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MULTITEMPORAL FOREST DEGRADATION ASSESSMENT IN THE AMAZON RAINFOREST THROUGH L-BAND AND OPTICAL DATA

Abstract

Global efforts to mitigate climate change and to preserve unique ecosystems of our planet are directly related to the reduction of deforestation and forest degradation. The REDD+ was created with the objective of supporting developing countries in the policy of accounting for CO2 sources and sinks, thus contributing to sustainable national development. The Brazilian Amazon rainforest has a territorial area of 5.5 million km2. For such land extension, earth observation technologies are crucial to reduce current levels of deforestation and degradation in relatively short intervals of time. The integrated monitoring, combining optical and SAR sensors, is relevant to gain a more feasible understanding of the dynamics of forest processes as well as the detection of anthropogenic effects. This study presents a qualitative analysis of temporal features that allow identifying forest disturbances occurred from 2015 to 2018 in an area located in the arch of deforestation in the Brazilian Amazon rainforest. L-band synthetic aperture radar (SAR) data from ALOS-2/PALSAR satellite and Normalized Difference Vegetation Index (NDVI), Normalized Difference Moisture Index (NDMI), and Land Surface Temperature (LST) derived from Landsat-8 optical satellite were used for this goal. The SAR data with 10-meter spatial resolution have identified, with fair accuracy, regrowth from densely vegetated areas. The NDVI and NDMI indexes highlighted the decrease of the photosynthetic activities and biomass changes in the affected areas, respectively. The surface temperature was higher in the regrowth areas than in the dense vegetation. The accuracy of discrimination of deforested and regrowth areas and dense vegetation increased with the combination of SAR and optical data. This study showed the importance of combining SAR and optical data to discriminate forest disturbances in tropical rainforest environment, especially in the Brazilian Amazon where the persistent presence of clouds often limits the use of optical satellite data.