

Risk assessment of a tsunami caused by a large-scale sector collapse - Damage estimation of the Sakura-jima collapse -

YANAGISAWA, Hideaki^{1*}

¹Department of Regional Management, Faculty of Liberal Arts, Tohoku Gakuin University

A large-scale sector collapse due to volcanic activities sometimes flows into sea area and generates destructive tsunami disaster. In Japan, large-scale sector collapses and following tsunamis that killed more than several hundred people were occurred at least 3 times after the year 1603 (Edo era). The worst of them is the sector collapse of Mt. Mayuyama collapse in 1792. The following tsunami was widespread across Ariake sea and killed 15,000 people. Although a tsunami due to sector collapses is much less often than that of earthquakes, they can cause unexpected disaster. The aim of this study is to estimate tsunami risk by a large-scale sector collapse using GIS system and conduct detailed simulation of the sector collapse and following tsunami for a high-risk active volcano.

We first estimated the flow range of the sector collapse of active volcanos in Japan and overlaid them on sea area data using GIS to confirm whether the debris flows into sea area. Next, we searched populations around active volcanos to extract volcanos prone to cause human damage. Using these information and active level of volcano, we ranked tsunami risk of active volcanos. As a result, we found that Mt. Sakura-jima is the highest risk active volcano for tsunami disaster.

We further conducted the integrated simulation of landslide and tsunami. Here, we assume that volume of the sector collapse is same as 1640 Mt. Komagatake collapse. According to numerical results in the worst-case, approximately 1,000 people are buried by the debris of Mt. Sakura-jima collapse and following tsunami with 50 m heights attacks the coast of the Kagoshima city. The tsunami inundates 0.16 million home and 0.34 million people. These results indicated that large-scale sector collapse and following tsunami could cause one of the most destructive disasters and we need to consider a response for the worst disaster scenario.

Keywords: Tsunami, Sector collapse, Landslide, Simulation, Sakura-jima, Damage estimation