Topographical interpretation of landslides using a constant vertical exaggeration stereoscopic map

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This study introduces the method for interpreting landslide topographies with a constant vertical exaggeration stereoscopic (CVES) map. The map created by using digital elevation model (DEM) data shows 3D images of landforms as an anaglyph. We created two types of CVES maps by using the light detection and ranging (LiDAR) digital terrain model (DTM) and the Advanced Land Observing Satellite (ALOS) World 3D (AW3D) digital surface model (DSM) data (observation data from the Japanese satellite ALOS-Daichi) around Mt. Ebiradake in Northern Japanese Alps. We then compared these maps with a landslide distribution map created using air-photo interpretation. As a result, we could clearly identify scarps, which were formed on the landslide body due to secondary landslide activity and were several meters high on the CVES map created using LiDAR DEM data with 5 m resolution. A number of scarps identified on the CVES map were difficult to interpret using the air-photo technique. The CVES map provides very helpful data for creating high-resolution landslide distribution maps. In contrast, it was difficult to detect those scarps on the CVES map that were created from AW3D DSM data with 5 m resolution. However, we could identify landslides more than 200 m width and scarps more than 10-20 m high on the landslide body. The AW3D data cover the entire world, so the CVES map created by using AW3D DSM is useful for areas where LiDAR data and / or air-photos are unavailable for generating landslide distribution maps.

Keywords: constant vertical exaggeration stereoscopic map, topographical interpretation, Ebiradake landslide