

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

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HDS025-03

Room:103

Time:May 22 10:00-10:15

Re-evaluation of potential of glacial lake outburst flood in the Himalayas

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Hazard of glacial lake outburst flood (GLOF) is an urgent environmental issue in the Himalayan countries such as Bhutan and Nepal. The GLOFs have frequently occurred since the 1960s, accompanied with shrinkage of glaciers and attendant expansion of glacial lakes. A previous study has reported that potentially dangerous glacial lakes existed 20 in Nepal and 24 in Bhutan. No obvious criteria, however, is not shown so far. In addition, some "real dangerous" glacial lakes, which have been pointed out by several field researchers, were not listed in the previous inventory.

We attempt to re-evaluate potential risk of GLOF by using ASTER images and digital elevation models (DEMs). Relative angles of surrounding topography against a lake surface are calculated. By adopting a threshold of 10 degree, a place surrounding glacial lake, where field researchers have felt as dangerous, is successfully marked. In addition, we validate the threshold angle by assessing the pre-GLOF lakes by Hexagon KH-9 satellite images and its DEM. We re-evaluate the 44 dangerous glacial lakes in Bhutan and Nepal.

Keywords: Himalayas, Glacial lake, ASTER, Hexagon, DEM