Earthquake induced landslides by the Mw 6.6 2018 Hokkaido Eastern Iburi Earthquake

Shusaku Yamazaki[*], Yoshihiko Ito[**], Toshiyuki Kurahashi[*] ([*]Public Works Research Institute, Japan; [**] Hokuden Integrated Consulting Service Co., Japan)
E-mail: yamazaki@ceri.go.jp

On Sep 6th of 2018, the 2018 Hokkaido Eastern Iburi Earthquake with Mw 6.6 was occurred by about 1.2 m slip of reverse fault at 37 km depth, as inland type earthquake in south central Hokkaido of Japan. This site is located in the northeastern edge of the Arc-Arc collision zone that formed by westward motion of Kuril fore-arc sliver toward NW-Japan arc driven by oblique subduction of Pacific Plate. Based on aerial photo analysis, 0.5 m resolution DEM analysis by aerial laser survey and field survey after earthquake, the two types of the earthquake induced landslides has been identified around the epicenter. The shallow type landslides occurred at over 6000 slopes and they distribute in hilly area of 20 x 20 km in 3-22 km north from the epicenter. The shallow landslides are classified into earth slide and flow of 2-3.5 m thick tephra and soil layers on slope, that covers on the basement rock consisting of Miocene to Pliocene marine sedimentary rocks. The distribution of the shallow landslides is clearly corresponding to thick area of the tephra fall deposits of Ta-d (ca. 9 ka; Mt. Tarumae) or Ta-d with En-a (ca. 20 ka; Mt. Eniwa). Using the 0.5 m resolution DEM, we newly identified over 250 deep-seated landslides within 5-15 km from the epicenter. At 5 km north from the epicenter, the largest rockslide occurred with 350 m slide of a dip-slope ridge topography of 350 m wide and 800 m long and the slide block formed landslide dam. This high-resolution DEM enables to subdivide the rockslides into ridge-, slope- and shallow-type depending on shape and depth of crown crack and main scarp below a few meters wide. The rock slides are concentrated within 3-10 km from the epicenter and their basement predominantly consists of marine sediments of shale, mud and sandstone of Karumai Formation (Late Miocene). Based on the topographic analysis using DEM data combined with geological survey and map analysis, most of the rockslides are presume to be occurred in ridge or slope with dip-slope structure. Thus, high resolution DEM is a strong tool for rapid identification of earthquake-induced landslides in tens km-scale area. In addition, high-resolution

DEM data is also useful as a reference surface for slope monitoring using multi-period models by UAV-photogrammetry at tens to hundreds meter scale.

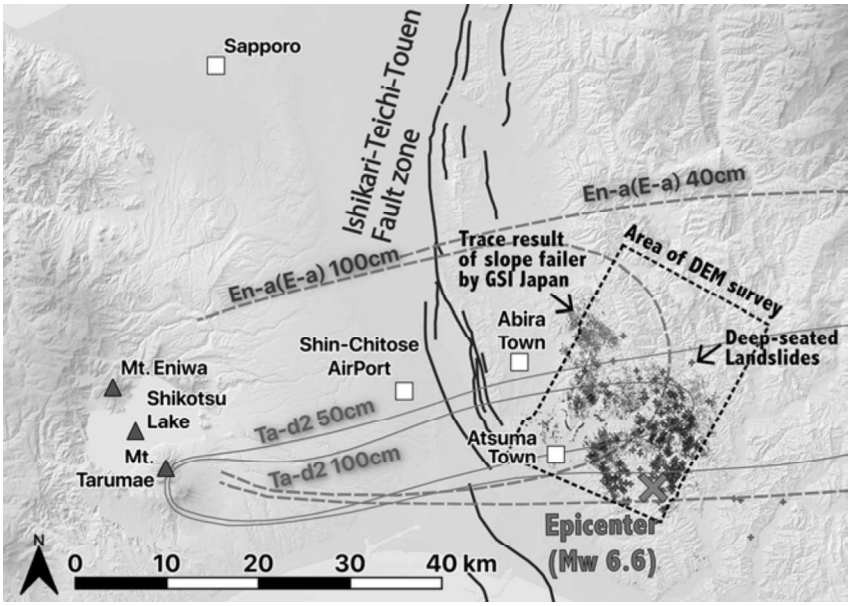

Fig.1 Location of epicenter of the 2018 Hokkaido Iburi Tobu Earthquake, with distributions of earthquake-induced landslides (GSJ Japan and our reuslts) and tephra isopach of Ta-d2 (Mt. Tarumae) and En-a (Mt. Eniwa).

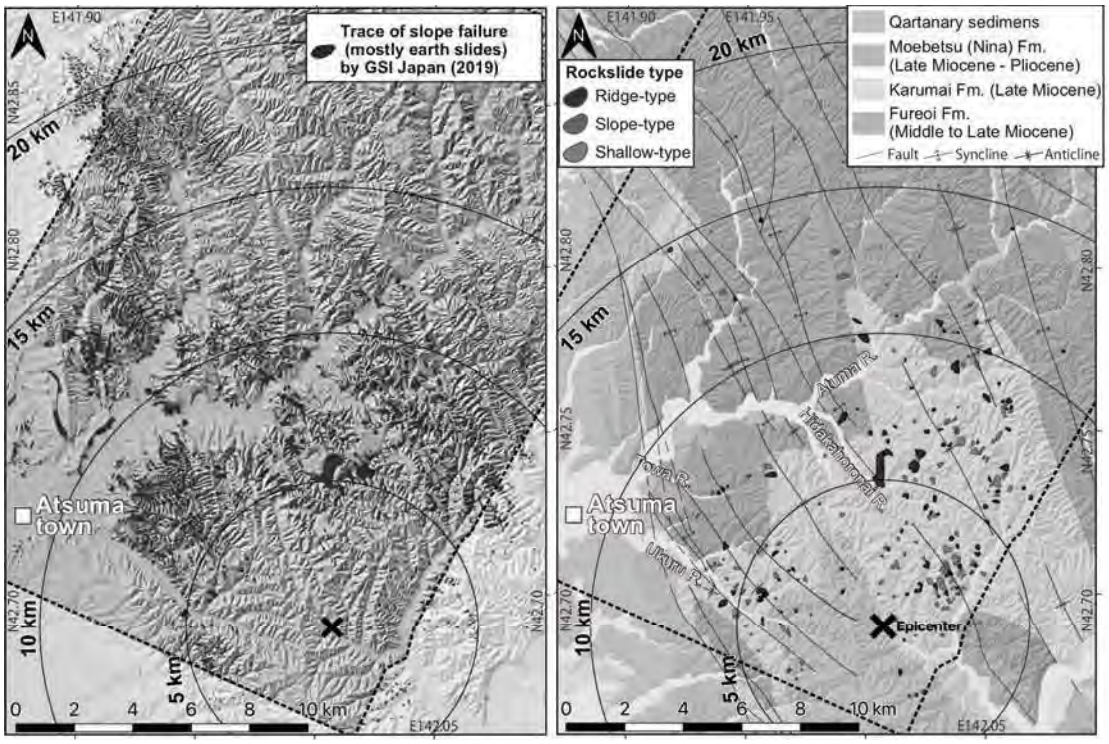

Fig. 2 Identification result of the shallow landslides (left; trace result of GSI Japan, 2018) and the deep-seated landslides by high-resolution DEM analysis (right; this study).