Development of the False Alarm Filtering Method for GEO-KOMPSAT-2A Forest Fire Detection Product

Seoyoung Chae, Yong-Sang Choi

Climate System Laboratory, Ewha Womans University
Engineer B 562, 52, Ewhayeodae-gil, Seodaemun-gu, Seoul, 03760, Korea.
EMail: cotjdud2@naver.com

ABSTRACT

Wildfires pose significant threats to lives, livelihoods, and national economies, with long-lasting impacts on communities. Wildfire detection is crucial, as it initiates the response chain for all subsequent firefighting and mitigation actions. Satellites, with their high spatiotemporal resolution, are invaluable tools for effective wildfire monitoring. Geostationary satellites, in particular, offer higher temporal resolution compared to low Earth orbit satellites, making them well-suited for real-time observation of rapidly changing surface events. However, satellite-based wildfire detection often depends on cloud detection products as preprocessing data, meaning that the accuracy of wildfire detection is linked to the reliability of cloud detection. Clouds can exhibit patterns similar to wildfires over time, leading to potential misclassification. Therefore, cloud detection products are used to mask out cloud-contaminated pixels and focus on clear-sky pixels. The GK-2A wildfire detection product also uses the cloud detection output from the same satellite to mask clouds, but the images reveal that false alarms from unmasked clouds near cloud edges frequently occurs. In this study, we developed a filtering method to eliminate false alarms detected as wildfires near cloud edges by leveraging the differences in the satellite imagery between clouds and wildfires. We compared and analyzed the performance of three cases: the GK-2A wildfire detection product, our filter used alone, and the combination of both. The results show that applying the filter successfully detected 14 out of 19 wildfires while significantly reducing the number of false positives from 560 to 13. This filtering method has the potential to reduce cloud-related contamination in future ground-based detection products, thereby improving overall detection accuracy.