



Actual state of snow avalanche disaster in the railway field in Japan and development of avalanche detecting system

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1. Introduction

Serious natural hazards induced by snow avalanches have frequently occurred on slopes beside railway tracks. Although various anti-avalanche structures are installed at the slopes, it is impossible to completely protect a railway from the damage only by the anti-avalanche structures. Therefore, suspended train operation is needed when the occurrence of avalanche is detected.

To mitigate the natural hazards by avalanches beside the railway tracks, a simple and cost-effective system of detecting avalanches had been desired. In such a background, we developed a new system that can detect the occurrence of avalanches by a simple technique using a small vibration sensor.

2. Core

We, first, describe actual states of the natural hazards by avalanches on the slopes on Japan Railways. Second, we show a newly developed system of detecting avalanches. Especially we explain the method and composition of avalanche detecting system: identification of alarm levels corresponding to avalanche scales. Third, we discuss some field tests in Kurobe Canyon in two winter seasons where powder snow avalanches had occurred frequently. As a result, avalanche occurrence times detected

by the system were well agreed with the observed ones. It was proved that the system had high-level reliability.

3. Conclusions

We developed and tested a new system that can detect the occurrence of avalanches. The system was confirmed to be practical enough for railway slopes subjected to avalanches. It also has the function of issuing alarm levels in response to avalanche scales. Therefore, it is available to quickly check the avalanche occurrence time/site and to clear snow away from the railway track.