Research on a method of estimating the potential depth of slope failure using the Airborne Electromagnetic Survey

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At Ontake volcano in 1984 and Kurikoma volcano in 2008, areas of the volcanoes collapsed and large-scale sediment disasters occurred. These events were unrelated to volcanic eruption. We conducted case studies using airborne electromagnetic surveys to investigate slopes likely to induce landslides on such volcanoes.
Airborne electromagnetic surveys are effective for rapidly investigating wide-ranging extreme environments that persons cannot enter. The surveys were conducted by a helicopter carrying survey instruments; this method of non-contact investigation acquires resistivity data by electromagnetic induction. The surveys were conducted on 15 active volcanoes where volcanic events could have serious social implications. These case studies extracted data showing only areas likely to be at risk of collapse. This is the first time that such data on slopes likely to induce landslides and on estimated collapse depths have been obtained. It remains necessary to find a method of extracting precise data on slopes likely to induce landslides on each volcano.
Firstly, we categorized the properties of the collapsed slopes as cap rock type, extended collapse type, or landslide type on the basis of collapse case and paid attention to the slope of the cap rock type and defined the collapse range based mainly on the topography and geological properties.
Secondly, we analyzed the resistivity structures of collapse cases with a differential filter and found that collapse occurred at a depth at which resistivity suddenly changes. In other volcanoes, we could estimate collapse depth by extracting areas where resistivity suddenly changes.
Several cases, including Hokkaido Komagatake, Asama volcano, and Ontake volcano, will be introduced in this presentation.

Keywords: Airborne Electromagnetic Survey, resistivity, volcano, collapse depth, differential filter

