

HDS027-04

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Observing topographical displacement of the slope and distributing real-time hazard information in Ubayu hot spring

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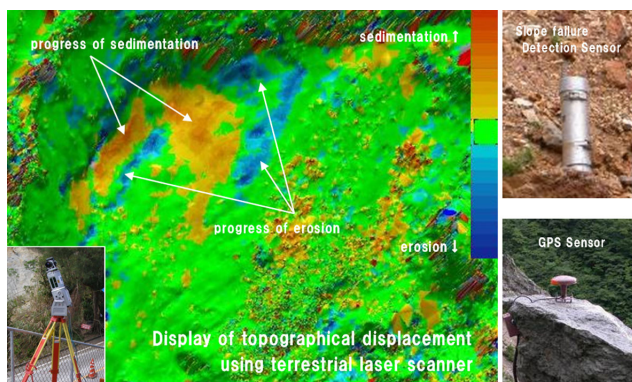
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Ubayu hot spring area is located in the southeast of Yonezawa-city, Yamagata-prefecture. Bedrock is extremely weathered and altered by hot spring alteration in this area. Instability of slopes caused by continuous rock fall and slope failure is going on. Because of these, recently, the large slope failure occurred two times. Also, Ubayu hot spring inn is possible to be isolated by sediment-related disasters, because of its location of deep mountainous region.

The objective of this examination is to detect displacement of the slope related to slope failure, just before or just after, and providing warning information for the people in order to let them make self decision regarding evacuation.

The following were examined:

- 1) Testing two times of highly precise survey measurements using terrestrial laser scanner. Visualizing the topographical changes for the past two years by analyzing the survey data.
- 2) Installing highly precise GPS sensor and observing topographical displacement of the slope continuously.
- 3) Installing real-time slope failure detection sensor and monitoring slope failure directly.
- 4) Installing the rain gauge and considering relations of topographical displacement and the rainfall.
- 5) Providing real-time hazard information of monitoring observation, and it was enabled to share information.



Keywords: Laser Scanning, Increment, GPS Sensor, Slope failure Detection Sensor