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Analysis of vegetation regeneration after a wildfire in Portugal using the Google Earth Engine (GEE) platform

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Abstract

Wildfires represent a significant risk to the environment and the population. In recent decades Portugal has been one of the European countries most affected by wildfires, and although most occurrences burn a small area, some take on large dimensions, becoming Large Wildfires (GIF), which have increased in frequency, intensity, and destructive capacity. In this paper, we analyze the regeneration of vegetation in the area affected by the GIF that runs in the municipality of Baião in 2019. Consequently, the land use and occupancy (LUC) and the vegetation regeneration after 6 months and after 1 year were mapped. The study was organized into 2 steps: in the first one we proceed with the characterization of the GIF; and in the second we performed an evaluation of the vegetation regeneration according to the land use. In the 1st step, for the fire mapping the NBR spectral index was applied on a Sentinel 2 image, and for the LUC mapping we used the COS 2018. The cartographic data were manipulated and analyzed using GIS software. In the second step Sentinel 2 images were used and dNBR spectral index application was done for the evaluation of vegetation regeneration. The processing of the images was performed on the Google Earth Engine platform (GEE). The GIF of Baião burned an area corresponding to 853ha in a single occurrence and was the third-largest GIF in 2019. Regarding the evaluation of vegetation regeneration 6 months after the fire, we identified that 40.7% of the area showed high vegetation growth and 20.8% low vegetation growth. 1 year after the fire, 62,2% of the area showed high vegetation growth and 21.1% low vegetation growth. About the land use and land cover type, 6 months after the fire, 6.3% (53.8ha) of forest and 31.8% (271.4ha) of bush showed high vegetation growth. 1 year after the fire, 17.6% (150.4ha) of forest and 43.4% (370.2ha) of bush showed high vegetation growth. We can verify that 1 year after the fire, the area occupied by the forest and bush classes, which were hit by high severity, already presents significant levels of vegetation regeneration. We can conclude that for the studied area, an increase in high regeneration was recorded, going from 15% to 42% in forest areas, from 6 months to 1 year, and from 58% to 80% in bush areas, also from 6 months to 1 year.

Keywords: Vegetation recovery, Large Wildfire, Sentinel 2, Google Earth Engine, Land use and

land cover.

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