Abstract

An Automatic Algorithm for Mapping Burned Areas from Sentinel Data in Mediterranean Europe: Analysis of 2021 Major Fire Events in Italy and Greece †

Matteo Sali [1], Mirco Boschetti [1], Gherardo Chirici [2], Saverio Francini [2], Francesca Giannetti [2], Michele Salis [3], Bachisio Arca [3], Grazia Pellizzaro [3], Pierpaolo Duce [3] and Daniela Stroppiana [1,*]

1 Istituto per il Rilevamento Elettromagnetico dell'Ambiente (CNR-IREA), Consiglio Nazionale delle Ricerche, 20133 Milano, Italy
2 Department of Agriculture Food Environment and Forestry, Università degli Studi di Firenze, 50121 Firenze, Italy
3 Istituto per la BioEconomia (CNR-IBE), Consiglio Nazionale delle Ricerche, 07100 Sassari, Italy
* Correspondence: stroppiana.d@irea.cnr.it
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The 2021 European summer season has been one of the most intense for Mediterranean regions that experienced a heatwave in August, determining the onset of several fire events across regions in southern Europe. According to preliminary reports, most of the fires occurred in forest and in protected areas (Natura 2000, https://ec.europa.eu/environment/nature/natura2000/index_en.htm (accessed on 4 August 2022)) thus affecting system particularly sensitive. Moreover, fire have been increasingly affecting areas of Central and northern Europe as an effect of climate change (https://ec.europa.eu/commission/presscorner/detail/en/ip_21_5627 (access date 4 August 2022)).

In this work, we wanted to compare the area mapped as burned by an automated algorithm, developed by the research group and already applied to Mediterranean regions [1], to official map products provided by two operative systems: (i) European Forest Fire Information System and (ii) the Copernicus Emergency Management Service (CEMS).

We perform such inter-comparison by selecting three major fires in Italy and Greece to estimate the area affected by fire (burned area) from classification of Sentinel-2 pre- and post-fire images. The algorithm maps burned areas using an automated approach built on fuzzy set theory and region growing. Independent validation has been carried out over all datasets to provide reference for comparison of the quantitative assessment of the extent of the area burned.

Additional analysis has been carried out on burn severity estimated from NBR difference and Copernicus fire damage level that is the CEMS grading product. Preliminary results on the test site in the Sardinia Island (Montiferru region), Italy, revealed that more than 40% of the area affected by the fire has severely been damaged.

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Reference

1. Sali, M.; Piaser, E.; Boschetti, M.; Brivio, P.A.; Sona, G.; Bordogna, G.; Stroppiana, D. A Burned Area Mapping Algorithm for Sentinel-2 Data Based on Approximate Reasoning and Region Growing. *Remote Sens.* **2021**, *13*, 2214. [CrossRef]