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Abstract

Monitoring Wildfires in the Northeastern Peruvian Amazon Using Landsat-8 and Sentinel-2 Imagery in the GEE Platform

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Abstract:

During the latest decades, the Amazon has experienced a great loss of vegetation cover, in many cases as a direct consequence of wildfires, which became a problem at local, national, and global scales, leading to economic, social, and environmental impacts. Hence, this study is committed to developing a routine for monitoring fires in the vegetation cover relying on recent multitemporal data (2017–2019) of Landsat-8 and Sentinel-2 imagery using the cloud-based Google Earth Engine (GEE) platform. In order to assess the burnt areas (BA), spectral indices were employed, such as the Normalized Burn Ratio (NBR), Normalized Burn Ratio 2 (NBR2), and Mid-Infrared Burn Index (MIRBI). All these indices were applied for BA assessment according to appropriate thresholds. Additionally, to reduce confusion between burnt areas and other land cover classes, further indices were used, like those considering the temporal differences between pre and post-fire conditions: differential Mid-Infrared Burn Index (dMIRBI), differential Normalized Burn Ratio (dNBR), differential Normalized Burn Ratio 2 (dNBR2), and differential Near-Infrared (dNIR). The calculated BA by Sentinel-2 was larger during the three-year investigation span (16.55, 78.50, and 67.19 km2) and of greater detail (detected small areas) than the BA extracted by Landsat-8 (16.39, 6.24, and 32.93 km2). The routine for monitoring wildfires presented in this work is based on a sequence of decision rules. This enables the detection and monitoring of burnt vegetation cover and has been originally applied to an experiment in the northeastern Peruvian Amazon. The results obtained by the two satellites imagery are compared in terms of accuracy metrics and level of detail (size of BA patches). The accuracy for Landsat-8 and Sentinel-2 in 2017, 2018, and 2019 varied from 82.7–91.4% to 94.5–98.5%, respectively.

Biography:

Elgar Barboza, an environmental engineer by profession, specialist in geographic information systems from the Universidad Distrital de Caldas (Colombia) and is currently pursuing a Master's degree in Territorial Planning and Urban Development at the Pedro Ruiz Gallo National University (Perú).

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