

Polarimetric analysis of PALSAR data to detect Landslide Caused by Iwate-Miyagi Nairiku Earthquake in 2008

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We analyzed ALOS PALSAR data observed with damaged area by Iwate-Miyagi Nairiku Earthquake in 2008. PALSAR is the first spaceborne SAR to have full polarizations mode. An earthquake hit inland area of Iwate and Miyagi prefecture in Japan at 8:43 AM (JST) on June 14, 2008. This earthquake caused many large-scale landslides in mountainous forest area. The forested area changed to bare surface by these landslides.

Three component decomposition technique attempts for images obtained before and after the earthquake. Most of the target areas are covered by forest and volume scattering component is dominant there. On the large-scale landslide areas at the Aratozawa-dam and east slope of Mt Kurikoma, surface scattering component becomes dominant in the image obtained after the earthquake. An eigenvalue-eigenvector decomposition is performed and polarimetric entropy, anisotropy and alpha are also computed. Decreasing of entropy and alpha are found on the large-scale landslide area acquired after the earthquake. Scattering characteristics change from forest to bare land is detected by polarimetric analysis of PALSAR data.

Single polarization PALSAR image shows landslide area as topographic features change by comparison of images obtained before and after the earthquake. In this study, it is difficult to find topographic change on landslide areas at east slope of Mt Kurikoma by single polarization image. Polarimetric image shows these landslide areas as surface scattering characteristics change.

SAR has capability to observe the earth surface in all weather conditions, day and night. Full-polarimetric data assess land surface coverage from scattering mechanism. And if land coverage is known not only from polarimetric SAR data but also from optical sensor or other reference information, full-polarimetric SAR data is useful to estimate damaged area.