Geophysical Research Abstracts
Vol. 20, EGU2018-8711, 2018
EGU General Assembly 2018

Tsunami deposits surrounding perialpine lakes in Switzerland

Valentin Nigg (1), Stéphanie Girardclos (2), Katrina Kremer (3), and Flavio Anselmetti (4)

(1) Institute of Geological Sciences, University of Bern, Switzerland (valentin.nigg@geo.unibe.ch), (2) Department of Earth Sciences and Institute for Environmental Sciences, University of Geneva, Switzerland (Stephanie.Girardclos@unige.ch), (3) Swiss Seismological Service, ETH Zurich, Switzerland (katrina.kremer@sed.ethz.ch), (4) Institute of Geological Sciences and Oeschger Centre for Climate Change Research, University of Bern, Switzerland (flavio.anselmetti@geo.unibe.ch)

Tsunamis are not restricted to the marine realm: historical reports, multibeam bathymetric datasets, seismic-reflection surveys and numerical wave modelling reveal that devastating tsunamis occurred in perialpine lakes in Switzerland. These events have diverse trigger mechanisms such as earthquakes, rockfalls or spontaneous subaquatic mass movements displacing large amounts of water. For example, a tsunami with run-up heights exceeding 4 m is reported after an earthquake (Mw 5.9) in Lake Lucerne in 1601 AD. The earthquake triggered basin-wide sublacustrine mass-movements with a total volume of hundreds of million m^3 of downgoing sediments. This event resulted in local inundation over a distance of several 100 meters inland and caused even a few causalities. At Lake Geneva, a major rockfall led to the collapse of the Rhone delta in 536 AD causing a tsunami with a height of several meters.

This study focuses on the identification of onshore and near-shore tsunami deposits around major Swiss lakes based on sediment cores drilled along transects in coastal marshes. We first investigate in which way lacustrine tsunami deposits differ from their marine counterparts and how terrestrial flood deposits can be differentiated from tsunami deposits. Thus, this study provides the foundation to confirm historic tsunami events and to extend the event catalogue to the prehistoric time period. This tsunami chronology will be correlated with major mass-transport deposits observed in various lake basins. Moreover, we infer run-up height, inundation distance and flow regime based on event deposits. Information gained from tsunami deposits will serve to ground truth results yielded by numerical modelling.

The study presented here is part of an interdisciplinary project addressing the causes, controls, frequency of this to date underrated lacustrine tsunami hazard. The SNF Sinergia projects includes numerical modelling of tsunami propagation and inundation, quantifies the stability and threshold conditions on lateral lake slopes and develops a holistic framework for probabilistic tsunami hazard assessment.