Landslides due to the 2016 Kumamoto earthquake (Research period: FY 2017)

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1. Introduction

In the Aso caldera, a number of landslides were induced by the 2016 Kumamoto earthquake. Large shallow, continental earthquakes in mountain areas trigger many landslides. These landslides have a serious impact on human life and the infrastructures of the affected areas. Seismic landslides should be controlled by type of earthquake fault, geological setting, and topography. So, clarifying the effects of the type of earthquake fault, geological setting, and topography on seismic landslides and development of an assessment method for seismic landslide susceptibility is essential in the efforts for an emergency response just after a major earthquake.

2. Landslide due to 2016 Kumamoto earthquake

Landslides occurred at the central volcanic cone and caldera wall (Figure 1). In particular, many landslides were concentrated in the western to northwestern caldera wall.

3. Comparison with previous earthquake

Here we compared the number and density of seismic landslides caused by the Kumamoto earthquake with those caused by recent shallow, continental earthquakes in the mountain region. We compiled and interpreted landslide data from aerial photographs. The interpreted areas are varied and range from 170 to 800 km^2.

Although the number of landslides due to the Kumamoto earthquake was less than in the 2004 mid-Niigata earthquake, the number was similar to the 2008 Iwate-Miyagi earthquake and greater than other earthquakes (upper panel of Figure 2). While, the number of large landslides (ca. landslide area is larger than 1 ha) was less than in the mid-Niigata and Iwate-Miyagi earthquakes and similar to the 1984 western Nagano earthquake. The density of landslides due to the Kumamoto earthquake was smaller than in the mid-Niigata and Iwate-Miyagi earthquakes and similar to the western Nagano earthquake.

In conclusion, the number and scale of landslides due to the Kumamoto earthquake was large compared to other earthquakes induced by strike-slip faults after the 1984 western-Nagano earthquake, although the mid-Niigata earthquake induced by inverse faults triggered more landslides. We will quantify the effects of the type of earthquake fault, geological setting, and topography on seismic landslides to mitigate disasters caused by seismic landslides.

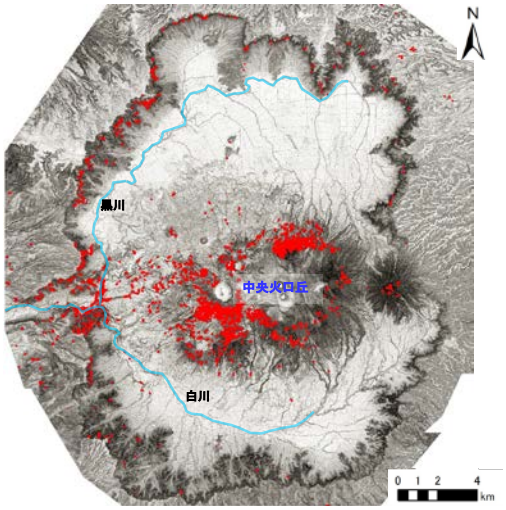

Figure 1 Spatial pattern of seismic landslide in the Aso caldera. Red areas indicate landslide scars.

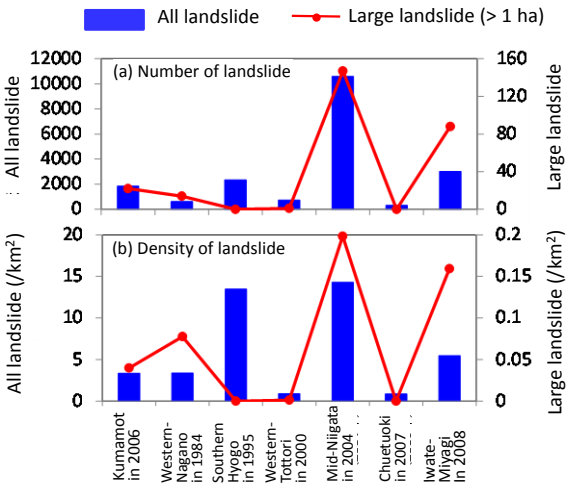

Figure 2 Number and density of landslides due to recent earthquakes in mountain areas.