

Slope Monitoring by DInSAR and Assessment of Potential Landslide Risk by Spatial Data

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Abstract: Japan has so many devastating hazards because of its location, geographic feature, climate and so on. Recently, abnormal weather influence typhoon and rainy season of Japan and landslide happen every year. Especially it is grave problem for Hiroshima Prefecture. It has over 1400 warning areas for landslide. The granite rock is main component of Hiroshima ground. It is easy to undergo weathering and erosion. That feature is one part of the risk for landslide frequency. In this situation, ground sensors and monitoring cameras are used to maintain and monitor warning areas, however, it is very difficult to monitor all warning areas by man powers, because of its cost and labor. Therefore, there is a high demand for effective monitoring method using satellite remote sensing.

In this study, we propose utilization of Differential InSAR (DInSAR) to monitor sediment deposit using ALOS-2 before the disaster occurred. ALOS-2 has PALSAR-2 that sensor uses L-band for acquiring fine changes of ground like some centimeter by crustal movement. The feature of L-band is possible to acquire ground changes directly without effect of trees. ALOS-2 started to acquire ground condition from 2014. We collected SAR data from 2014-2019 in Hiroshima, especially Kure city. The landslide occurred in Kure city in 2018 and had severe damages in railway infrastructure. We conduct InSAR process using 2 season data by GMTSAR to find out the changes before the landslide occurred. GMTSAR is open software for InSAR. After that, we conduct raster calculation process 2 result of InSAR by QGIS. These results compare for long-term analysis of change.

In addition, we collected the data that there is a possibility to influence landslide occurrence like NDVI, land cover change, location of sand dam, DEM (Digital Elevation Model) and Bare land cover. At the same time, the questionnaire investigation was conducted for AHP (Analytic Hierarchy Process). and the 20 people of Expert for disaster answered. Finally, the collected variety data were used for risk assessment with result of DInSAR as sediment flow.

The result of risk assessment indicates high risk area from damaged area in 2018 by the data before disaster happens. Therefore, it is possible to detect geographic changes that influence landslide occurrence.

Keywords: DInSAR, ALOS-2, Landslide, Risk Assessment, Hazard Map