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Spacialization and estimation of carbon emissions from sugarcane culture in different agricultural management in the northeast region of the state of São Paulo

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The energy costs and consequent emission of equivalent carbon dioxide (CO₂e) was estimated in different agricultural management of sugarcane harvests between 1988 and 2013 in the northeastern region of São Paulo state, comprising an area of 51,650 km² and 125 municipalities. Emissions from diesel consumption, addition of harvest-derived straw and emissions from the burning process of sugarcane were considerate. The data used in this study were obtained from the local industry and scientific publications. The values of CO₂e emissions were related to maps of the area of sugarcane harvested using the green harvesting and the pre-harvest burning method in the region. Images from multiple sensors acquired from March to December in the years of 1988 and 2013 were used. The area where the pre-harvest burning of sugarcane was carried out in 1988 accounted for 1.1 million ha (100 % area of sugarcane), amount that decreased in 2013 to 0.32 million ha (17 % area of sugarcane) resulting in a reduction of carbon emission of 2.14 Tg CO₂e. The area in which the green harvesting method was used in 2013 represented 1.6 million ha (83 % area of sugarcane). The results showed that using the traditional cultivation method of sugarcane of pre-harvest burning issued 12,032.7 kg CO₂e ha⁻¹. This method of cultivation presented the greatest amount of emission of CO₂e ha⁻¹. In comparison, the minimum tillage method resulted in an estimation of 7,146.9 kg CO₂e ha⁻¹. As a more sustainable method of sugarcane production will be used in the future through harvest without burning and minimum tillage, it is expected that this activity emission rates will be reduced. The relevance of this proposal is to estimate the carbon footprint of the sugarcane culture in the main producing region of Brazil and the culture adaptation to climate change through a more sustainable agricultural management.

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