of glacier lakes is in progress, thus offering a general overview of geographical and geomorphological characteristics of glacier lakes. Remote sensing investigations (e.g. semi-automatic analysis of optical satellite images and aerial ortophotos) are proved to be useful to identify and characterize lakes on large alpine areas. Some preliminary results, regarding glacier lakes in Piemonte region, have been obtained: about 80 lakes have been identified, they are mainly proglacial lakes with a surface area lower than 2,000 m^2 and located in the elevation range between 2,500 m and 3,100 m s.l.m.

Moreover, the assessment of future glacier lakes formation has recently become a research focus in many high mountain regions of the world (such as the Himalayas and the Swiss Alps). A selection of methods will be tested on glaciers of the Western Italian Alps: glacier bed over-deepenings are identified through the analysis of glaciers surface topography by means of Digital Elevation Model (DEM) in a GIS environment. In these sites, if glaciers will continue to retreat and eventually disappear, water can accumulate forming new lakes.

Regional scale results will be then verified at the local scale on few selected case studies that recently experienced the formation of new glacier lakes; two proposed test sites are the Rutor and the Indren glaciers (Aosta Valley). In this cases, it is expected to reconstruct evolutionary stages of glacier-glacier lake systems by using historical data (for enlarging the considered time frame through the Little Ice Age), aerial photos, optical satellite images and field surveys.