FLATIRON SCHOOL

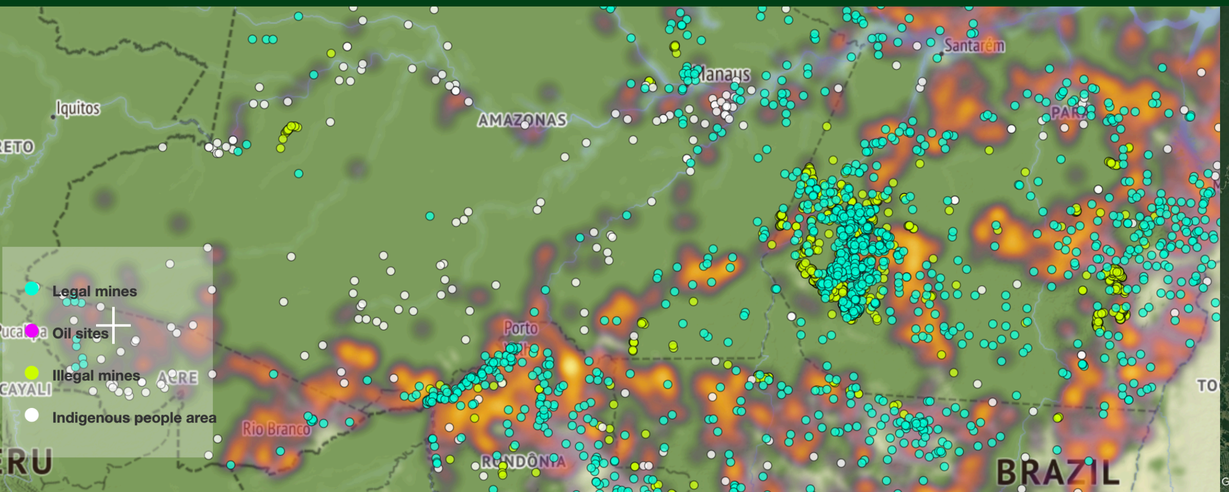
Data Science

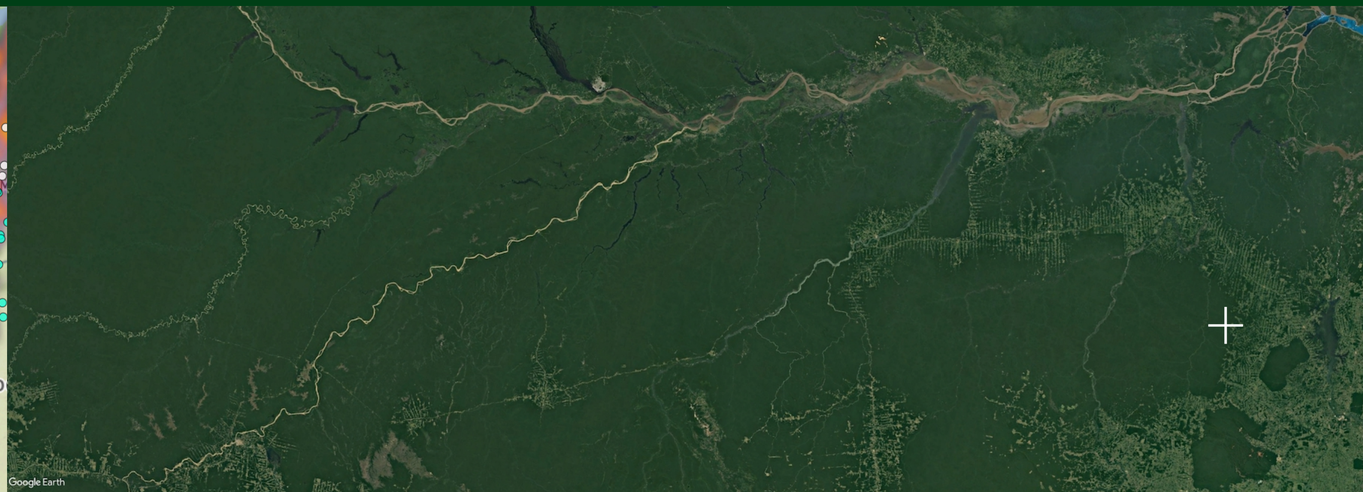
Module 4 Project

Marco Nasuto - 2021

deepAmazon

How deep learning and satellite images can help tracking and planning a sustainable strategy for a region.





Business value

STRATEGIC SUSTAINABLE DEVELOPMENT

-Core concept: Sustainable Development Goals framework

-Estimated business opportunity: $12 trillions USD

-ML and AI are key to success

Business value

DEVELOPMENT PLANNING OF A REGION: A COMPLEX PROBLEM

1. Highly interdisciplinary task
2. Necessary set of tools, competencies, people and timing
3. Ultimate goal: a political vision of the future

Business value

MACHINE LEARNING AND SUSTAINABLE DEVELOPMENT

- Factors of development = enormous amount of data
- Digitalization is not de-materialization
- Remote sensing (RS) imagery is a low cost & scalable
- Deep Learning hasn´t been extensively applied to RS (yet)

Business value

THE AMAZON BASIN CASE

-The Amazon basin: symbolic, endangered area

-Only 17% adequate for agriculture or ranching

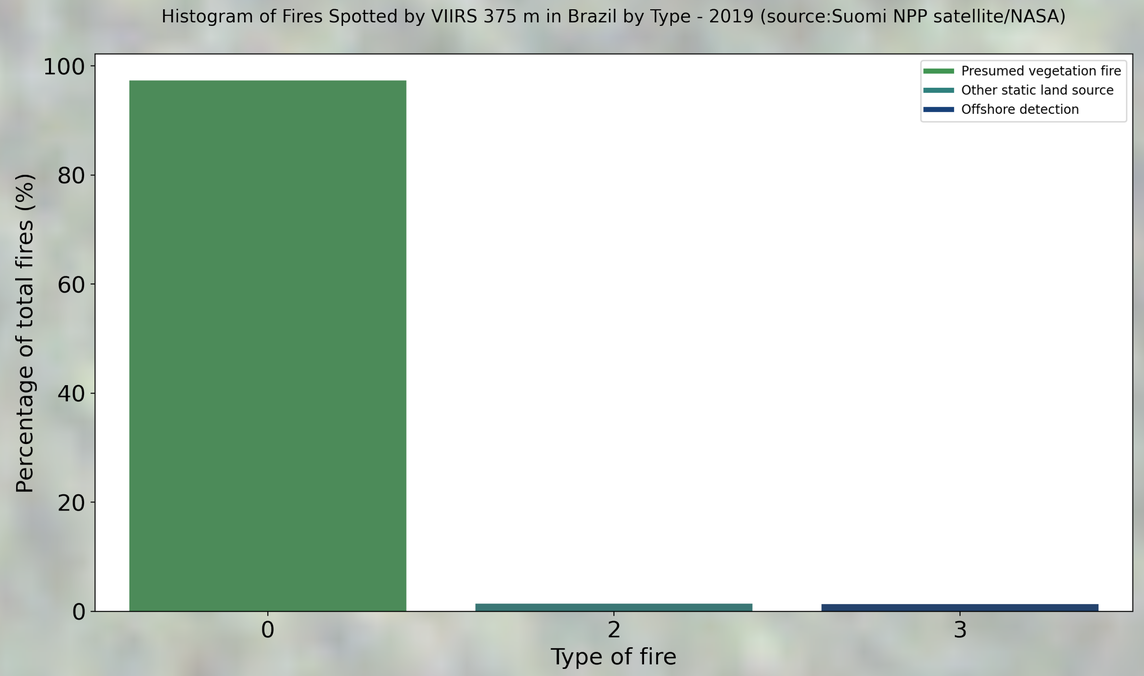
-Development model so far: mega-projects

-Sustainable alternative: Projeto Castanha-do-Brazil

Business value

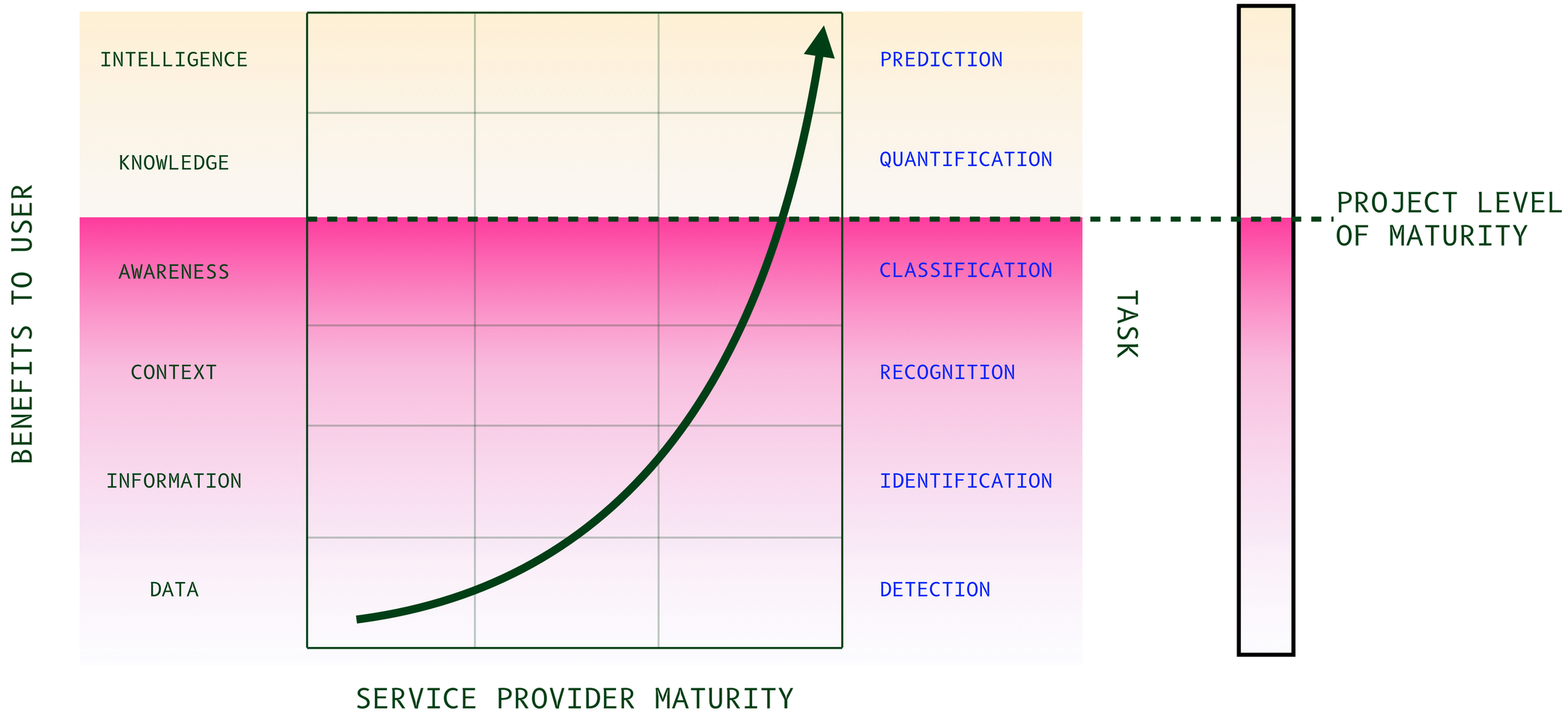
THE AMAZON BASIN CASE

Problem: scalable, low cost, solution to track regional enroachment?



Business value

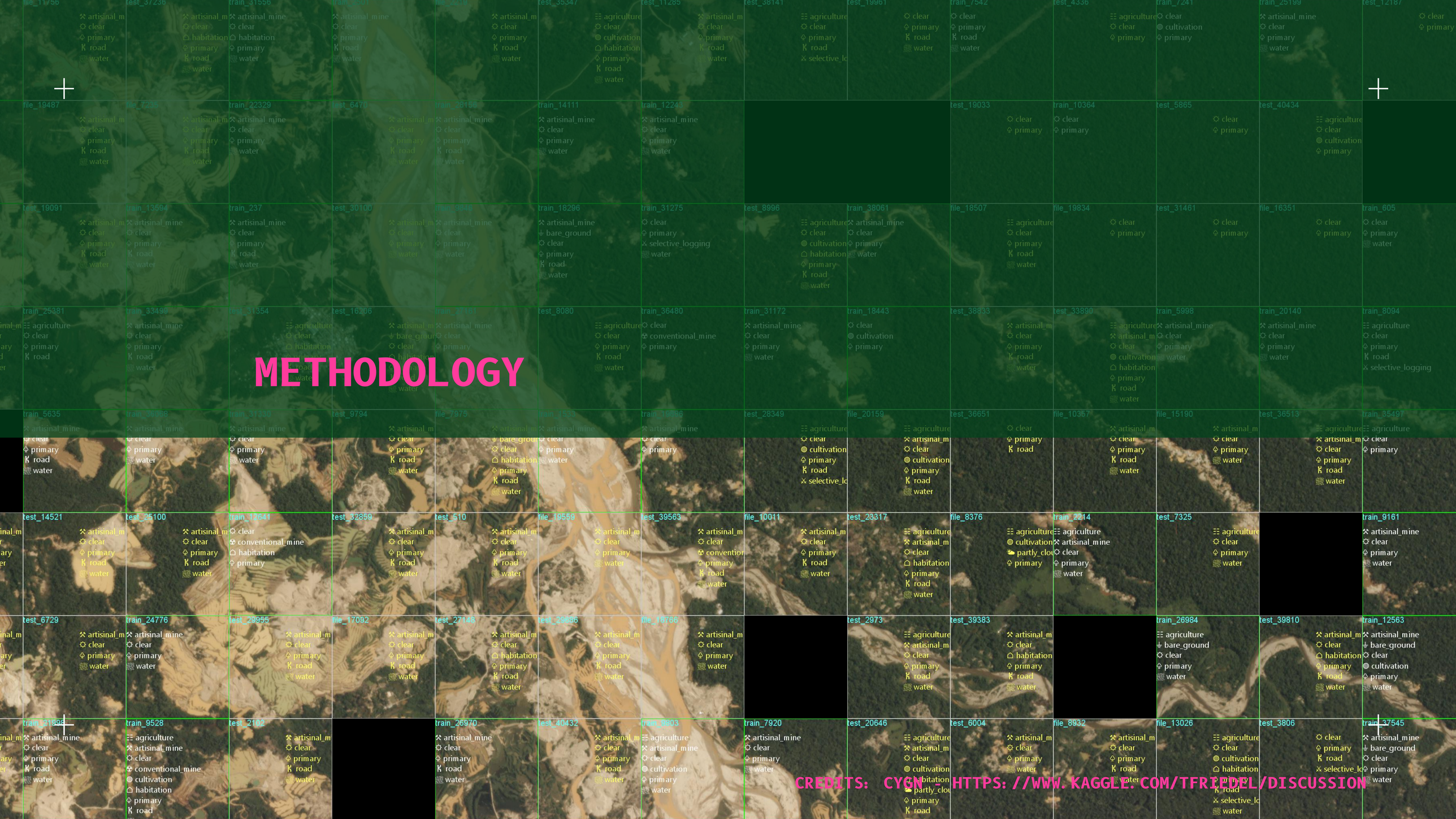
PROJECT MATURITY VS EARTH OBSERVATION SERVICE MATURITY



Business value

QUESTIONS THAT THIS PROJECT WANTS TO ADDRESS

1. Where is the majority of fires located?
2. Can DL help tracking the exploitation of the Amazon basin?
3. Can this tool be potentially used for verifying deforestation alerts?


METHODOLOGY
CREDITS: CYCN - HTTPS://WWW.KAGGLE.COM/TFRIEDEL/DISCUSSION

Methodology

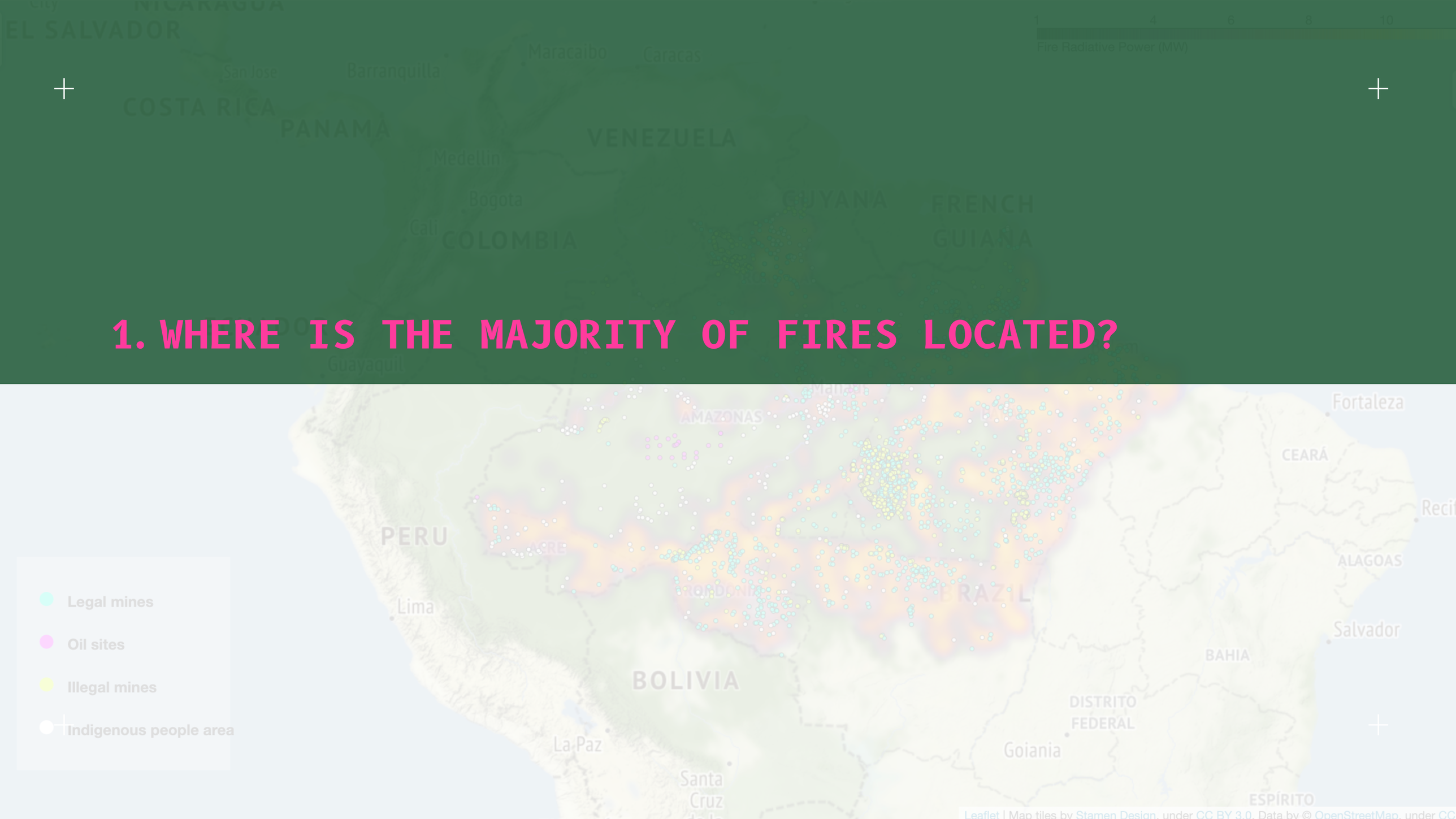
BUSINESS UNDERSTANDING +
Obtain Scrub Explore Model iNterpret - OSEMN

Business understanding → Obtain → Scrub → Explore → Model → Interpret

1 2 3 4 5 6

OUR RECOMMENDATIONS

1. WHERE IS THE MAJORITY OF FIRES LOCATED?



2. TRACKING THE AMAZON BASIN MORE EFFICIENTLY

- **No need to create expensive training datasets** [lower upfront costs of R&D]

- **RS imagery + Machine Learning = easy, consistent time comparison of same area**

-***Potentially game changing:*** **AI and Hyperspectral Images [HSI] + SAR [radar]**

3. DEEP LEARNING AND DEFORESTATION ALERTS

- GLAD, Global Land Analysis Discovery, example of ML applied to remote sensing to track deforestation

- Limits o GLAD is accuracy and timing: 65% of alerts were discharged due to accuracy

- Deep learning way more powerful

FUTURE WORKS

FUTURE WORKS

1. Improving performance experimenting with known DL architectures and parallel computing

2. Being able to see time-evolution: adding time-series to geospatial analysis

3. Leveraging near-infrared channel (NIR) for vegetation indices, and applications of deep learning to hyperspectral images

WRAPPING UP

Wrapping up

DEEP LEARNING APPLIED TO THE SUSTAINABLE DEVELOPMENT OF THE AMAZON BASIN

Wildfires = a proxy for sustainable development of the Amazon

1. Map of majority of fires and relationship with human activities

2. Deep Learning achieves good results without massive RS imagery datasets + game changing potential on HSI

3. Deep learning as a major advancement in deforestation tracking

THANK YOU