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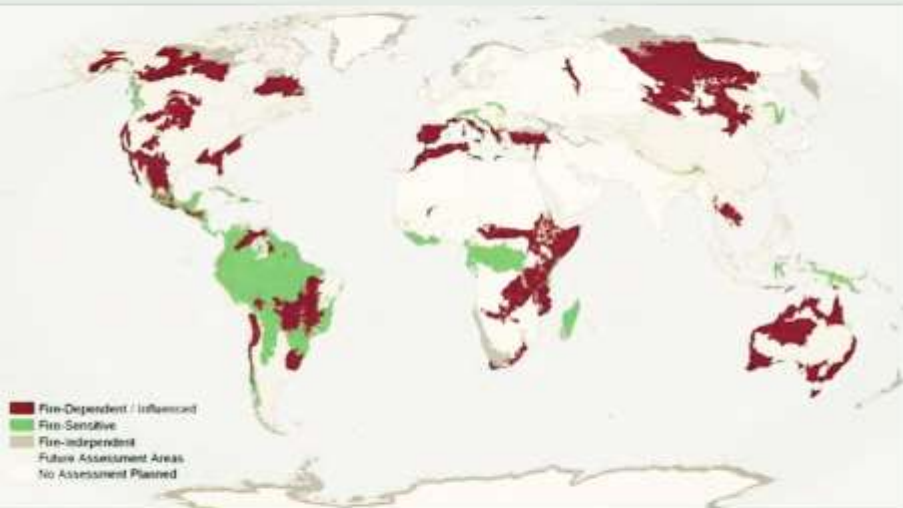
**INSTITUTO
SUPERIOR DE
AGRONOMIA**

DEFORESTATION AND AGRICULTURE DRIVE AMAZON FIRE ACTIVITY, WHILE DROUGHTS RIDE IN THE SHOTGUN SEAT.

R. Libonati, J.M.C. Pereira, **C.C. Da Camara**, L.F. Peres, D.
Oom, J.A. Rodrigues, F.L.M. Santos, R.M. Trigo, C.M.P.
Gouveia, F. Machado-Silva, A. Enrich-Prast & J.M.N. Silva



RELATIONSHIPS BETWEEN FIRE AND ECOSYSTEMS



HARDESTY, J., MYERS, B., & FULKS, W. (2005, JANUARY). FIRE, ECOSYSTEMS, AND PEOPLE: A PRELIMINARY ASSESSMENT OF FIRE AS A GLOBAL CONSERVATION ISSUE. IN THE GEORGE WRIGHT FORUM (VOL. 22, NO. 4, PP. 78-87). GEORGE WRIGHT SOCIETY.

FIRE DEPENDENT (USUALLY DRY)

40% of the world's land surfaces (grasslands, savannas, Mediterranean shrublands and boreal forests) owe their distribution/ecological properties to fire.

FIRE INDEPENDENT

Tundra, deserts: never burns.

FIRE SENSITIVE (USUALLY WET)

Tropical rainforests, **such as the Amazon**. Most tropical forest species cannot tolerate burning.

FIRE REGIME IN THE AMAZONIA RAINFOREST



NATURAL FIRES ARE ALMOST INEXISTENT.



DRIVERS OF FIRE ACTIVITY

Over the past few decades, **human activities** and **climate variability** contributed to periodic spikes in forest fire activity in the Amazon basin

FAR-REACHING EVENTS

These are far-reaching events since fire is an unusual selective force in **fire-sensitive ecosystems** such as Amazonia, disrupting native species, reducing forest carbon stocks, and releasing greenhouse gases and aerosols to the atmosphere, all with profound direct and indirect impacts on the regional and global climate

NATURAL OR ANTHROPOGENIC IGNITIONS?

Natural wildfires are uncommon in the Amazonian ecosystem and when they occur, they are small and unimportant (*Gora et al, 2020*).

EXTREME DROUGHTS OVER AMAZONIA

- RECURRENT DROUGHTS

River records indicate that the Amazon experienced an extreme drought event every 10 years in the last century.

However, recently, in the short span of 10 years, the region was affected by three severe droughts in 2005, 2010, and 2015.

- 2005

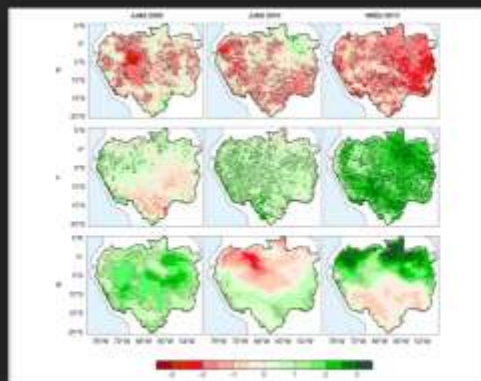
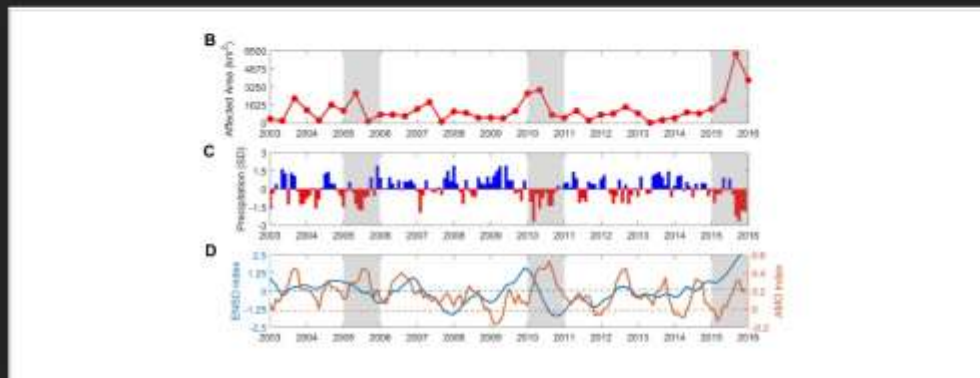
Large sectors of the western Amazonia were affected by dry conditions associated with warming in the Atlantic. By that time it was reported as one of the most intense droughts of the previous 100 years.

- 2010

The region suffered the influences of temperature increments of both the Pacific and Atlantic oceans, resulting in an even more severe drought than that observed in the year of 2005

- 2015

The anomalous precipitation deficit during 2015 exceeded the amplitude and spatial extent of the previous events, affecting more than 80% of Amazon basin, particularly the eastern portion, due to the mega-El Niño event.



INTERNATIONAL JOURNAL OF CLIMATE
Vol. 32, 2013, pp. 1006–1018
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http://www.ijclimatology.com/ISSN/1522-0275

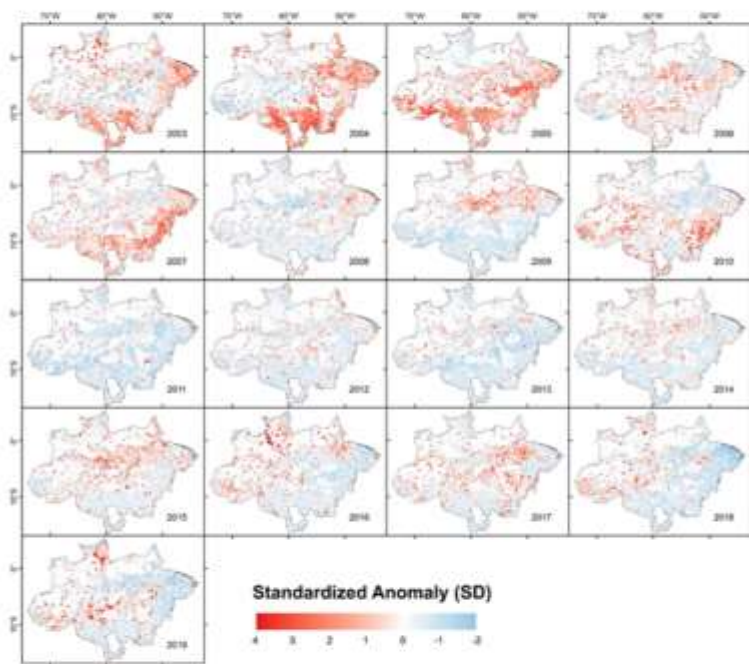


Short Communication
Contrasting patterns of the extreme drought episodes of 2005,
2010 and 2015 in the Amazon Basin

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DROUGHT AND FIRES

Climate variability and change play an important role in the biomass burning over Amazonia, especially in drought years



2005, 2007, 2010

Anomalously extensive and severe fire season

2015

The record-breaking drought of 2015 raised concerns about a fire season of unprecedented severity, but instead fire activity remained 16% below the average of the preceding 13 years.

[View F. Szeftal's research profile](#)

Article | Open Access | Published: 23 February 2021

Twenty-first century droughts have not increasingly exacerbated fire season severity in the Brazilian Amazon

F. Szeftal^{1*}, L. M. J. Ferraz^{1,2}, G. C. de Góes^{1,3}, L. S. Pires^{1,4}, D. Bello^{1,5}, A. B. Rodrigues^{1,6}, L. M. S. Santos^{1,6}, R. M. Dias¹, C. M. P. Siqueira¹, M. Machado^{1,6}, A. S. S. Machado¹ & L. M. S. Dias

Scientific Reports | 11, Article number 448 (2021) | [Check for updates](#)

FIRE - DEFORESTATION DECOUPLING

THE DECOUPLING HYPOTHESIS

A recent study proposed that fire activity in the region has decoupled from deforestation.

SUPERSEDED DATABASE

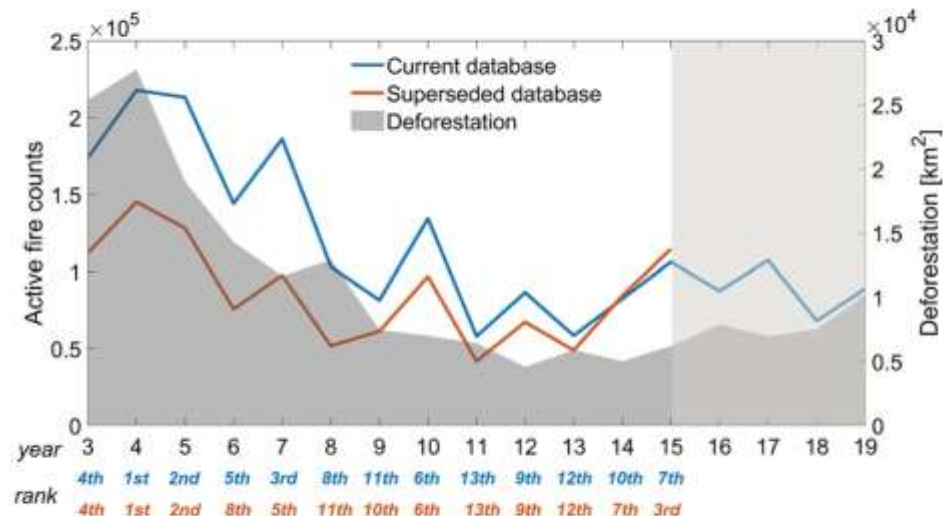
However, assessment of the decoupling hypothesis relied on a fire database that contained incorrect data.

WEAK TREND

The weakly negative trend in the superseded database appeared to strengthen the fire-deforestation decoupling hypothesis

INFLATED NUMBERS FOR 2015

36% higher than the average, 10% lower than for 2005, and 17%, and 18% higher than those for 2007, and 2010



FIRE - DEFORESTATION ~~DECOUPLING~~

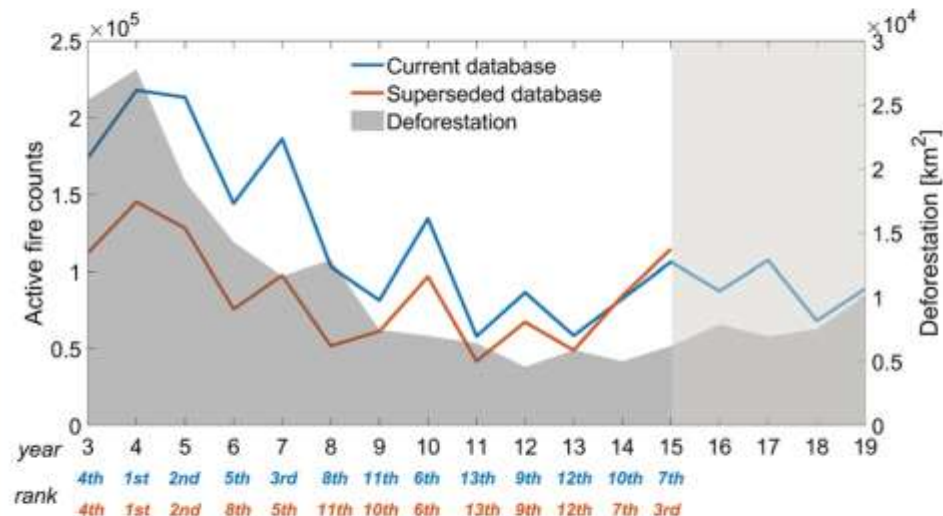
THE NUMBER OF FIRE
COUNTS IN 2015 WAS

50%, 42%, 21%
lower than those
from the 2005,
2007, and 2010
drought years.

WEAKENED EVIDENCE
OF DECOUPLING IS

conveyed by
trends in the
number of active
fires per km²
deforested and in
the concentration
of pyrogenic
emissions

WE DID NOT FIND EVIDENCE THAT 21 CENTURY DROUGHTS ARE INCREASINGLY
EXACERBATING FIRE SEASONS IN THE AMAZONIA FROM 2000 TO 2015

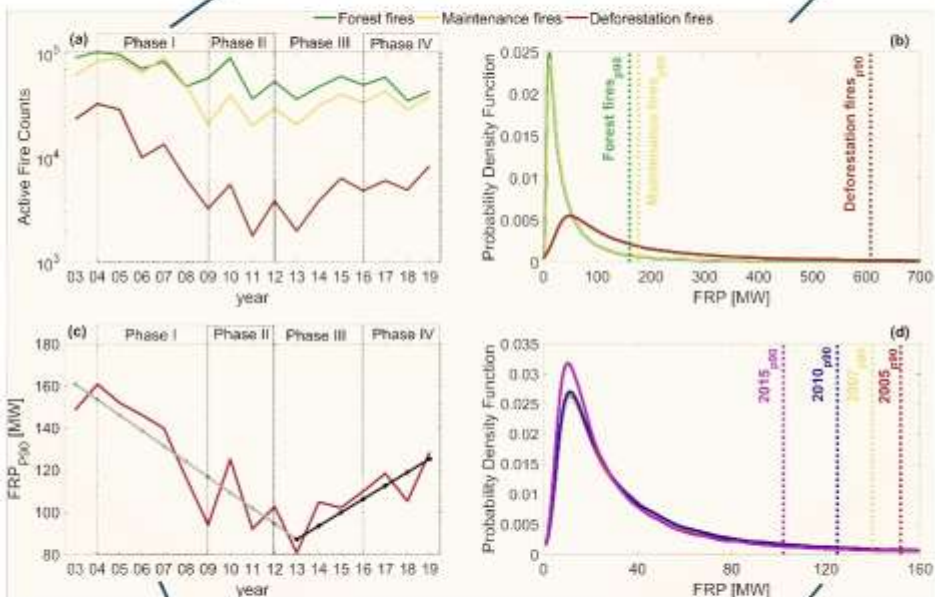


INTERANNUAL VARIABILITY OF FOREST FIRES (GREEN), MAINTENANCE FIRES (ORANGE), AND DEFORESTATION FIRES (BROWN)

FIRE INTENSITY PER FIRE TYPE

FIRE TYPES AND INTENSITY

The role of deforestation as a driver of fire activity in the region should not be underestimated.



THE EFFECTS OF DROUGHTS

on fire activity are evident, especially on **forest fires and maintenance fires**.

FIRE INTENSITY BY FIRE TYPE

Forest and maintenance fires display similar intensity, while **deforestation fires are much more intense**.

FIRE INTENSITY PER DROUGHT YEAR

Fire intensity for the four drought years decreased monotonically and the value in 2015 is about **2/3 of that observed in 2005**

MORE DEFORESTATION, HIGH FIRE INTENSITY

Deforestation rates induced a marked decrease from 2003 to 2013 on fire intensity, **followed by an increase that extends to 2019**.

INTERANNUAL VARIABILITY OF THE 90TH PERCENTILE OF FIRE INTENSITY

FIRE INTENSITY PER DROUGHT YEAR

THANKS



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