Evaluation of R-based Wildfire Classification Algorithm Using KOMPSAT-3A

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Abstract: In particular, Satellite data play a major role in supporting knowledge about fire severity by delivering rapid information to map fire-damaged areas in a precise and prompt way. This research study deals with the classification multi-temporal KOMPSAT-3A image and Sentinel-2 to mapping burned areas. The recent satellite of the KOMPSAT series, KOMPSAT-3A, demonstrates high resolution multi-spectral imagery with infrared and high resolution electro-optical bands. In addition, this research using the Sentinel-2 time series, taking the differenced Normalized Burn Ratio(dNBR) and improved the spatial and spectral resolution of the MSI optical sensor, for mapping burned areas. The main purpose of this paper is to present a new algorithm for classifying wildfire severity in KOMPSAT-3A. To test the effectiveness of the proposed procedure, the April 4, 2019 Gangneung wildfires were considered as a case study. This research using the probability density function for the classification of forest fire damage severity based on R software, a free software environment of statistical computing and graphics. In addition, points belonging to more than 0.1 of the Delta-NBR value obtained from the pre-fire and post-fire images were defined as forest fire damage points. In this study, we used dNDVI to show the severity of wildfire in KOMPSAT-3A images. The severity of wildfire severity expresses as a vector area according to the area of calculated by dNBR. In addition, the dNDVI pixel distribution in each vector area was calculated and expressed as a histogram. Histograms according to the total of five severity levels are shown, and the interval values are subdivided to be expressed in the form of a probability density function. The highest density level was calculated to determine the level of severity caused by wildfire according to dNDVI. The results show how the proposed algorithm enables the determination severity of wildfire in the KOMPSAT-3A image. Furthermore, this results can be an effective way to classify forest fire damage in high-resolution multi-spectral images.

Keywords: wildfire, KOMPSAT-3A,, R-based classification, Sentinel-2, dNDVI