Estimation method of slip surface by ground surface displacement

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Abstract

After a landslide has occurred, it is important to take emergency countermeasures as soon as possible to prevent the damage from worsening. To do this, it is necessary to quickly identify the characteristics and size of movement of the landslide. However, conventional methods such as investigating the slip surface by taking core samples and monitoring the movement of land mass using vertical boring holes is time-consuming and involves risk, as the work must be carried out directly on the unstable landslide.

This paper introduces a method of estimating the depth of the landslide slip surface using by ground surface displacement. The method involves dividing the landslide block and deriving a formula that approximates the line of the slip surface. Inputs for this method include the lengthwise section of the ground surface, displacement of ground surface, points of the scarp and tip of the landslide. We applied this method to several landslides and proved that the slip surface estimated by this method closely matched the actual surface determined by conventional methods, provided that measuring points were properly arranged.

The results suggest that this method can estimate the slip surface of landslides. In future, it is necessary to improve systems of monitoring active landslide masses and methods of estimating their size in a quick, easy, and reliable manner to be practically applicable to disaster areas.