

Remote-sensing-based monitoring the dynamics of Kyagar Glacial Lake in the upstream of Yarkant River, north Karakoram

Luo Yunyi¹, Qiao Liu¹, Yan Zhong¹, and Wang Han¹

¹Institute of Mountain Hazards and Environment Chinese Academy of Sciences

March 28, 2022

Abstract

Long-term monitoring of ice-dammed lake development are important for understanding the process of lake storage and outburst. Based on remote sensing observations for the period 1972-2020, we obtained so far the most detailed reconstruction of the filling and drain of Kyagar lake, a typical annually ice-dammed lake in the north Karakoram. We show that annually repeated lake filling-drains were detected by satellite observations during two periods:1996 to 2009 and 2015 to 2020, while between 2009 and 2015 none obvious outburst occurred. These two intermitted periods with regular annual cycles of lake outburst were likely related to the long-term cycle of glacier surge dynamics, which show two remarkable surge-induced terminus accelerations during 1995-1997 and 2014-2016. Following each surge, the maximum lake areas were decreased by about 33% from 1996-2009 and by about 88% from 2015-2020. With climate warming and the thinning of the ice-dam, the storage capacity of glacial lake will likely continue decrease in the future, and the risk of lake outburst flood thus somehow decrease. Repeated drainage following filling exacerbates the depletion of material at the glacier terminal, leading to the cessation of storage and creating the conditions for the next glacial surge to occur, thus creating a long-term cycling process. Together with the uncertainty and intensified climate changes, it suggests that a close monitoring of the glacial lake development and glacier dynamics would be still important.

Hosted file

Remote-sensing-based monitoring the dynamics of Kyagar Glacial Lake(YL).docx available at <https://authorea.com/users/467014/articles/561132-remote-sensing-based-monitoring-the-dynamics-of-kyagar-glacial-lake-in-the-upstream-of-yarkant-river-north-karakoram>