Update of a glacial lake inventory in the Bhutan Himalaya using ALOS-2

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A glacial lake outburst flood is one of natural hazards in the high-mountain area related to recent glacier retreating. In the Bhutan Himalaya, a glacier and glacial lake inventory up to 2011 was developed by means of high-resolution satellite images, however, there is no update campaign that causes no answer on which lakes are still expanding and how many lakes has been born there. Therefore this study aims to develop an updating method of glacial lake inventory by means of a synthetic aperture radar which is not hampered by cloud cover.

The initial information is obtained from the glacial lake inventory released from the Japan Aerospace Exploration Agency, which contains geospatial information of the glacial lakes in the Bhutan Himalaya between 2006 and 2011. We use PALSAR-2 images observed the same site after 2014 for several times. They were acquired at the stripmap mode with spatial resolutions of 3 to 10 m. In a PALSAR-2 backscatter amplitude image, a lake surface is identified as low-value homogeneous pixels. Therefore a segmentation tool in QGIS/Orfeo Tool Box is used to extract the lake surfaces automatically.

As the result of segmentation on a PALSAR-2 image, almost all of glacial lakes which have ranges larger than 100 m were extracted, whereas small lakes were not able to be extracted resulting in small fragments. From this result, we are going to discuss influence of PALSAR-2 spatial resolution and several data processing which can be needed before lake extraction.

Keywords: SAR, GLOF, Glacial lake inventory