Comparison of Landslides' Recognition Capacity of L- and C-band RADAR Polarimetry

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ABSTRACT

Japan is mountainous country situated in a volcanic zone and surrounded by the oceans. Due to this geographical situation, there are many natural disasters occurring in Japan such as earthquakes, landslides, typhoons, and so on. Especially, landslides are now one of the serious major disasters, which are caused by recent powerful typhoons, heavy rains, and massive earthquakes. These landslides are leading to large human and economic damages these days. When disaster occurs, Heli- and Air-borne monitoring is usually used to investigate the landslides damaged areas in Japan. However, these investigations are sometimes limited due to bad weather conditions, night-time, and largely spreading damaged areas. Under this unfavorable situation during the initial response phase to disaster, acquisitions of radar satellite data are effective to estimate the landslides areas especially during the continuing bad weather conditions and night time. Additionally, we believe that utilizing not only one satellite of radar sensor (ALOS-2) but also other cooperative radar satellites including RADARSRSAT-2 are more effective to disaster countermeasure activities requiring swift and practical actions.

In this study, we evaluated SAR data including C-band RADARSAT-2 and L-band ALOS-2 with polarimetric and interferometric analysis to effectively detect the landslide areas. We applied several techniques to recognize landslides from SAR data such as interferometric coherence analysis of different polarization, texture analysis, and these combinations. Interferometric coherence analysis of HH-VV polarization performed well in both L- and C-band SAR data and it was confirmed that we could easily identify landslide areas from Multi Polarization Coherence mapping (MPC) imagery. In the texture analysis, we calculated SCR between different polarizations and it was performed well for landslides recognition when utilizing HH and HV polarization. Moreover, we also confirmed that the combination of interferometric coherence and SCR has effective for determination of landslides’ candidate areas. Additionally, we utilized the imageries of study areas including the damaged areas caused by the 2016 Kumamoto earthquake in Japan.