



A multidisciplinary approach to assess the causes, consequences and hazard of tsunamis in Swiss lakes

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Marine tsunamis have been increasingly discussed in the context of ocean-wide natural hazards since the 2004 Sumatra, the 2011 Tohoku earthquake and the more recent 2018 Palu tsunamis. However, as historical reports and recent studies have shown, tsunamis also occur in lakes. While ocean tsunamis are often caused by earthquake-related plate displacements, tsunamis in lakes are of seismic or aseismic origin, caused by mass-movement processes that displace large amounts of water, generating devastating waves.

In Switzerland, historical reports document that tsunamis occurred in many lakes (e.g. 563 AD in Lake Geneva, 1601 and 1687 AD in Lake Lucerne) causing large damages and casualties. The causes of these historical tsunamis were diverse and include earthquake-triggered sublacustrine and subaerial mass-movements, spontaneous delta collapses. Today, the shorelines of many Swiss lakes are densely populated. Although tsunamis are known to have occurred in the past on various Swiss lakes, a workflow for a holistic tsunami hazard assessment is still missing. An interdisciplinary project, funded by the Swiss National Science Foundation, uses the outstanding field laboratory of Switzerland's lakes to better understand the key concepts of governing processes of lake tsunamis by investigating i) their trigger mechanisms, ii) the geotechnical and sedimentological properties of the unstable sediment, iii) the potentially unstable sediment volumes on charged slopes, iv) wave propagation and inundation, v) onshore tsunami deposits and vi) their related hazard. The results of this project will provide the basis for assessing the risk for people and infrastructure along lakeshores and coasts.