

Observation of a gigantic Bhutan landslide caused by Cyclone Aila in 2009 using ALOS data

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The kingdom of Bhutan is located in the Himalayan Range in a mountainous area of weak geology. Landslide disasters occur every year, mainly induced by heavy rain. In 2009, the Mangde-chu River, one of the primary rivers in the country was blocked at 1,063 masl of its river bed by huge volumes of debris discharged from a tributary. Moreover, a National Highway connecting Bhutan with India was covered by the debris and closed to traffic. In spite of the significance of the event, no research was conducted on the debris transport process of the tributary.

Therefore, we conducted observations of the topographic condition of the tributary basin using satellite images produced by the Advanced Land Observing Satellite (ALOS, Daichi) of the Japan Aerospace Exploration Agency. Interpretation of the topography was done using a counter Digital Surface Model of ALOS PRISM data (5 m resolution). The ALOS data were observed just after Cyclone Aila. As a result, we detected the topography of a gigantic landslide with fresh scarps, at an upstream site of the tributary. The body of the landslide was 1.2 km wide and 1.1 km long; moreover, the landslide occurred in the vicinity of an older landslide.

We think that this landslide was induced by Cyclone Aila and became the source of the huge volume of debris that blocked the Mangde-chu River. The landslide is divided into blocks and is assumed to be unstable. It is important to conduct more detailed work and assessment in a timely manner because the government of Bhutan has constructed hydro-power facilities along the Mangde-chu River.

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