[Speaker Zoom video]

Trends in fire regimes in South America

Liaoceratops Limbo Scherzando

Background and Aims

[Speaker Zoom video]

South America's **diverse ecosystems,** from dry tropical forests to wetlands, have seen a sharp rise in wildfires over recent decades, leading to **substantial economic** and **environmental damage**, impacting **water availability** (Hohner et al. 2019) and **indigenous communities**.

Fire regimes, characterised by frequency, size, pattern, and season are changing globally due to a multitude of factors:

- **Human Activities** & Deforestation
- **Intense droughts** due to climate change
- Natural causes due to **climate variability**, ENSO and AAO

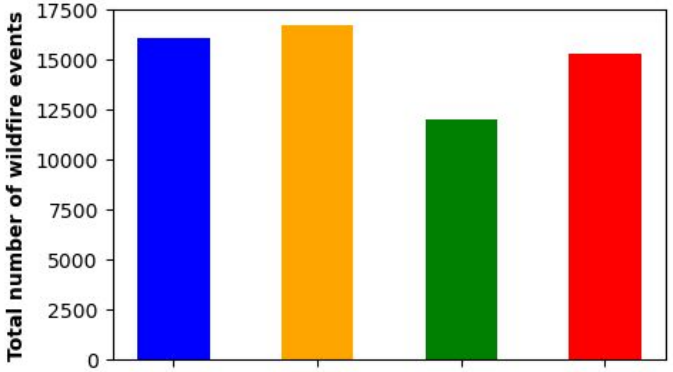
In this project we investigated the **changes in fire properties** such as distribution, seasonality and frequency across fire events over 1000 acres in **2005, 2010, 2015, 2020** to understand the contribution of all causes to these changes.

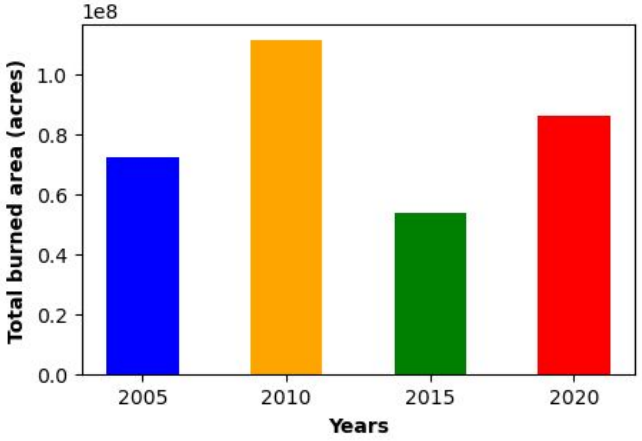
Our analysis relies on the **Climate Action Large Wildfire Dataset**, which uses the MODIS **burned area product** to ascertain the extent of the burnt area per event and Copernicus Global Land Cover Layers to add **landcover descriptions**.

Dry Chaco. Argentina - via Wikimedia Commons

Results: number and severity

[Speaker Zoom video]

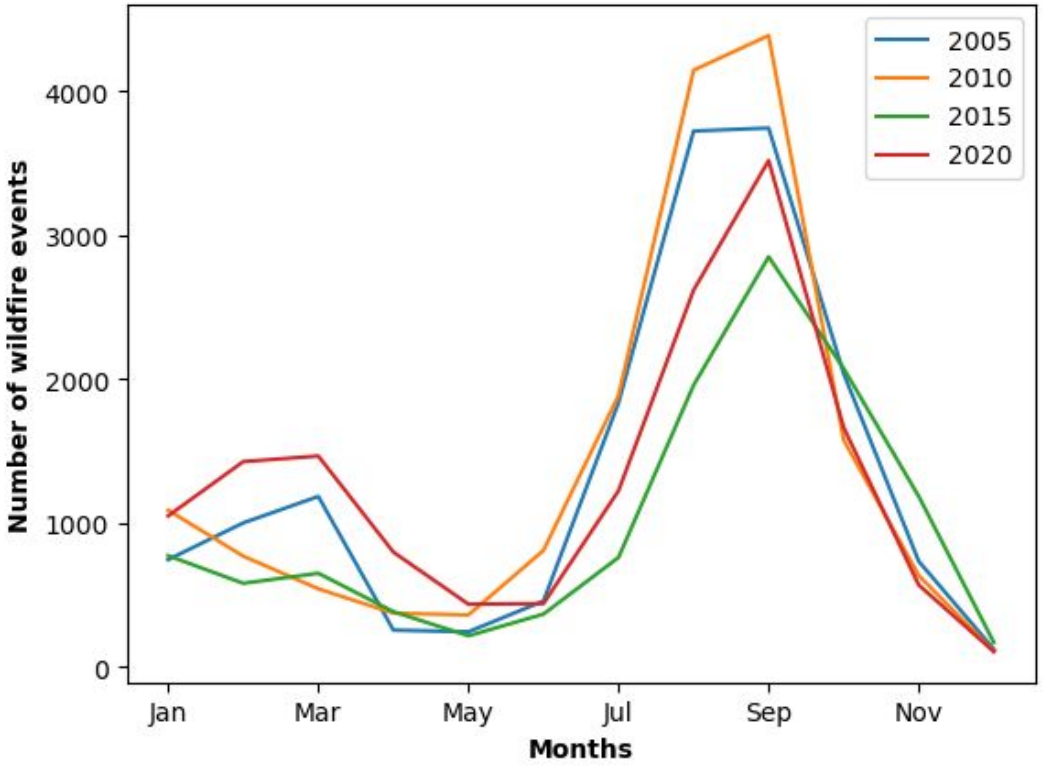




- Number of fires **fluctuates** without a specific trend
- 2005 fires were less severe than 2020 fires. The severity of 2020 wildfires can be explained by the COVID pandemic.
- 2015 had the lowest number of wildfires and burned area. This can be accounted by the start of the Integrated Fire Management program by Brazilian government in 2014. Moreover the negative anomaly of Antarctic oscillation enhances the activity of cyclonic system and intensifies precipitation (Silvestri & Vera, 2003).

Results: seasonality

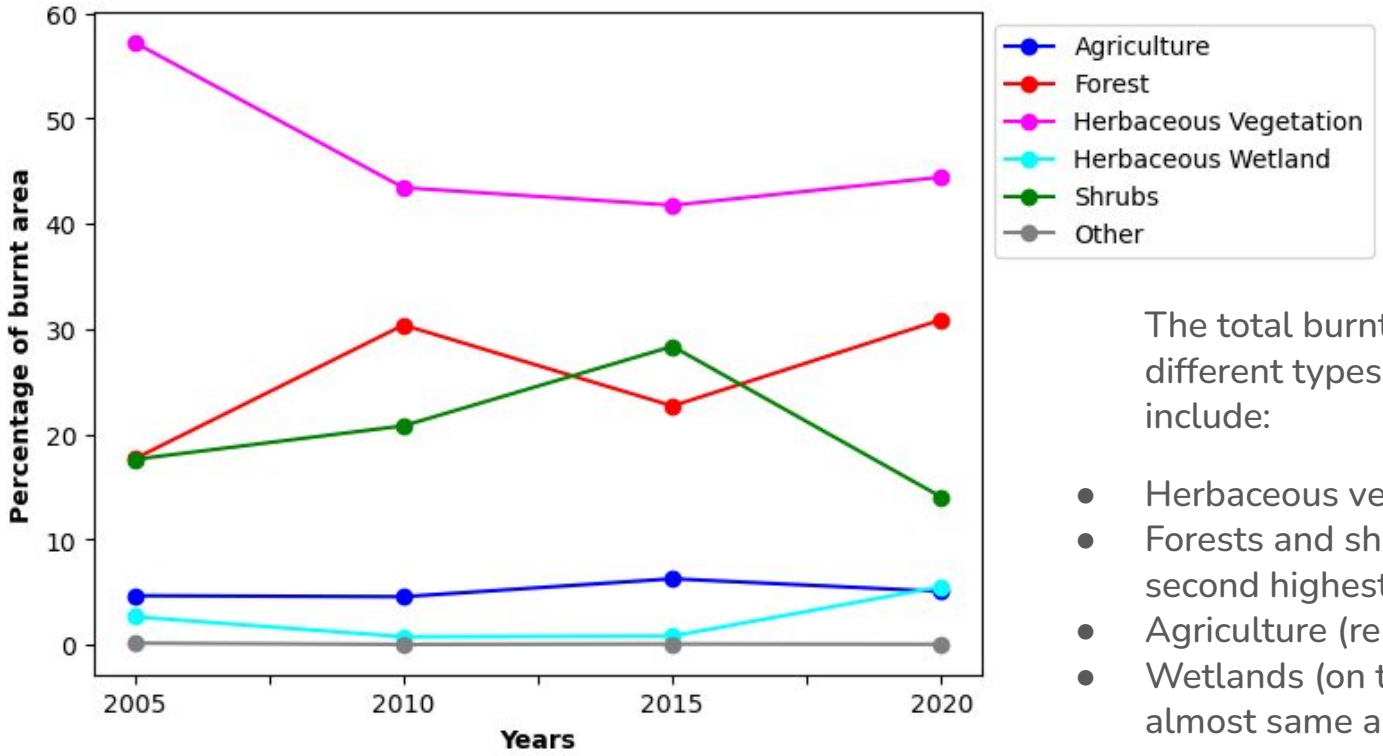
[Speaker Zoom video]



- Most wildfires occur from July to October and the dry season in most parts of South America is from July to September
- Number of wildfires also rises slightly from February to April

Results: landcover type factor

[Speaker Zoom video]

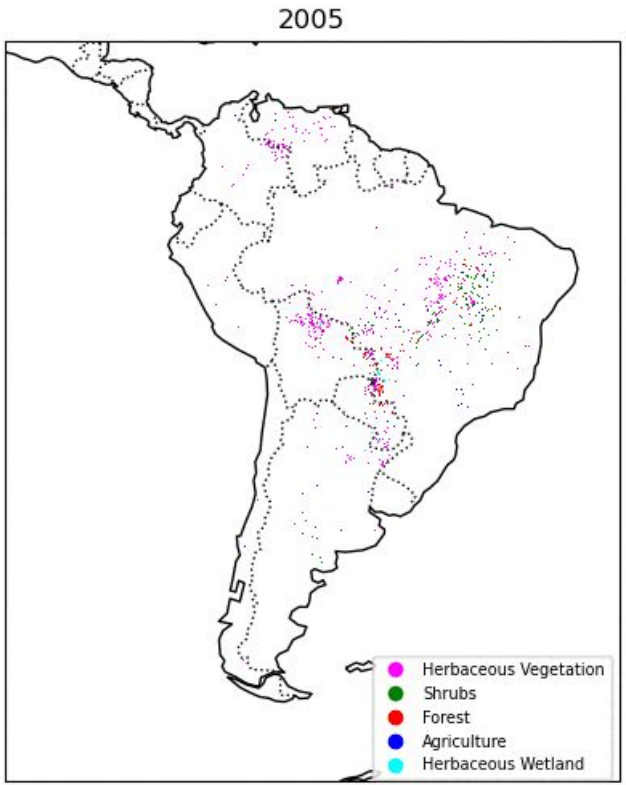


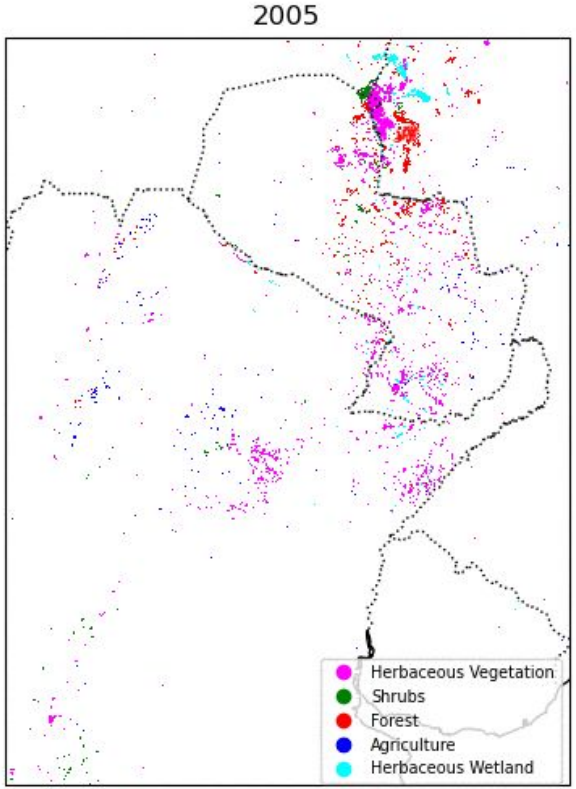
The total burnt area can be divided into different types. In descending order they include:

- Herbaceous vegetation
- Forests and shrubs (competing for the second highest percentage every year)
- Agriculture (remains stable)
- Wetlands (on the rise in 2020 burning almost same as agriculture fires)

Results: distribution

[Speaker Zoom video]





- Wildfires occur mostly in the central South America which is a transitional area between forests and croplands
- In Gran Chaco area there is a significant increase in wildfires in 2020 which can be attributed to deforestation
- Reburns are frequent

Wildfire distribution in relation to vegetation type in South America and Gran Chaco region

Preliminary conclusion

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- On the large scale main cause for wildfires are weather conditions. Those are influenced by both natural causes and climate change. Droughts lead to destructive fire-climate feedback loop.

- In some regions wildfire are caused directly by human activities, to a shift from eco-climatic to anthropogenic fire regime. Example: Gran Chaco suffers from deforestation associated with ranching and soybean production (Baumann et al. 2016, Fehlenberg et al. 2017) and experiences severe burns in 2020.

- Further research steps: investigation across all years, in-depth look into specific regions, estimation of the frequency of reburns