Evaluation of inundation area extraction method for the 2018 Western Japan heavy rainfall using PALSAR-2

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In recent years, due to global warming, there are many opportunities to use SAR (Synthetic aperture rader) mounted on earth observation satellites for emergency observation of typhoons and heavy rains and for measuring damage over a wide area. Many methods for extracting the inundation areas from SAR have been proposed, but most of them are methods that perform threshold processing of the backscatter coefficient from the intensity information. However, a method of extracting the inundation area by combining the intensity information and the phase information has not been established yet, and there are few examples(Ohki et al., 2016).

In this study, PALSAR-2 satellite is used. From the intensity information, One is a normalized backscattering intensity change index image (NoBADI) (Nagai et al., 2017)is created. It is possible to display unusual inundation area using multiple images before inundation, And the other is a single image of the backscattering intensity was created. From the phase information, two types of images are created a pair immediately before and after the disaster: γ_{pre} (observation interval width: about 3 months) and a pair before and after the disaster: γ_{summer} (observation interval width: about 2 years). The verification area in this study is the inundation area of Kurashiki City and Soja City in Okayama validation prefecture, which was flooded by heavy rains on 2018, and the area 3 km around it. From the intensity information, Inundation areas were extracted by classifying land cover, paddy areas, upland areas, and building areas. From the topological information, Extract the inundation area in the building area. The κ coefficient was used as the index of inundation area extraction accuracy.

As a result of the inundation area extraction, it was found that the paddy field area and upland field area showed a higher value of κ coefficient when the backscattering intensity single image was used regardless of the presence of the speckle noise filter. It was confirmed that when the filter window size was enlarged, a high κ coefficient was shown. The urban area showed the highest value of the κ coefficient when the coherence image of the phase information was used. As for the κ coefficient of the phase information, γ pre: $\kappa = 0.397$ γ summer: $\kappa = 0.037$ was calculated.It is necessary to consider the observation period when creating interference pairs.

Next steps we will propose an optimal method for extracting the inundation area according to the geographical features, And Determine the optimal filter window size from the viewpoint of maintaining high resolution images.

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