



## LETTER TO THE EDITOR

### The 2020 Brazilian Pantanal fires

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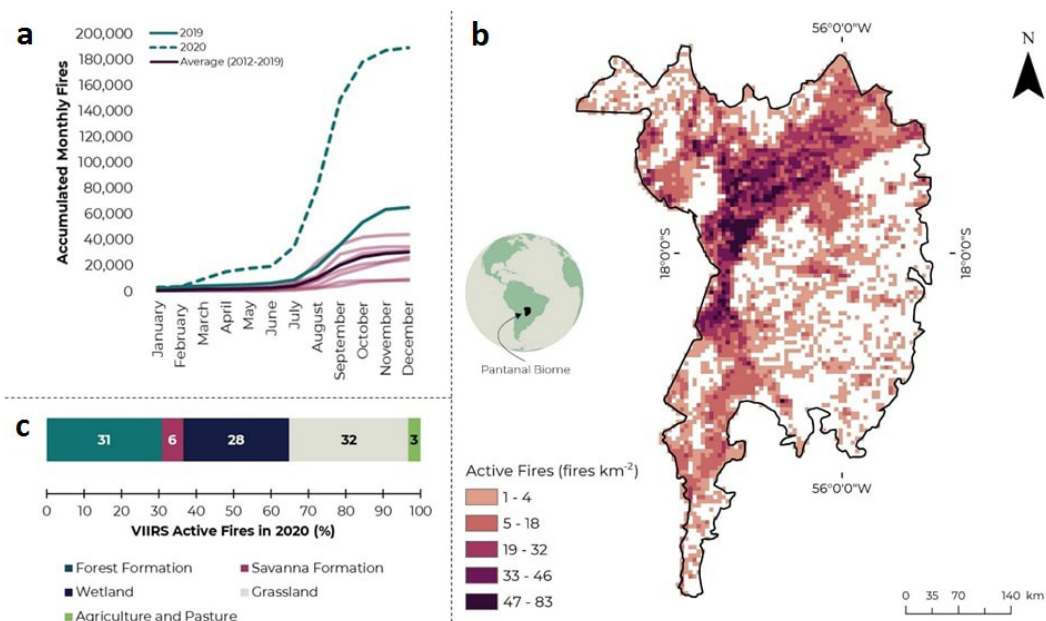
As the world's largest tropical wetland (UNESCO 2020), the Brazilian Pantanal covers an area of 150,355 km<sup>2</sup>, approximately 62% of United Kingdom territory. In January 2020, 3,506 fires were detected in the region, an increase of 302% in relation to the 2012-2019 average for the same month (Fig. 1a). Fire occurrence continued with an accelerated pace, when cumulative number of fires at the end of 2020 reached 189,440, 508% higher than the average (Fig. 1a). Considering all fire occurrences since 2012, the number of fires in 2020 exceeded detections in any other previous year, with 43% of the total (Fig. 1a).

Spatially, the 2020 fires were located mainly in the north and west of the region (Fig. 1b). About 31% of fires occurred in areas covered by forests, 32% in grasslands, and 28% in wetland areas, totaling 91% of all fires detections (NASA 2020a, Souza et al. 2020) there is still a gap of annual land use and land cover (LULC (Fig. 1c). Besides, along all months of 2020, Brazilian Pantanal fires were responsible for emissions of 524,453 tons of health-damaging fine particulate matter (PM<sub>2.5</sub>) and 115,576,561 tons of CO<sub>2</sub> to the atmosphere (VIIRS NRT Emissions) (NASA 2020b).

The 2020 perfect firestorm in Brazilian Pantanal was induced by a combination of the greatest drought in 60 years (Libonati et al. 2020) and broad environmental setbacks in Brazil (ASCEMA 2020). The weakening of environmental enforcement and monitoring institutions, by cutting or reducing funds, certainly compromised their ability to fight and prevent fires in the region. The consequences of Brazilian Pantanal fires are triggering a set of countless negative impacts on Brazilian environmental, social, and economic systems.

Uncontrolled fires threaten Brazil's biodiversity asset protected under the Convention on Biological Diversity and the national environmental laws. The long-term commitment to tackle greenhouse gas emissions under the Nationally Determined Contribution (NDC) is also compromised, negatively interfering in the National Policy on Climate Change. Furthermore, the increase in smoke emissions due to fires leads to an escalation of the respiratory-health vulnerability of about 11,717 native indigenous populations (ISA 2020, Reddington et al. 2015).

To prevent similar disasters in the Brazilian Pantanal or in other Brazilian biomes during 2021 and in the future, different actions levels will be required. In the short-term, in parallel with a



**Figure 1.** The state of Suomi NPP-VIIRS Active Fires (NASA 2020a) (here defined only as fire), at 375-m spatial resolution, in the Pantanal biome between 2012 and 2020. (a) Accumulated monthly fires for each year and for the 2012-2019 average period. (b) Spatial distribution of 2020 Brazilian Pantanal fires (5km of spatial resolution). (c) The 2020 Brazilian Pantanal fires classified by land-use and land-cover types (MapBiomas for the year of 2019). We excluded all fires with low confidence level in the analyses.

fire moratorium throughout Pantanal mainly in the driest and hottest seasons, reinforcement of firefighters is urgently needed to avoid ignition sources and fire spread. In the long-term, the Brazilian diplomacy must be re-established to attract international funds, which can be used to support the financing of infrastructure and human resources for the environmental monitoring, law enforcement, and fighting fires. Finally, we argue that the urgency of the Pantanal's fire crises must concern multiple stakeholders, involving both civil society and scientific community to call for strategic decisions to urgently curb these environmental crimes and hinder future fire crisis.

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