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Towards an International Framework

Porto - Portugal | May 16-19th, 2023

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Can prescribed burns reduce areas burned by wildfires and associated greenhouse gas emissions?

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8TH INTERNATIONAL WILDLAND FIRE CONFERENCE

ISPN INSTITUTO SOCIEDADE, POPULAÇÃO E NATUREZA

WWF

LASA Laboratório de Aplicações de Satélites Ambientais da UFRJ

Universidade de Brasília

Introduction

- Zero-fire policy

✓ Increase on late-dry season wildfires frequencies

✓ Large burned extensions with high severity, including sensitive vegetation

✓ High costs and great damages and losses

✓ Sociocultural and economic conflict source

Durigan & Ratter, 2016; Fidelis et al 2018; PNSC, ICMBio;, 2012; Schmidt et al, 2018; Sesc Pantanal, 2020

Introduction

- 2014: Integrated Fire Mangement Programme in Brazil

✓ 3 Protected Areas

✓ Paradigm shift

✓ Peoples' knowledge and experience recognition, consultation and assimilation

✓ National Fire Brigade Programme in indigenous and traditional territories

✓ 2022: 113 protected areas

Rodrigo Falleiro, Prevfogo/Ibama

Fernando Tatagiba, ICMBio

Falleiro et al., 2021; Moura et al., 2018; Schmidt et. al. 2018; 2020

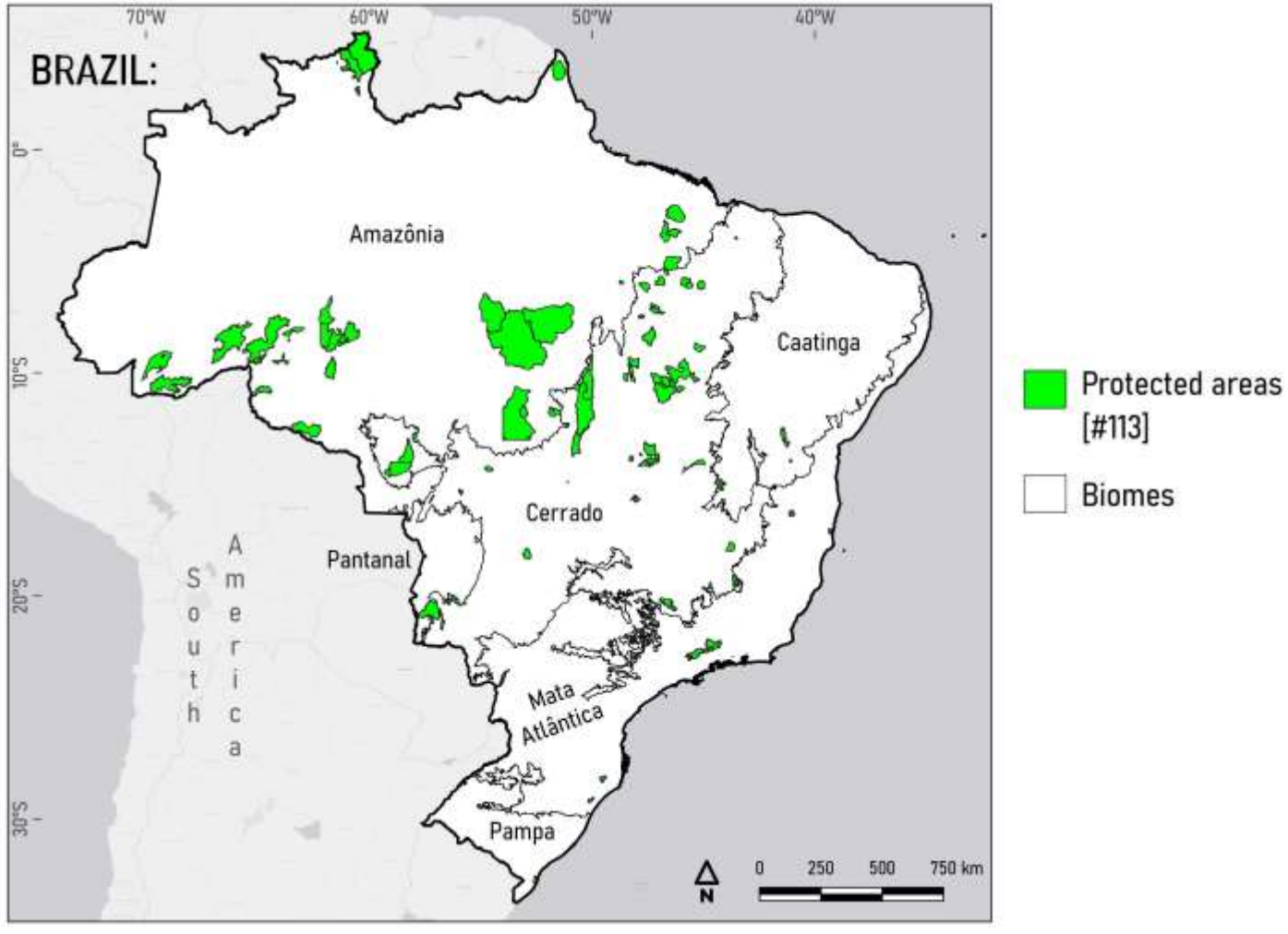
Objective

Evaluate the **effectiveness of prescribed burns**, as a part of the Integrated Fire Management approach, in **reducing areas burned** by **wildfires** and their associated **greenhouse gas emissions** in Brazilian protected areas.

Methodology

- Protected areas – IFM

✓ Public Information System from official sources (Prevfogo/Ibama and ICMBio)

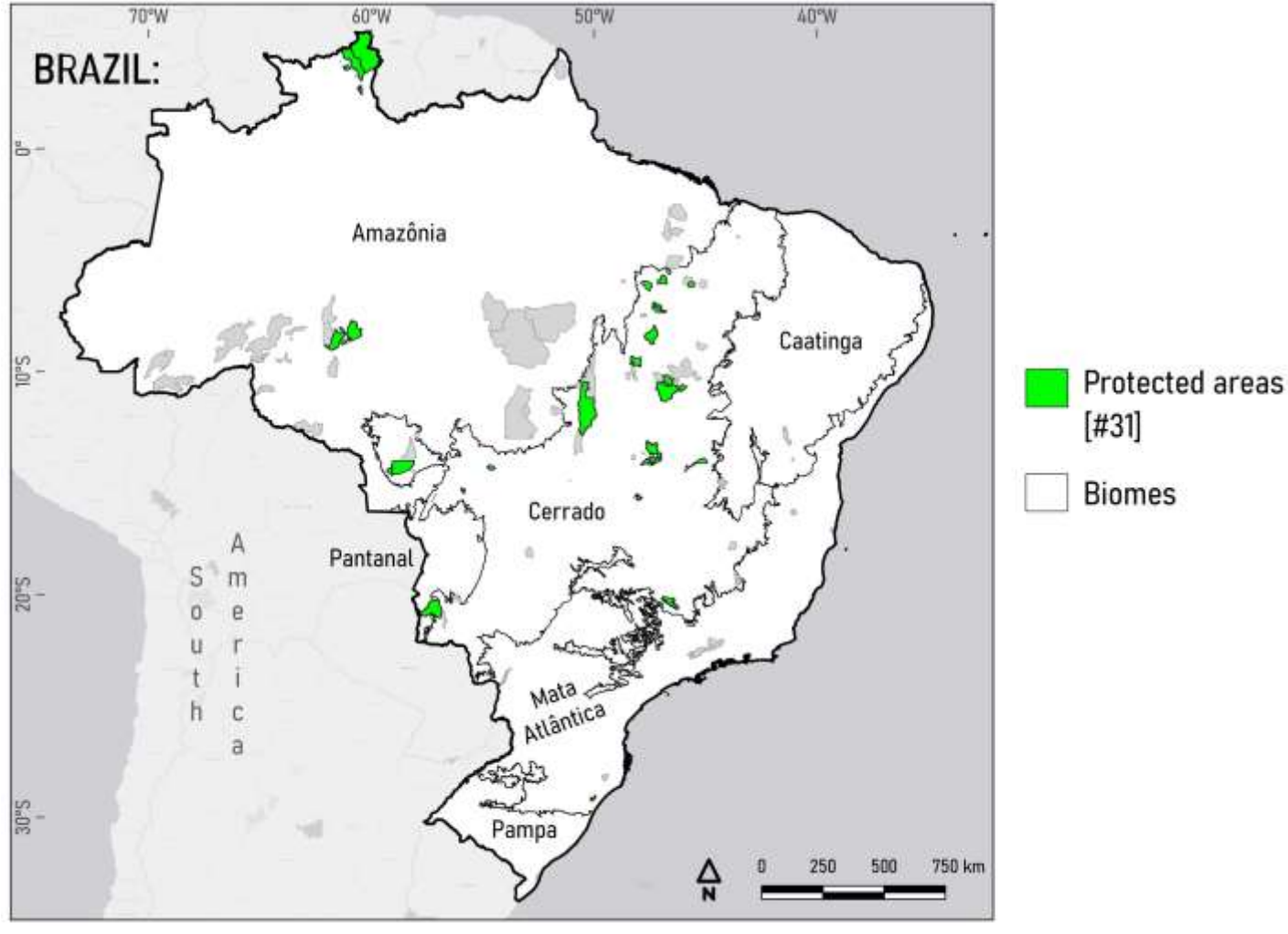


Methodology

- Study areas – prescribed burns

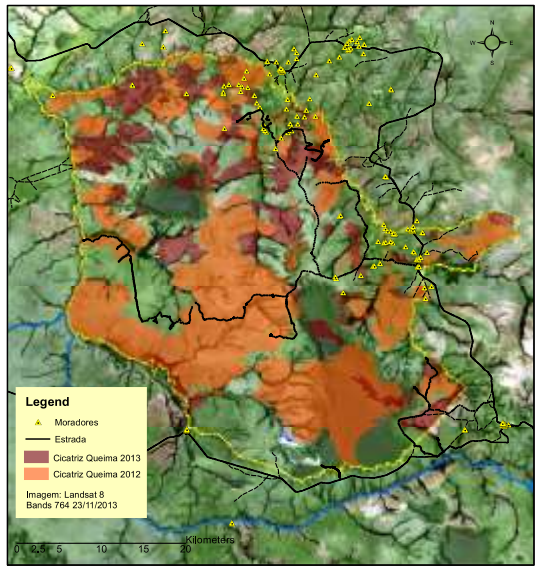
✓ Validation with managers

✓ Biomes: Cerrado, Amazônia and Mata Atlântica



Methodology

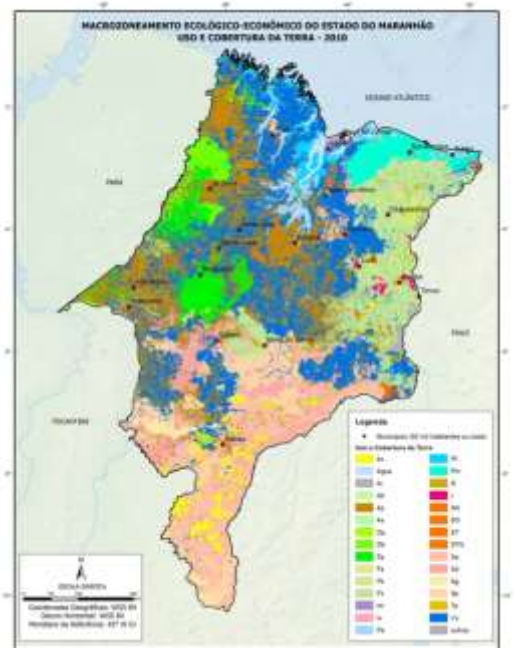
- Criteria:



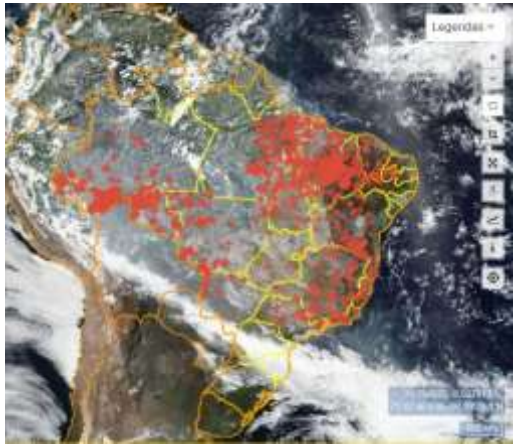
✓ Prescribed fires vs. wildfires based on fire season

✓ Areas with prescribed burns since 2018 or before

✓ Land use and cover classification (grasslands, savannas, forests, forestry, agriculture)



- **Satellite image sources and resolutions (2001-2021)**



- Burned area

✓ Nasa monthly products from Aqua and Terra satellites and Modis Burned Area (MCD64A1 v061)

✓ 500 m spatial resolution

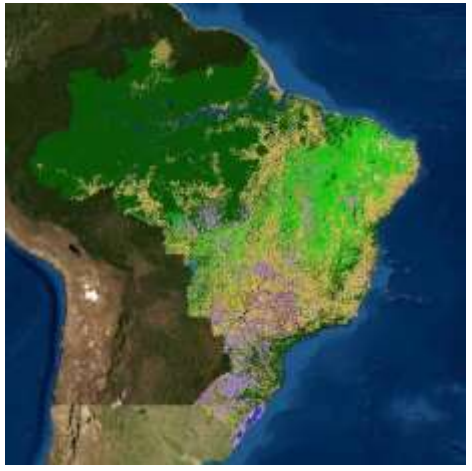
✓ Platform Google Earth Engine (GEE), javascript language

- Land use and cover

✓ Collection 7 from Mapbiomas Project (Landsat series)

✓ 30 m spatial resolution

✓ Google Earth Engine Application Programming Interface (API), javascript language



Giglio et al., 2018; 2021; 2022; Gorelick et al., 2017; Souza et al., 2020

Methodology

- **Greenhouse gas emissions (CO_2,CO, CH_4, N_20, NO_x)**

✓ Calculation

$F(\eta)=b*c*E_F*Ba$

- F: emitted amount (tons)
- b: initial fine fuel load (kg/m^2)
- c: combustion factor (burn efficiency) (%)
- E_F: emission factor (kg/ton)
- Ba: burned area (km^2)

Freitas et al., 2005

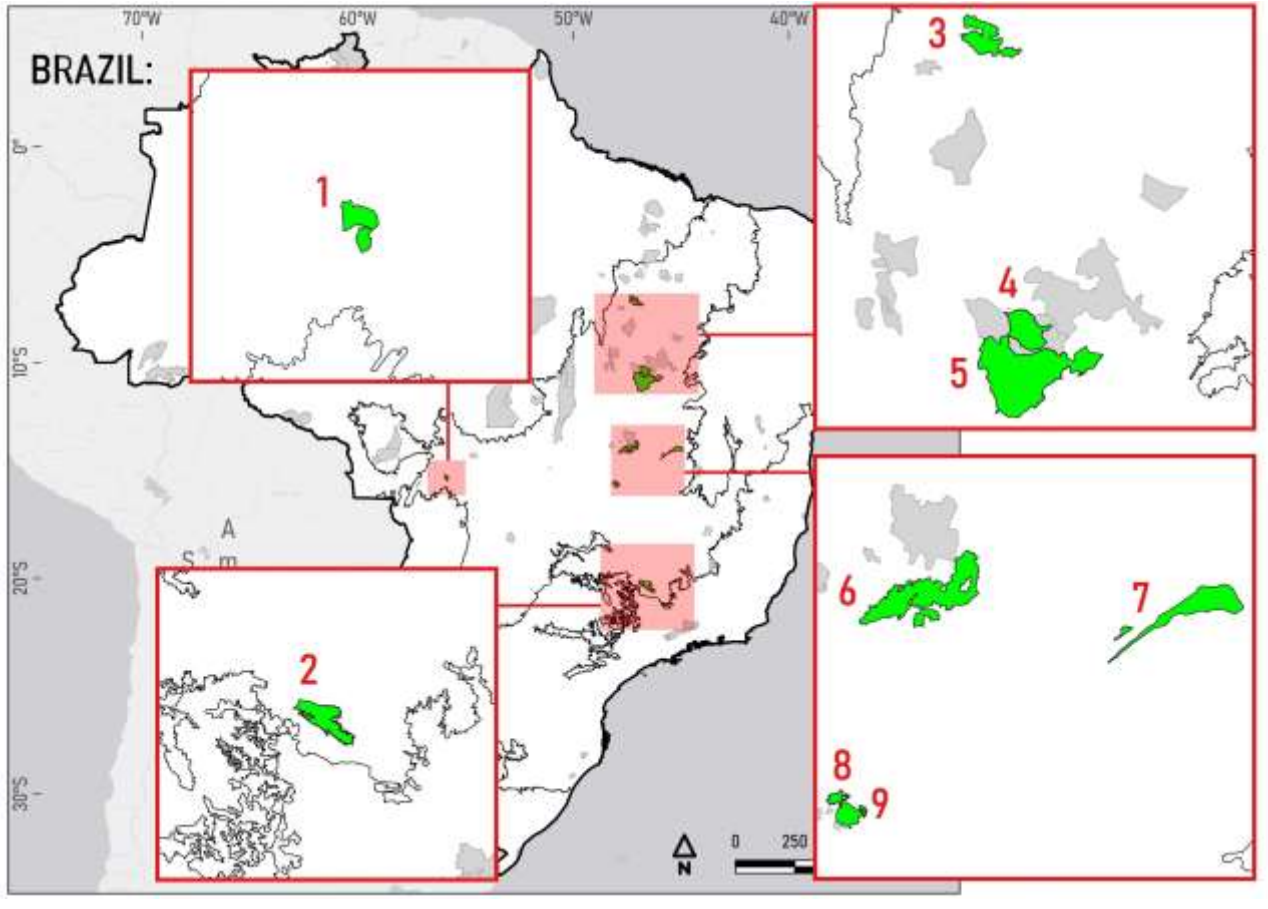
Results

- Most effective results

✓ Cerrado

- Large extensive fire prone areas

Clara Baringo, 2014



1- NP Chapada dos Guimarães

2- NP Serra da Canastra

3- NP Chapada das Mesas

4- SP Jalapão

5- ES Serra Geral do Tocantins

6- NP Chapada dos Veadeiros

7- WR Veredas do Oeste Baiano

8- NP Brasília

9- BR Contagem

Results

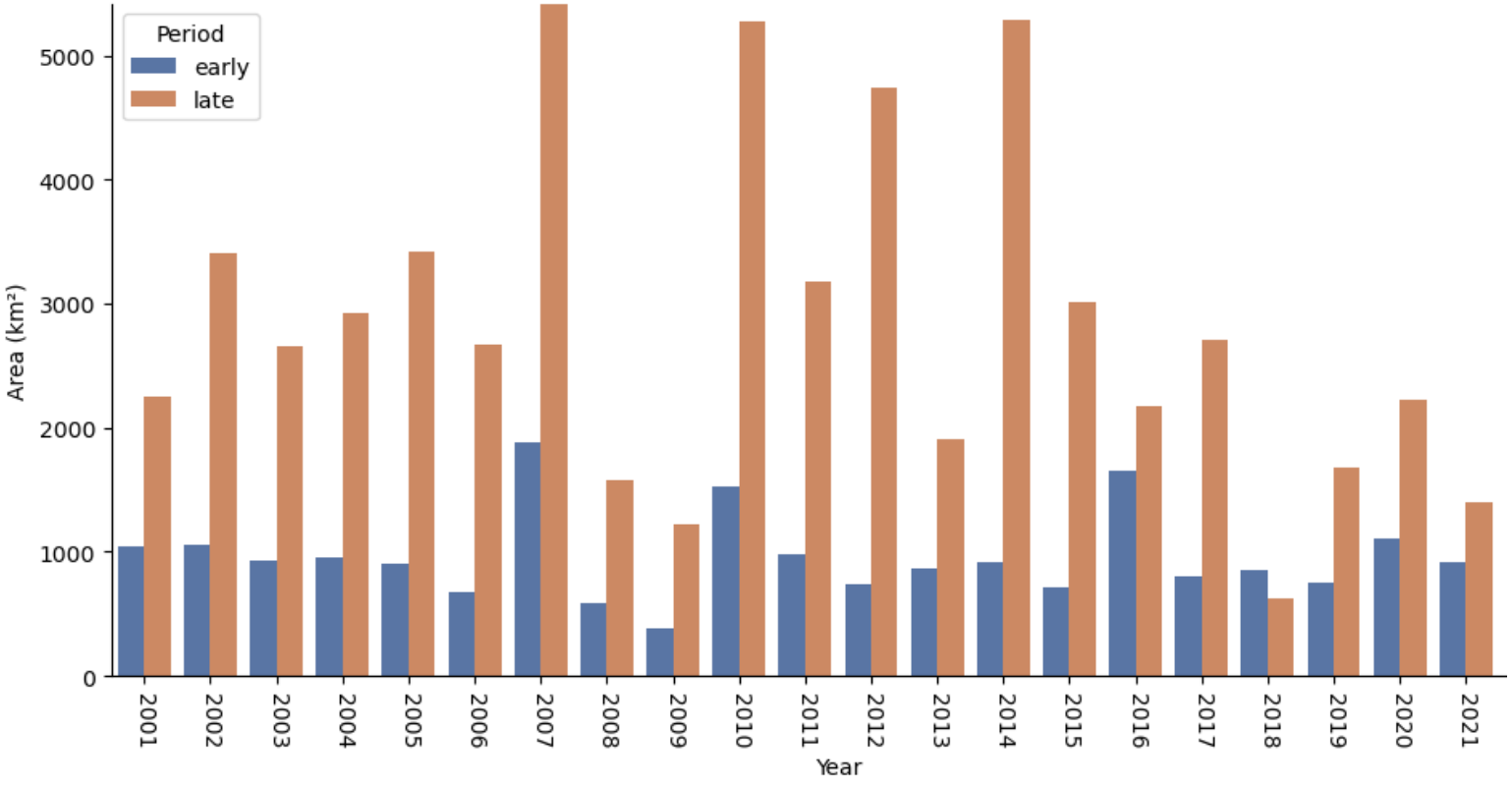
- Burned area

✓ Cerrado protected areas

✓ Early: increase of 1%

✓ Late: reduction of 41%

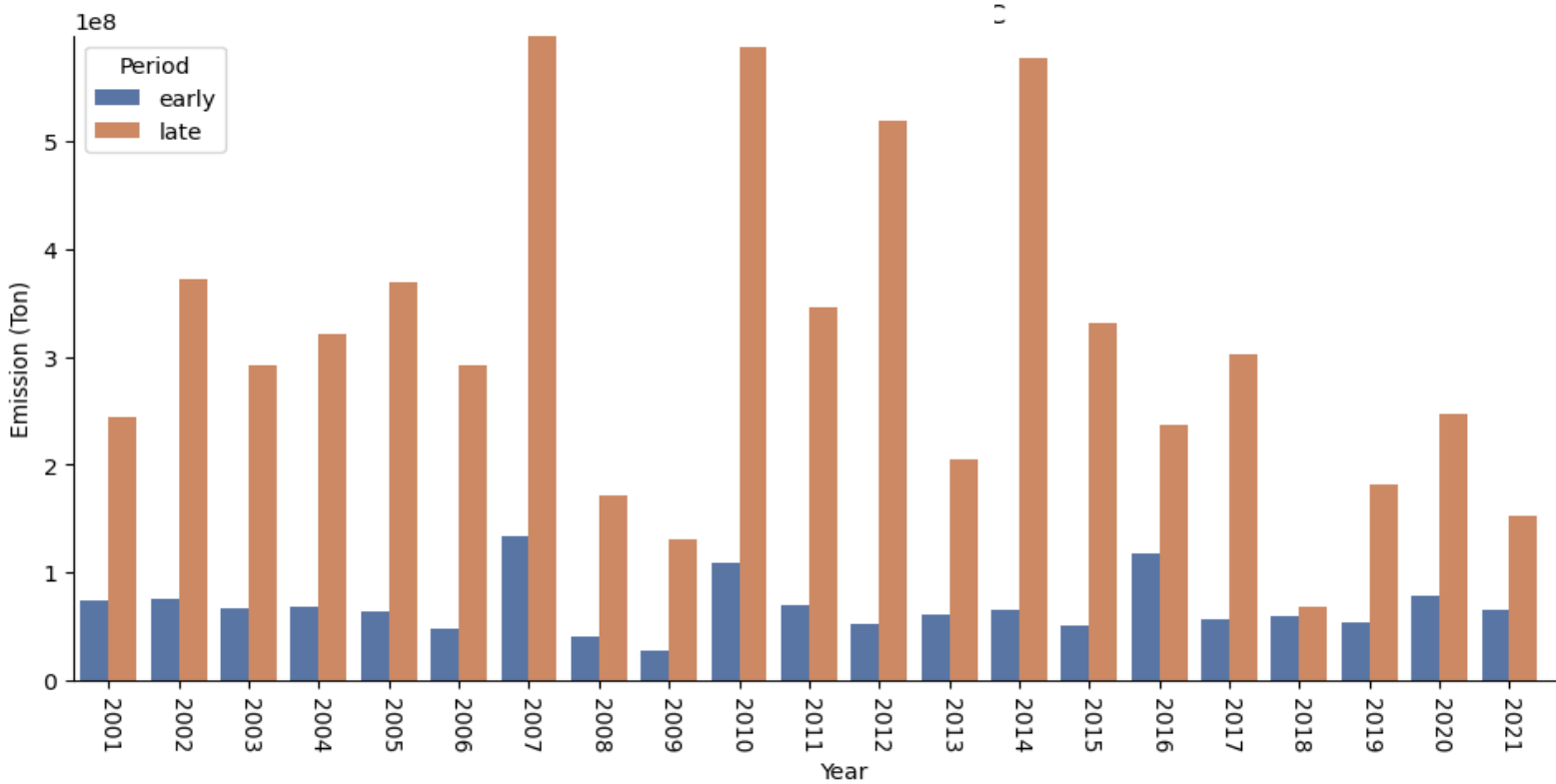
Fernando Tatagiba, ICMBio



Results

- GHG emissions
- ✓ Cerrado protected areas
- ✓ Reduction of up to 39%

Isabel Schmidt, 2014

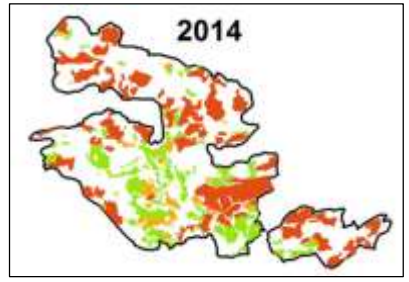


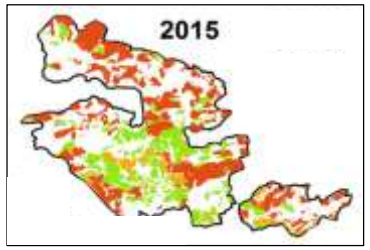
Results

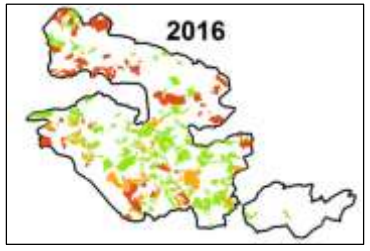
- Burned area

✓ Chapada das Mesas National Park (2005)

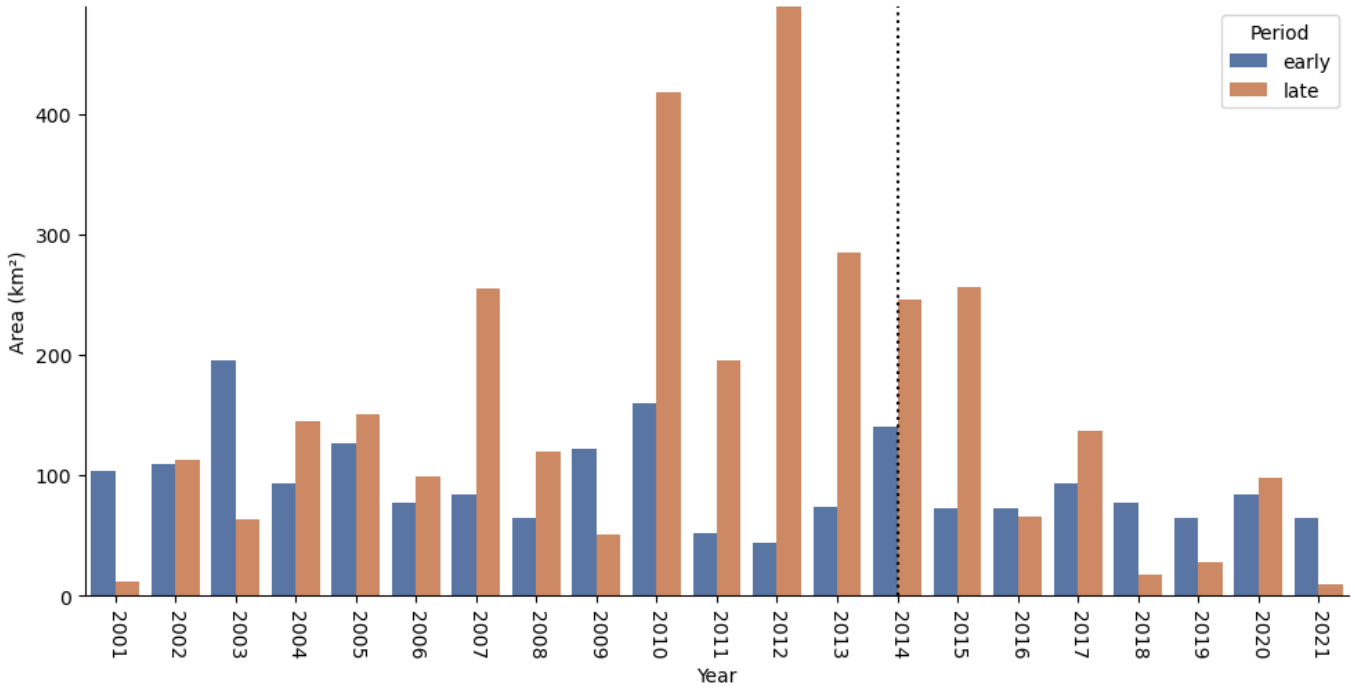
- 1,600 km^2
- Reduction of 27% (early) and 54% (late)
- Adaptation period (2013-2015)







Alexandre Sampaio, ICMBio, 2014



Results

- Adaptive management

✓ Chapada das Mesas National Park

- Collective fire agreements (180 active participants)
- Planning tools: burning calendars and maps (37 families)
- Prescribed burns
- Research
- Capacity building for fire brigades

Moura 2018; PNCM/ICMBio, 2017

Final considerations

- Late dry season **wildfires** burn **larger extensions**, consume **more fuel** and **burn** different types of vegetation (including **forests**), **emitting more green house gases (GHG)**
- **Prescribed burns** help **fragmenting fuel** loads (firebreaks), burn **smaller areas** (usually < 10 km^2), consume **fire prone vegetation**, **emitting less GHG**
- **Fuel composition, quality and state** also influence GHG emissions, not only the burned area size!!!!!

Fernando Tatagiba, ICMBio

Berlinck & batista, 2020; Fidelis et. Al., 2018; Santos et al., 2021; Schmidt et. al. 2018

Thank you!

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