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^{10}Be and AMS Ages of the Gunsakot Landslide, Formative Age of the Gigantic Landslide Located in Eastern Mount-Foot of the Lantang Himal, Central Nepal

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Received: July 12, 2025, Accepted: October 15, 2025

Abstract: Formative age of the Gunsakot Landslide, the gigantic landslide, of which volume is thought to be 1 km^3 at least, was clarified by Cosmogenic and AMS dating. It is ca 2000 years ago.

Keywords: ***Gunsakot landslide, Deep seated landslide, Gigantic landslide, Cosmogenic dating, AMS dating***

Introduction

Dormant landslides of deep-seated type are densely distributed in the topographic transitional zone from the Midland to the Great Himalaya. Dormant landslides of the deep-seated type are distributed in an area below 3,500 m a. s. l., because the mountain slope higher than that was presumably eroded away by valley glacier in the former Ice Age. As to geology, they are predominantly distributed in geological areas of phyllite and augen gneiss areas, considering both landslide area ratio and the number of the landslide site. Most of large landslides are sliding down to northwest, reflecting the geological structure that declines to northwest due to activity of MCT. Consequently, landslides of deep-seated type are also prone to develop on dip-slopes in this area. Landslides usually occur easier on dip slope than those on anti-dip slope under same geological condition. And the scale of deep-seated landslides is prone to become larger where those toe parts are cut by deep valley (Yagi et al., 2018).

Gunsakot landslide

Aerial-photo interpretation detected a gigantic dormant landslide at Gunsakot locating in the upper course of Indravati River, Sun Kosi watershed, central Nepal Himalayas (Figure 1). Its slope length is 8km, the maximum width is 2 km and relative height below the crown 2000 m. Its planar scale is almost 15 km^2 including source and depositional areas. Depositional area of detritus with the thickness of 300 m more is 4 km^2 remained on the left bank of Indravati river. Its volume is estimated to be 0.9 km^3 in the source area and 1.2 km^3 in the depositional area, respectively. The net volume is thought to be 1 km^3 at least. Equivalent coefficient of friction, H/L, is 0.25, that is equal to 14 degrees (Figure 2). Landslide mass colliding with the right bank of the Indravati River stopped, consequently the H/L might be lower than 0.25.

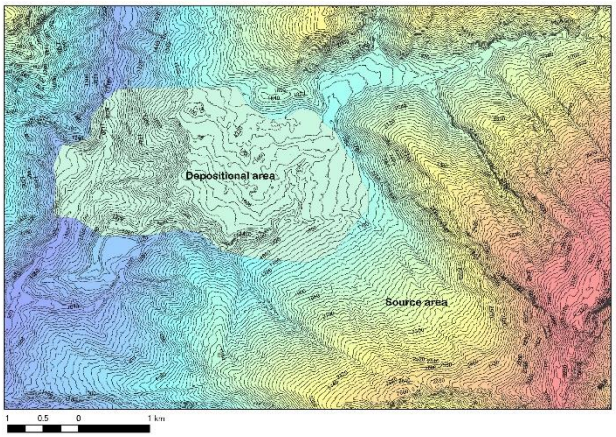

Figure 1, Topography of Gunsakot Landslide and its vicinity.

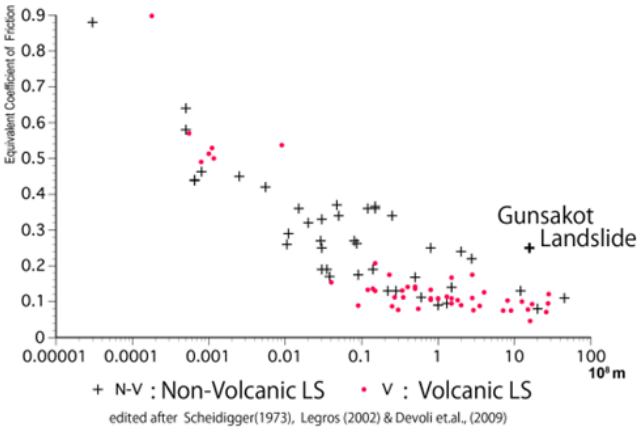

Figure 2, Relationship between volume and equivalent Coefficient of friction.

Formative age of the Gunsakot landslide

Rocky detritus forming mounds are distributed on the top part of the depositional area. Rock masses with long axis of 5 - 10m are scattered on the mounds. The authors got samples from the top part of the rock masses for ^{10}Be dating to clarify the formative age of the gigantic

landslide. The results of the dating are 2500-1900 years ago for three samples and 8000 years ago for another sample, respectively (Figure 3; Yagi et al., 2019).

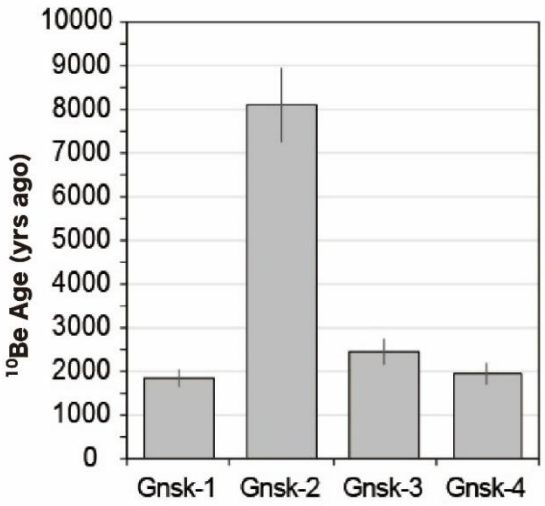

Figure 3, Cosmogenic age of Gunsakot landslide.

The authors also collected two carbon dating samples just behind the landslide dam. One (AMS Sample 2) is located along the highest level of former shoreline of the dammed-up lake just behind the landslide dam (Figure 4). Result of its AMS dating are 2400-2200 Cal BP. The AMS age is harmonious to the above-mentioned three cosmogenic ages showing around 2000 years ago. The authors think one cosmogenic age of 8000 years ago is the inherited one. Consequently, the Gunsakot landslide is formed around 2500 years ago. Cause of the Gunsakot landslide is presumably the complex factors triggered by earthquakes in the heavy rain.

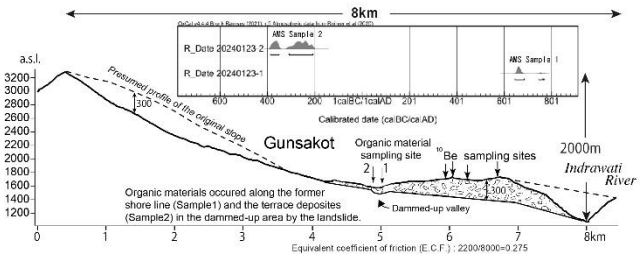

Figure 4, Cross section of Gunsakot landslide and location of dating sample.

Concluding remarks

The Gunsakot Landslide is a gigantic landslide of which scale is more than a billion km^3 and the equivalent coefficient of friction, H/L, is 0.25, that is equal to 14 degrees. The formative age of the Gunsakot Landslide was around 2.5 years ago.

Gravitational deformation also has proceeded along the top ridge in the augen gneiss area, forming multiple ridges widely, uphill facing scarplets and linear depressions on its surrounding slope in northern part of Gunsakot. This implies more mega-scale landslides will occur in future.

Acknowledgement

^{10}Be dating in this study was carried out at Micro Analysis Laboratory, Tandem Accelerator, the University of Tokyo. AMS dating was done at the Center for Accelerator Mass Spectrometry of Yamagata University. The authors thank members of the institutions involved.

References

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