Geophysical Research Abstracts
Vol. 14, EGU2012-10804, 2012
EGU General Assembly 2012

New lakes in deglaciating high-mountain areas: Regional intercomparison of current and future risks from impact waves due to rock/ice avalanches in the Swiss Alps

Y. Schaub, C. Huggel, M. Serraino, and W. Haeberli
University of Zurich, Geography, Zurich, Switzerland (yvonne.schaub@geo.uzh.ch)

The changes in high-mountain environments are increasingly fast and complex. GIS-based models of the Swiss Alps show that numerous topographic overdeepenings are likely to appear on progressively exposed glacier beds, which are considered as potential sites of future lake formation. In many cases these newly forming lakes will be situated in an over-steepened and destabilized high-mountain environment and are, therefore, prone to impact waves from landslides. The risk of glacier lake outburst floods, endangering infrastructure, residential areas and persons further downvalley, is increasing with further lake formation and glacier recession. This risk may persist for many decades if not centuries.

Future-oriented hazard assessments have to be integrative and must deal with all possible process chains. Reference studies and methodologies are still scarce, however. We present an approach to compare risks resulting from high-mountain lakes in the Swiss Alps amongst each other. Already existing lakes are thereby as much included in the analysis as future ones. The presented risk assessment approach integrates the envisaged high-mountain hazard process chain with present and future socio-economic conditions.

Applying the concept of integral risk management, the hazard and damage potentials have to be analyzed. The areas that feature the topographic potential for rock/iceavalanches to reach a lake were analyzed regarding their susceptibility to slope failure including the factors slope inclination, permafrost occurrence, glacier recession and bedrock lithology. Together with the analysis of the lakes (volume and runout path of potential outburst floods), the hazard analysis of the process chain was completed. As an example, high long-term hazard potentials in the Swiss Alps have, for instance, to be expected in the area of the Great Aletsch glacier.

A methodology for the assessment of the damage potential was elaborated and will be presented. In order to estimate the location of the largest damage potentials, driving forces of different spatial development scenarios for the Swiss Alps will be implemented in a land allocation model for the Swiss Alps.

By bringing together hazard, exposure and vulnerability analyses, a risk assessment for the entire Swiss Alps regarding lake-outburst floods triggered by impacts of rock/ice avalanches can be conducted for today, the middle of the century and even beyond.