

Introduction

The Amazon rain forest removes CO₂ from the atmosphere, **reducing the negative impacts of climate change**. This is one reason why protection and preservation of the Amazon is so important.

Ozone (O₃) formed at the surface is damaging to human and plant health.

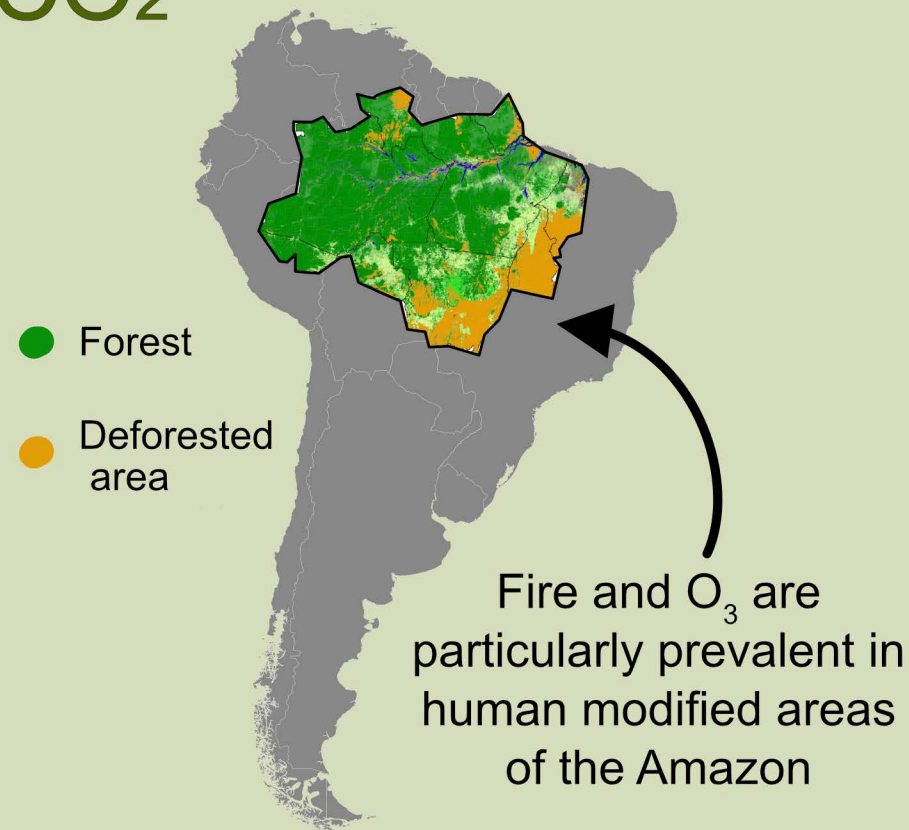


Precursor sources of O₃ include fires, industry and transport. In the Amazon, fires are one of the largest sources.



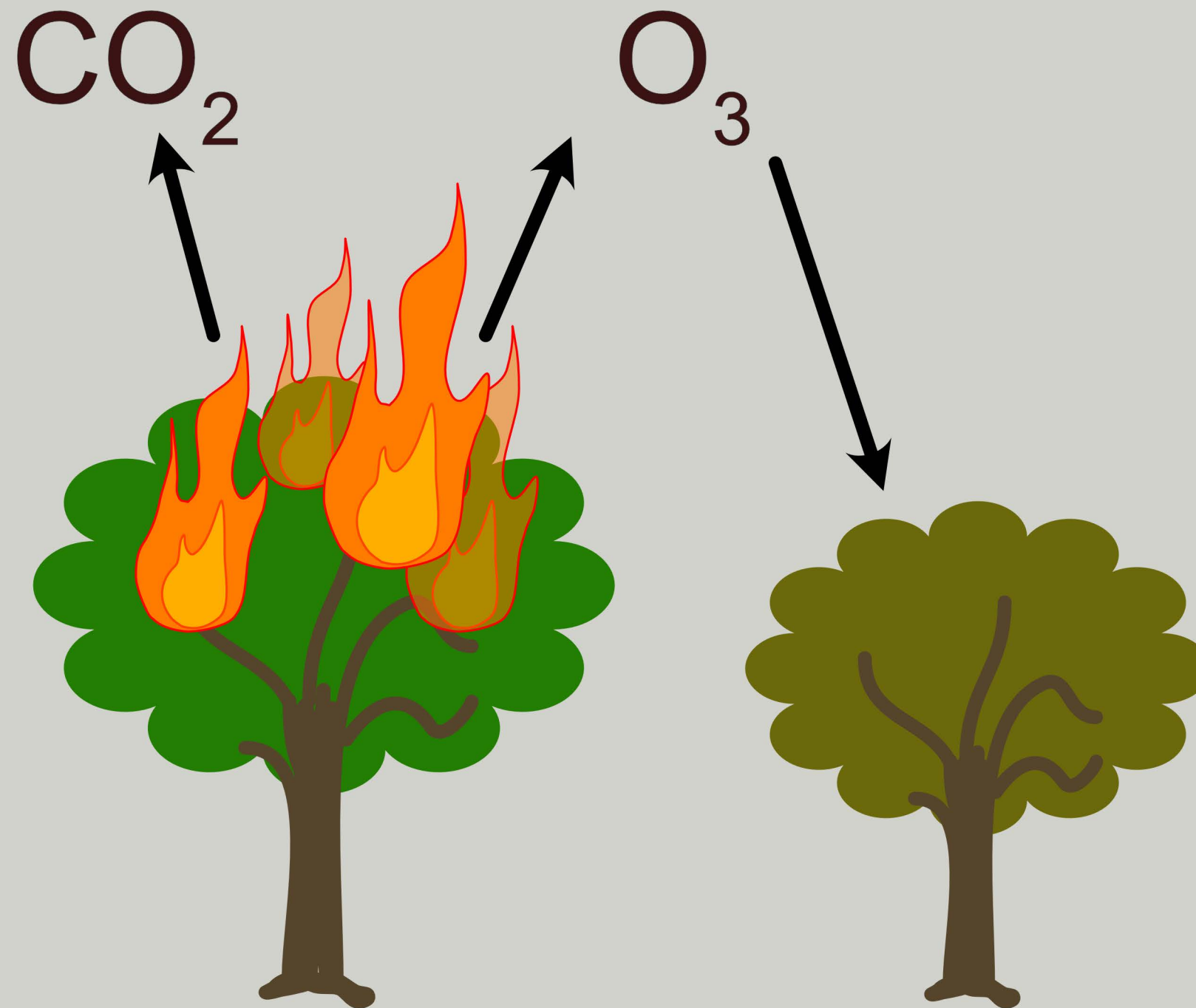
Amazon fires release on average **800 million tonnes** of CO₂ into the atmosphere every year.

CO₂ Fire in the Amazon is **not natural**; forest fires were rare before the introduction of Western agricultural practises and deforestation.



Fires lead to O₃ production → O₃ damages plants and decreases growth

We compare 2 ways that fires in the Amazon lead to increased CO₂ in the atmosphere:



Direct effect on CO₂

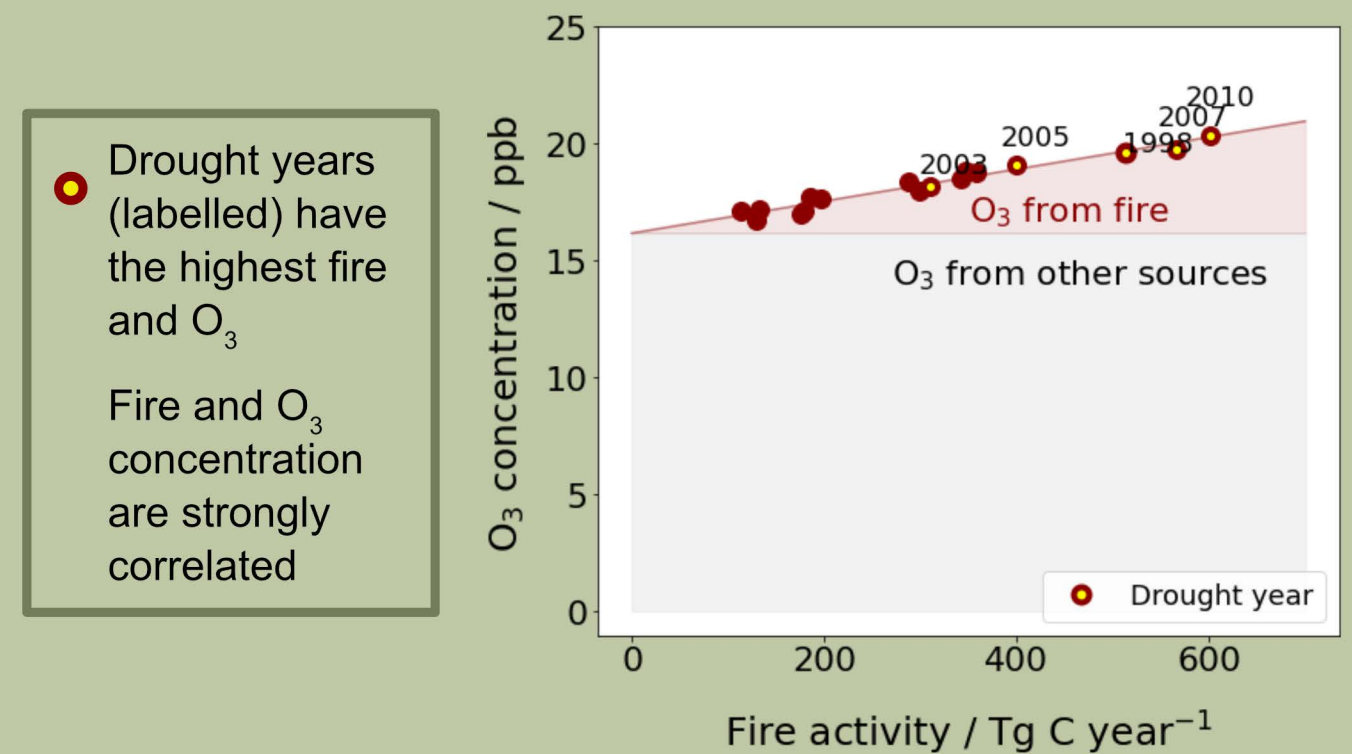
Fires release of CO₂ into the atmosphere as plants burn

Indirect effect on CO₂

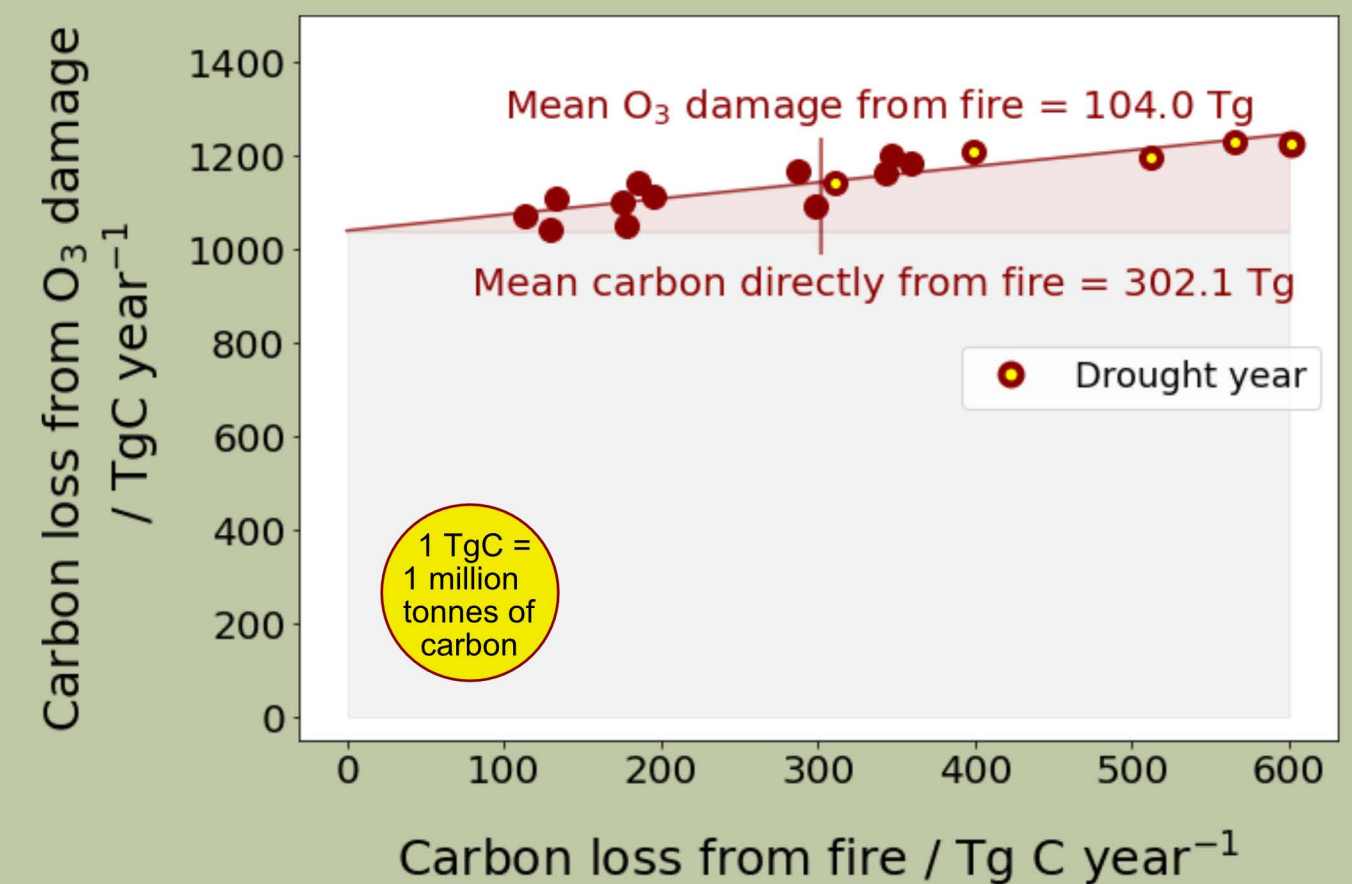
Trees damaged by O₃ do not remove as much CO₂ from the atmosphere as they should. Therefore, more CO₂ remains in the atmosphere.

Results

Fire drives year-to-year variation in O₃ concentration in the Amazon



Carbon lost from fire-driven O₃ damage is ~30% the magnitude of the carbon emitted directly from fires



Methods

- Fire data is taken from **satellites** and O₃ concentrations from **climate models**.
- We predict the amount of carbon lost due to O₃ damage to trees using a **land surface model**.
- The model calculates O₃ damage based on measurements made on **12 tropical tree species**, scaled up to the whole Amazon.

Final statements:

Carbon lost from fires is underestimated without including the effect of O₃ damage.

Climate change is likely to see an **increase in drought events**, which may **increase O₃ damage** to the Amazon in the future.