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Differences in applicability of mudslide scars estimation methods due to different spatial resolutions

Hromi Akita

National Research Institute for Earth Science and Disaster Resilience, Storm, Flood, and Landslide Research Division, Tsukuba, Japan (akita@bosai.go.jp)

In recent years, the variety of satellite data that can be used for analysis in the event of a disaster has increased. At the same time, there is a need to process different satellite data using a unified analysis method, especially when extracting mudslide scars that have been newly exposed after a sediment disaster. Nonetheless, comparative studies focusing on spatial resolution, a potential factor affecting applicability and accuracy, have been lagging. Therefore, this study targeted the area surrounding Murakami City, Niigata Prefecture, which was the site of extensive sediment outflows due to heavy rainfall in August 2022. Specifically, the mudslide scar was estimated by calculating NDVI difference values (ΔNDVI) for four types of optical satellite data with different spatial resolutions. The data was extracted over a wide area and the effects of differences in spatial resolution on the applicability of the extraction method and the extraction rate were clarified. The relationship between precision and recall can be approximated by the quadratic equation $y=ax^2+bx+c$, and there was a trade-off relationship between the two metrics; as the threshold value rose, precision increased while recall decreased. The optimal NDVI threshold for maximizing the F -measure ranged from 0.20 to 0.25. The medium-resolution satellite platforms Planet and Sentinel-2 had higher F -measure values, and the efficacy of NDVI extraction was not proportional to the fineness of the spatial resolution. The reason for this was that the area distribution of the mudslide scar in the target area was dominated by relatively small areas with a mode of 42 m² and a median of 253 m², which were considered to increase precision and recall. Consequently, selecting a spatial resolution that matches the area of the mudslide scar in the target area is considered to be effective.