

Study on the prediction of the large landslides of the volcanoes using the Airborne Electromagnetic Survey

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In the lower basins of the active volcanoes, there are always the risks that sediment disasters are occurred. Especially, when large landslides are occurred at the time of heavy rains, the landslide sediment become a debris flow and makes a big damage by the sedimentation and the flooding in a lower basin. In late years, the Airborne Electromagnetic Survey is performed a close-up of as means to predict these large-scale landslides. It is necessary to estimate establishing technique to estimate a collapse side, the water seepage process in the slope to predict the slope where there is possibility of the collapse in at the time of heavy rains, but is the situation that is hard to say to be considered about these enough currently. Therefore, in this study, we have taken Mt. Azuma and Mt. Fuji examples and examined the estimate technique of the collapse side and technique to predict a water seepage process from the result of a geological survey and the quality of the water investigation that we carried out the airborne electromagnetic survey in addition.

First, we performed the documents investigation into the characteristics of the topography, the geological feature, results of the sediment disasters, volcanic activity history there. Next, we performed a field work and confirmed the quality of soil structure in conjunction with the landslides, hydrothermal alteration situation causing the landslides and the hot spring gush situations. We examined areas of the airborne electromagnetic survey in reference to these results. We decided that the top of the mountain body and the representative craters were included and did the investigation object with the area including inclines more than 15 degrees that landslides were possible. The exploration area of Mt. Azuma was about 18km² and the exploration area of Mt. Fuji was about 120km². We have arranged them every depth two-dimensionally so that we could recognize the result of the helicopter electromagnetic exploration regionally. And, at the area where sediment disasters were easy to be occurred, there were some craters and water level under the ground were high, we have arranged them every depth two-dimensionally so that we grasped ratio resistance levels of the depth direction for running. We have verified the result of the airborne electromagnetic survey by comparing with the investigation results of the topographic and geological features. In addition, we investigated hydrology and water quality of the water at 10 neighboring streams in Mt. Azuma for the purpose of confirming the result of the airborne electromagnetic survey in detail. The investigation items were water discharge, electric conductivity, pH, water temperature and ion silica concentration. In addition, we have carried out the boring investigation for the purpose of checking the ratio resistance levels by the airborne electromagnetic survey and the relations with the geological feature in Mt. Fuji.

We have found that by using the airborne electromagnetic survey in volcano area we could roughly grasp the geological features and underground water levels. From this, we could roughly predict the slopes that may collapse at the time of a heavy rain by using the airborne electromagnetic survey. On the other hand, we cannot estimate the collapse depth and the collapse volume in detail when it is only the airborne electromagnetic survey. It is necessary to supplement the results of the airborne electromagnetic survey by carrying out other investigations which are the boring investigations and physics explorations on the ground, the water quality and hydrological investigation to estimate these. In the near future, we will carry out the investigations including the airborne electromagnetic survey for models in some volcanoes and want to establish the estimate technology of the collapse dangerous points in the volcano areas, estimate technique of the collapse depths and collapse volume by accumulating data.

Keywords: airborne electromagnetic survey, large landslide, volcano