Team Roo

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Hypothesis

H_o Deforestation in Brazil has no effect on the average yearly rainfall in the area of deforestation.

H_A Deforestation in Brazil affects the average yearly rainfall in the area of deforestation.

Introduction

Why we chose this topic?

All members have an interest in environment preservation.

General curiosity around deforestation & impacts on Amazon rainforest.

Questions to Ask

Are deforestation rates increasing or decreasing?

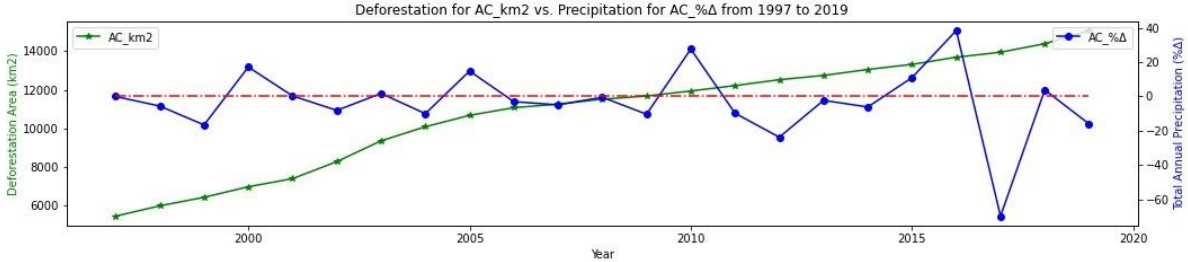
Are there certain years we see rises/falls in deforestation/precipitation rates?

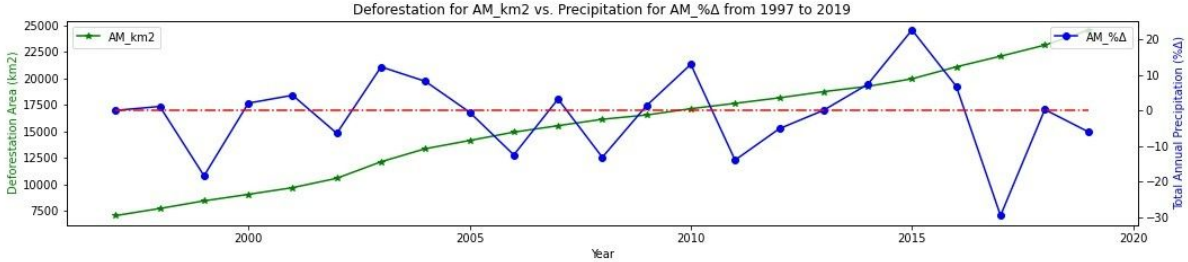
Does deforestation and rainfall have a correlation?

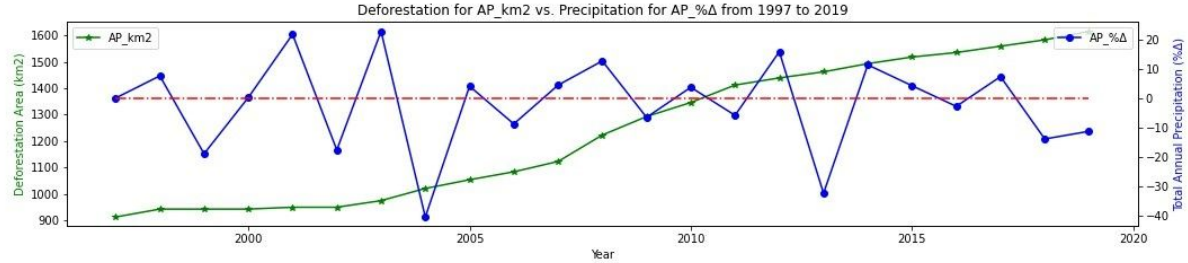
Data Exploration & Cleaning

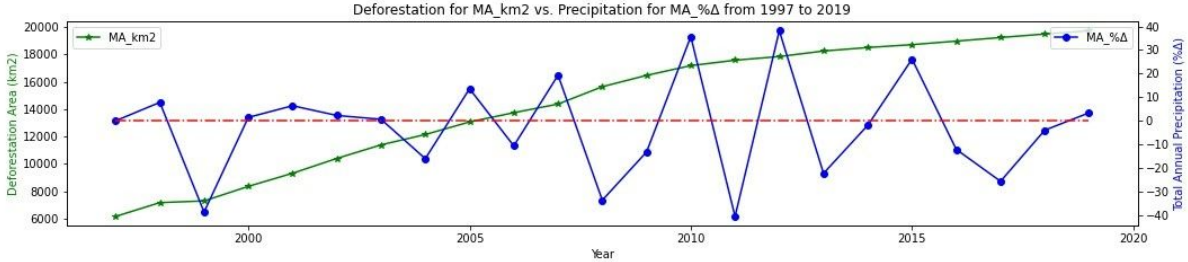
- Brazil historical rainfall data - Kaggle API
  - Read CSVs, rename columns, merge two files by weather station information to match station with state and to isolate precipitation data. Reduced a data set of over 12 million data points down to 750. Plot the data from 1997 - 2019 by dropping state & years with incomplete data, get totals, save to cleaned/useable CSVs.

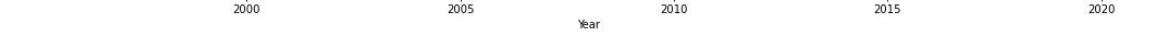
- Brazil historical deforestation data - TerraBrasilis
  - Read CSV, rename columns, dropping state & years with incomplete data, get totals, create new dataframe & save cleaned/useable CSV.

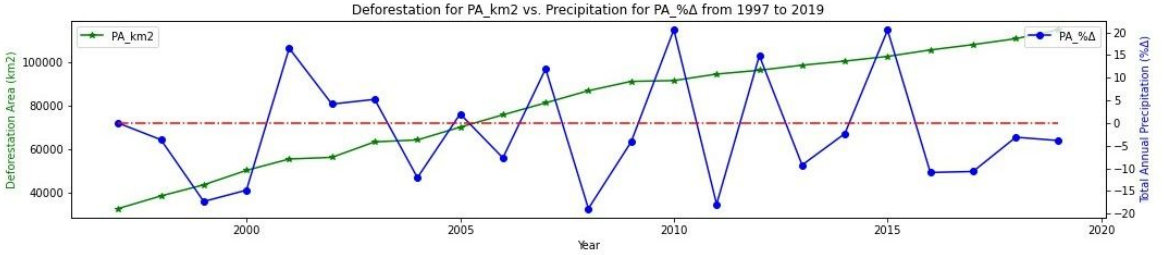

Deforestation for AC_km2 vs. Precipitation for AC_%Δ from 1997 to 2019
AC_km2
AC_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year

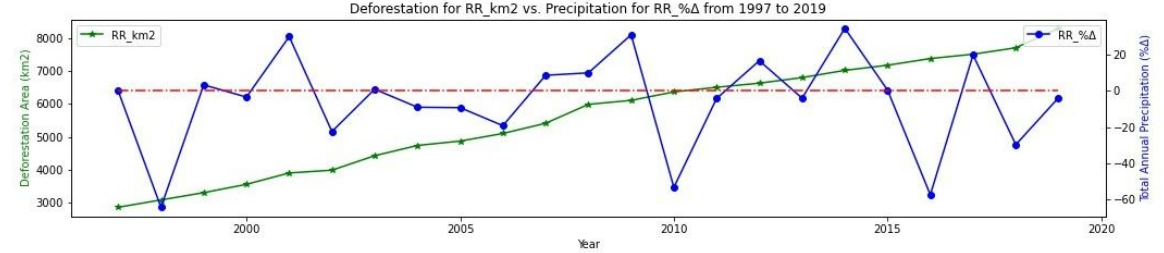

Deforestation for AM_km2 vs. Precipitation for AM_%Δ from 1997 to 2019
AM_km2
AM_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year

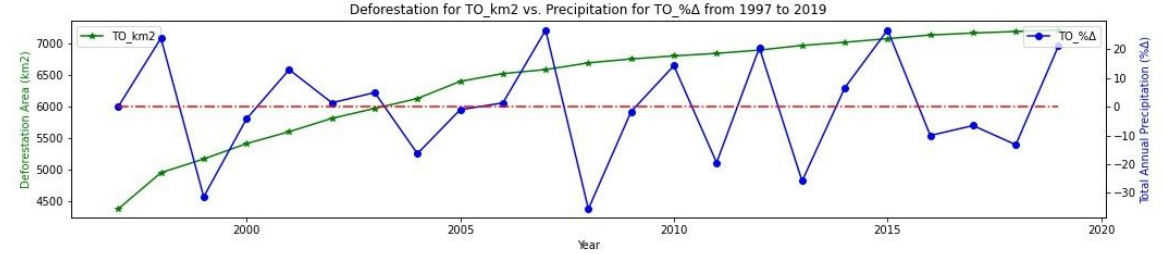

Deforestation for AP_km2 vs. Precipitation for AP_%Δ from 1997 to 2019
AP_km2
AP_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year

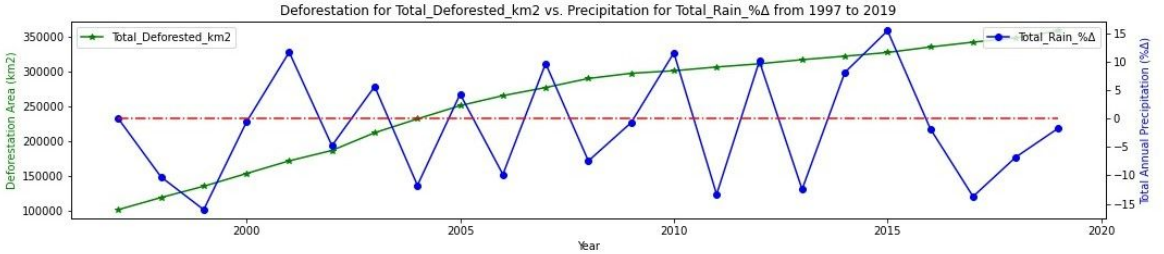

Deforestation for MA_km2 vs. Precipitation for MA_%Δ from 1997 to 2019
MA_km2
MA_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year

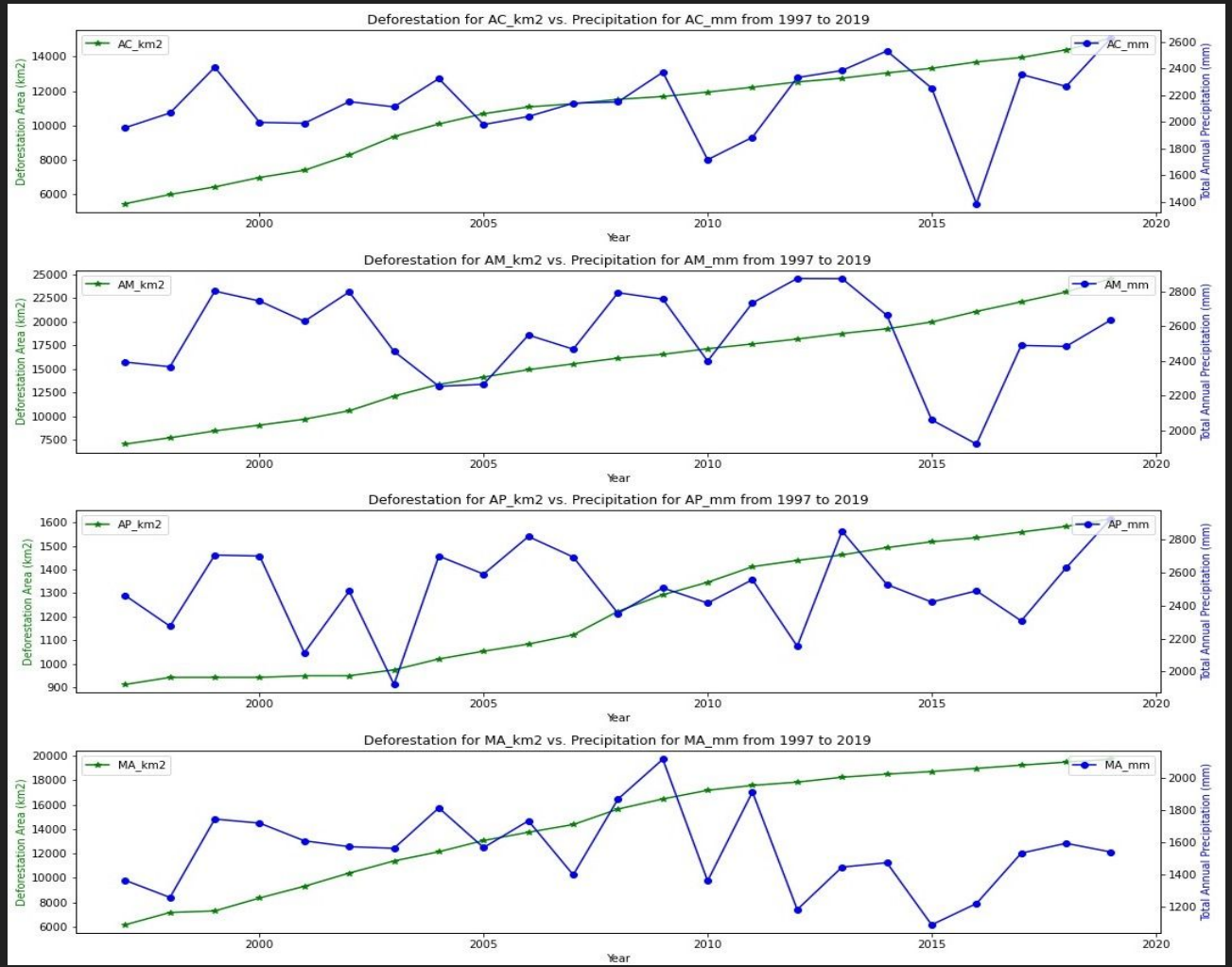

2000
2005
2010
2015
2020
Year

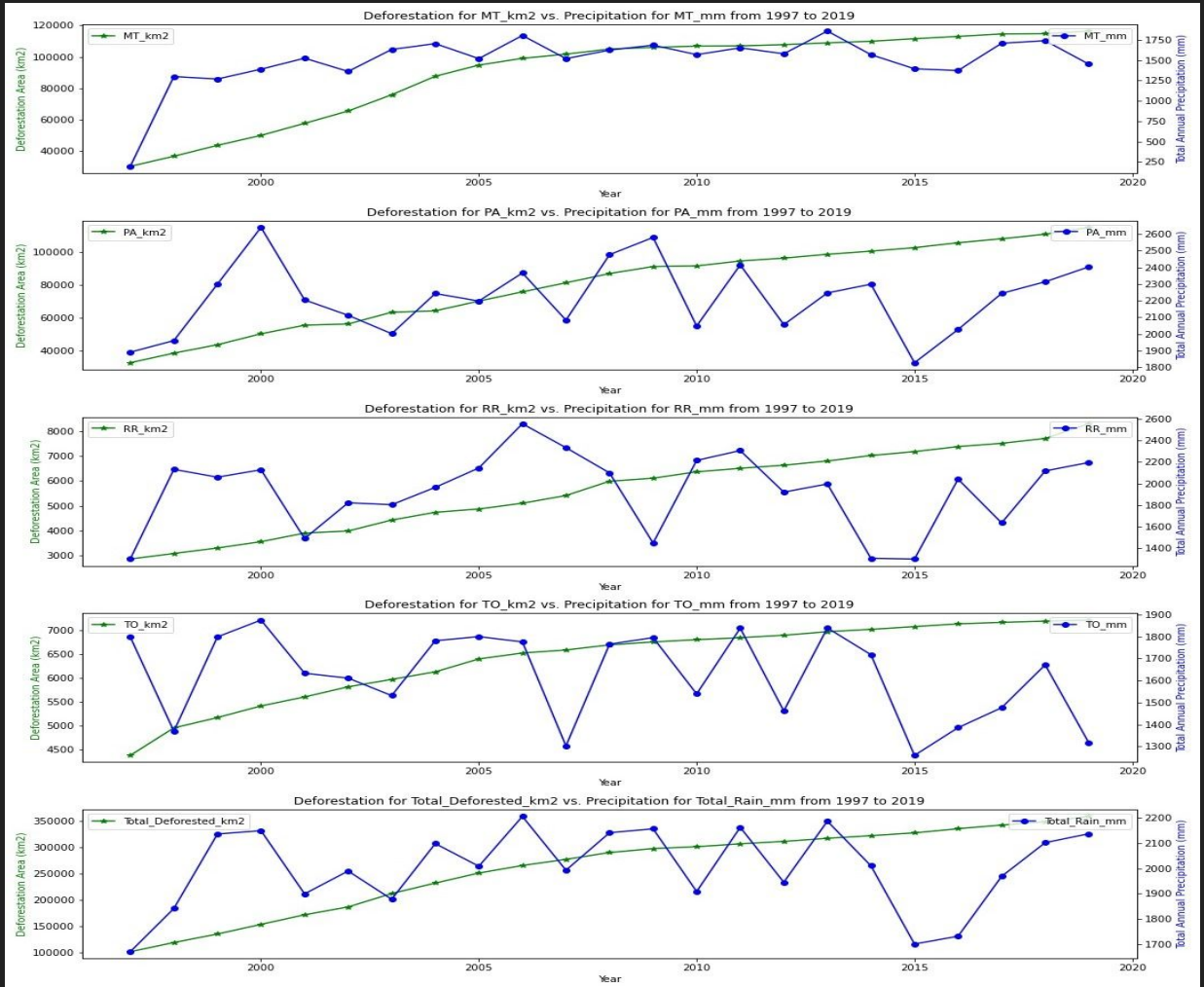

Deforestation for PA_km2 vs. Precipitation for PA_%Δ from 1997 to 2019
PA_km2
PA_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year


Deforestation for RR_km2 vs. Precipitation for RR_%Δ from 1997 to 2019
RR_km2
RR_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year


Deforestation for TO_km2 vs. Precipitation for TO_%Δ from 1997 to 2019
TO_km2
TO_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year


Deforestation for Total_Deforested_km2 vs. Precipitation for Total_Rain_%Δ from 1997 to 2019
Total_Deforested_km2
Total_Rain_%Δ
Deforestation Area (km2)
Total Annual Precipitation (%Δ)
Year


Deforestation for AC_km2 vs. Precipitation for AC_mm from 1997 to 2019
AC_km2
AC_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year
Deforestation for AM_km2 vs. Precipitation for AM_mm from 1997 to 2019
AM_km2
AM_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year
Deforestation for AP_km2 vs. Precipitation for AP_mm from 1997 to 2019
AP_km2
AP_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year
Deforestation for MA_km2 vs. Precipitation for MA_mm from 1997 to 2019
MA_km2
MA_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year


Deforestation for MT_km2 vs. Precipitation for MT_mm from 1997 to 2019
MT_km2
MT_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year
Deforestation for PA_km2 vs. Precipitation for PA_mm from 1997 to 2019
PA_km2
PA_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year
Deforestation for RR_km2 vs. Precipitation for RR_mm from 1997 to 2019
RR_km2
RR_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year
Deforestation for TO_km2 vs. Precipitation for TO_mm from 1997 to 2019
TO_km2
TO_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year
Deforestation for Total_Deforested_km2 vs. Precipitation for Total_Rain_mm from 1997 to 2019
Total_Deforested_km2
Total_Rain_mm
Deforestation Area (km2)
Total Annual Precipitation (mm)
Year

Conclusions

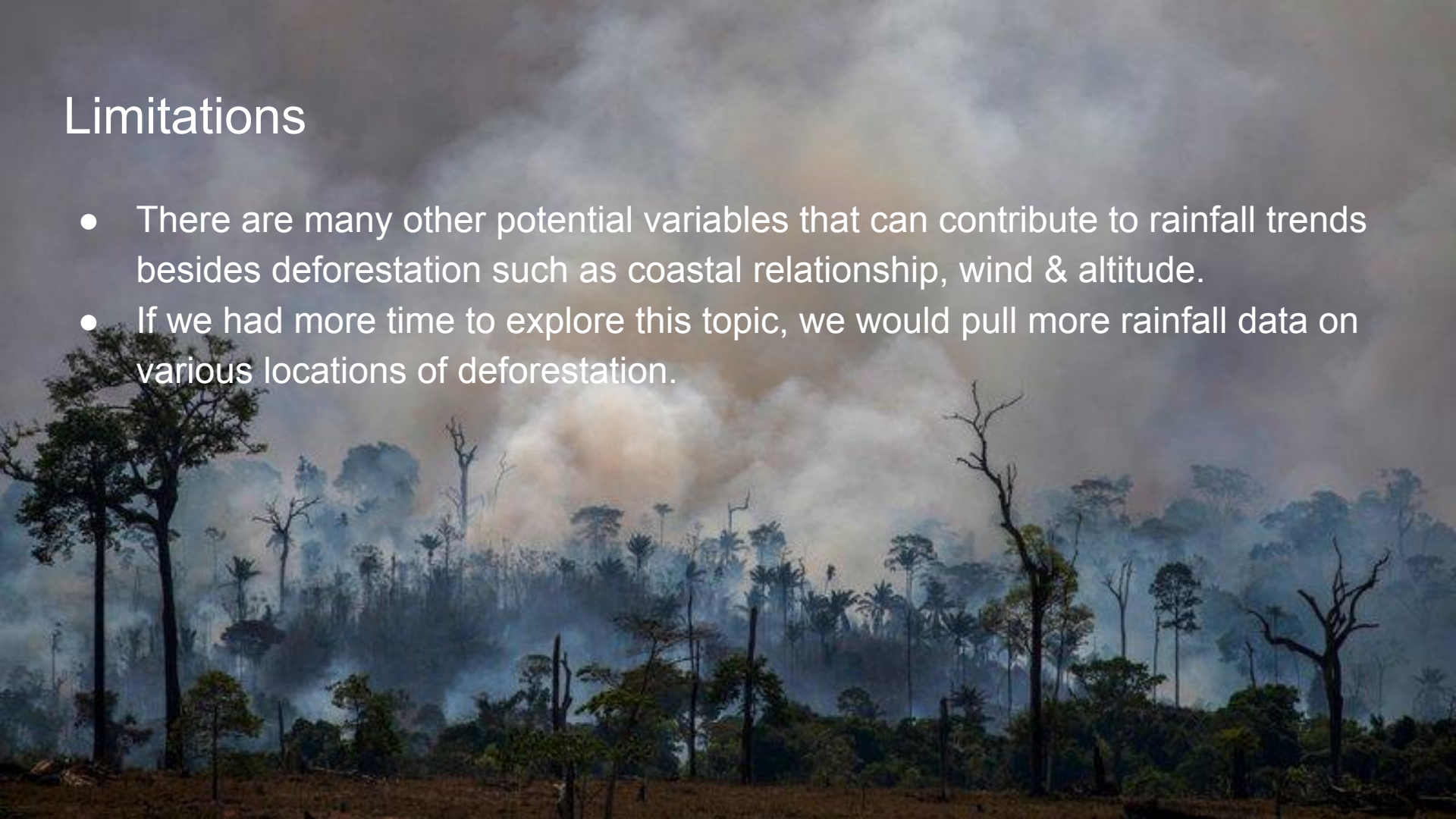
- With our current data findings, we can’t confirm whether or not there is any correlation between rainfall and deforestation.
- We did find that there is a trend in rainfall around 2015 across all states in Brazil.
- Since the chi square value of 281.74 exceeds the critical value of 33.92, we conclude that the results are statistically significant. We reject our null hypothesis.

Brazil	p_value	critical_value	chi_square_value
Total_Rain_mm	6.05E-47	33.92	281.74

State	p_value	critical_value	chi_square_value
AC_mm	1.47E-147	33.92	764.97
AM_mm	5.49E-106	33.92	567.57
AP_mm	3.27E-98	33.92	530.41
MA_mm	2.11E-174	33.92	891.65
MT_mm	0	33.92	1557.77
PA_mm	1.07E-80	33.92	446.32
RR_mm	8.57E-298	33.92	1469.86
TO_mm	1.24E-99	33.92	537.21
Total_Rain_mm	6.05E-47	33.92	281.74

Limitations

- There are many other potential variables that can contribute to rainfall trends besides deforestation such as coastal relationship, wind & altitude.
- If we had more time to explore this topic, we would pull more rainfall data on various locations of deforestation.



Challenges

- We worked with very large data files thus creating lots of issues with Git pushes.
- Our largest file had roughly 12 million rows of data.
- Had to create a new project repo using gitignore to exclude large files.
- We also had some merge conflicts with Github.

Q&A