

# The challenge of controlling fires tropical forests: Brazil's experiences in the Amazon



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Ecosystems

Fires

IFM

**Savanna**

X

**Rainforest**

Recurring fire;

Fire-prone;

Prescribed burnings;

Direct attack.

Rare fire;

Fire sensitive;

Agricultural burnings;

Indirect attack.



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# Problems associated with fires in tropical forests: emissions, degradation and loss of socio-biodiversity are accelerated by climate change.



**SPREADING LIKE WILDFIRE**  
THE RISING THREAT OF EXTRAORDINARY LANDSCAPE FIRES

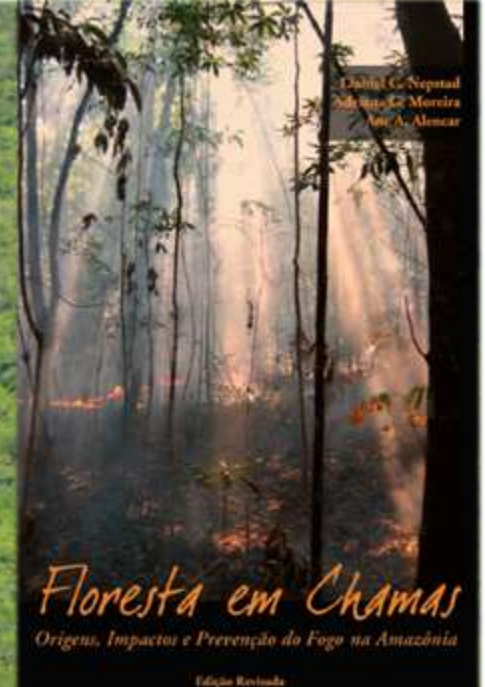


**12**

**Wildfires**

Edited by: [List of authors including Carlos Pérez, Carlos Pérez, etc.]

Small text at the bottom of the page, likely a reference or publication information.



*Floresta em Chamas*  
Origens, Impactos e Prevenção do Fogo na Amazônia

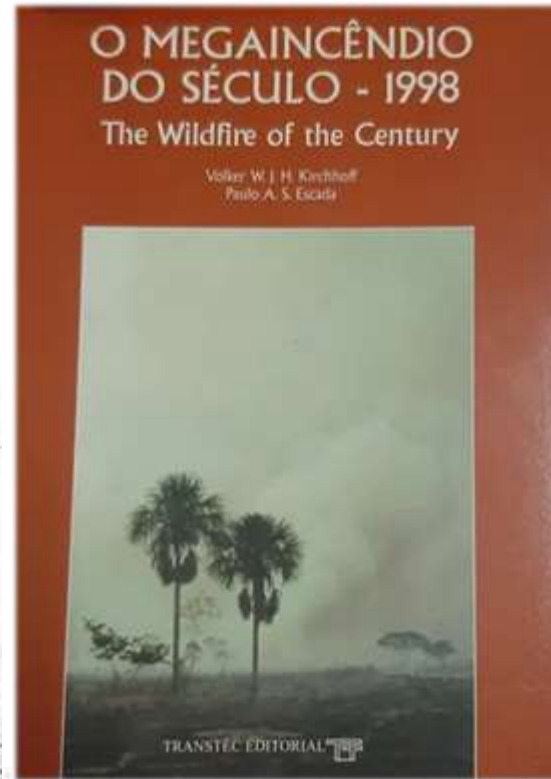
**O MEGAINCÊNDIO DO SÉCULO - 1998**  
The Wildfire of the Century



Volker W. J. H. Kattsov  
Paulo A. S. Duarte

TRANSTEC EDITORIAL

# And now, another *El Niño* is coming!!!



Amazônia 2016-2019



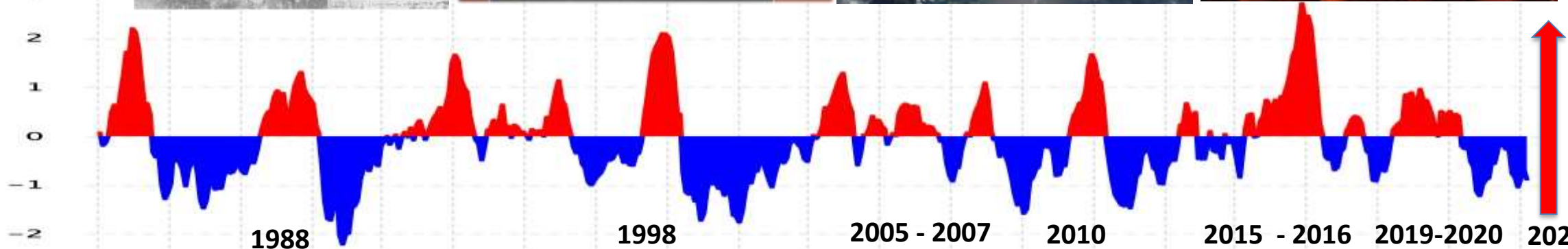
Indonésia 2015



Pantanal 2020



NINO3.4 SST Anomaly (°C)



# Could it be worse?

We believe that forest degradation, caused by previous seasons, can potentiate the effects of *El Niño* and climate change.

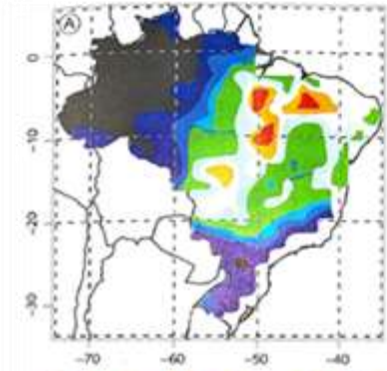


Figura 3: Risco de fogo entre set-out, baseado no clima e vegetação de 1980 a 2010. Justino *et al.* 2010

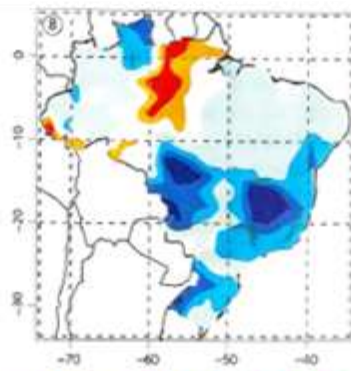


Figura 4: Risco de fogo entre set-out, baseado no clima futuro e vegetação atual. Justino *et al.* 2010

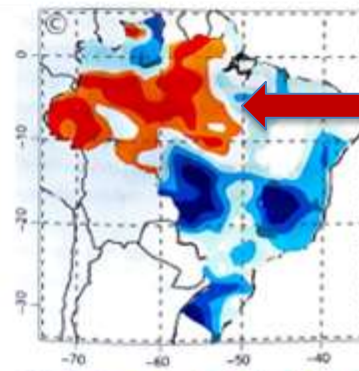
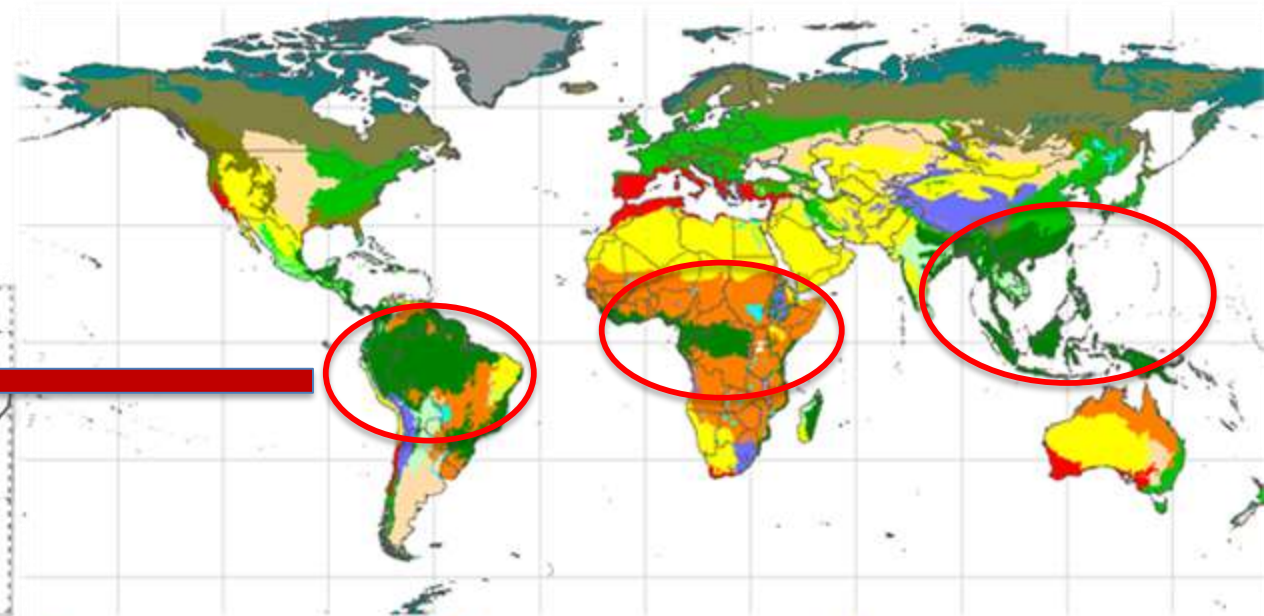


Figura 3: Risco de fogo entre set-out baseado no clima e vegetação futuros (2070-2100) Justino *et al.* 2010



- Bosques (sub)tropicales húmedos
- Bosques (sub)tropicales secos
- Bosques templados de frondosas y mixtos
- Bosques (sub)tropicales de coníferas
- Bosques templados de coníferas
- Bosques boreales / taiga
- Sabanas y matorrales sabanoides tropicales
- Desiertos y matorrales xeromorfos
- Estepas y praderas templadas
- Bosques y matorrales mediterráneos
- Tundra
- Matorrales y pastizales montañosos / tundra alpina
- Savanas y herbazales inundables
- Manglares
- Roca y hielo
- Aguas interiores

Case Study

# Xingu Indigenous Land can be an indicator of the future of the Amazonia

Forestry degradation

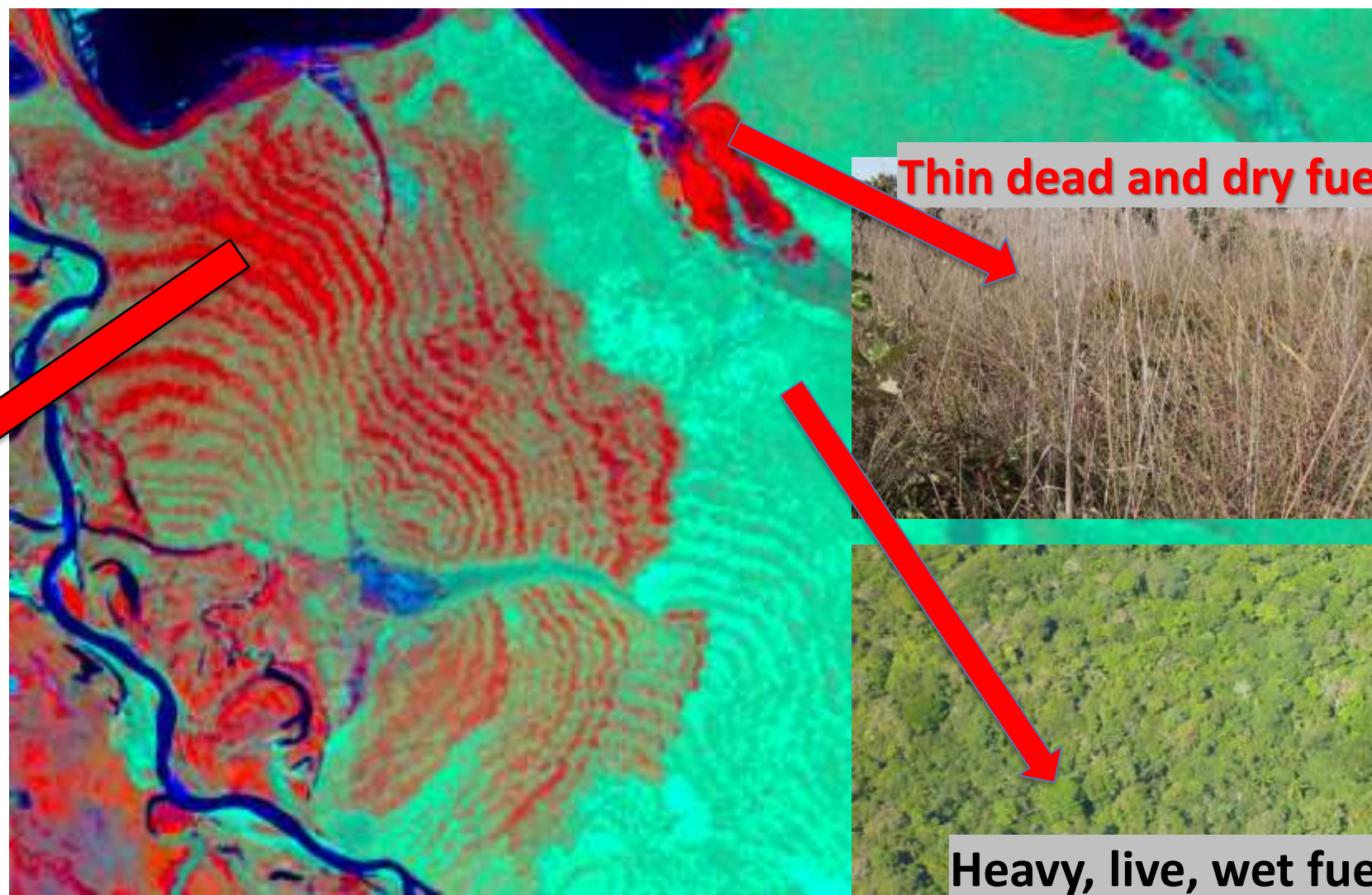


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Dead forest,

# Severity waves (day x night) shown on a Fuel Map

like a  
dry grass



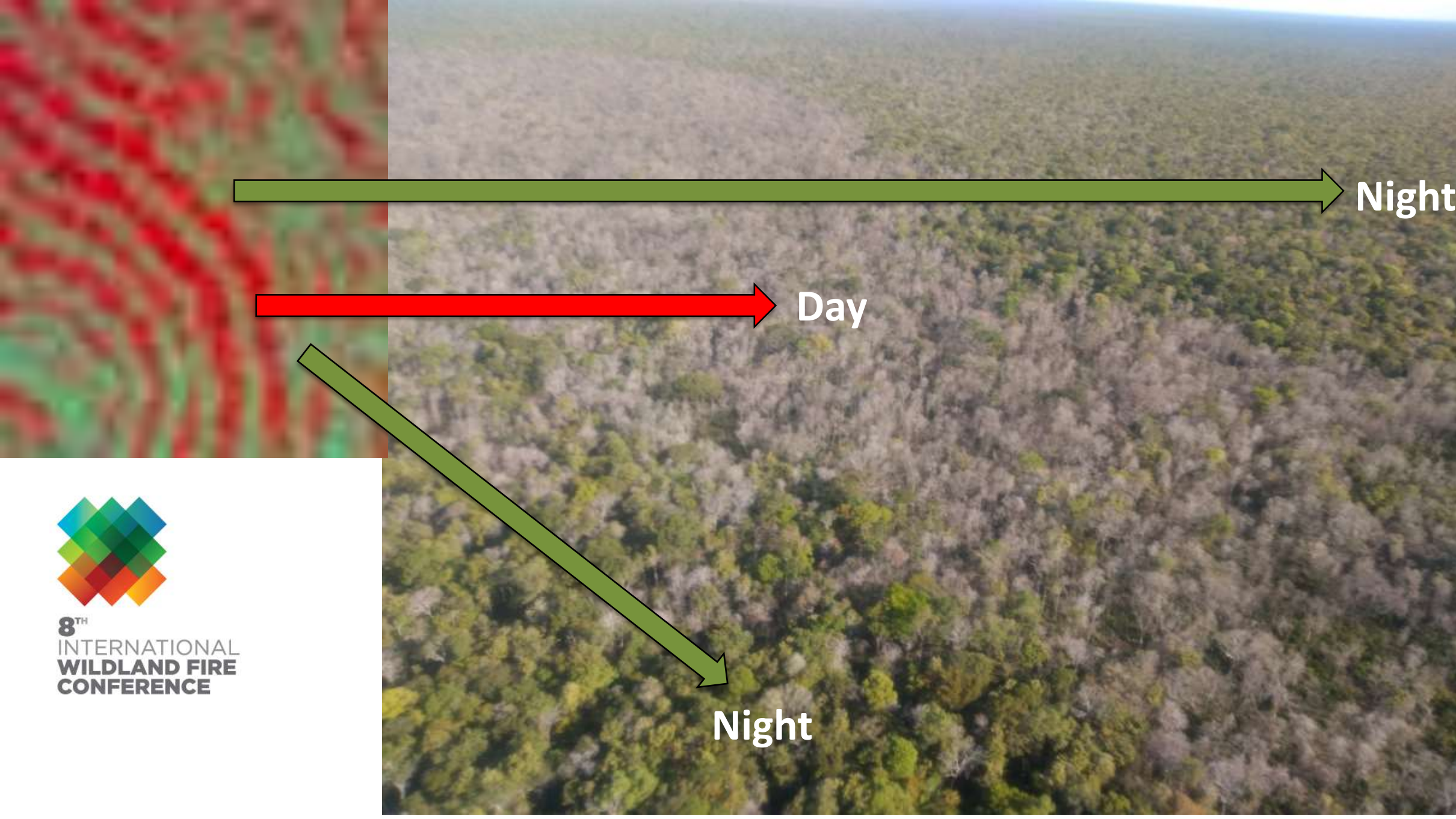
Thin dead and dry fuel



Heavy, live, wet fuel



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Night

Day

Night

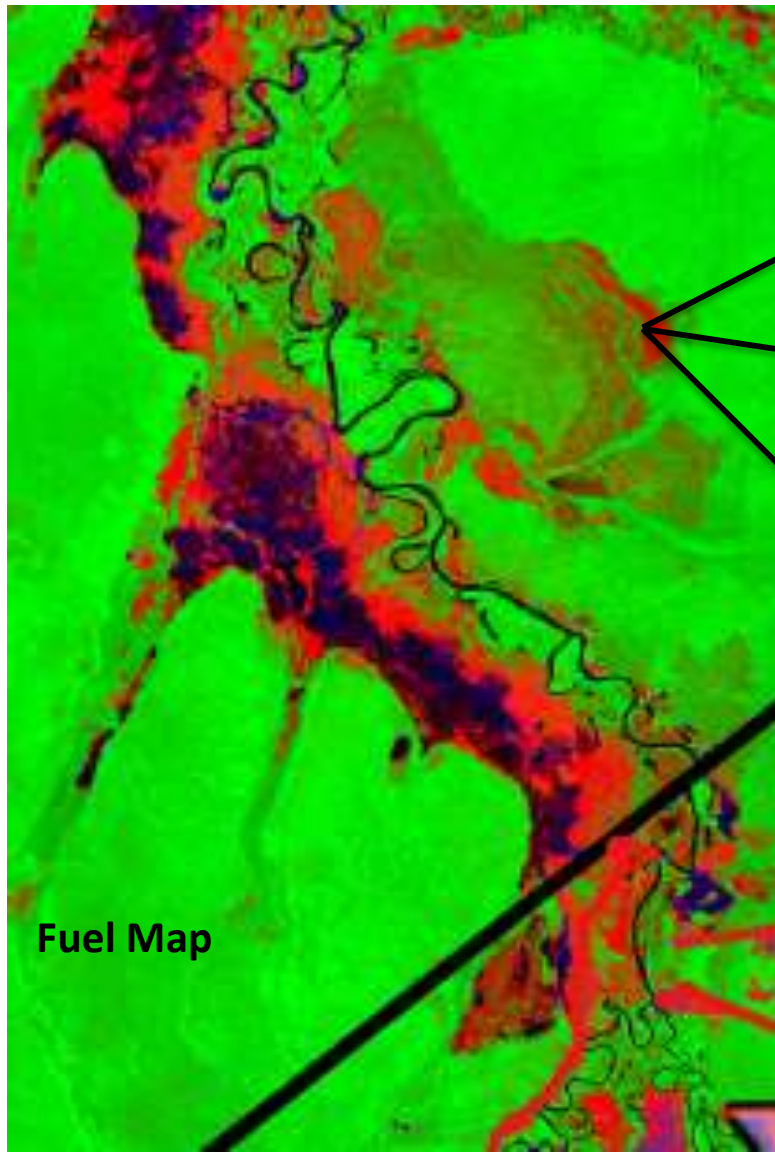
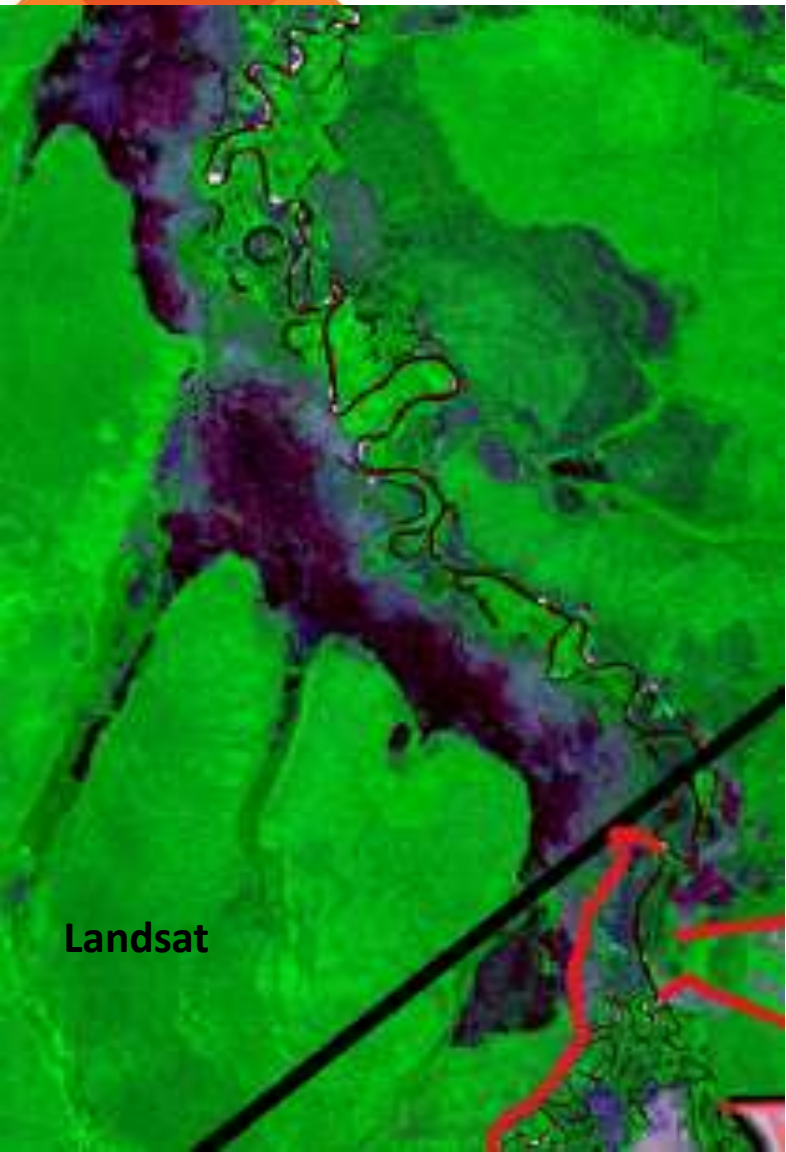


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2019

# Increased heavy fuel in the understory



# Severity waves two years after less biodiversity, more inflamability

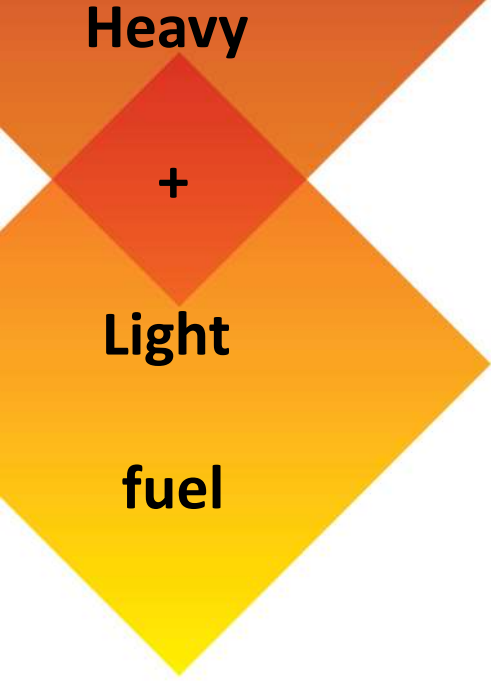


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Where are the trees???





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Many wildland fires in tropical forests are  
Acquiring extreme behavior and high severity



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Figura 16: IF 20: Agata  
(imagem Sentinel-2 de 05/09)

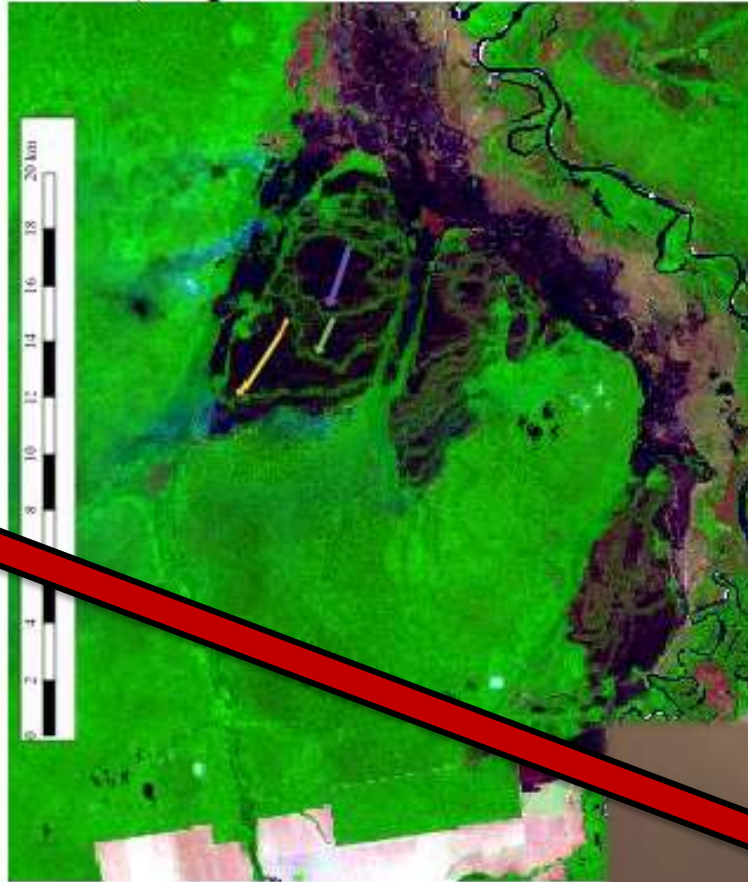
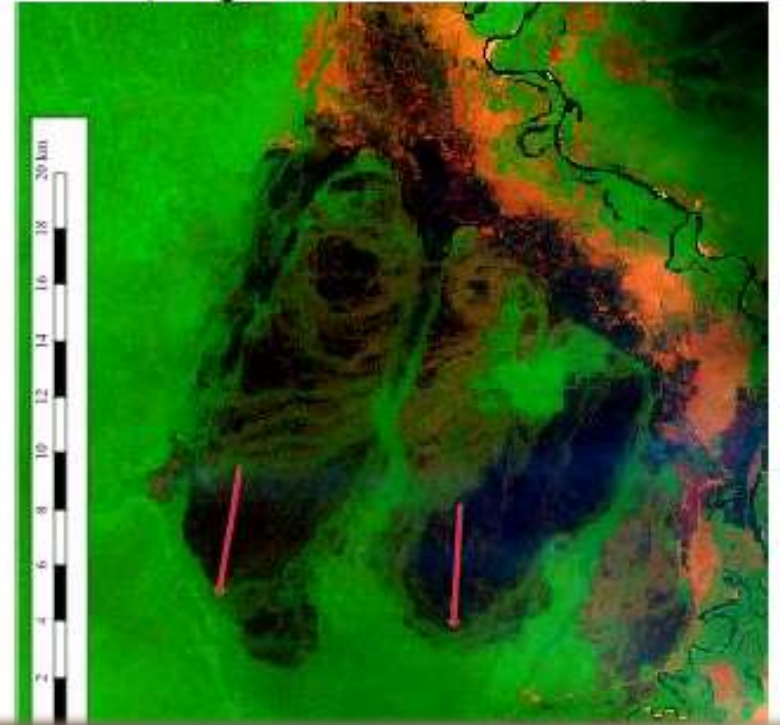


Figura 17: IF 20: Agata  
(imagem Sentinel-2 de 10/09)



45 km

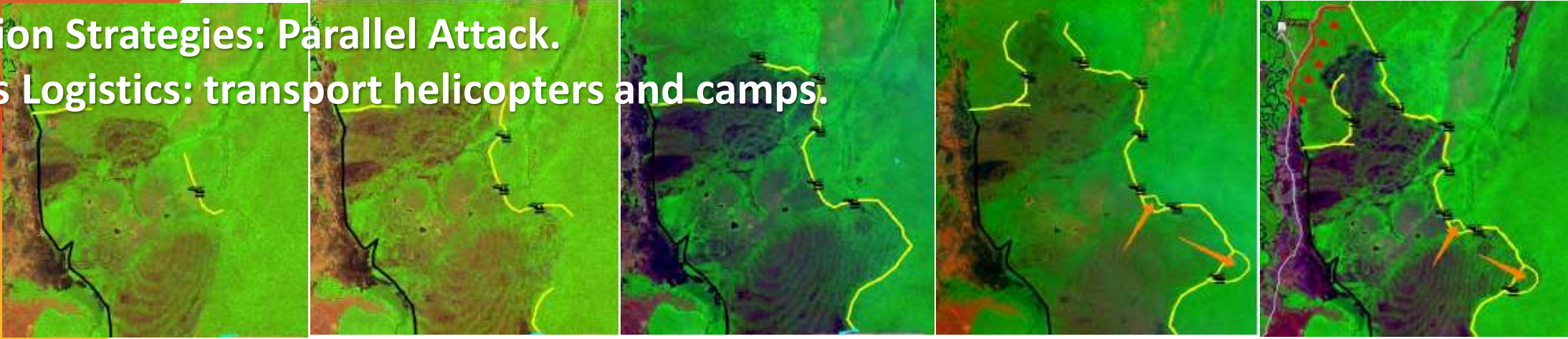


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Because high severity waves  
drive fire fronts



# Suppression Strategies: Parallel Attack. Brigades Logistics: transport helicopters and camps.



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# International

# cooperation



14 de marzo de 1998

### Fuego y hambre amenazan a los Yanomamis

## CON 22 HELICOPTEROS DE VENEZUELA COMBATEN INCENDIO EN RORAIMA, BRASIL

BRASILIA, mar 14 (Prensa-Asociada) - Funcionarios del estado brasileño de Roraima libieron el viernes que veintiún helicópteros de la fuerza aérea para combatir los incendios forestales que devastan parte de la región amazónica desde hace dos meses. «Hemos hecho veinte vuelos incendios tan intensos», dijo el gobernador de Roraima, Marcelo Simões, en declaraciones por teléfono a Reuters. «Esto es un gran desastre ecológico», añadió.

El fuego se originó en unas 500 hectáreas de mata de cerrado, según Simões. Él dice que los incendios se propagaron a una gran zona de la Amazonia brasileña y que los helicópteros que combaten el fuego provienen de Brasil, Venezuela y Uruguay.

El incendio también afectó a las zonas de cultivo, que están ahora casi totalmente quemadas, lo que amenaza la seguridad alimentaria de los Yanomamis, que viven en la zona desde el inicio de la década de los años setenta. Los Yanomamis ya se ven obligados a buscar comida en las zonas de cultivo de los agricultores locales.

El gobernador de Roraima, Marcelo Simões, dijo que los helicópteros que combaten el fuego son de la fuerza aérea de Venezuela, que tiene un total de 120 helicópteros de este tipo. Él dijo que los helicópteros que combaten el fuego en Roraima son de los modelos UH-1H y UH-1H Plus.

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Declaração de Viña del Mar 2017



# Manejo Integrado do Fogo entre Países Membros da OTCA

## Memorando de Entendimento de Cooperação e Assistência

**Can we apply the combat techniques from Europe and USA there?  
Or are we going to cause even more trouble? Are we prepared to  
send and receive international support in the Amazon?**



**Chemical suppression**



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**CL 415**



**Aerial structure**



**Firefighters**





Governance

Framework

## Questions to be discussed in this workshop:

- Do other tropical countries also have these problems?
- What are they doing to lead with the situation?
- How can we avoid this impending disaster?
- What can we do to anticipate possible problems?



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## GOVERNANCE PRINCIPLES:

Towards an International  
Framework

Porto - Portugal | **May 16-19<sup>th</sup>**, 2023

FIND OUT MORE  
AND REGISTER AT:

[www.wildfire2023.pt](http://www.wildfire2023.pt)

LOCAL ORGANIZER



INTERNATIONAL LIAISON COMMITTEE FOR THE IWFC



# Thank you

Rodrigo.Falleiro@ibama.gov.br

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## The challenge of controlling wildfires in rainforests

Rodrigo de Moraes Falleiro, Mariana Senra de Oliveira, Ana Maria Canut Cunha, Anderson Gonçalves Nunes and Fernando Viana Rodvalho

All countries will suffer from climate change and the worsening of wildfires. However, the differences in structure for protection, accumulated knowledge and available resources are enormous across the planet. As a rule, poor tropical countries have fragile wildfire protection systems. The few available resources are often wasted, due to lack of technical knowledge and experience, resulting in the destruction of millions of hectares each severe dry season. Brazil is a tropical country that has managed to implement several protection programs in recent years, ranging from nature conservation units to indigenous and traditional territories. Many of these programs have achieved good results in controlling wildfires in the savannas, but none of them have achieved good results in rainforests. We analyzed the operations carried out in the Brazilian Amazon, between 2016 and 2022, and concluded that there are several particularities, which are not being adequately considered in management strategies and international cooperation. The difficulties in opening lines of defense in degraded forests and the logistical challenges make the techniques established in other regions of the world inefficient. Extreme fire behavior and high severity have been increasingly frequent, indicating gloomy scenarios for the conservation of biodiversity and indigenous peoples in these regions. We believe that many of these problems are common to other countries around the world, which are also struggling to control wildfires in increasingly degraded and flammable rainforests. To avoid the repetition of disasters that have occurred cyclically in recent decades, from South America to Southeast Asia, we consider it essential to increase the exchange of experiences and knowledge related to management, combat, restoration, financing and cooperation, specifically for this type of vegetation. In this way, we propose that an international event on fire in the Tropical Forests be held, before the