



Contribution: Poster presentation

AN INTEGRATED APPROACH TO THE MORPHODYNAMICS OF GLACIER-GLACIER LAKE SYSTEMS IN THE ITALIAN ALPS

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Climate change affects glaciated and recently deglaciated areas in high mountain regions and can enhance the formation of new glacier lakes and/or the expansion of existing ones. The importance of glacier lakes either in the natural and human systems is due to several reasons: 1) their potential economic value (for hydropower production and tourism); 2) their environmental role for high mountain ecosystems; 3) the related natural hazards (outburst and consequent flood); 4) their strong dependence by glacier dynamics.

The Italian cryosphere is experiencing new glacier lakes formations: very important phenomena to be monitored, as it has been done in many other regions of the world, for better understanding present-day dynamics of the glacial environments and delineate evolutionary scenarios of the geomorphological landscape. In this framework, a cooperative research project and a PhD position have been established in 2014 at the University of Torino to study glaciers and glacier lakes of the Italian Alps by using a multiscale (regional and local), multitemporal (past, present and future) and multidisciplinary (geomatics, geomorphology and geography) approach.

The first step of the research is the identification and the characterization of present and historic glacier lakes in the Italian Alps in order to improve the knowledge of the phenomenon at the present time and at the regional scale. As suggested by scientific literature, further remote sensing investigations (semi-automatic analysis of optical satellite images, e.g. Landsat 8, ASTER) offers updated information on large alpine areas. Data validation and integration is performed by analyses of aerial orthophotos and reports of the annual glaciological surveys. It is expected to offer a general overview of the geographical and geomorphological characteristics of detected glacier lakes.

A second step in the research is related to the assessment of future glacier lakes formation in the Italian Alps. A selection of methods applied in other high mountain regions such as the Himalayas and the Swiss Alps, will be tested on glaciated regions of Italy. They are based on the analysis, in a GIS environment, of glaciers surface topography through Digital Elevation Model (DEM) in order to identify glacier bed over-deepenings. In these sites, if glaciers will continue to retreat and may be disappear, water can accumulate forming new lakes.



Regional scale results will be then verified on few case studies that have experienced the formation of new glacier lakes recently in the past. At the local scale, it is expected to reconstruct evolutionary stages of glacier-glacier lake systems by using historical data (maps, photos), aerial photos, optical satellite images and field surveys. A first proposed test site for detailed studies is the Rutor Glacier (Aosta Valley): it has a well known history of glacier lake outburst floods and recently new glacier lakes have appeared in the proglacial zone.