Geophysical Research Abstracts
Vol. 21, EGU2019-3849, 2019
EGU General Assembly 2019

Characteristics of the surge wave triggered by ice avalanche and its run-up prediction along a moraine dam

Huayong Chen (1,2), Peng Cui (1,2,3), Xiaoqing Chen (1,2,3), Jiangang Chen (1,2)

(1) Key Laboratory of Mountain Hazards and Earth Surface Process/Institute of Mountain Hazards and Environment, Chengdu, 610041,China, (2) University of Chinese Academy of Sciences, Beijing, 100049, China, (3) CAS Center for Excellence in Tibetan Plateau Earth Sciences, Beijing, 100101, China

Climatic warming leads to the retreat of glaciers in the high mountain areas of the world, which often triggers glacier avalanches, landslides, snow avalanches. Surge waves may be generated in the confined water bodies like glacier lakes and reservoirs when a large volume of glacier or rock mass slides into the water. Serious surge waves triggered by glacier avalanches often pose a potential threat to the stability of dams. A famous moraine-dammed lake outburst event occurred on July 15, 1988, in Tibet Autonomous Region, China which led to the destroying of several villages downstream. In this article, four different types of blocks with a constant density of about 900 kg/m3 were used to simulate the glacier avalanches under natural conditions. An empirical equation was given to predict the initial surge wave height triggered by glacier avalanches. The attenuation rule was also investigated under different operating conditions. The prediction of surge wave run-ups along moraine dam was also investigated when it arrived at lake shore. It indicated that the variation of surge waves triggered by glacier avalanches was divided into three stages: 1) sudden attenuation, gentle attenuation, and periodic fluctuations. The turning point between sudden attenuation and gentle attenuation was found at about 1.5 times as big as the water depth away from the dropping location. Additionally, the run-ups of surge waves calculated by empirical model were in good agreement with the experimental ones.