

短期滞在型共同研究（課題番号： 30S-02）

課題名： Why do some landslides exhibit precursory seismicity?

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所内担当者名： Masumi Yamada

滞在者（所属）： Geology Department, Western Washington University

滞在期間：平成 30 年 10 月 26 日 ～ 平成 30 年 11 月 24 日

滞在場所： 京都大学防災研究所

共同研究参加者数： 4 名 (所外 1 名, 所内 3 名)

・大学院生の参加状況： 0 名 (修士 名, 博士 名) (内数)

・大学院生の参加形態 []

研究及び教育への波及効果について

This project will help determine why some landslides exhibit precursory seismicity prior to failure, while others do not. The results have implications for landslide monitoring and hazard mitigation, as the potential exists for using seismic signals to predict landslide failure several hours in advance.

研究報告

(1)目的・趣旨

The objective of this project is to examine a dataset of landslides and glacial avalanches that exhibit precursory seismic sequences prior to failure. We will examine the earthquakes preceding ~10 landslides to identify trends in their occurrence timing, amplitudes, and waveforms as a window into the mechanisms governing failure.

(2)研究経過の概要

We examined in detail the seismic data for ~10 landslides that are known to have precursory seismic sequences, as well as data from slides that do not. These valuable data were obtained from some recent landslides in Japan, US and other countries, where there have been close seismic recordings (a few km). We used waveform similarity and other innovative signal processing techniques to identify and extract very small earthquakes from the continuous data (e.g. Yamada et al., 2016). We identified which signals in the precursory sequence are associated with the landslide, and created a database of parameters such as location, inter-event timing, amplitude, and waveform similarity, to help illuminate how these signals relate to the landslide failure.

(3)研究成果の概要

We created a database of landslides at the Iliamna volcano in Alaska and compiled parameters such as location, precursor signals, event types, etc. Our database has obvious importance for efforts in predicting landslides and mitigating their damaging effects. Once our database is complete we will identify parameters that contribute to the likelihood of precursory seismicity. Where possible, we will use stacked waveforms to locate the source region for the seismicity. Our next steps will be to examine the physics associated with precursory seismicity; we will identify why some landslides exhibit these signals while others do not. We anticipate presenting these results at conferences, and we expect that our work will result in at least one, but hopefully several publications.

(4)研究成果の公表

Masumi Yamada, Jim Mori, Yuki Matsushi, and Jackie Caplan-Auerbach (2019), Seismic events induced by a landslide: what can they tell about the landslide?, EGU meeting, Vienna, April 2019.