[Speaker Zoom video]

Impact of Albedo Changes due to Tropical Deforestation in Bolivia on Regional Meteorological Variables and Building a Model to Estimate GPP

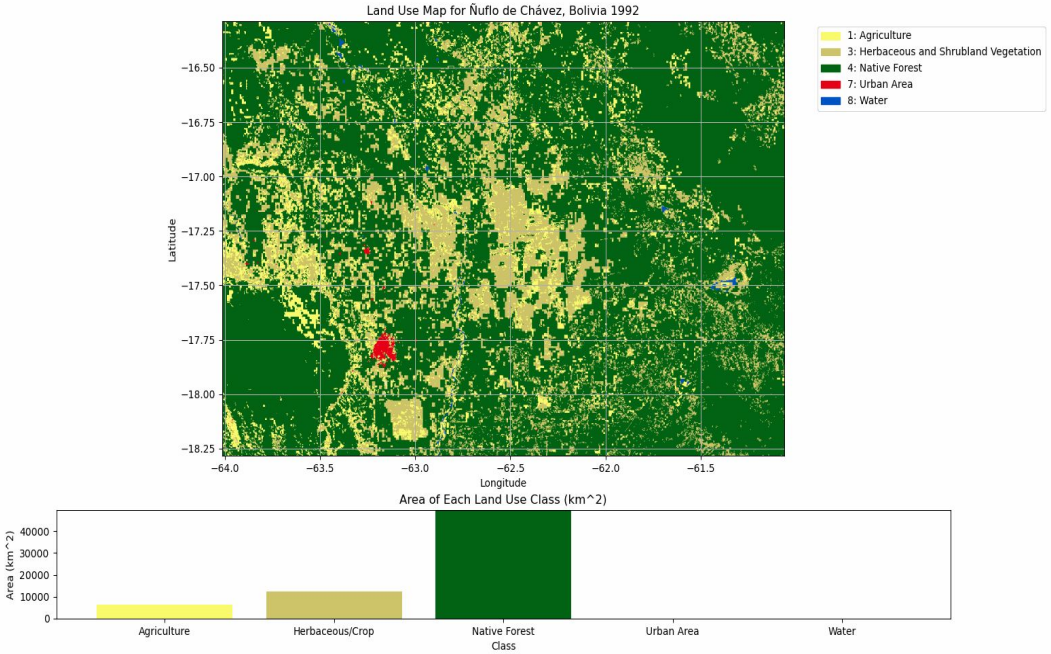
Gorgosaurus_Calypso_Adagio

Climatematch Academy

Introduction

[Speaker Zoom video]

Land cover/use change from 1992 to 2020 (ESA Climate Change Initiative)



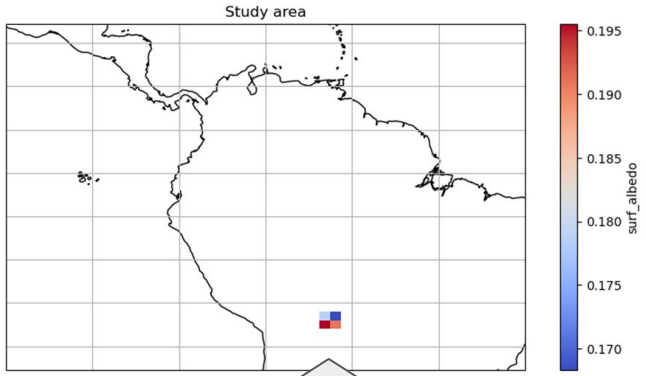
ESA Climate Change Initiative

Objective:

Investigate how albedo variation due to land cover changes from 1984 to 2014 affected mean surface temperature, carbon sequestration in the Bolivian Rainforest. Additionally, develop a model for estimating Gross Primary Productivity (GPP) to monitor and assess the health and productivity of the ecosystem.

Materials

[Speaker Zoom video]



CMIP6's variables:

- Land Area Percentage Tree, Grass, Pasture Covers
- Upwelling and downwelling shortwave radiation (albedo)
- Near-surface air temperature
- Carbon Mass Flux out of Atmosphere due to Gross and Net Primary Productions on Land (GPP and NPP)

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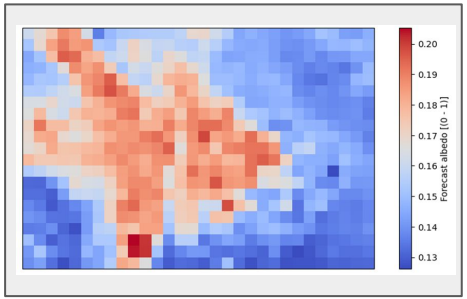
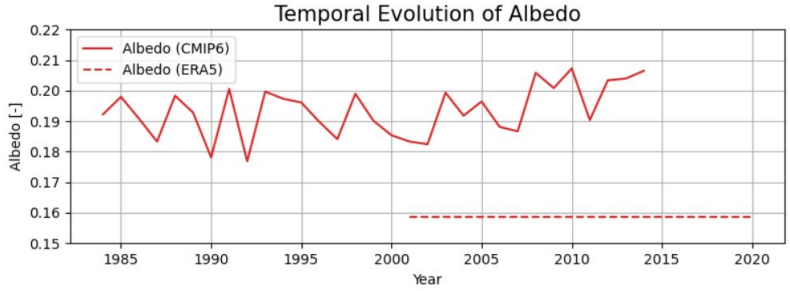
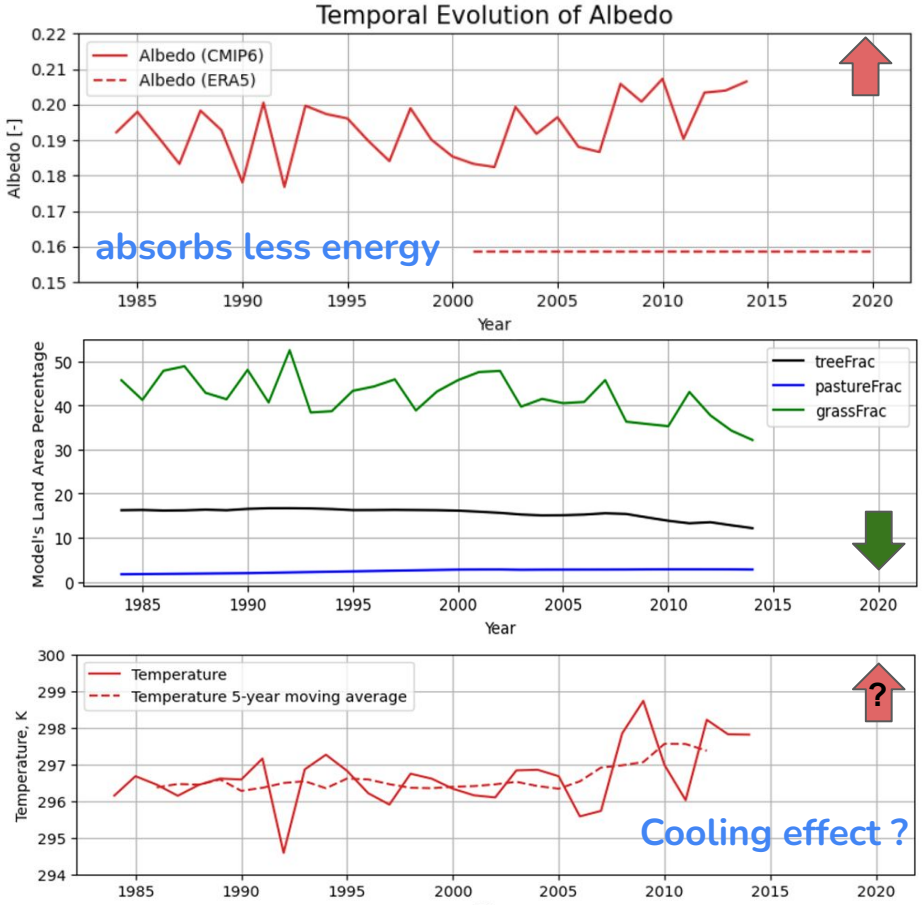




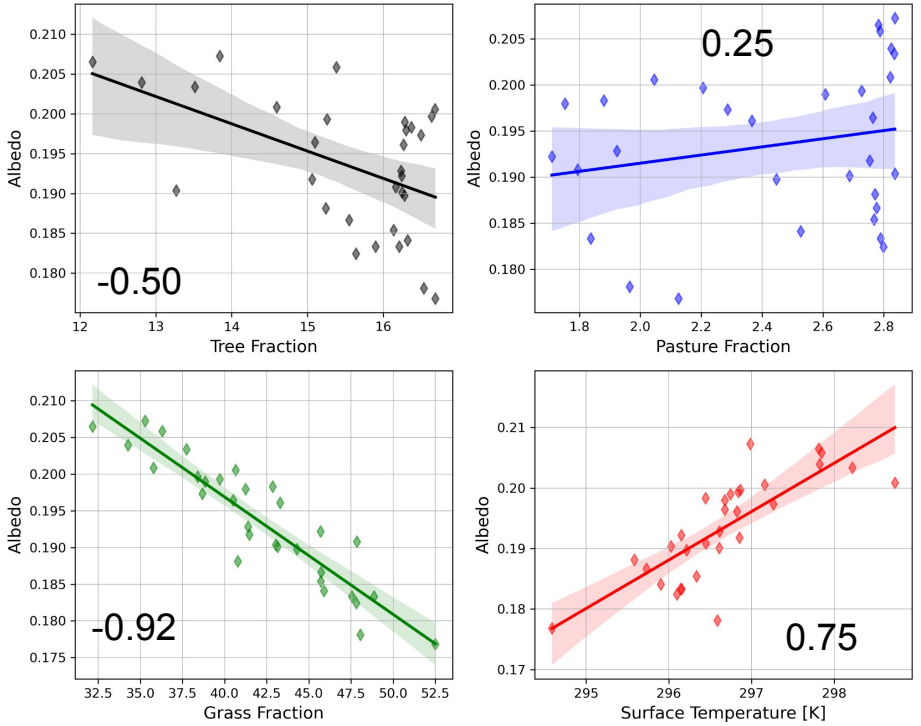
CMIP6 data (GFDL-ESM4 model)

ERA5 data

Albedo and Land cover changes



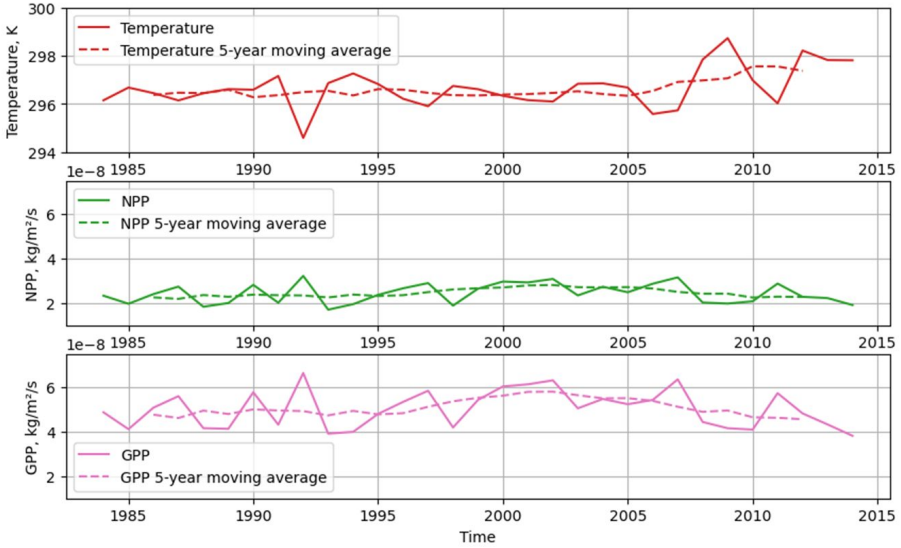
[Speaker Zoom video]

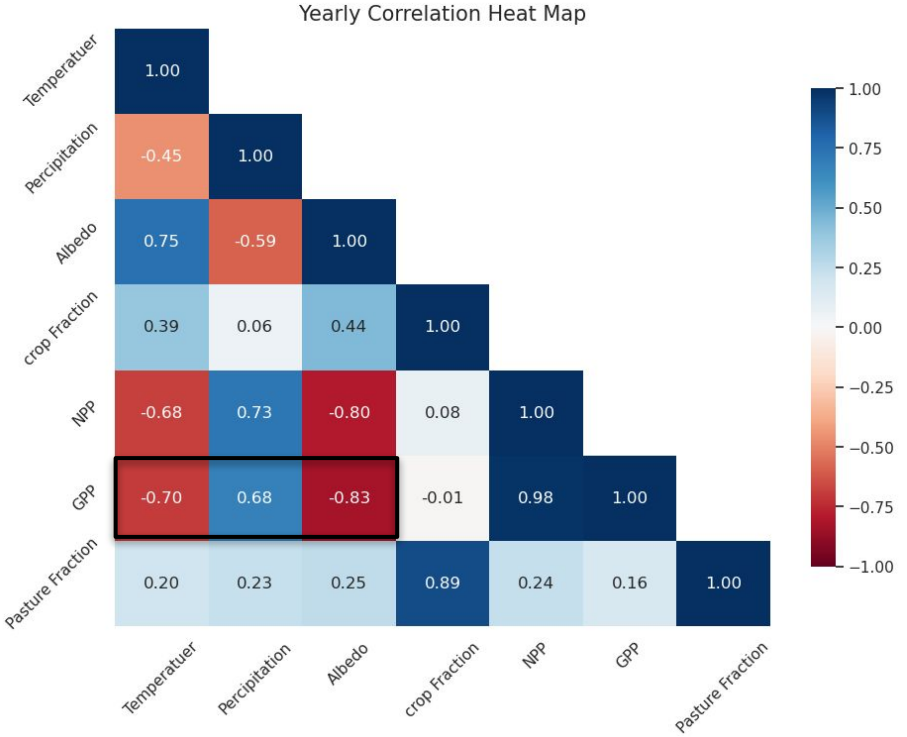


Near-surface air temperature and GPP

[Speaker Zoom video]

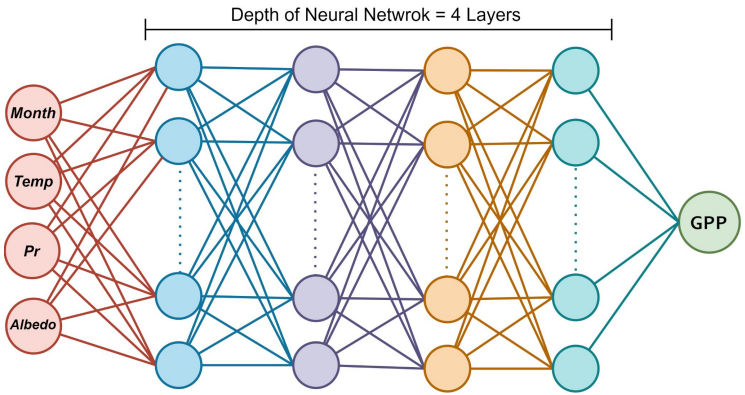
Temperature ~ ((1-albedo), GPP)

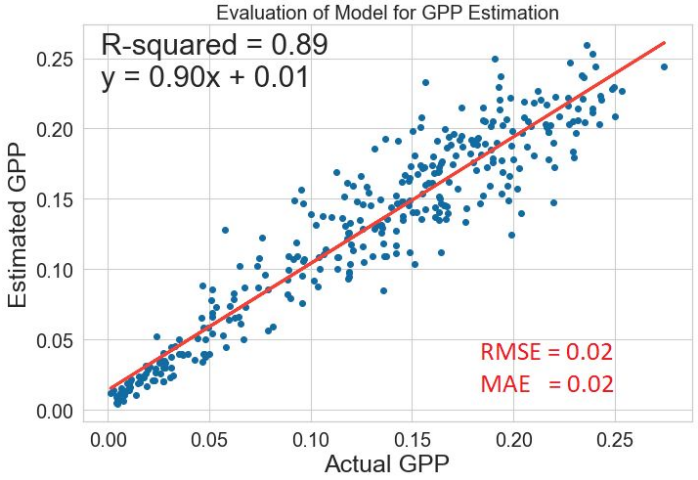


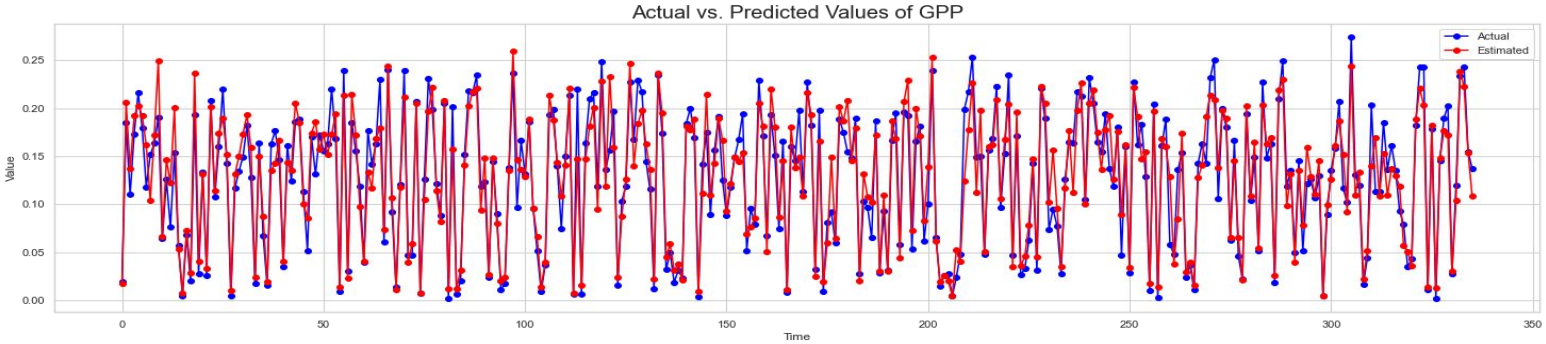


GPP Model - Results

[Speaker Zoom video]







Social and economic impacts

[Speaker Zoom video]

- Economic impact
  - Tourism
  - Economic dependency
- Social and political impacts
  - Indigenous communities and local population
  - Paris Accords (2015)
  - Government policies and enforcement

Conclusions

[Speaker Zoom video]

- There is a positive correlation between deforestation and albedo.
- However, changes in albedo and GPP don’t lead to decreasing annual averaged near-surface air temperatures. This result requires further study.
- Correctly assessing GPP is crucial to estimate future climate and can be produced not only with physical numerical models, but also with AI.

Team Members

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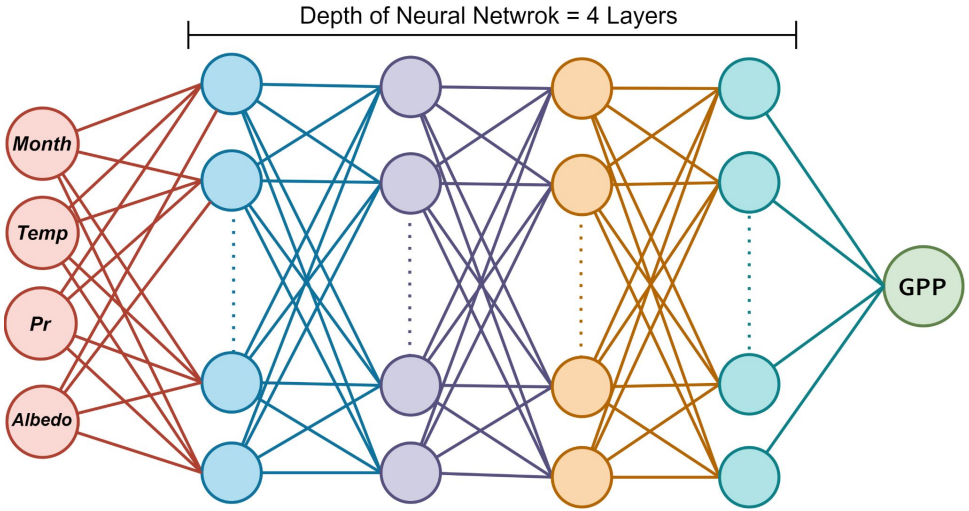
[Speaker Zoom video]

Thank you!!!

[Speaker Zoom video]

A Multilayer Perceptron (MLP)

[Speaker Zoom video]



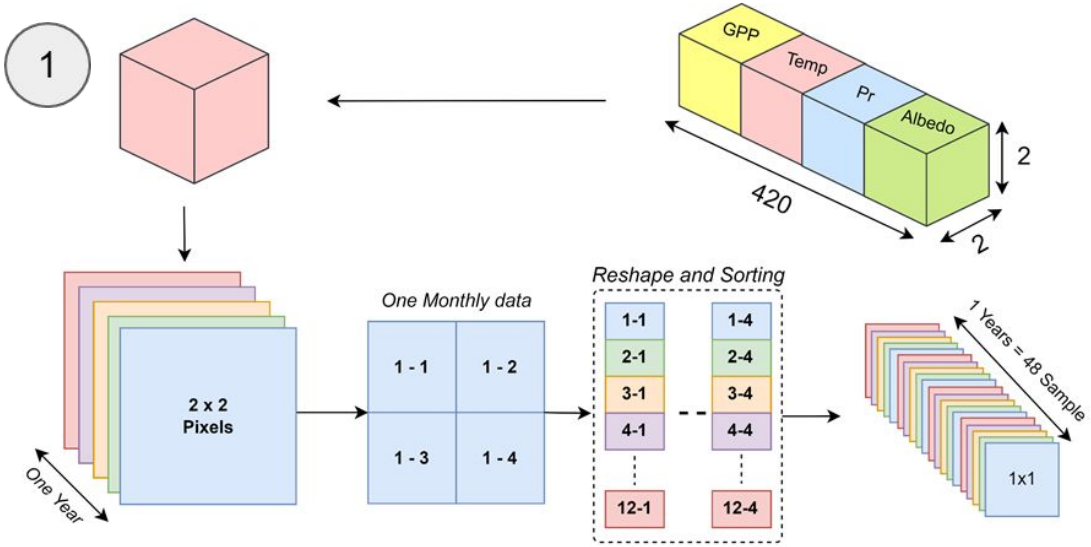
Network Architecutre	
Input Shape	4
Output Shape	1
Activation Function	ReLU
Number of Layers	4
Number of Nodes	516

Hyperparameters	
Optimization Algorithm	Adam
Learning Rate	0.001
Batch size	128
Epochs	200

Data Preprocessing

[Speaker Zoom video]

1. Data Reshape and Sorting
2. Define Input and output
3. Data Normalization (Min-Max)
4. Train, Validation and Test Split



2

Dataset Shape: (1680,5)	
Input	***Output***
1. Number of Month 2. Temperatuer 3. Percipitation 4. Albedo	GPP

3

Normalized Value, Orginal Value, Maximum Value of X

$$X_{norm} = \frac{X - min(X)}{max(X) - min(X)}$$

Maximum Value of X

4