



Characterization of deforestation patterns in Amazon

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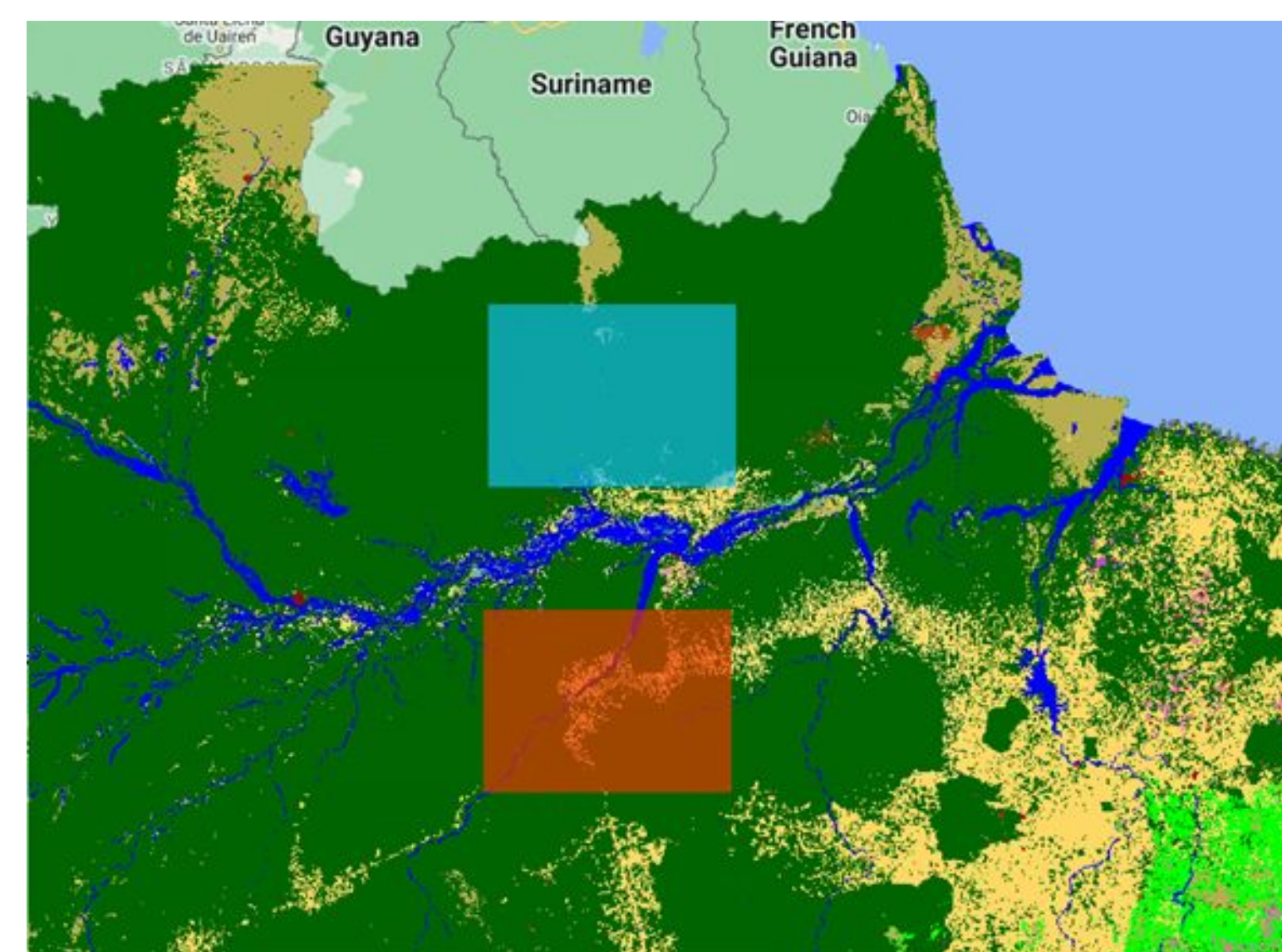
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MOTIVATION

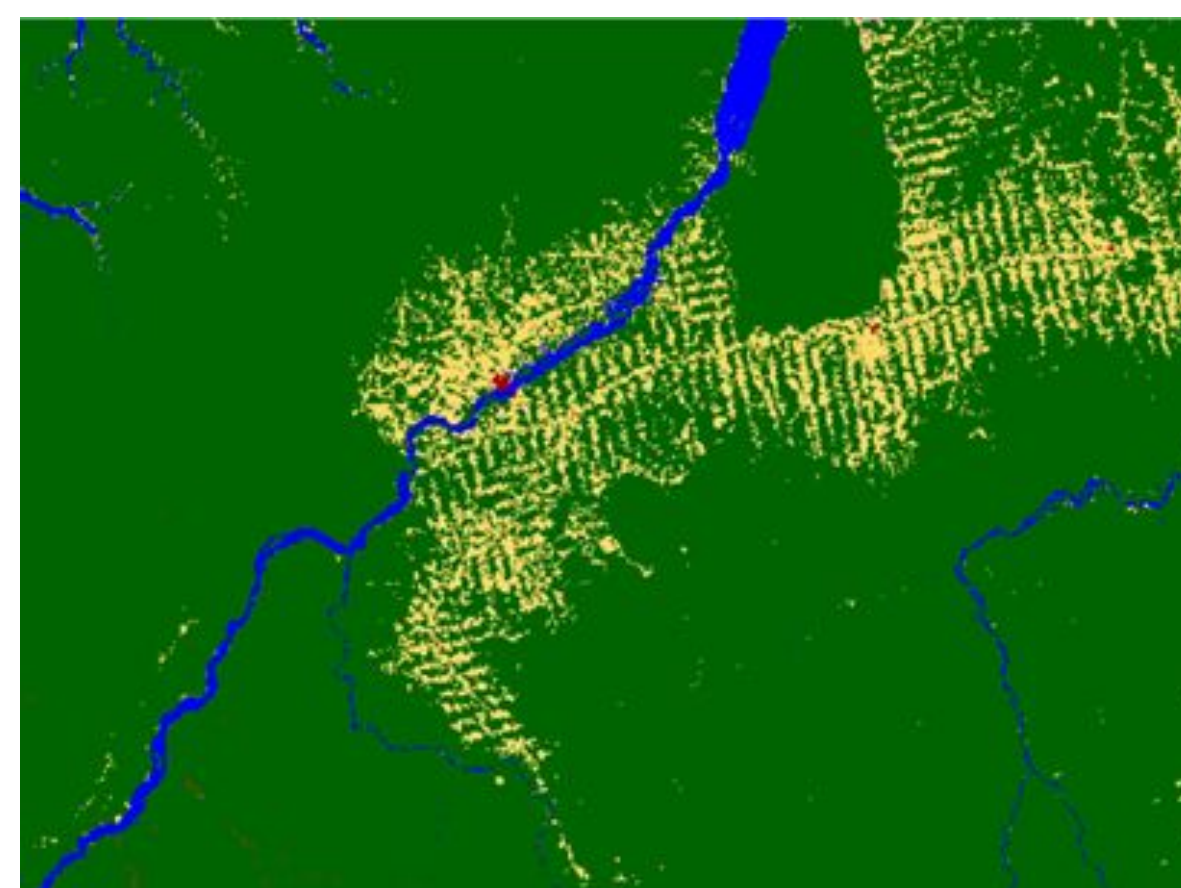
The objective of this work is to identify deforestation patterns using statistical and machine learning techniques. Inputs are yearly images of land use and land coverage (LULC) from MapBiomas platform.

Two regions of interest (ROIs) were selected with relatively low and high deforestation

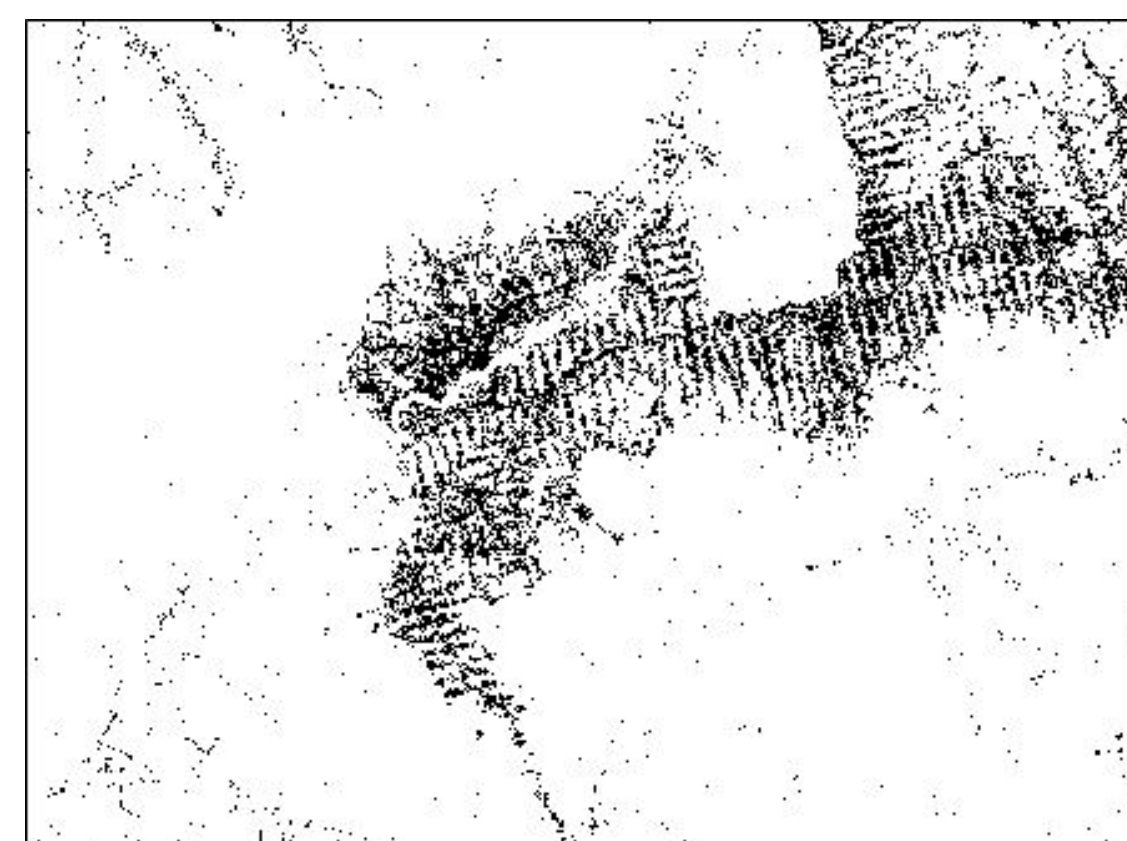


ROIs in the Amazon rainforest (blue and red rectangles) in 2020. Yellow shows deforestation areas. Resolution: 30 m / pixel Source: MapBiomas

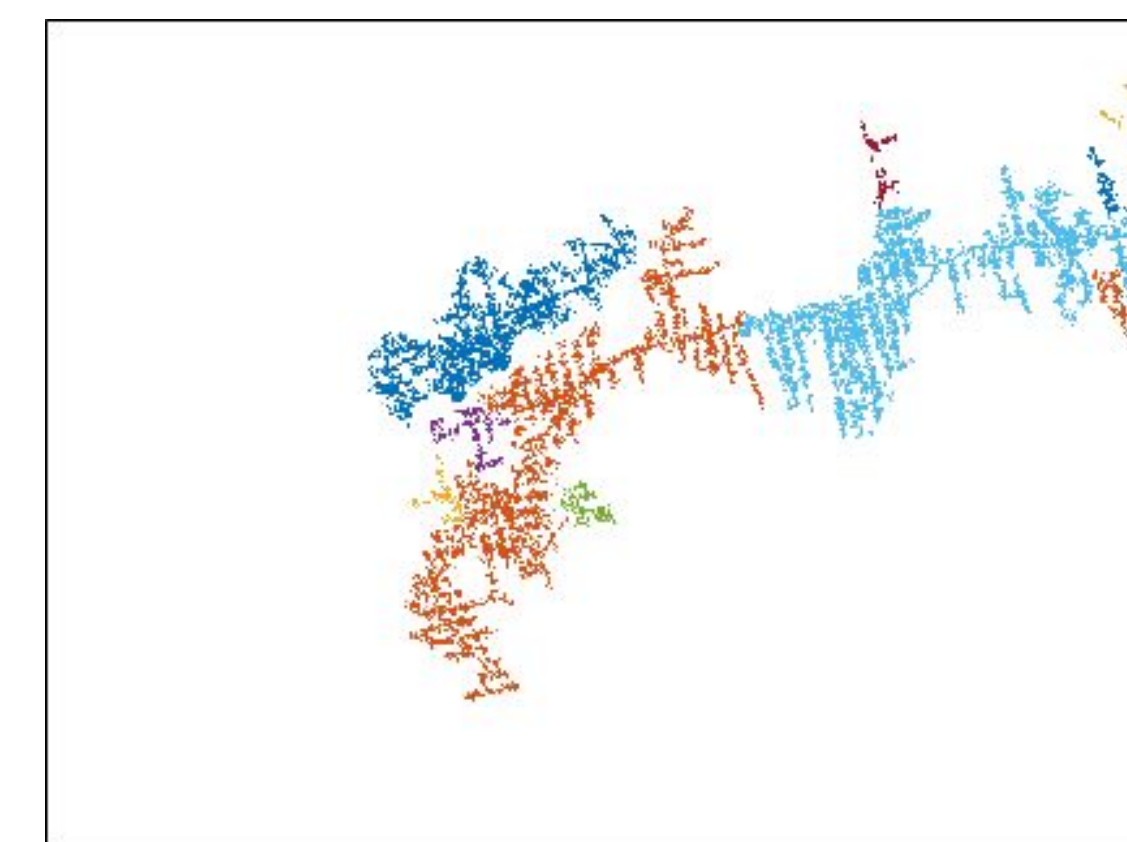
METHODOLOGY



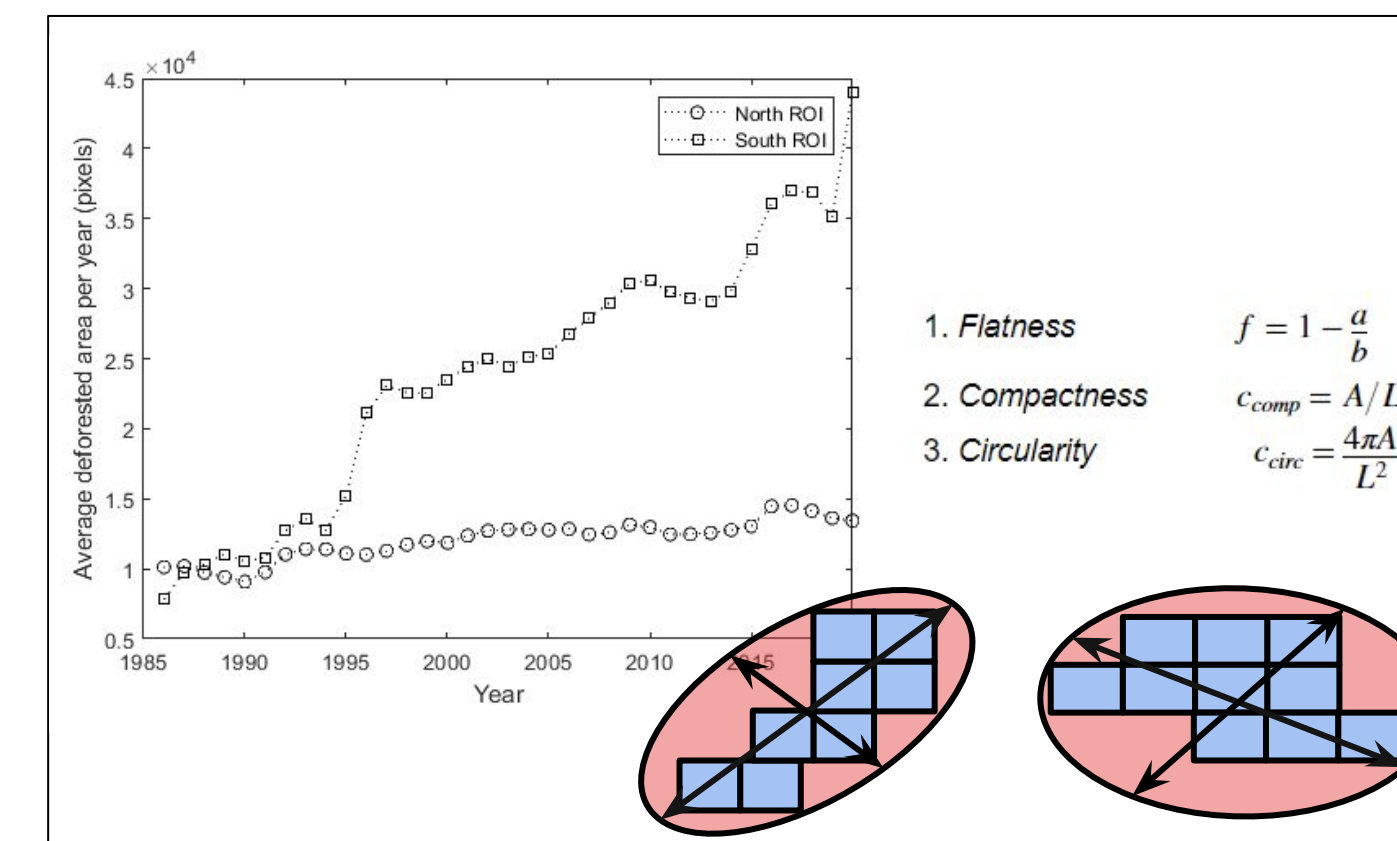
Step 1: select ROI and year



Step 2: binarize (deforestation = 1; else = 0) and filter (less than 20 pixels)



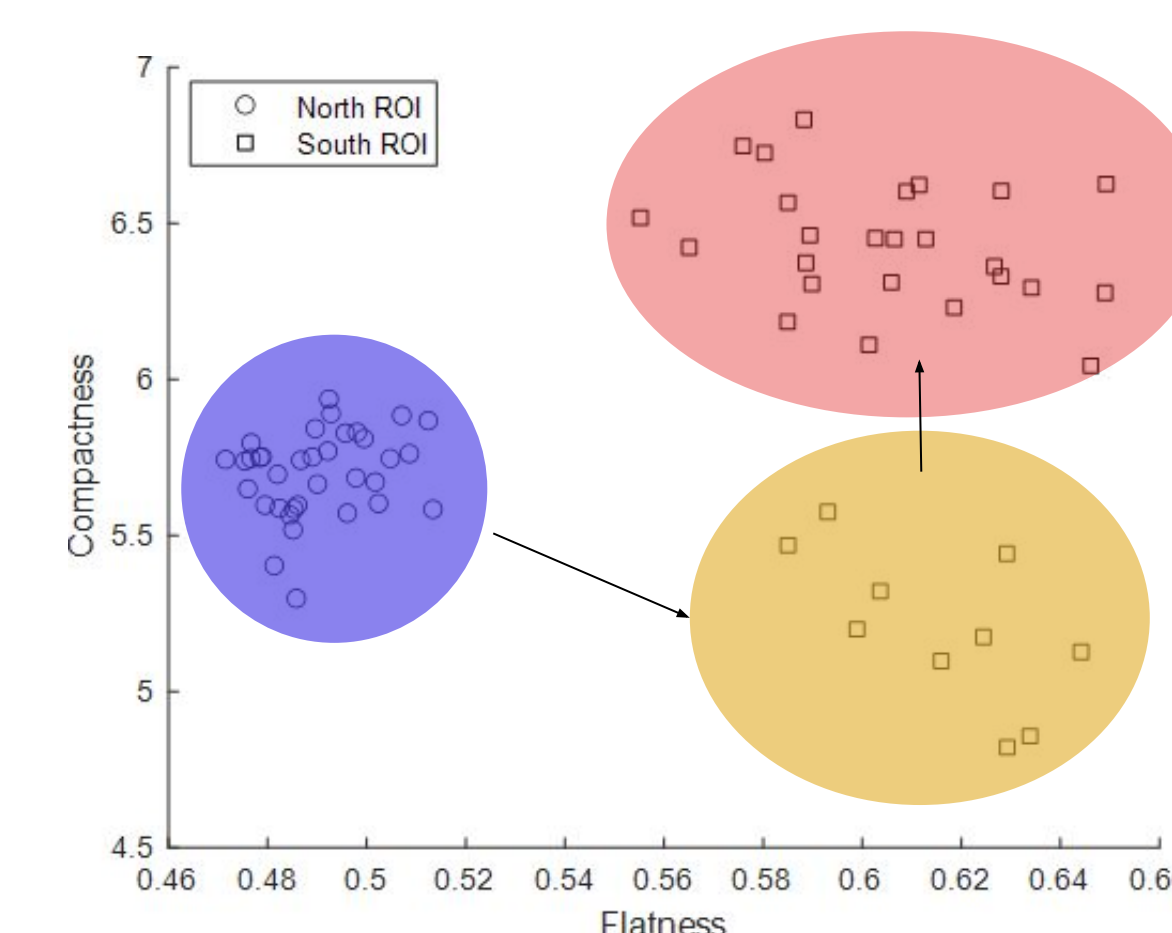
Step 3: Label deforested areas (shown top 10)



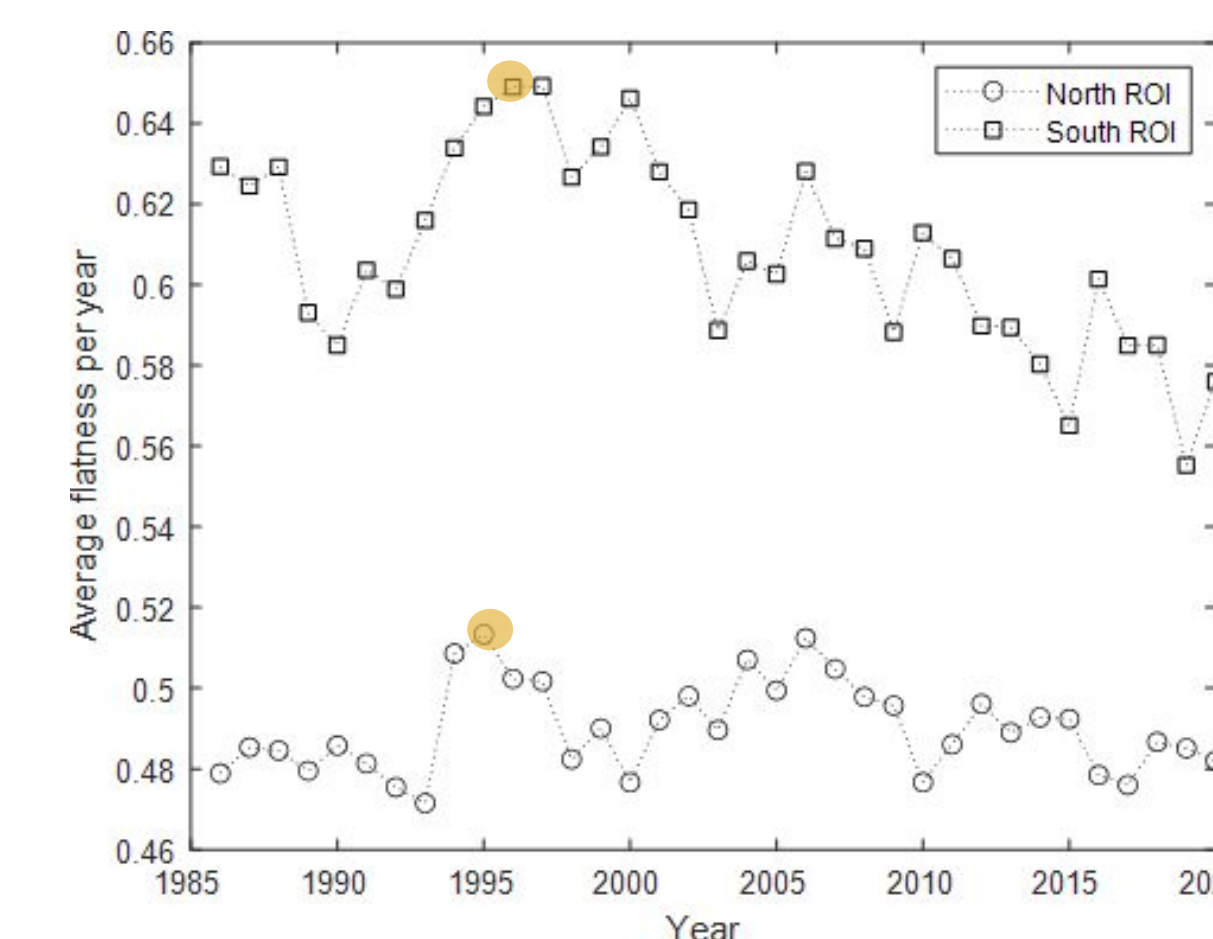
Step 4: Get metrics, statistics and time series for ROIs

PRELIMINARY RESULTS

Average of top 100 deforested areas in both ROIs

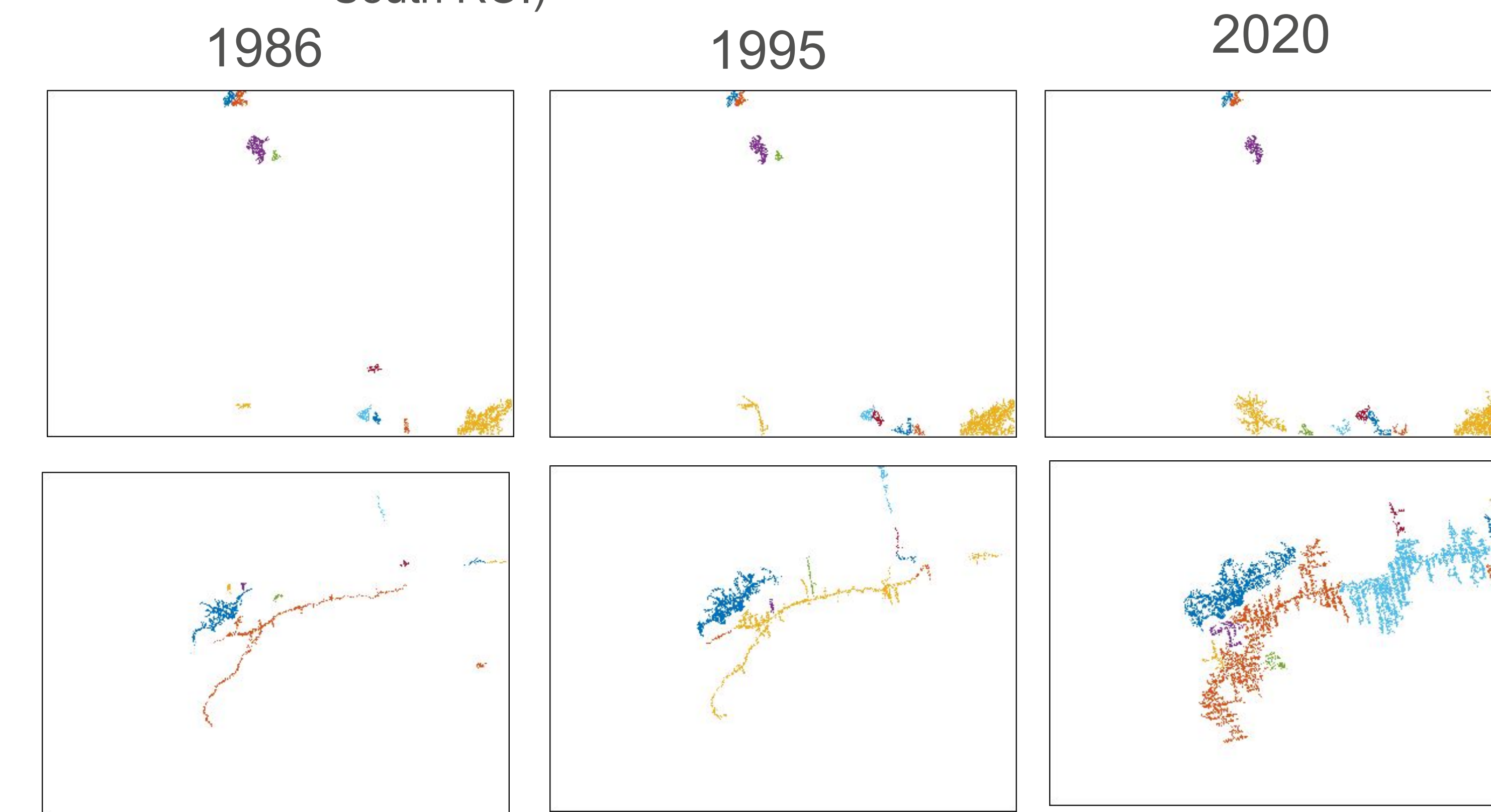


Features to feed deep learning (DL) model (clusters)



Fishbone deforested areas show higher flatness

Deforestation (Top panels North ROI; Bottom South ROI)



FUTURE ACTIVITIES

- Track the deforestation patterns along time and correlate with LULC
- Correlate multiple deforestation patterns using metrics (flatness, compactness etc.)
- Train a DL model using identified metrics
- Use the trained model to forecast deforestation and use as input to Earth System Model - CESM

References:

[1] MapBiomas: <https://plataforma.brasil.mapbiomas.org/>. Accessed on 13-Sep-22

[2] Castleman, K. R. (1996). *Digital image processing*. Prentice Hall Press

[3] Ball, J. G. C., Petrova, K., Coomes, D., & Flaxman, S. (2021). *Using deep convolutional neural networks to forecast spatial patterns of Amazonian deforestation*. bioRxiv., <https://doi.org/10.1101/2021.12.14.472442>. Accessed on 13-Sep-22

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