Interpretation of landslide surface deformation around the branch basins of Sun Kosi river in Nepal using InSAR images

*Otake Shunpei[1], Hiroshi, P. Sato[1]

1. College of Humanities and Sciences, Nihon University

On 25 Apr 2015, Gorkha earthquake (Mw 7.8) occurred at 80 km NW from Kathmandu, Nepal. After that, the largest aftershock (Mw 7.3) occurred on 12 May 2015 at 75 km ENE from Kathmandu. These earthquakes caused landslide disasters and big damages. Nepal has wide mountain area, and landslides disasters tend to be induced by both conditions as follows. On the one hand many earthquakes occur in Nepal, where is on the collision and subduction area related Indo-Australian and Eurasian plate. On the other hand they have much rain in monsoon season there. Therefore, landslide caused by these earthquakes may be reactivated. It is important to monitor landslide surface deformation because it contributes to prevent landslide disasters after these earthquakes. In this study we focused on the area where the largest aftershock occurred, and tried to detect landslide surface deformations after the largest aftershock.

Recently InSAR (Synthetic Aperture Rader interferometry) has been used to detect landslide surface deformation. Then, we used and adopt it for the study area, where is the watershed of Sun Koshi river branches which includes epicenter of the largest aftershock. In this study two InSAR images were produced, which was taken on 12 Sep 2016/30 Jan 2017 and on 30 Jan 2017 /11 Sep 2017. Then, landslide surface deformations were interpreted on the two InSAR images, and the interpreted areas were delineated and the center of the area were mapped. And location of such the detected sites were analyzed related with distance from the epicenter, elevation, slope aspect, deformation amount along LoS (line of sight) known from InSAR image, interpreted deformation area, lithological units of geology, and the watersheds of the branches.

As a result of the interpretation, 29 and 25 deformation sites were detected on InSAR image taken on 12 Sep 2016/30 Jan 2017 and on 30 Jan 2017 /11 Sep 2017, respectively. As a result of the analysis, it was found that ca. 70 % of the detected sites locate in the elevation of 1,500-2,999 m, and that the averaged area of deformation per one site was larger on 30 Jan 2017 /11 Sep 2017 image than on 12 Sep 2016/30 Jan 2017 image. For the former result, it is thought that low Himalayan meta-sedimentary rocks gave more detected sites than other lithological units and the rocks tend to be widely distributed in this elevation belt. For the latter result, it is thought that effect of precipitation in rainy season are related more closely with landslide surface deformation interpreted on 30 Jan 2017 /11 Sep 2017 image than on 12 Sep 2016/30 Jan 2017 image.

Keywords: Landslide, SAR, Earthquake, Nepal

