COMPUTER VISION IN SPACE

Marco Bressan

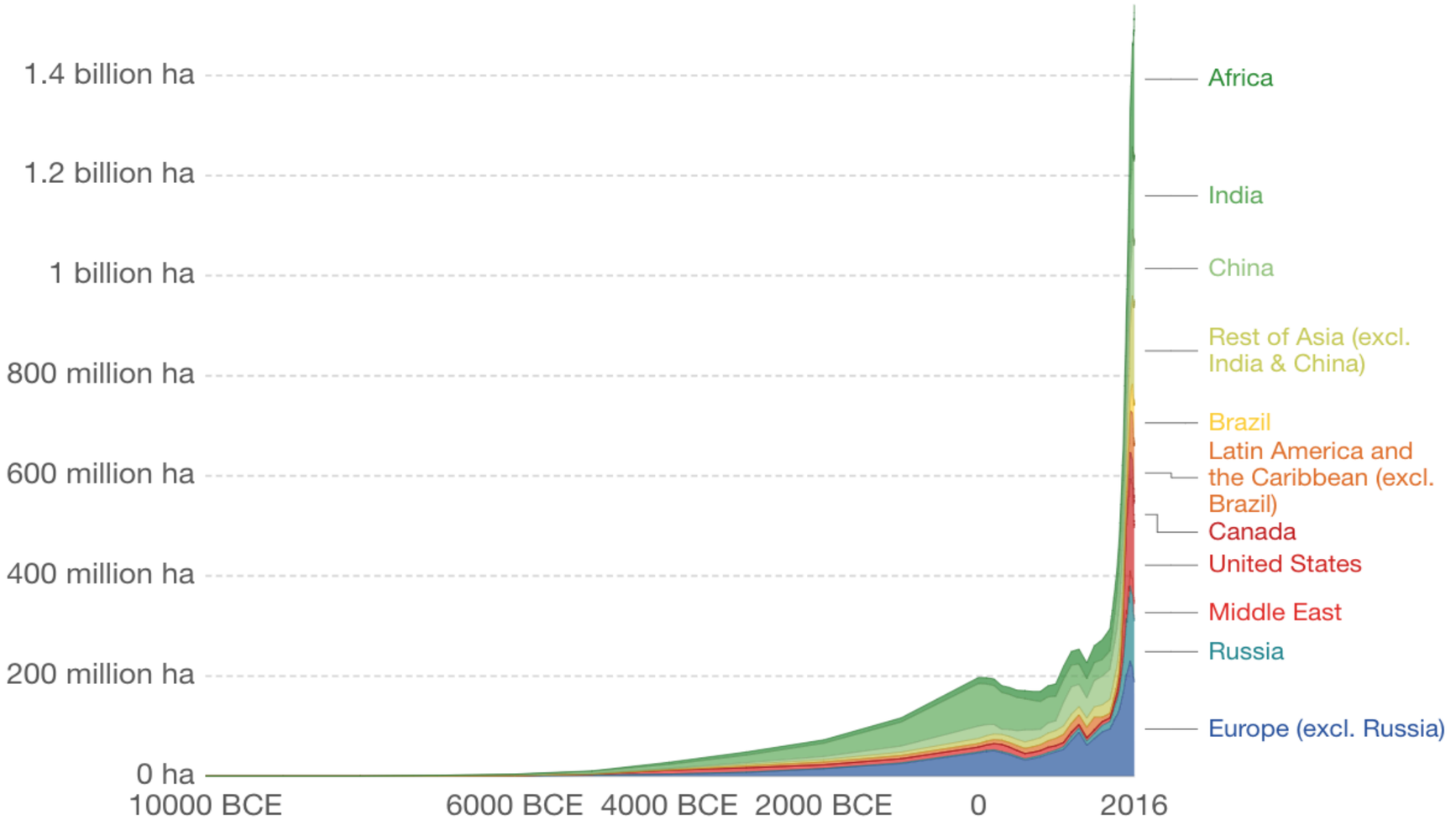
SATELLOGIC

CHALLENGE: FOOD

Cropland use over the long-term

Total cropland area, measured in hectares. Cropland refers to the area defined by the UN Food and Agricultural Organization (FAO) as 'arable land and permanent crops'.

Our World in Data



Source: Land Use Data - HYDE (2017)

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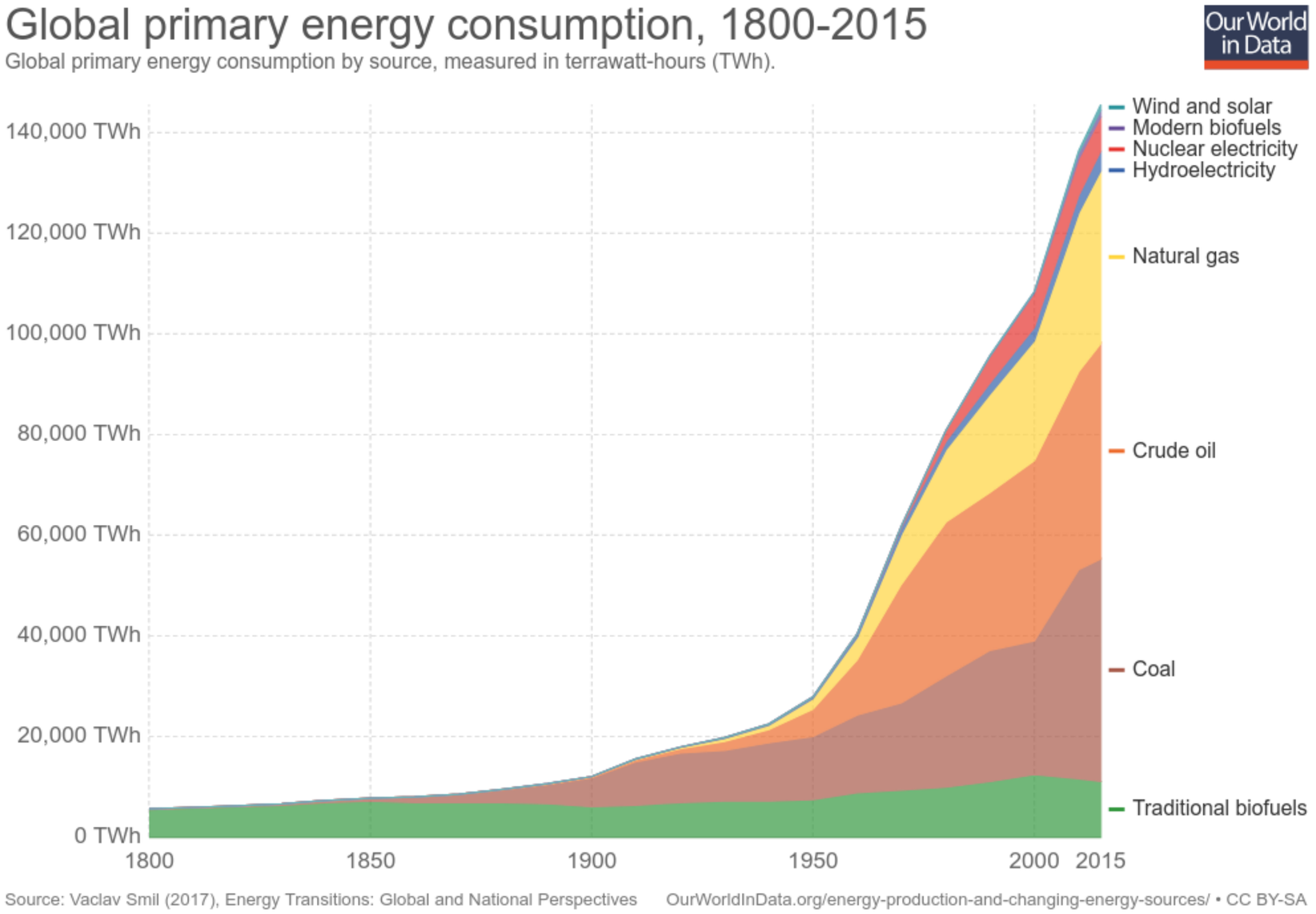
CHALLENGE: ENERGY



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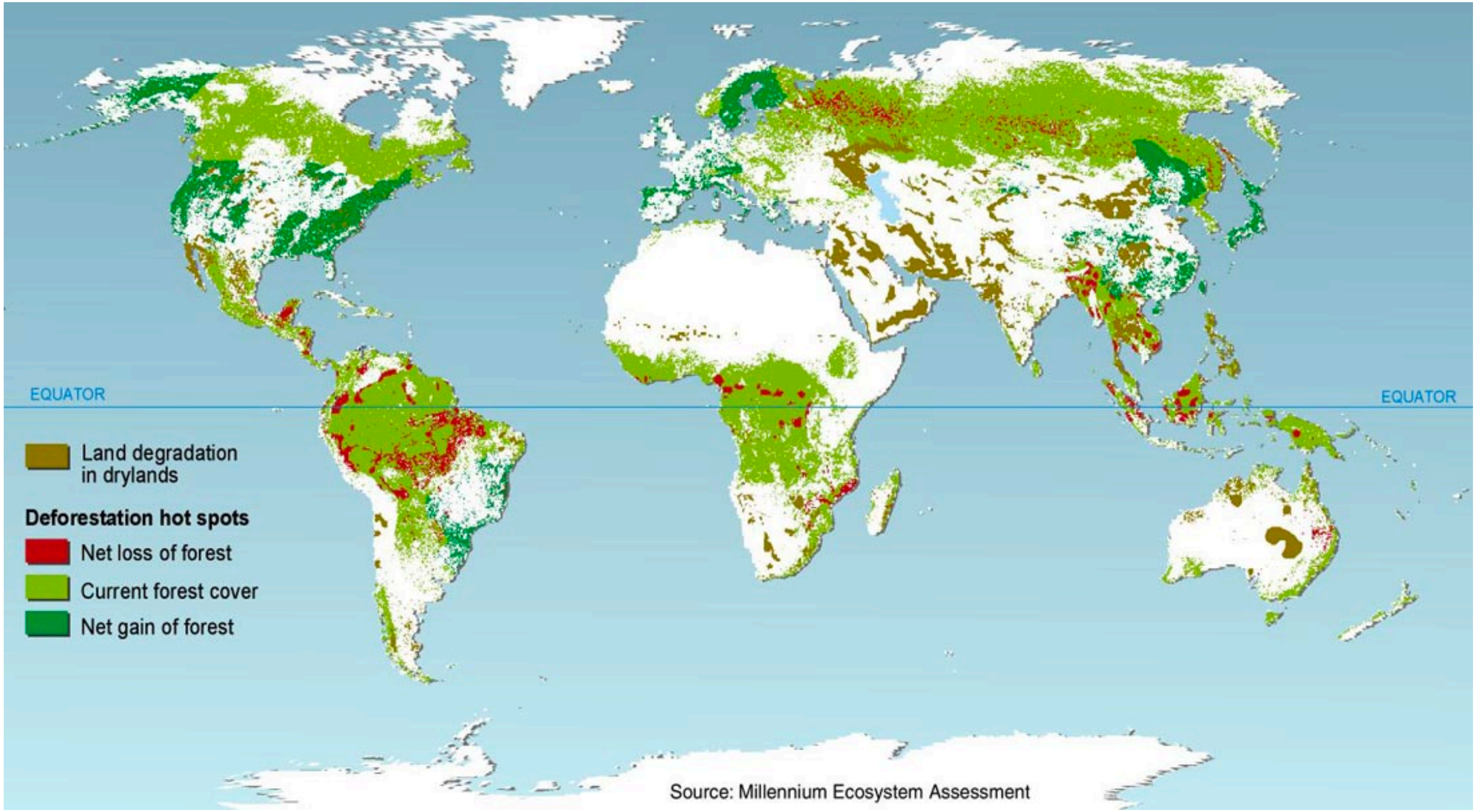
CHALLENGE: NATURAL RESOURCES



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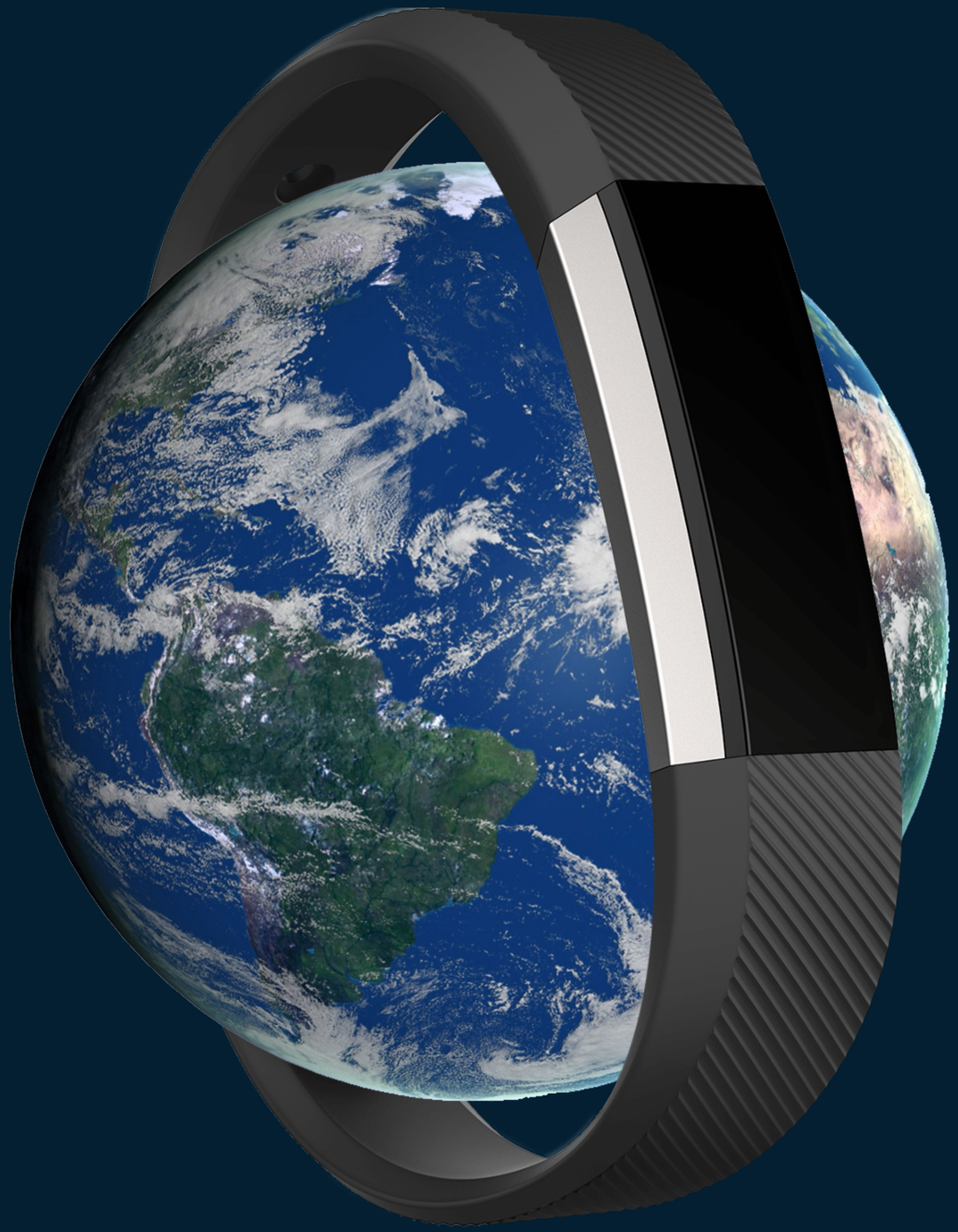

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SATELLOGIC®

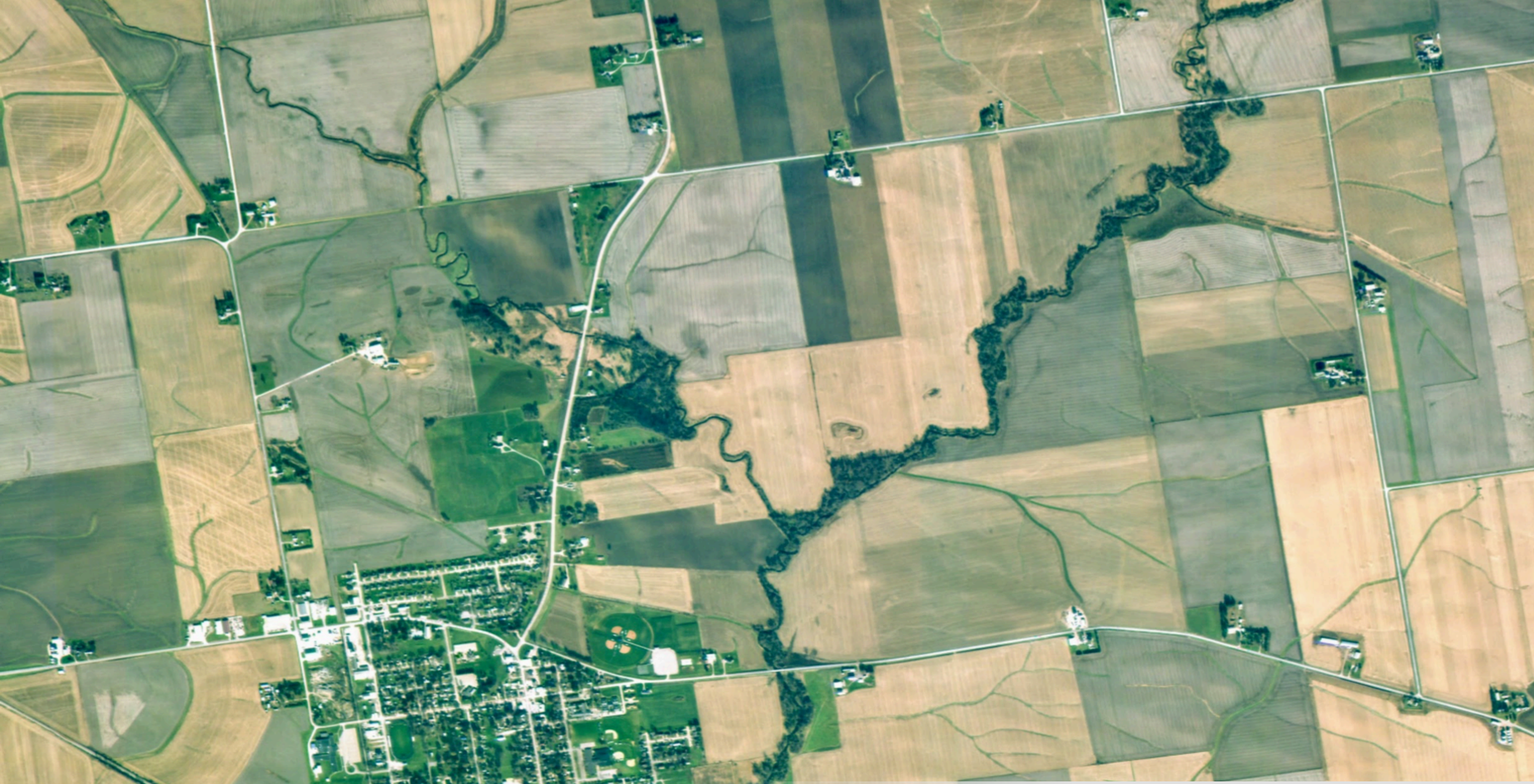
We need to make satellites cheaper and lighter,

so we can scale coverage and reduce the learning cycle,

while preserving data quality.

Barcelona, Spain
2018
Multispectral camera

SATELLOGIC



West Liberty, Iowa, USA
2018
Multispectral camera

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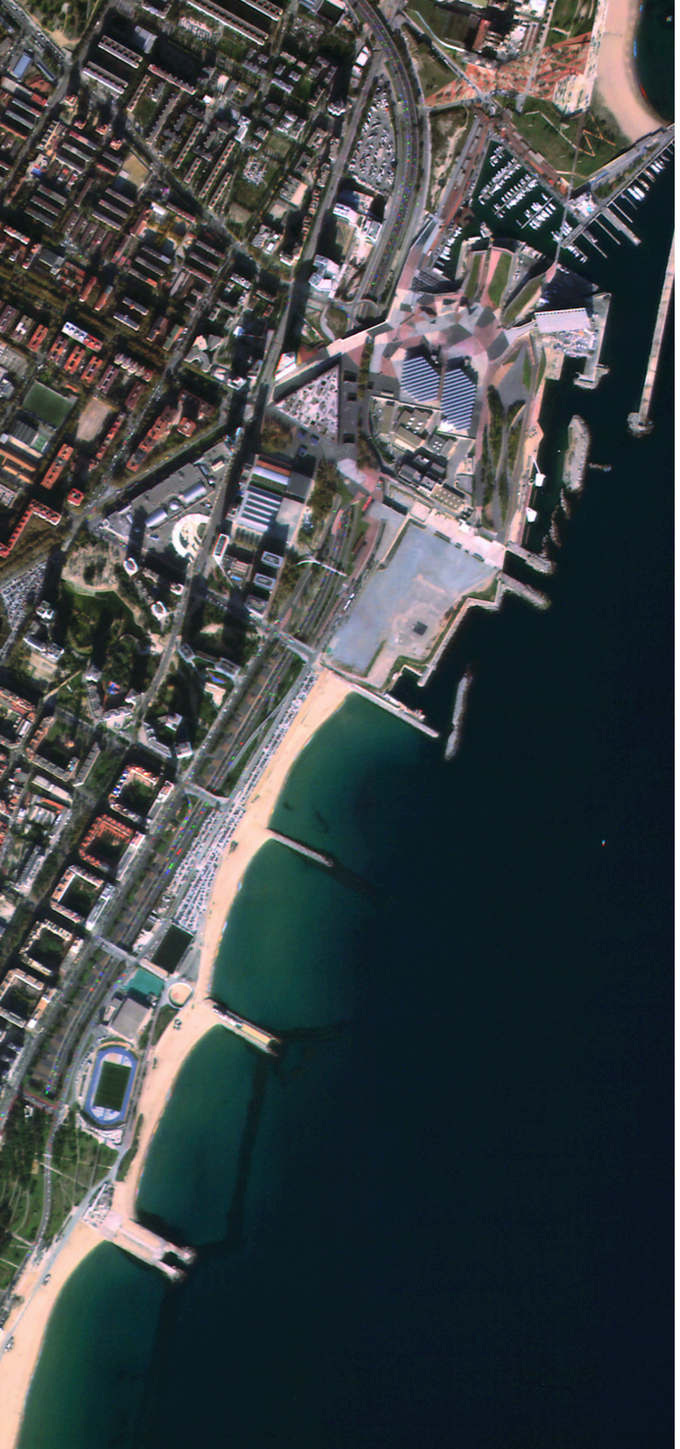
Gambia, África
2018
Hyperspectral camera

SATELLOGIC



Infrastructure

Energy

Food security & sustainability

Natural Resources

Cartography Urban patterns

Policy & Government

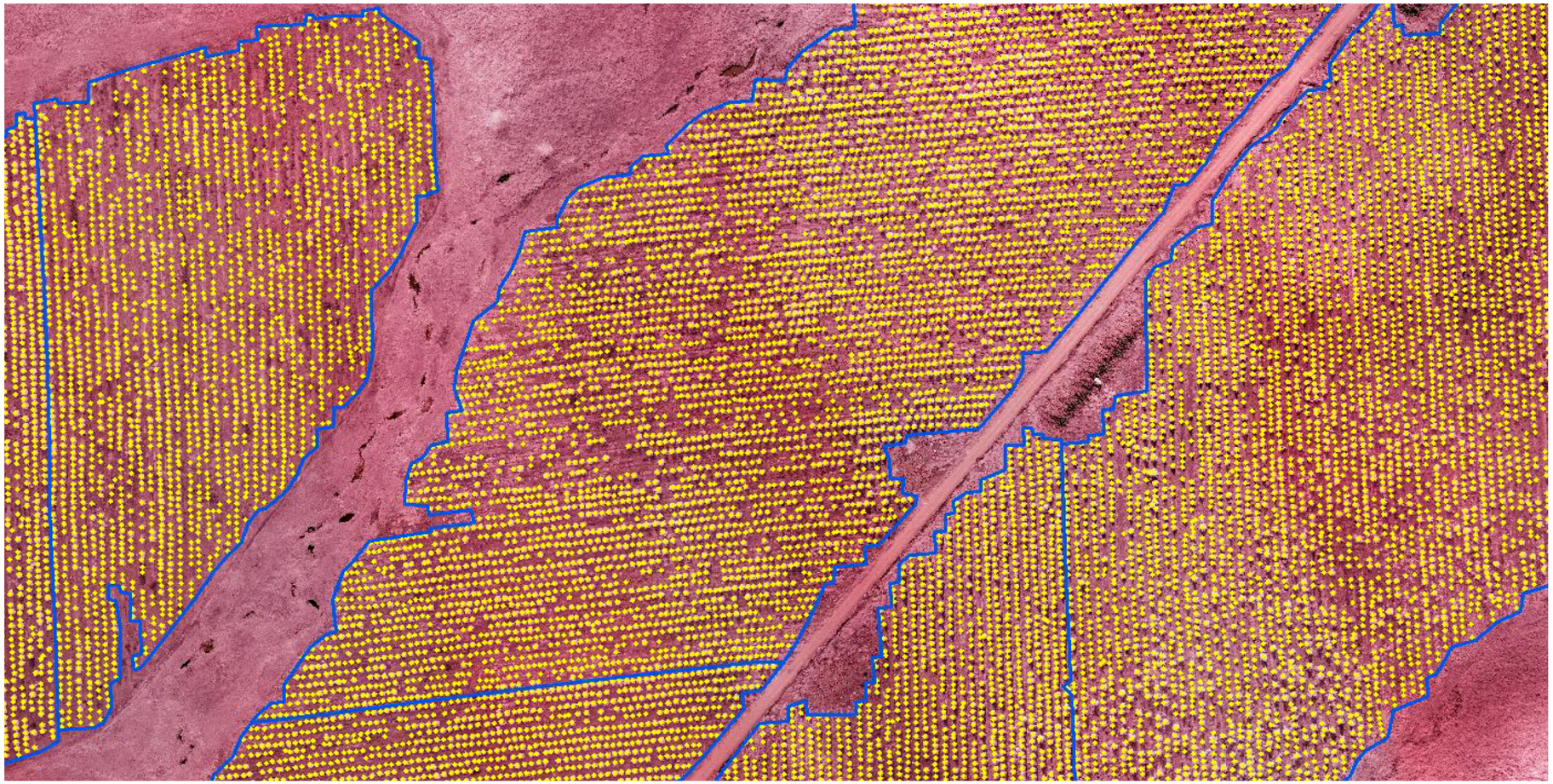
KEY CV & ML ALGORITHMS IN REMOTE SENSING

Segmentation

Detection

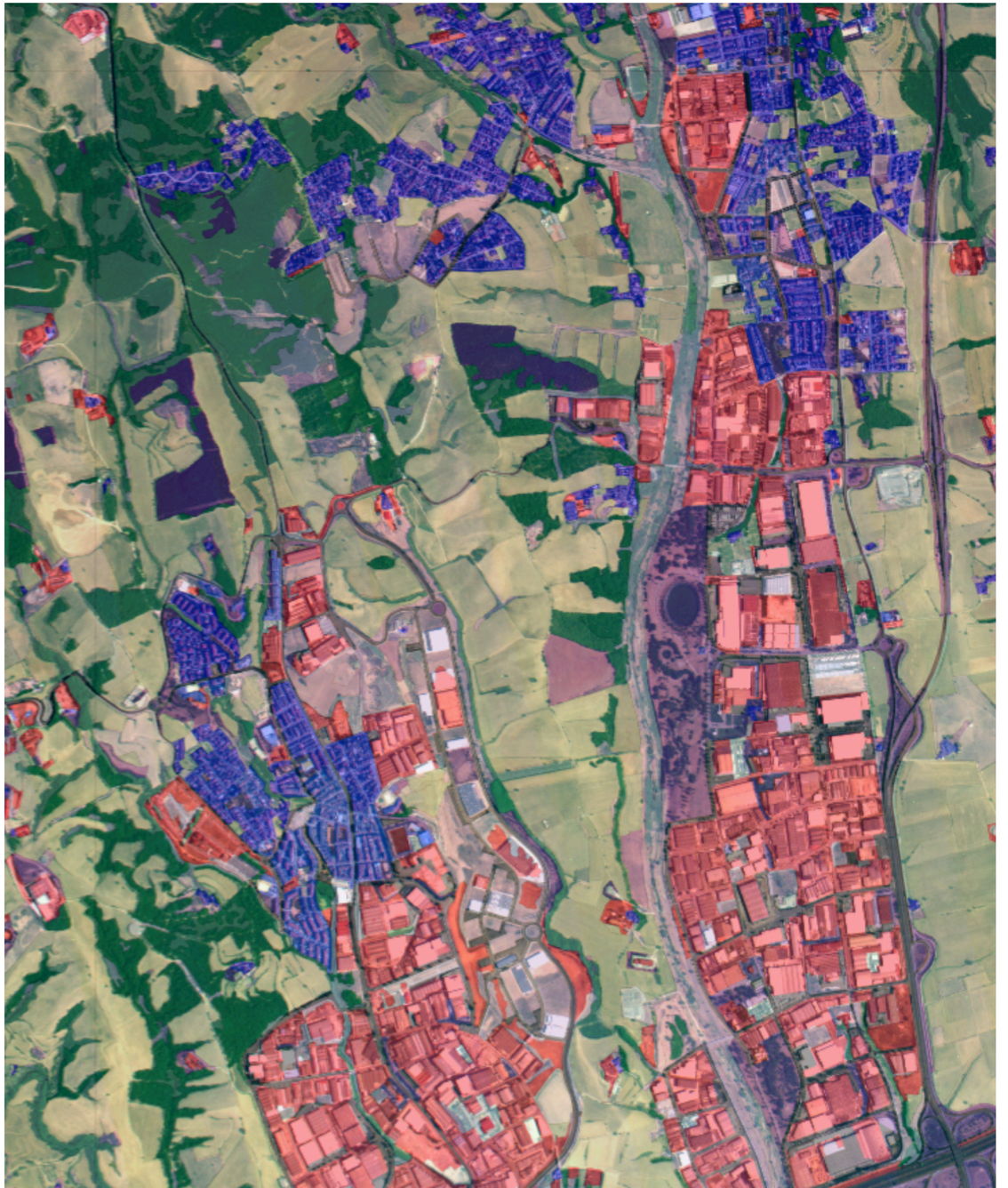
Change Detection

Regression



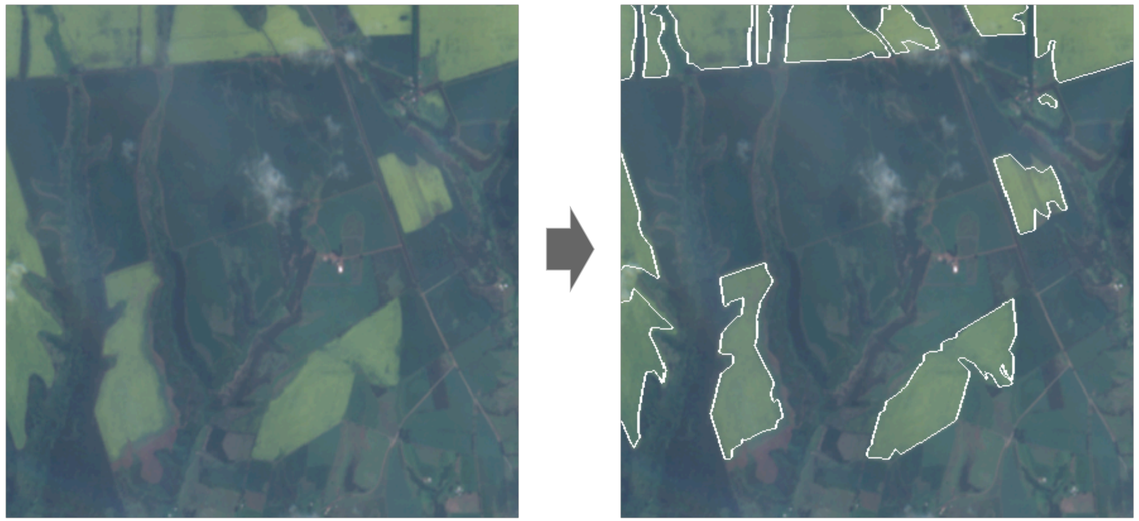
SATELLOGIC

SEGMENTATION

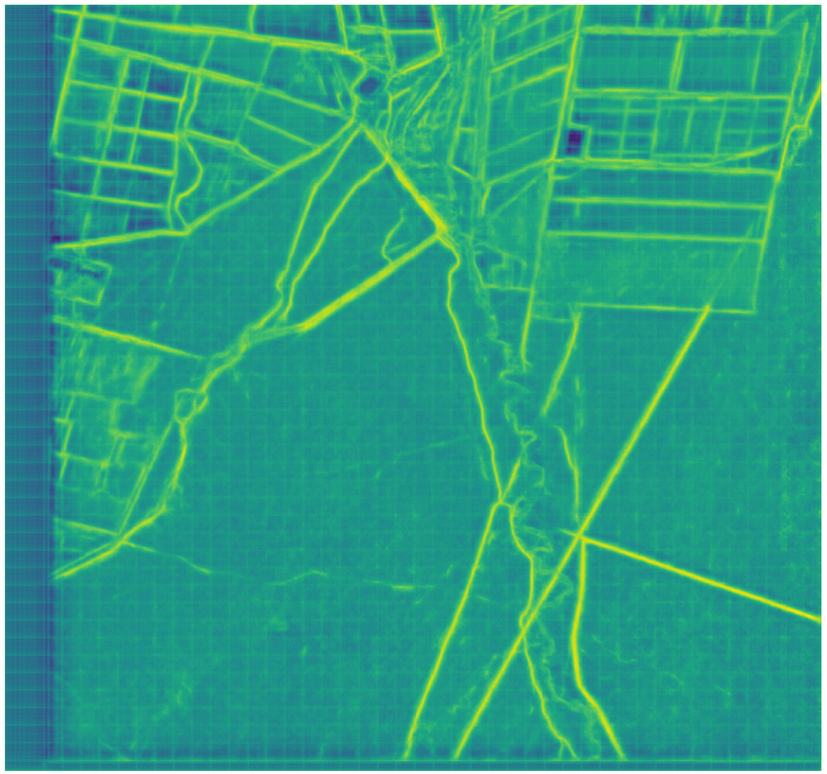


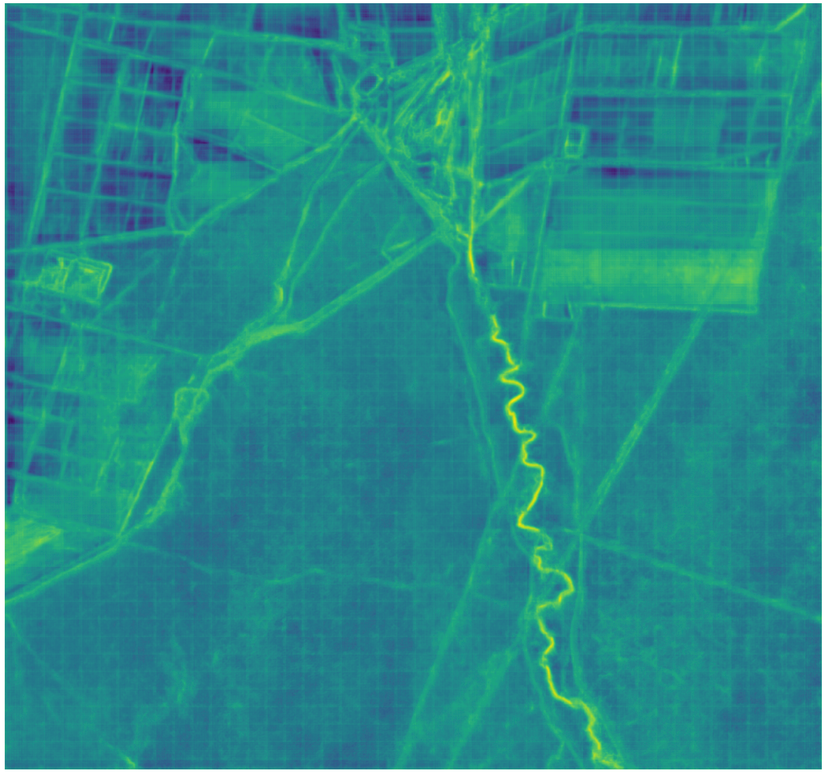
- Forest oaks
- Forest pine trees
- Agricultural
- Residential buildings
- High density residential
- Industrial buildings
- Roads and highways

SEGMENTATION

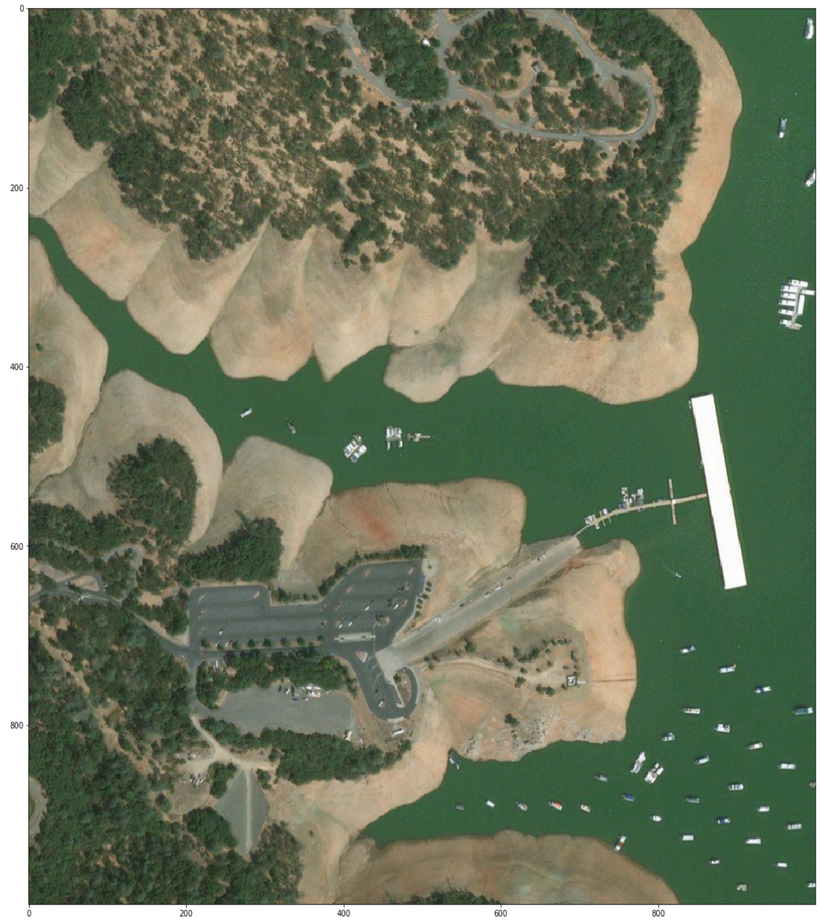


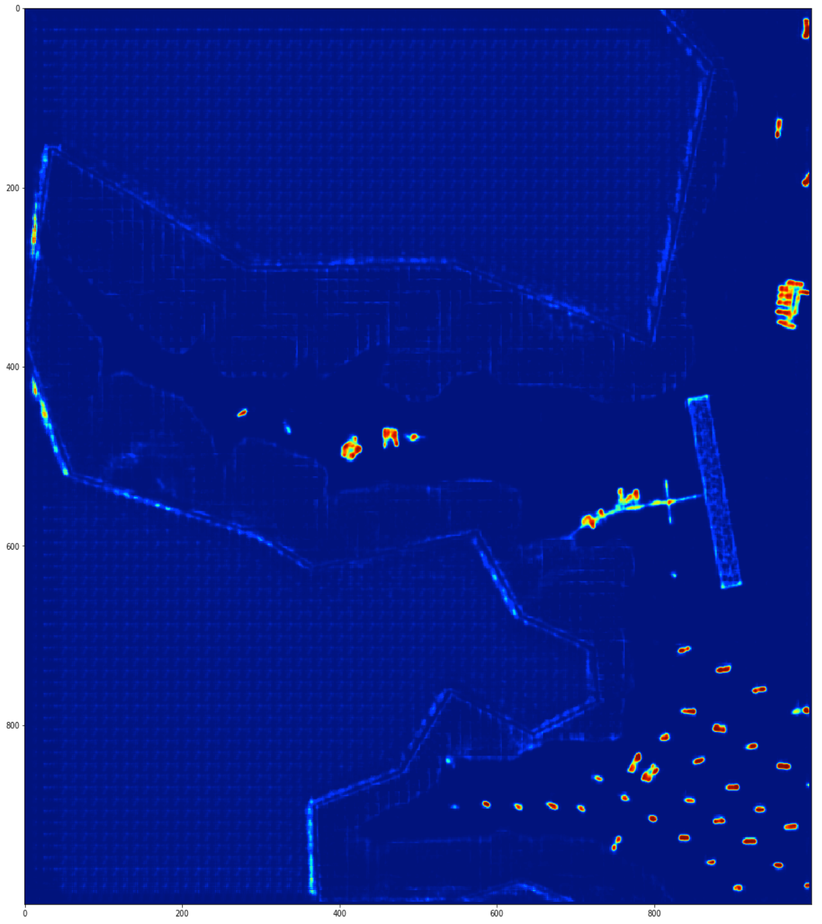
SEGMENTATION

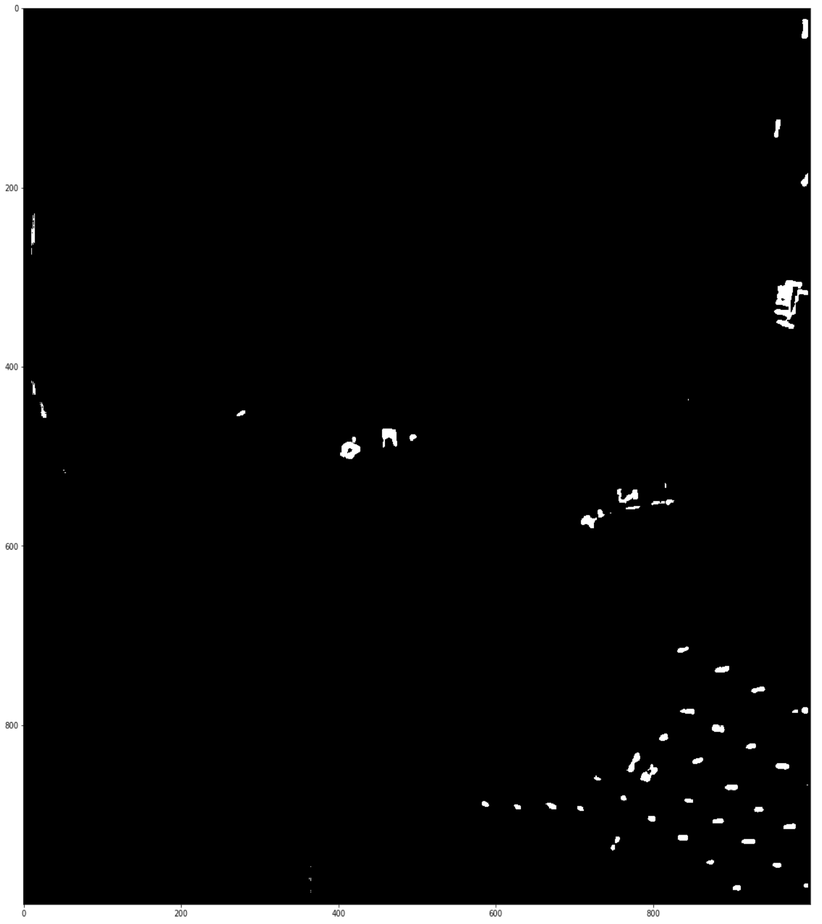




DETECTION







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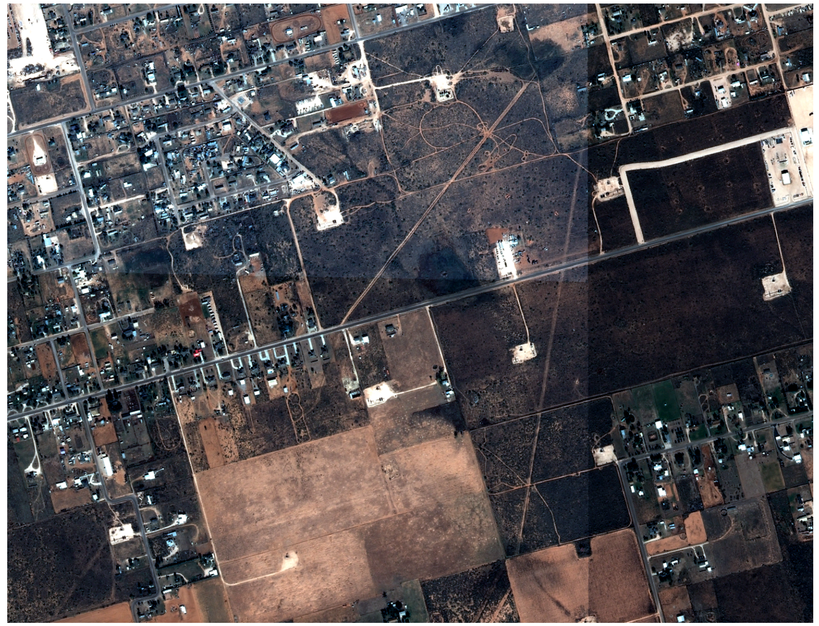
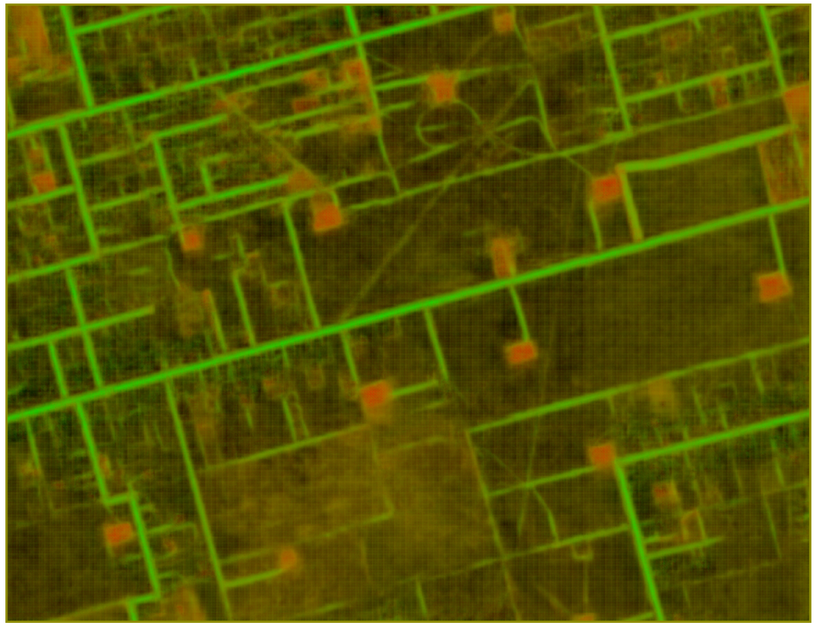
DETECTION

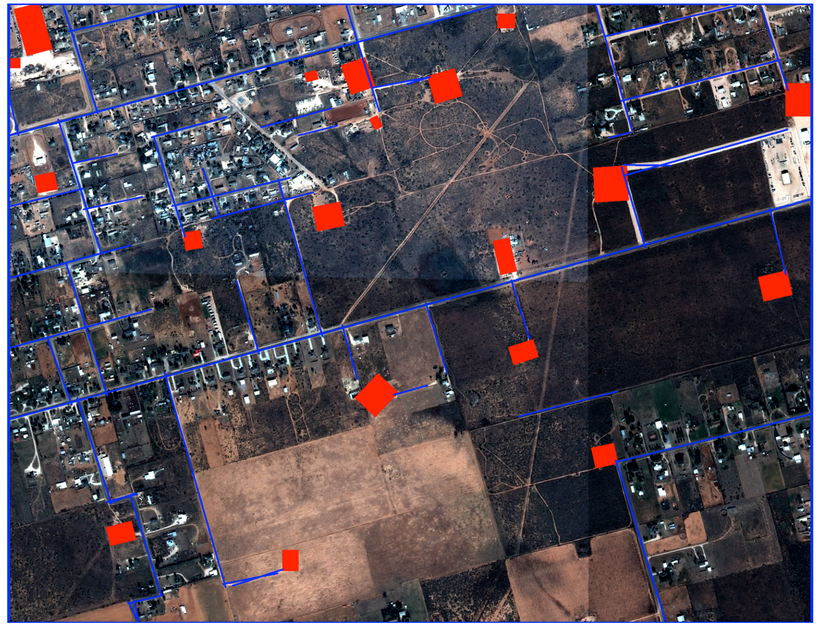
Original



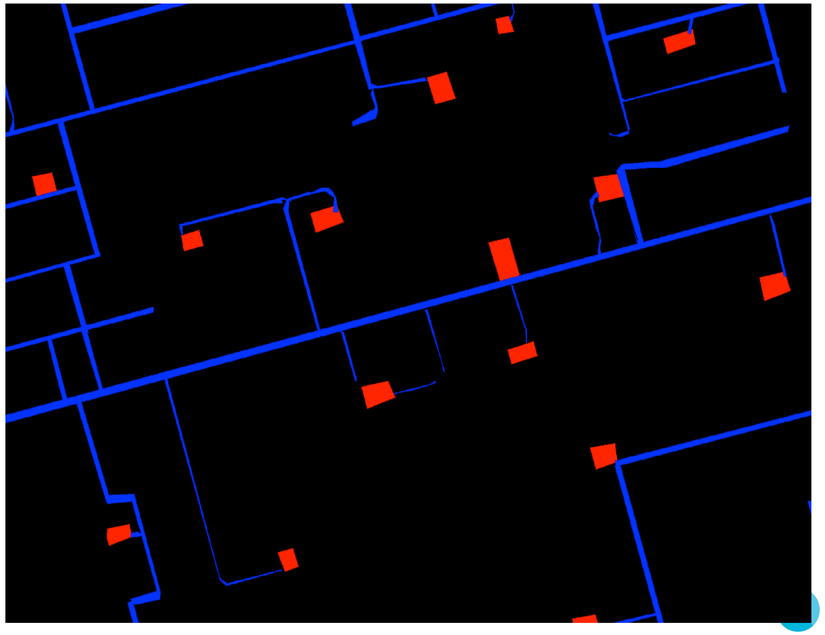
Heatmap



Prediction

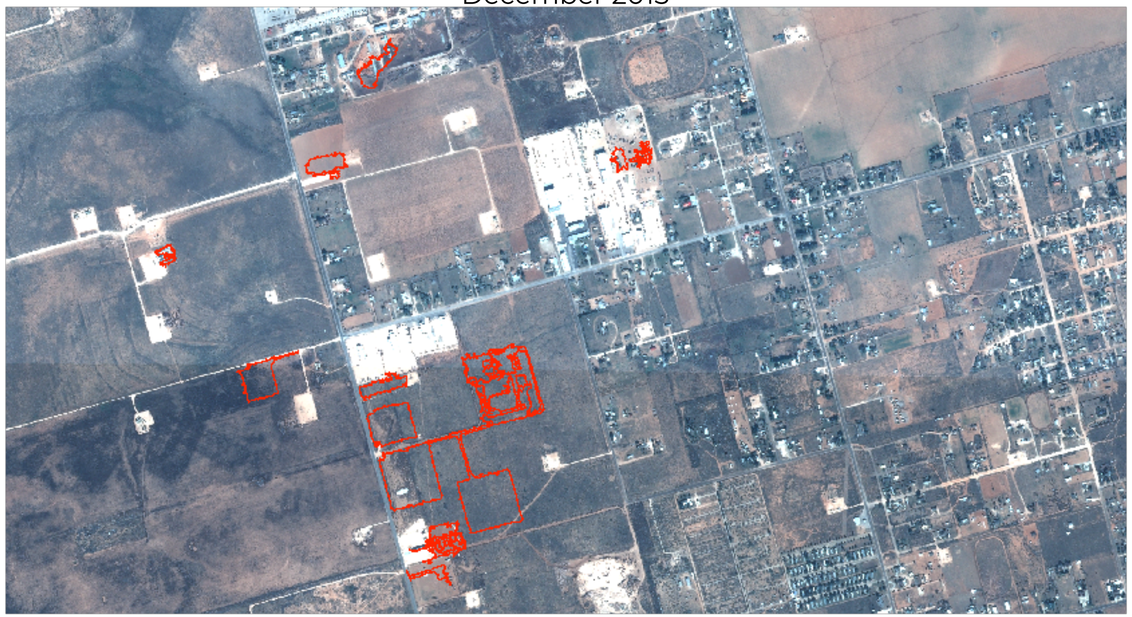


Groundtruth

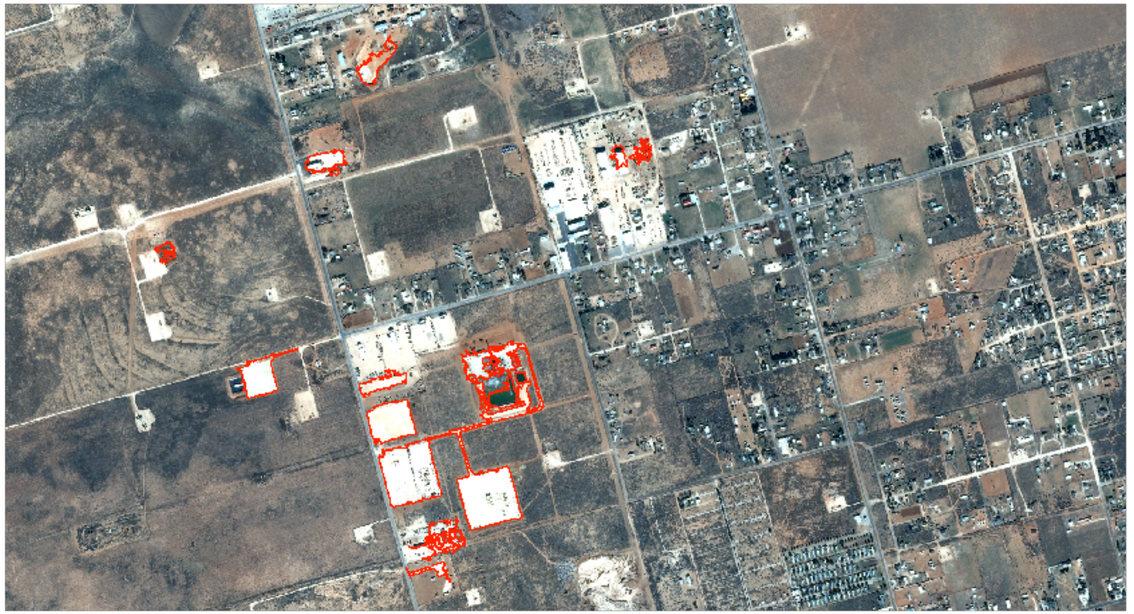


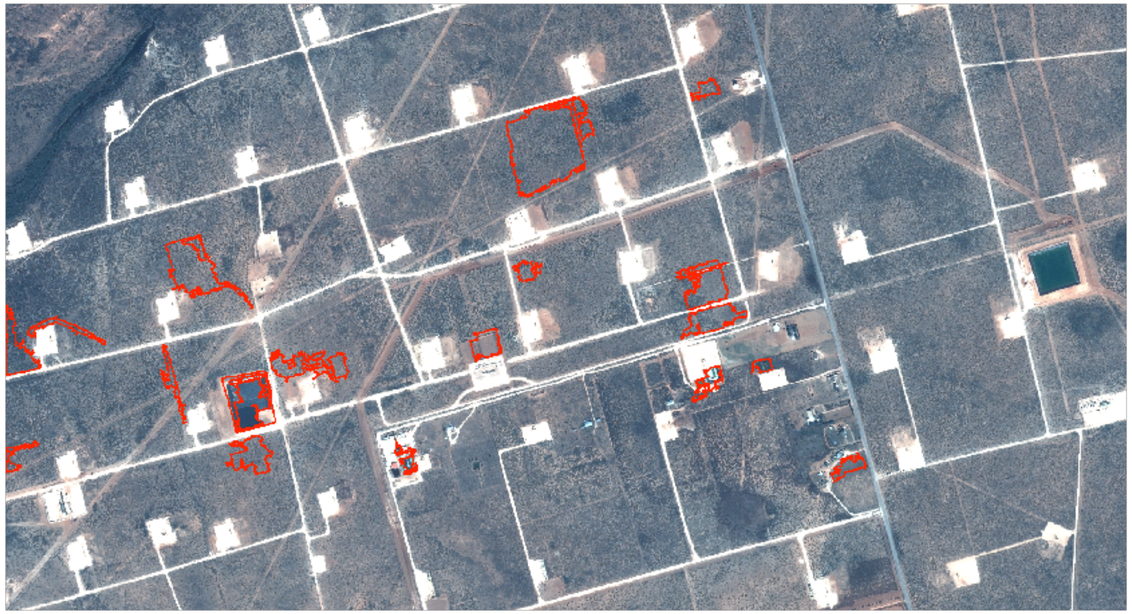
CHANGE DETECTION

December 2015



December 2016





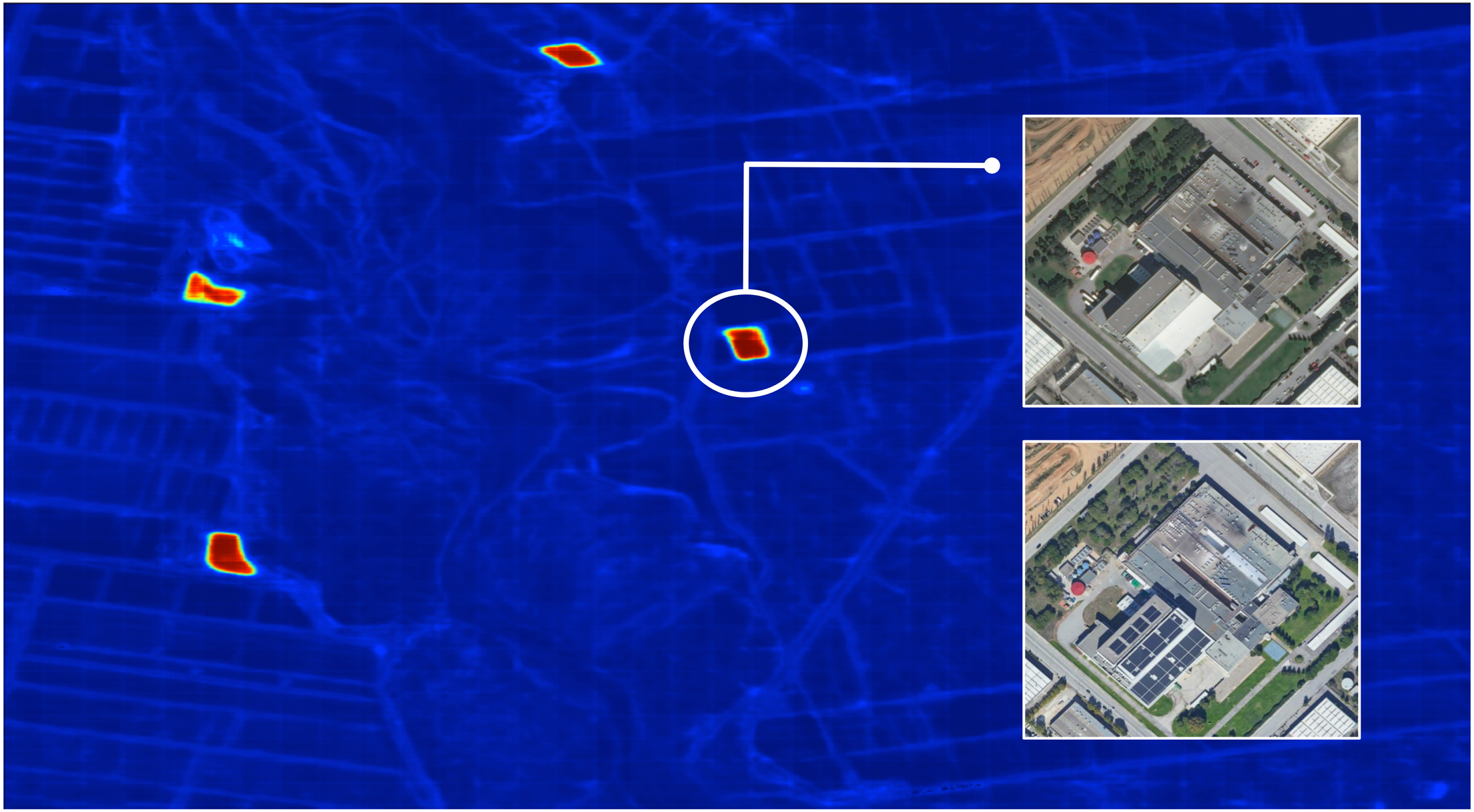
SATELLOGIC

CHANGE DETECTION

HARVEST DETECTION IN FORESTRY

SATELLOGIC

CHANGE DETECTION



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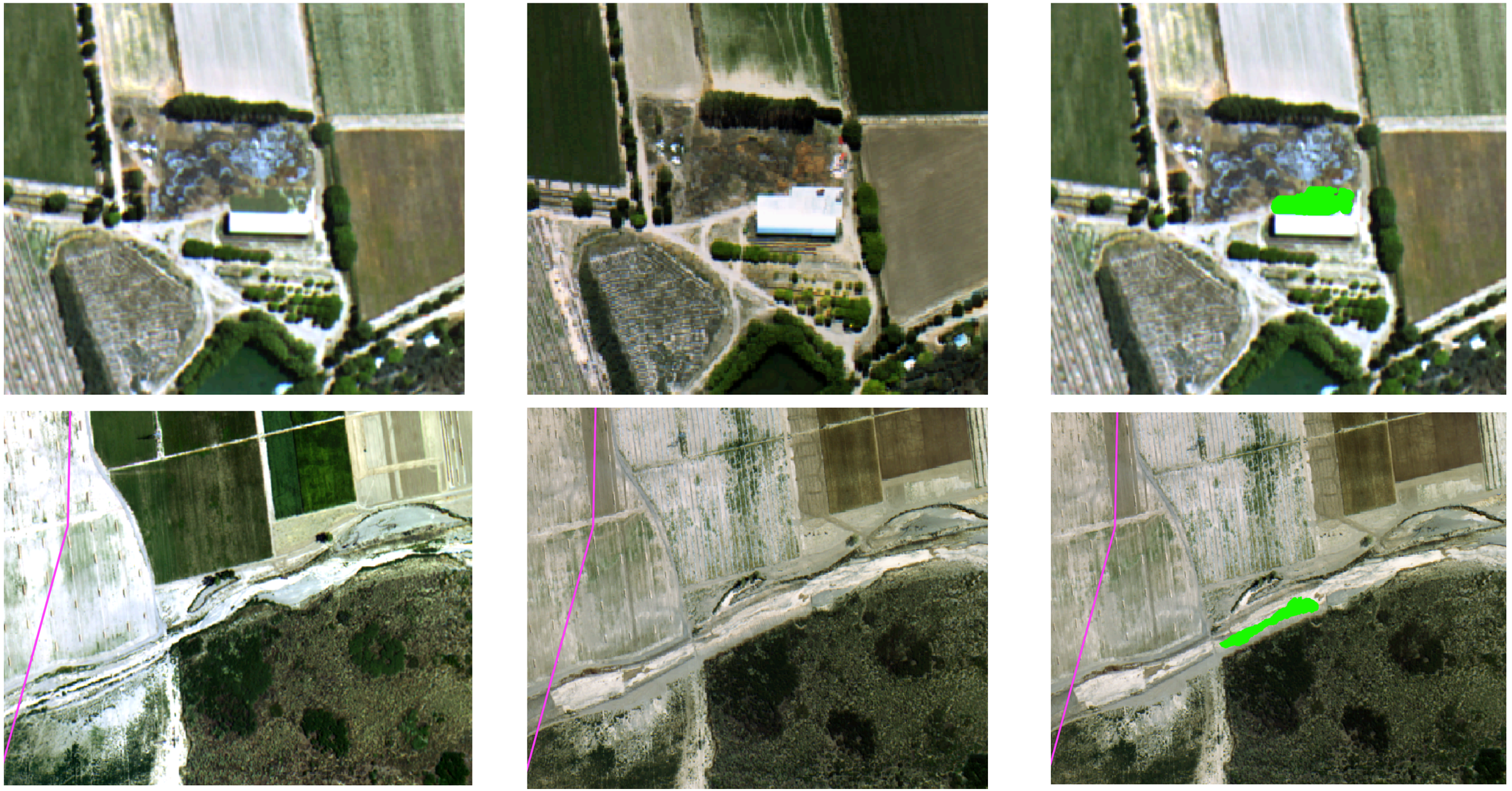
CHANGE DETECTION



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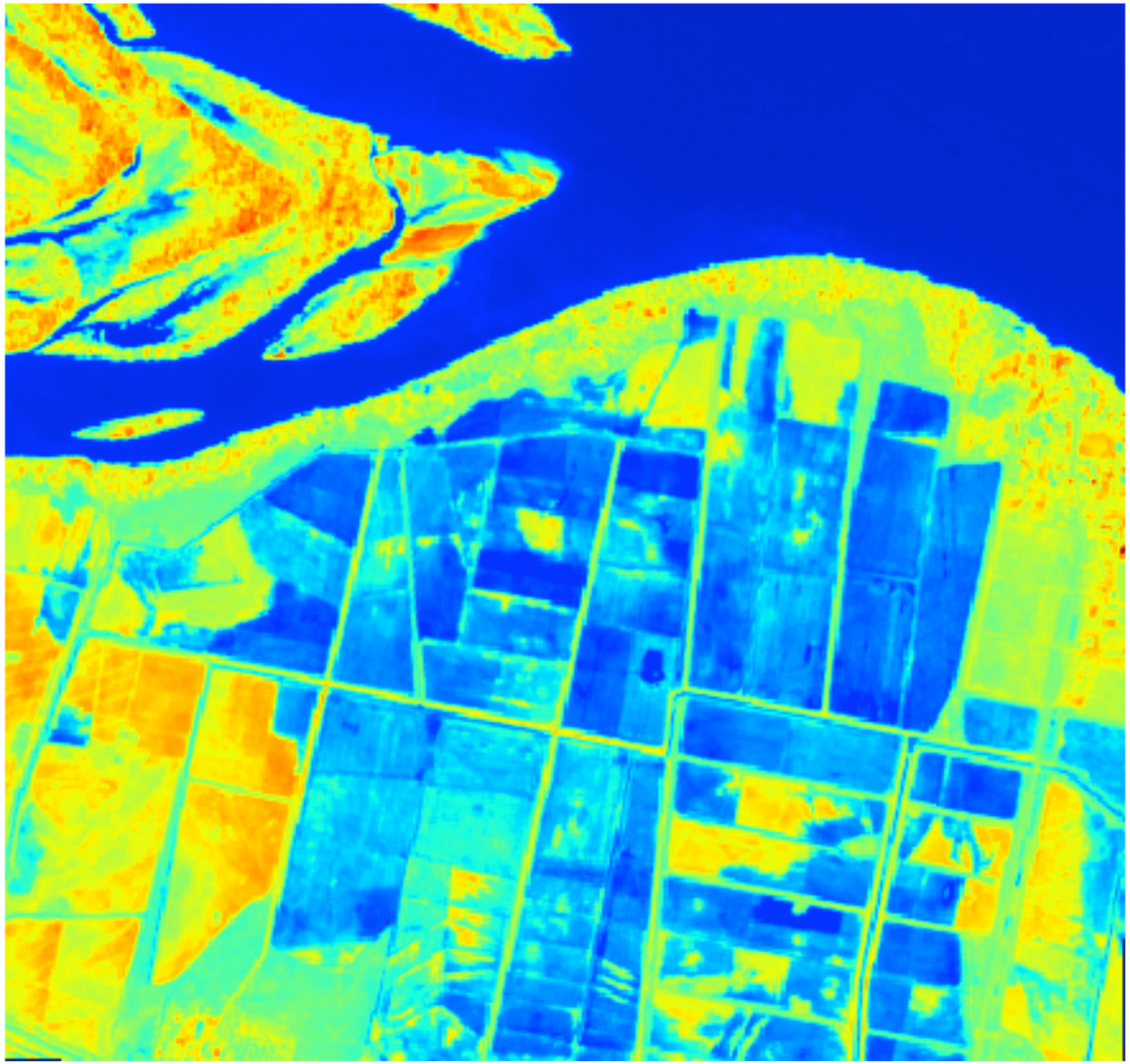
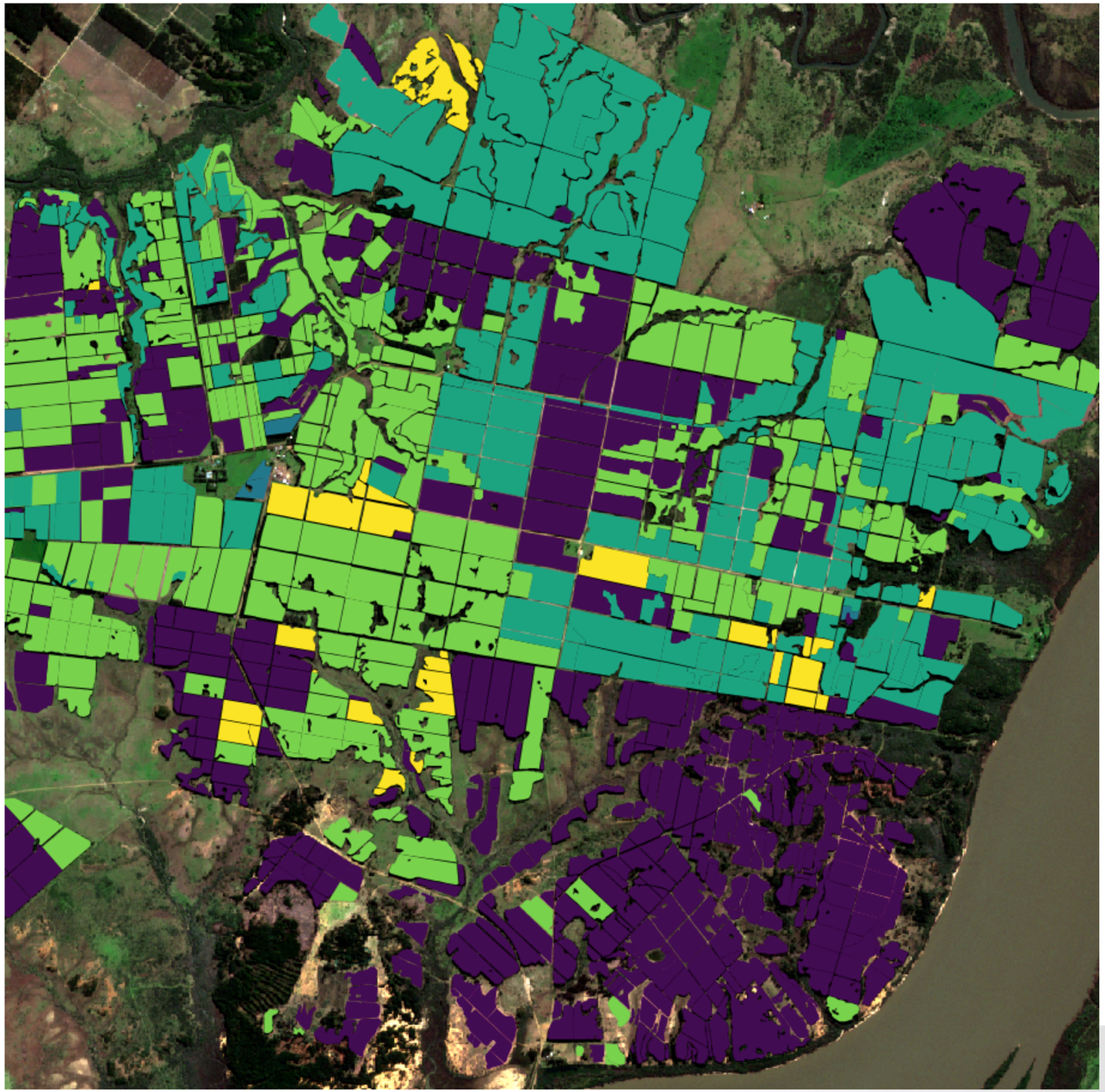
REGRESSION



REGRESSION



COMPUTER VISION IN SPACE: OUTLOOK

Roads and Bridges
Trains
Ports and Airports
Dams
Power Plants

Infrastructure

O&G
Utility networks
Alternatives
Security, Planning
and Monitoring

Energy

Agriculture
Aquaculture
Livestock
Food Security

Food security & sustainability

Deforestation
Pollution
Water quality
Climate change

Natural Resources

Autonomous Vehicles
Cadastral Information
Maps

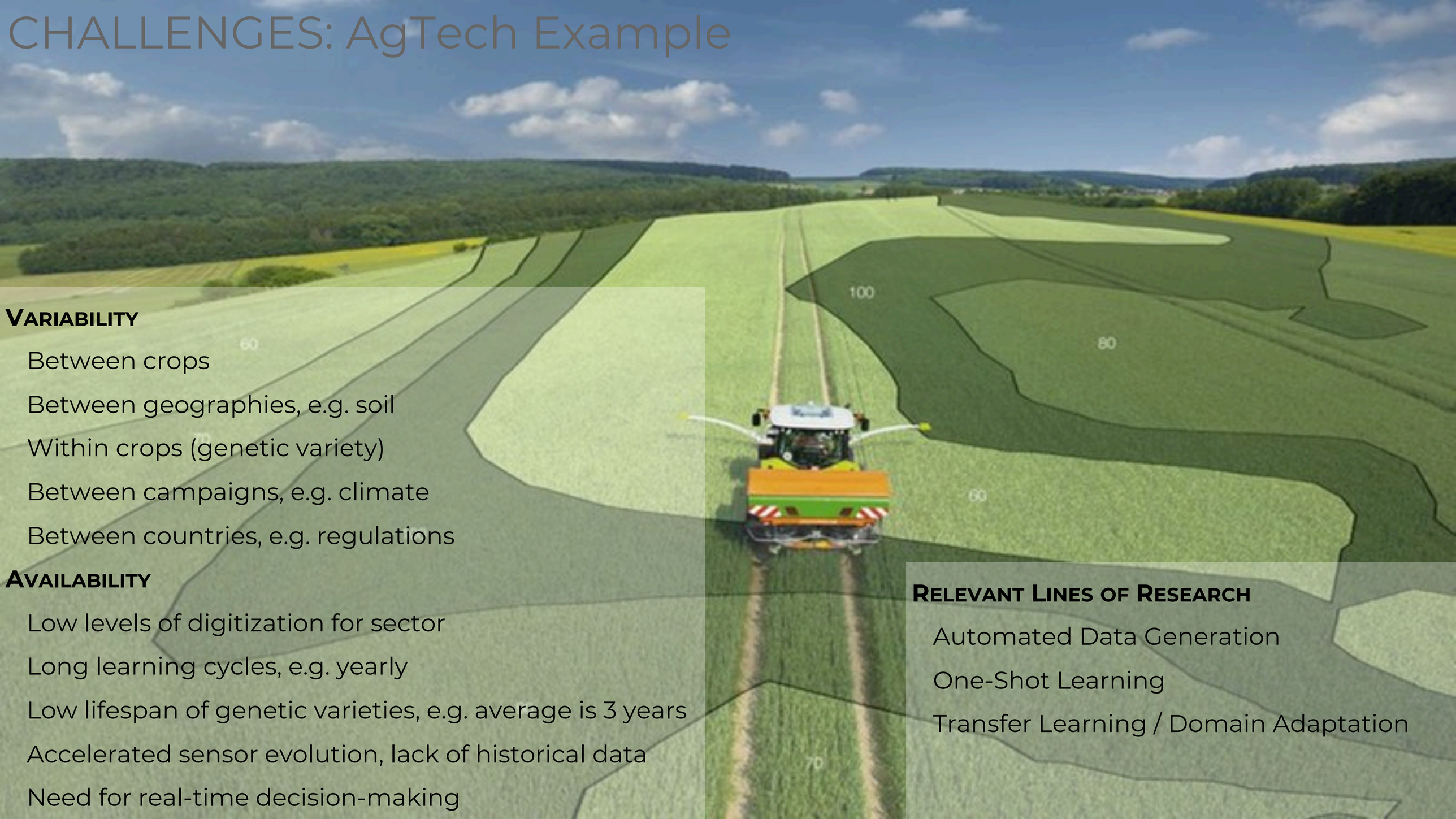
Cartography Urban patterns

Socioeconomic Indicators
Border and Maritime Security
Planning
Taxation
Disaster Response
National, Local, City

Policy & Government

SATELLOGIC

CHALLENGES: AgTech Example



Variability

- Between crops
- Between geographies, e.g. soil
- Within crops (genetic variety)
- Between campaigns, e.g. climate
- Between countries, e.g. regulations

Availability

- Low levels of digitization for sector
- Long learning cycles, e.g. yearly
- Low lifespan of genetic varieties, e.g. average is 3 years
- Accelerated sensor evolution, lack of historical data
- Need for real-time decision-making

Relevant Lines of Research

- Automated Data Generation
- One-Shot Learning
- Transfer Learning / Domain Adaptation