

ANALYSIS ON DAMAGED AREAS BY WILDFIRE ON GANGWON PROVINCE IN 2019 USING KOMPSAT-3 IMAGES

Yeji Kim (1), Jong Min Yeom (1), Hongtak Lee (1), Hyun-Ok Kim (1),
Tae-byeong Chea (1), Jeongho Lee (1)

¹ Korean Aerospace Research Institute, 169-84 Gwahak-ro, Yuseong-Gu Daejeon, 34133, Korea
Email: jlyjkim@kari.re.kr; yeomjm@kari.re.kr; leeht@kari.re.kr; hokim@kari.re.kr;
tbchae@kari.re.kr; jeongho@kari.re.kr

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ABSTRACT: Satellite image analysis are efficient tool for quick response of extensive disasters, and wildfire is the recent global issue. This study will present the entire process of damaged area analysis by wildfire using KOMPSAT data, which is the earth observation satellite with an optical sensor collecting data of four multispectral bands and one panchromatic band. In this study, KOMPSAT-3 and Sentinel-2 were used for burned area analysis. After preprocessing the KOMPSAT-3, images with geometric correction and Bottom-Of-Atmosphere (BOA) reflectance were produced for reflectance information after wildfire, and Sentinel-2 file was used for non-vegetation area removal. For burned area detection, Normalized Difference Vegetation Index (NDVI) and Normalized Difference Water Index (NDWI) were calculated using BOA reflectance values, and burned areas were extracted by thresholding of index map values. The analyzed results of damaged areas in Gangwon province were compared with the official report of Korea Forest Service.

1. INTRODUCTION

The KOMPSAT-3 is the earth observation satellite with an optical sensor acquiring four multispectral bands and one panchromatic band. KOMPSAT-3 images are efficient for disaster monitoring and analysis, and provide information about disasters for quick responses of domestic and global governments. Wildfire is one of the disasters using satellite information, and it became a recent global issue. In this year, there was a huge wildfire on Gangwon Province, Republic of Korea, in April 4th, 2019, and two people are dead and more than 4,000 people have been evacuated. For wildfire analysis, Sentinel 2 were widely used because of its free and easy acquisition. Sentinel-2 and Pleiades 1B imagery were used to perform forest fire susceptibility assessment, and normalized difference vegetation index (NDVI), GNDVI, and Normalized Difference Water Index (NDWI) were estimated using Pleiades 1B orthoimages (Mihai et al., 2019). Amos et al. (2019) was also used spectral indices of Sentinel 2 to analyze burned area and severity index.

This study focused on the processing procedure of KOMPSAT-3 data for efficient analysis of the damaged areas by wildfire, and the comparisons were performed on the results using official report of Korea Forest Service.

2. METHODS

For burned area analysis, 1R products of KOMPSAT-3 and level 2 products of Sentinel-2 were used. For the preprocessing, digital number of KOMPSAT-3 1R products were calculated to

radiance using the gain and offset values, and the BOA reflectance values were estimated from the radiance values (Yeom et al., 2018). The KOMPSAT-3 was geometrically registered to the Sentinel-2 2A after matching the spatial resolution of KOMPSAT-3 and Sentinel-2. Sentinel-2 data collected before the wildfire was used for non-vegetation area removal. For burned area detection, Normalized Difference Vegetation Index (NDVI) and Normalized Difference Water Index (NDWI) were calculated using BOA reflectance values of KOMPSAT-3 data, and burned areas were extracted by thresholding of index map values.

3. RESULT AND DISCUSSION

Burned area in Gangwon Province were extracted using the KOMPSAT-3 data. Figure 1 presents the burned areas of one of the extensive damaged places in Gangwon Province, and it is extracted from NDVI map of KOMPSAT-3. The extracted burned areas presented close estimation of the damaged area values, which was officially announced by Korea Forest Service. Purpose of this study is to provide an application case using KOMPSAT-3 image data for quick responses of national disasters, focusing on the wildfire of Gangwon Province of Korea in 2019.



Figure 1. Burned Areas in Gangwon Province

4. ACKNOWLEDGEMENT

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