

斜面崩壊の危険度評価における高精細地形データの応用

High-definition topography applied to landslide hazard assessment around Aso Volcano

*齋藤 仁¹、内山 庄一郎²、小花和 宏之³、早川 裕弐⁴

*Hitoshi SAITO¹, Shoichiro Uchiyama², Hiroyuki Obanawa³, Yuichi S. Hayakawa⁴

1. 関東学院大学 経済学部、2. 防災科学技術研究所、3. 千葉大学 環境リモートセンシング研究センター、4. 東京大学 空間情報科学研究センター

1. College of Economics, Kanto Gakuin University, 2. National Research Institute for Earth Science and Disaster Prevention, 3. Center for Environmental Remote Sensing, Chiba University, 4. Center for Spatial Information Science, the University of Tokyo

In the last few years, small unmanned aerial vehicles (UAVs), and structure from motion and multi view stereo (SfM-MVS) photogrammetry have attracted a tremendous amount of interest for the creation of high-definition topographic data. This study was conducted to detect temporal changes of topography around shallow landslides using small UAVs and SfM-MVS photogrammetry. Study areas are the Sensuikyo area (1.2 km²) and the Saishigahana area (0.06 km²) around Aso Volcano, where many shallow landslides occurred because of heavy rainfall in July, 2012. During 2014–2016, field surveys were conducted using small UAVs. After acquiring high-definition DSMs and ortho-rectified photographs, we analyzed the topographic changes of shallow landslides in comparison to LiDAR-based DSMs in 2004.

We obtained ortho-rectified photographs and DSMs with spatial resolutions of 4 cm and 10 cm, respectively. In the Saishigahana area, 20 landslides (20–4,600 m²) occurred. The ratio of the total landslide area reached 30% of the area. These landslides tended to occur specifically on 40-degree slopes. The landslide depth was ca. 1.0 m. The estimated total landslide volume was 1.5–2.8×10⁵ m³/km². In the Sensuikyo area, 300 landslides (10–10,000 m²) occurred. The estimated total landslide volume was 1.1–1.4×10⁵ m³/km². In the Sensuikyo area, the landslide distribution was not uniform. Our results indicate that topography and past landslide history affected these landslide occurrences. Additional studies must be conducted to detect temporal changes of topography and vegetation around shallow landslides based on multi-temporal ortho-photographs and DSMs.

キーワード : shallow landslide、UAV、SfM-MVS photogrammetry

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