

INCREASING OF CARBON EMISSION FROM BIOMASS BURNING DUE TO THE TEMPERATURE RISING AND PRECIPITATION REDUCTION IN THE AMAZON



H.L.G. Cassol¹
*henrique@dsr.inpe.br

¹ Remote Sensing Division, National Institute for Space Research (INPE), São José dos Campos, Brazil.
² Earth System Science Center (CCST), National Institute for Space Research (INPE), São José dos Campos, SP, Brazil
³ Nuclear and Energy Research Institute (IPEN), SP, Brazil
⁴ School of Geography, University of Leeds, Leeds LS92JT, UK.
⁵ Global Monitoring Division, Earth System Research Laboratory, National Oceanic and Atmospheric Administration (NOAA), Boulder, Colorado 80305, USA.
⁶ National Center for Monitoring and Early Warning of Natural Disasters - CEMADEN, São José dos Campos, SP, Brazil.

L.G. Domingues^{2,3}



L.S. Basso²



L.V. Gatti^{2,3}



L. Marani²



G. Tejada²



S.P. Crispim²



R.A.L. Neves²



C.S.C. Correia^{2,3}



E. Arai¹



M. Gloor⁴



J.B. Miller⁵



L.O. Anderson⁶



L.E.C. Aragão¹



Funding/support:



BACKGROUND

- Recent **droughts** have **increased** the magnitude and frequency of the **forest fires** in the **Amazon**;
- **Amazon** has become a **Carbon source** due to the rising of the Carbon emission from **biomass burned** in the **El Niño** events.

HYPOTHESIS

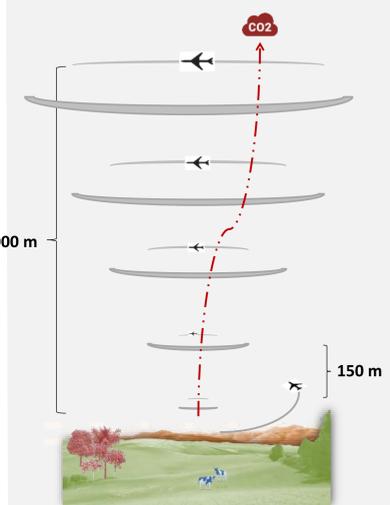
- **Amazon** will become a **Carbon source** even in **non-droughts years**, due to the increase of forest fires.

OBJECTIVE

- Estimate the **gross Carbon emission** from **forest fires**;
- Estimate the increase in **biomass burning** face to **climate change** scenario.

METHODS

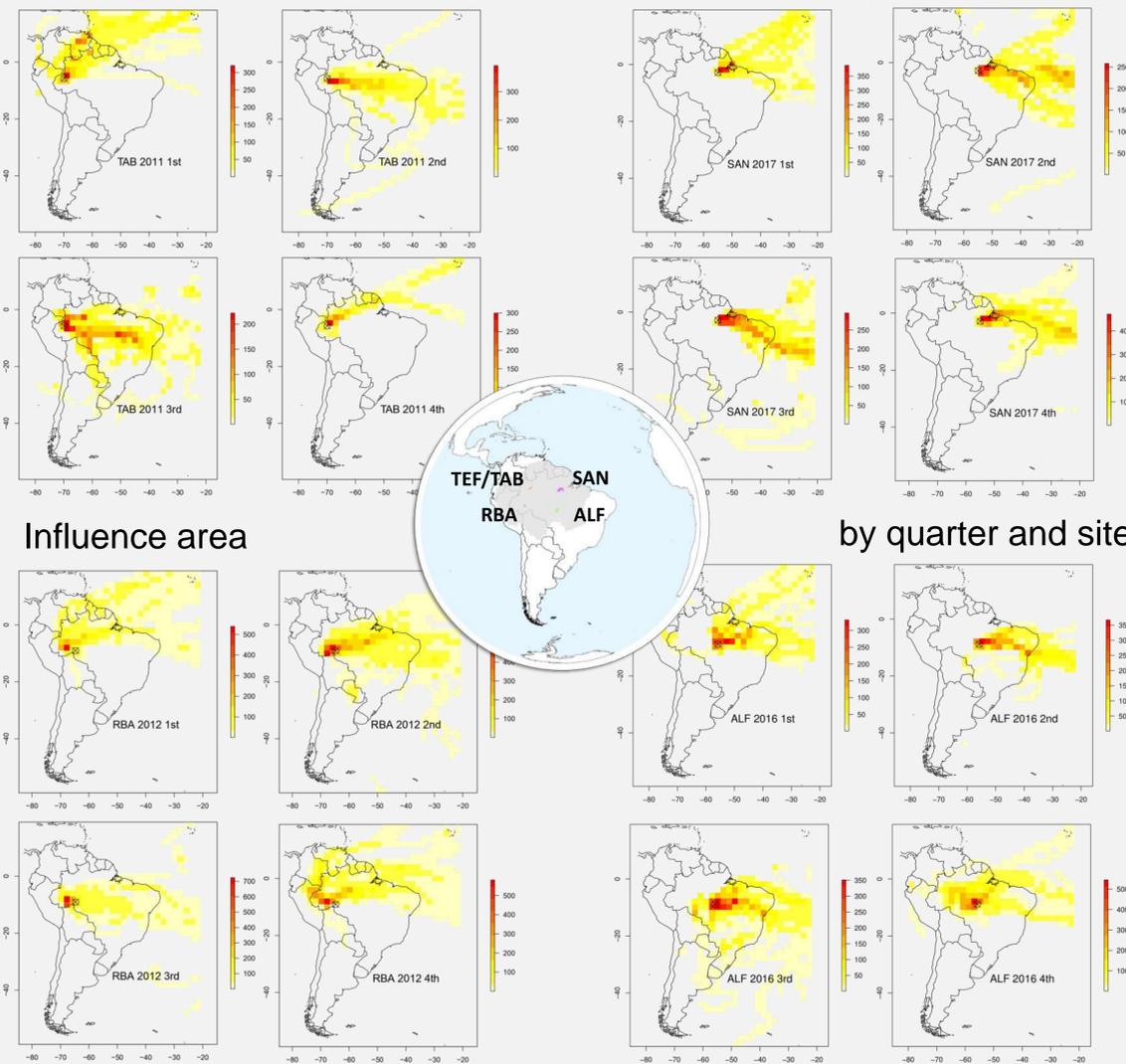
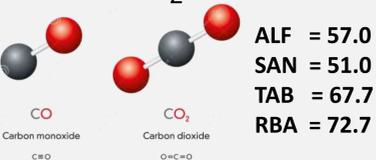
Atmospheric profiles



Back trajectories (Hysplit - NOAA)



CO/CO₂ Ratio



Data:

- Fire: Fire counts (INPE, 2019);
- Temperature: ERA Interim 2.0 (ECMWF, 2019);
- Precipitation: GPCP 1.3 (Huffman et al. 2001)

RESULTS

Amazon Fire emission:

$$C = 0.38 \pm 0.086 \text{ Pg.C.yr}^{-1}$$

Western

Eastern

40% less
Fire counts

400% higher
C Fire emission

Eva & Huber, 2005

Partial Correlation (ρ)	C Fire	Fire Counts	Temperature	Precipitation
C Fire		0.55-0.83	0.21-0.72	-(0.16-0.25)
Fire Counts	0.55-0.83		0.62-0.82	-(0.31-0.51)
Temperature	0.21-0.72	0.62-0.82		-(0.16-0.79)
Precipitation	-(0.16-0.25)	-(0.31-0.51)	-(0.16-0.79)	

CONCLUSION

- There are markedly **divergences** in the **Fire emissions** across Amazon.
- The **Eastern** has **60% more Fire counts** and represents of **4 times higher Carbon emission**;
- Increase of **1°C** << **13600 fire counts**; reduction of **100 mm** << **315 fire counts**.
- **C Fire emissions** balance: + **1.27 Pg.C.yr⁻¹** by **1°C** increase & + **0.2 Pg.C.yr⁻¹** by **100 mm** of precipitation reduction.

