Near Real-Time Burned Area Mapping Using Sentinel-2 Data

Miro Govedarica (Serbia), Gordana Jakovljevic (Bosnia and Herzegovina), Flor Alvarez-Taboada (Spain) and Zoran Kokeza (Bosnia and Herzegovina)

Key words: Engineering survey; Remote sensing; Risk management; burned area mapping, Sentinel-2, Google Earth Engine, region growing

SUMMARY

Wildfires are an important disturbance factor for ecosystems, involving land cover changes and playing an important role in the emission of greenhouse gases and biological diversity. The Mediterranean region is typically affected by wildfires every year, peaking in number and intensity during summer. Accurate and rapid mapping of burned areas is fundamental to support fire management and damage assessment, and for planning and monitoring the restoration of vegetation. Moreover, due to the high spatial and temporal variation, mapping of fire dynamics using ground measurements alone is challenging. Remote sensing data allows active fire detection, accurate mapping of burned areas, estimation of fire severity, characterization of fire drivers, and monitoring regeneration at global, regional and local scales.

This study presents the integration of a cloud platform (Google Earth Engine API) and an algorithm for automatic detection, for near real-time burned area mapping using Sentinel-2 images. The algorithm used differenced NBR images, a region growing algorithm and the OTSU thresholding method to maximize the level of automatization. The results were compared with the burned area maps obtained using WorldView-2 images and a Supported Vector Machine algorithm. Both burned area maps were validated using points verified in the WorldView-2 images and in the field. The KHAT coefficient showed a perfect agreement with reality for WorldView-2 (0.91) and a moderate agreement for Sentinel-2 burned area maps (0.66). The commission error (6.06% vs. 18.05%, respectively) shows that both data sources tend to overestimate the burned area, mainly due to misclassification of low albedo surfaces and significantly lower spatial resolution of Sentinel-2 data. However, the results provided by this approach to provide near real-time burned area maps using Sentinel-2 data are accurate enough to be an aid in post-fire management

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