

# ENVIRONMENTAL INTELLIGENCE

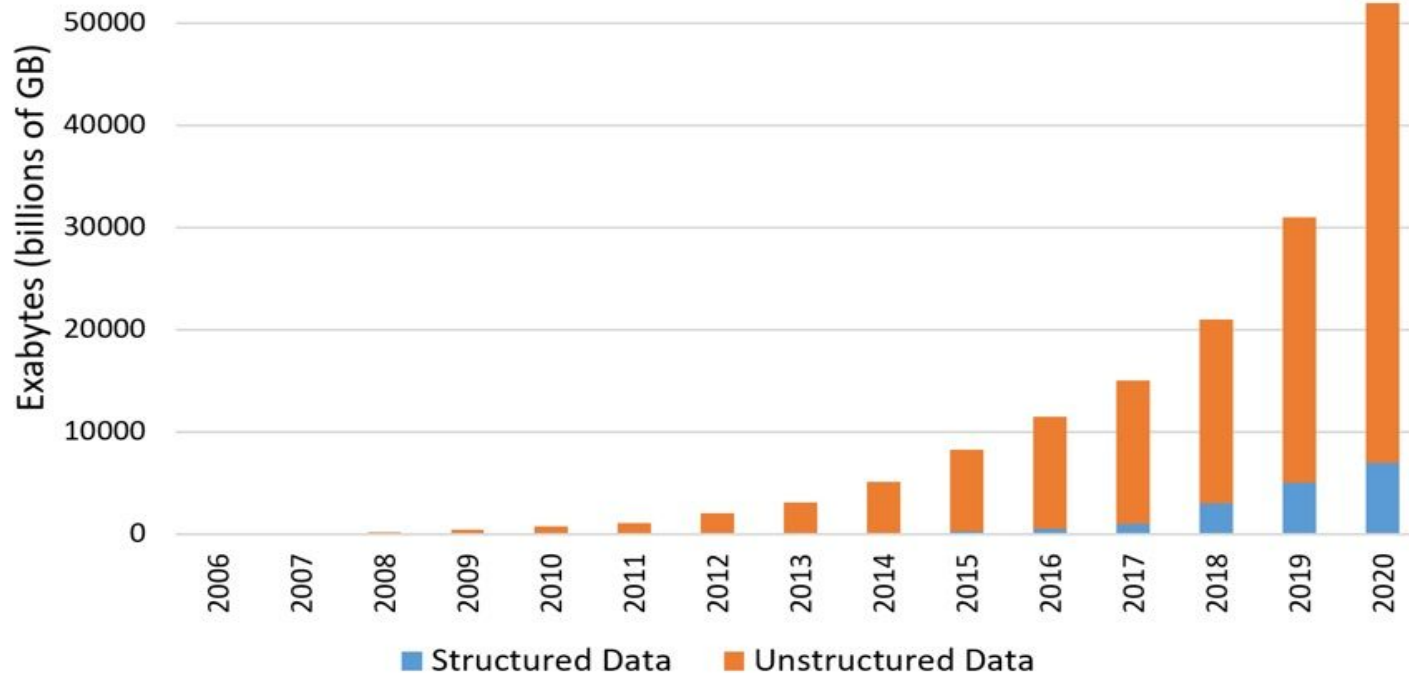
## From Theory to Practice

January 2019



# THE CAMBRIAN EXPLOSION...OF DATA

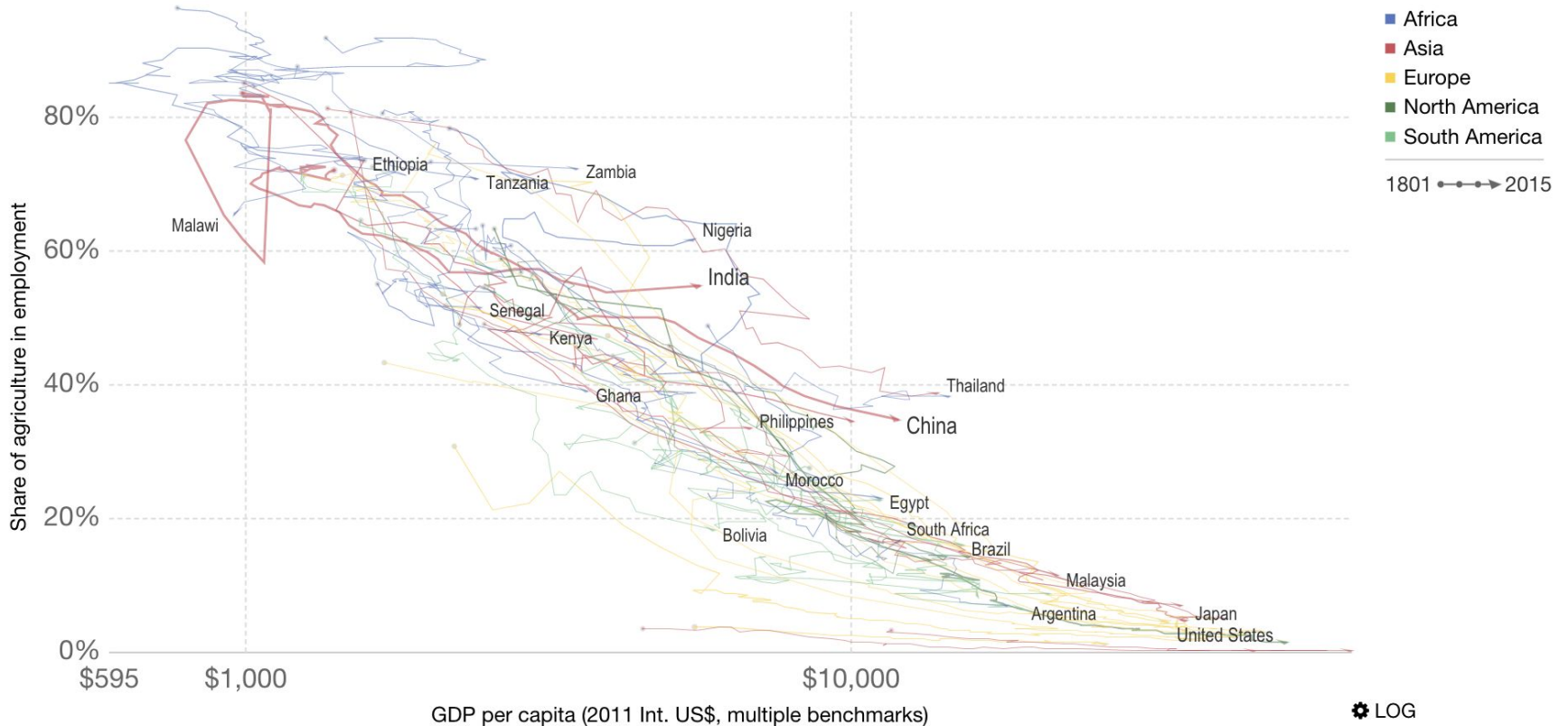
Unstructured data accounts for more than 80%





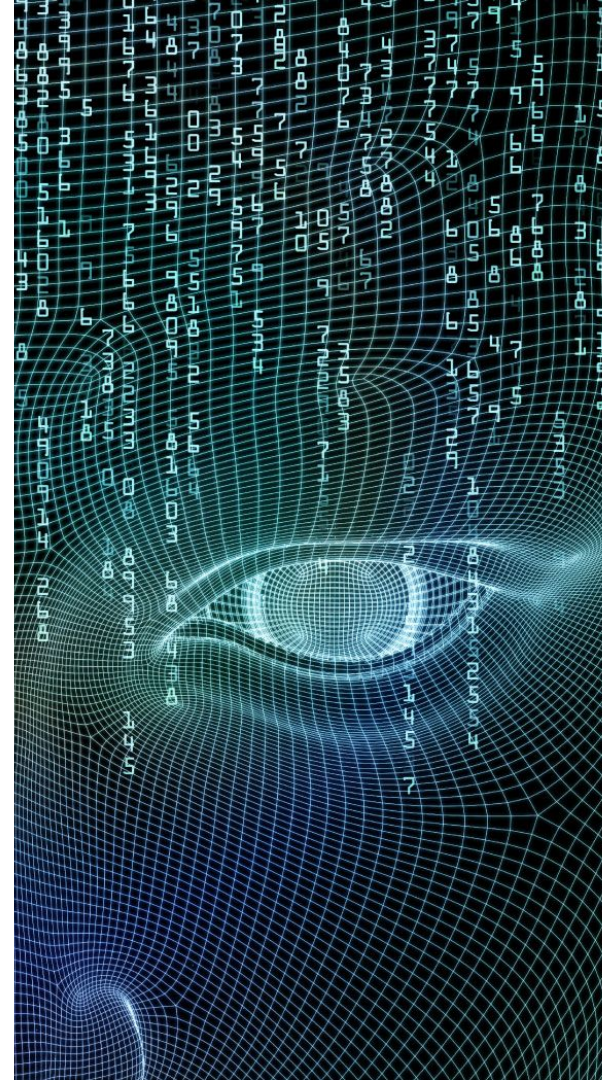
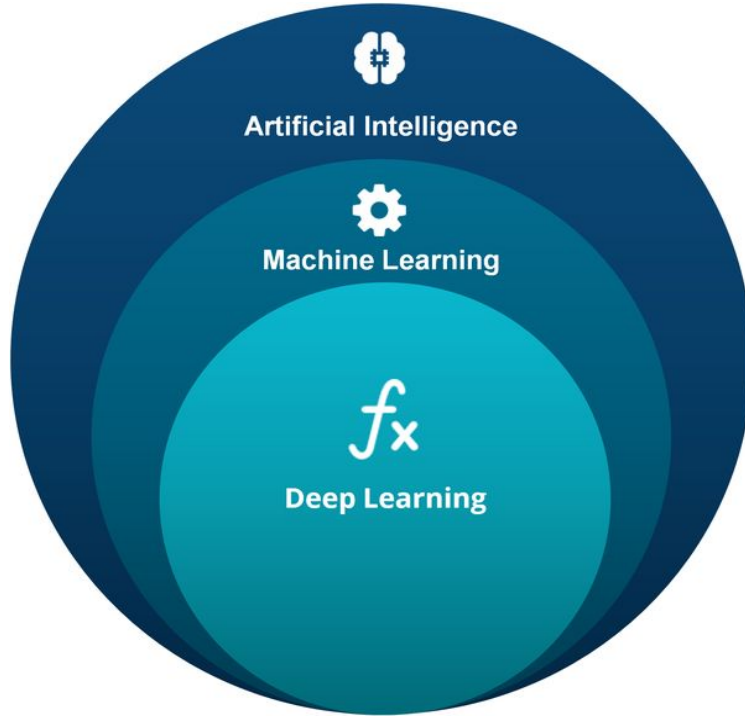
# GDP per head vs share of agriculture in employment, 1801 to 2015

The vertical axis shows historical estimates of the employment share in the agriculture sector. The horizontal axis shows GDP per head after adjusting for inflation (figures are in 2011 international US dollars) and uses multiple benchmarks for cross-country income comparisons.



# ARTIFICIAL INTELLIGENCE TO MAKE SENSE OF DATA

All three continue to make profound impacts on our world today





# ARTIFICIAL INTELLIGENCE IN AGRICULTURE

Market (US\$)

100 BN

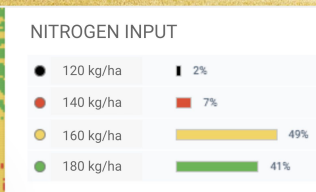
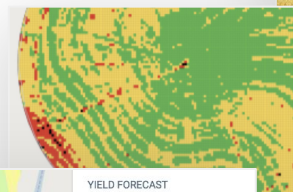
10

1

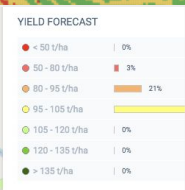
100 MN



**EXECUTIVE AI**  
Fully automated robotic farm

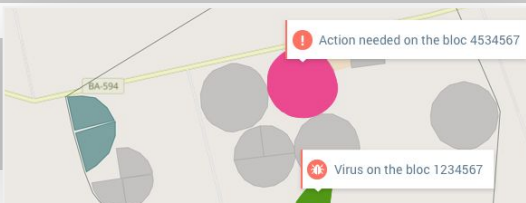


**PRESCRIPTIVE AI**  
Digital agronomy and automated farm management



**PREDICTIVE AI**  
ROI optimisation and risk management

**DESCRIPTIVE AI**  
Improved situational awareness and decision support



**PREVENTIVE AI**  
Crop health and yield optimization

2018

2025

2032

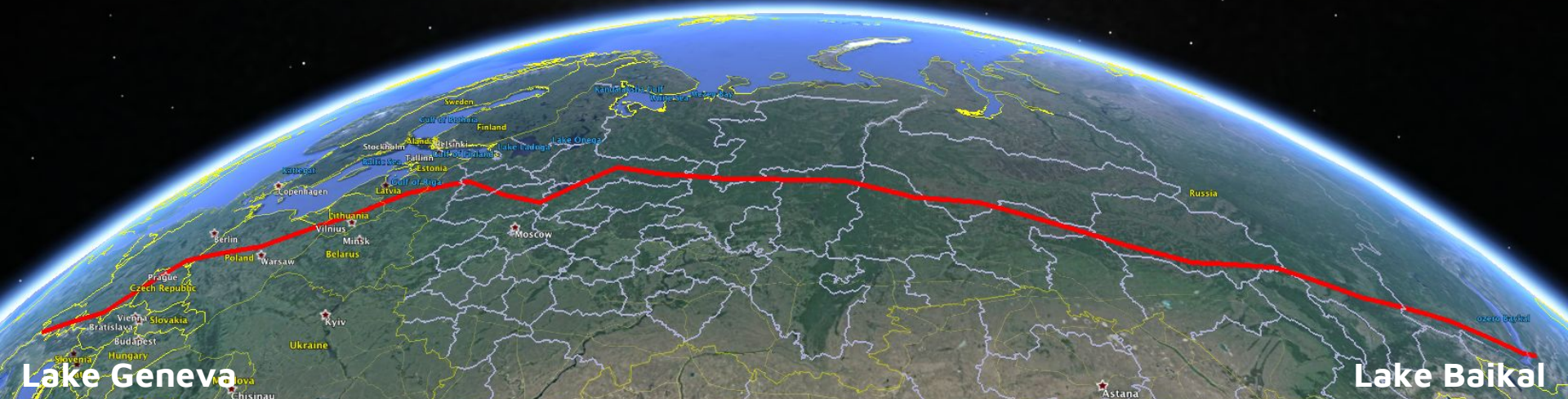
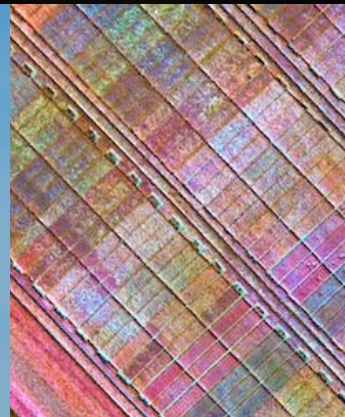
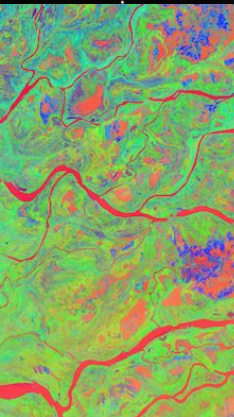
2040

year





# Trans-Eurasian expedition Lemnan-Baikal 2013-2015

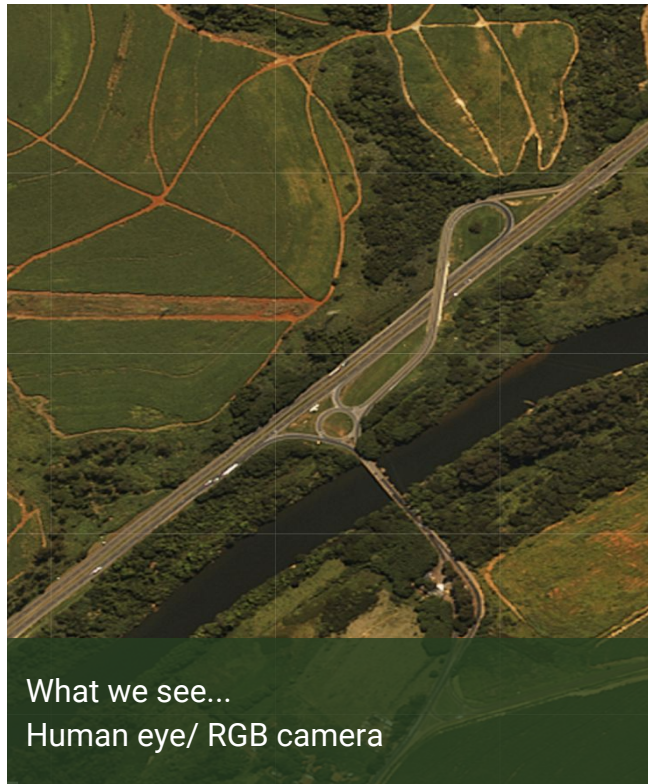


# HYPERSPECTRAL IMAGING

Unique way to connect plant-scale biology with large-scale remote sensing and analytics of crops

The gateway towards AI-driven decision support and process automation in industrial agriculture

Exclusive know-how of Gamaya based on many years of scientific research, as well as extensive portfolio of software/ hardware capabilities and IP



What we see...  
Human eye/ RGB camera

Hyperspectral camera  
What is really there...





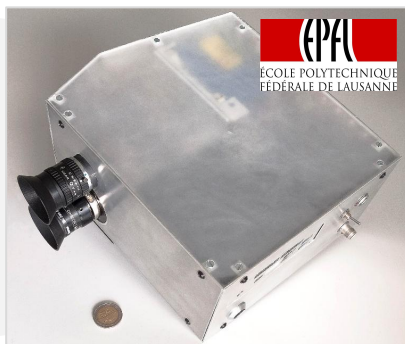
# HYPERSPECTRAL IMAGING TECHNOLOGY

World's smallest & lightest integrated HSI camera

2013 - 15kg



2014 - 5kg



2015 - 250g



2018 - 200g



## UNIQUE HARDWARE

## PROPRIETARY ANALYTICAL PLATFORM

### Unique HSI sensor:

- Miniaturised (fit on any drone)
- Lightweight
- High data compression (up to 100x)

### Integrated system:

- Calibration processes and tools
- Tailored software and algorithms
- Data fusion and machine learning

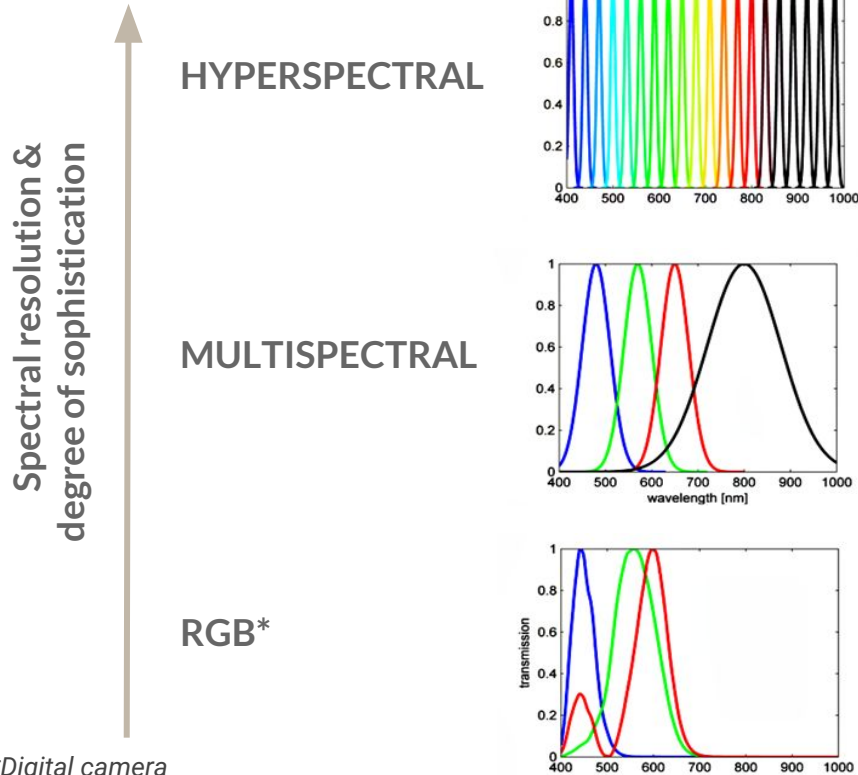
### Proven capabilities:

- Commercial solutions
- Advanced R&D pipeline
- Expert team



# HYPERSPECTRAL IMAGING TECHNOLOGY

Advanced remote sensing technology for rich insights



- Most advanced and **information rich** remote sensing technology
- **High flexibility** to target various stresses (biotic and abiotic), crops and environments
- Technology produces **unique fingerprint** of analysed stress x crop x region
- Enable **diagnostic of complex problems** such as nutrient deficiency, diseases and pests



# ENVIRONMENTAL INTELLIGENCE PLATFORM

Holistic approach using multiple data sources & unique capabilities to provide actionable insights

## MULTI-SCALE SENSOR FUSION



Satellite  
Observations



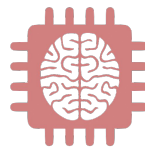
Airborne  
Hyperspectral  
Imaging\*



Weather  
Stations



Crop Model and Spectral  
Signature Database\*



Gamaya AI Engine\*

## DECISION SUPPORT & AUTOMATION

Monitoring and  
Heuristics



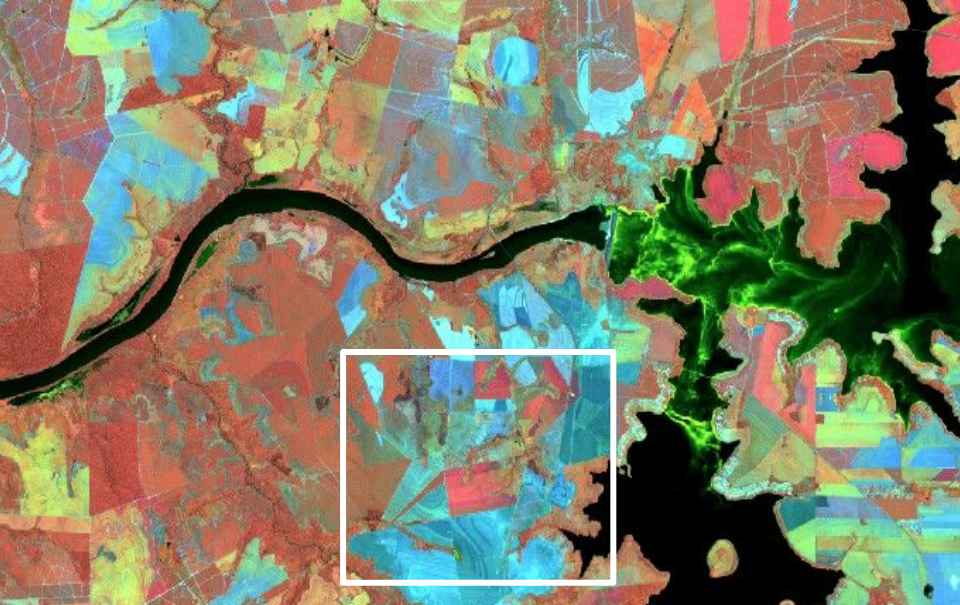
Field  
Robotics



Agricultural  
Machinery

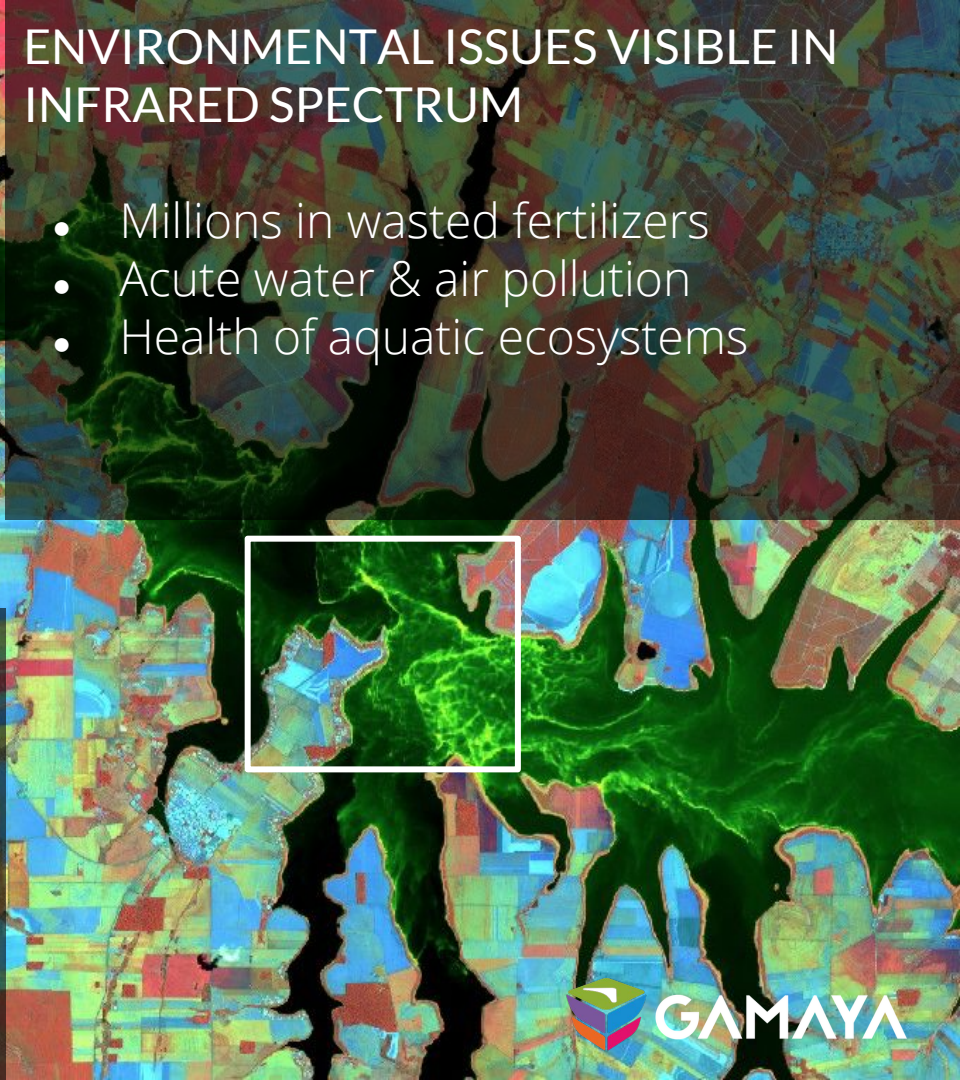






## ENVIRONMENTAL ISSUES VISIBLE IN INFRARED SPECTRUM

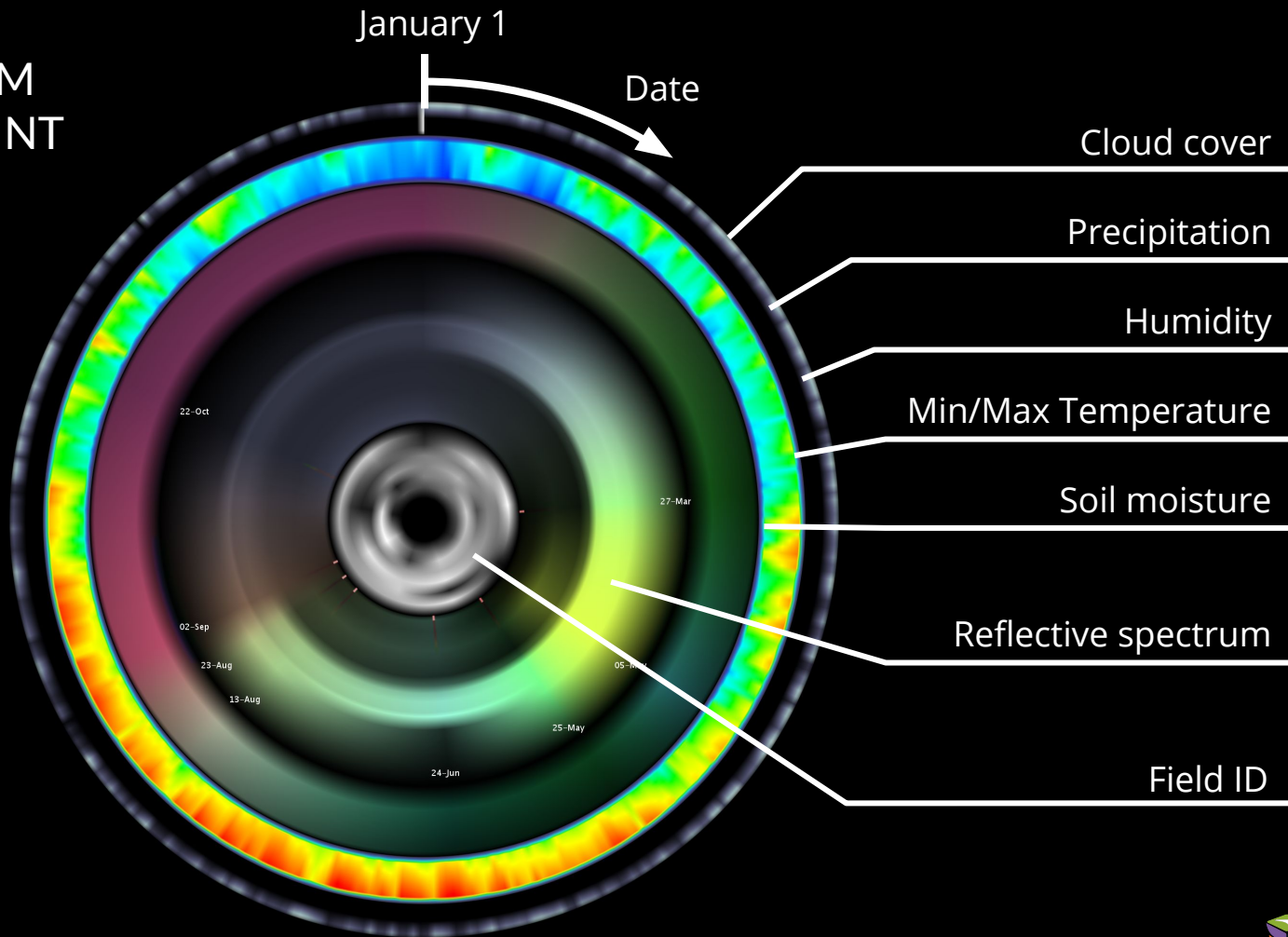
- Millions in wasted fertilizers
- Acute water & air pollution
- Health of aquatic ecosystems



## EVERY FIELD CARRIES UNIQUE, DISTINCTIVE SPECTRAL FINGERPRINT

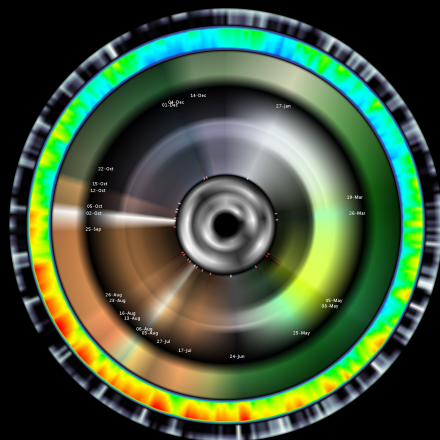
- Optimization of nutrients
- Diagnostics of stress & disease
- Prediction of yields

# ECOSYSTEM FINGERPRINT

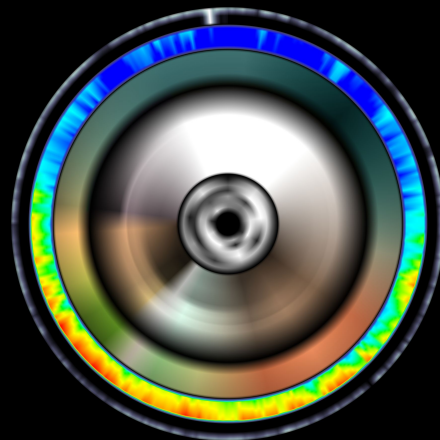




# ECOSYSTEM FINGERPRINT



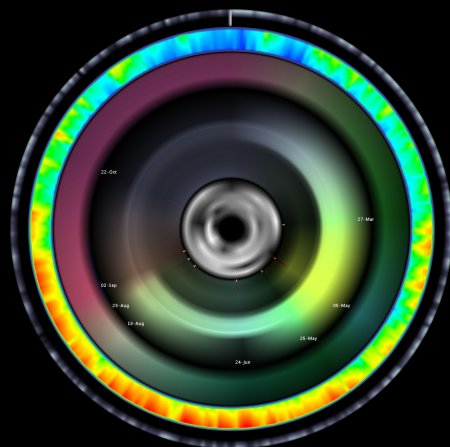
Rapeseed, France



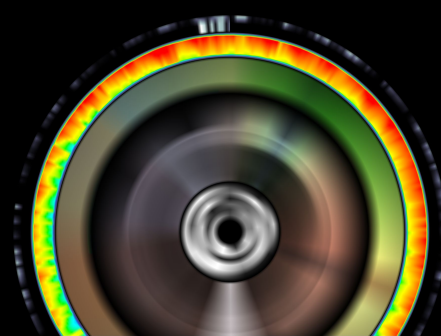
Wheat, Kazakhstan



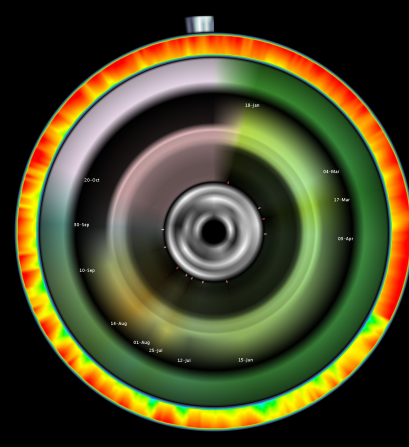
Unused, Kazakhstan



Rapeseed field, Switzerland



Cotton, Australia



Tobacco, Brazil



# SIGNIFICANT VALUE CREATION OPPORTUNITY ACROSS AGRICULTURAL INDUSTRY VALUE CHAIN

\$1.2 TN INDUSTRY, \$240 BN OPPORTUNITY

## EFFICIENCY

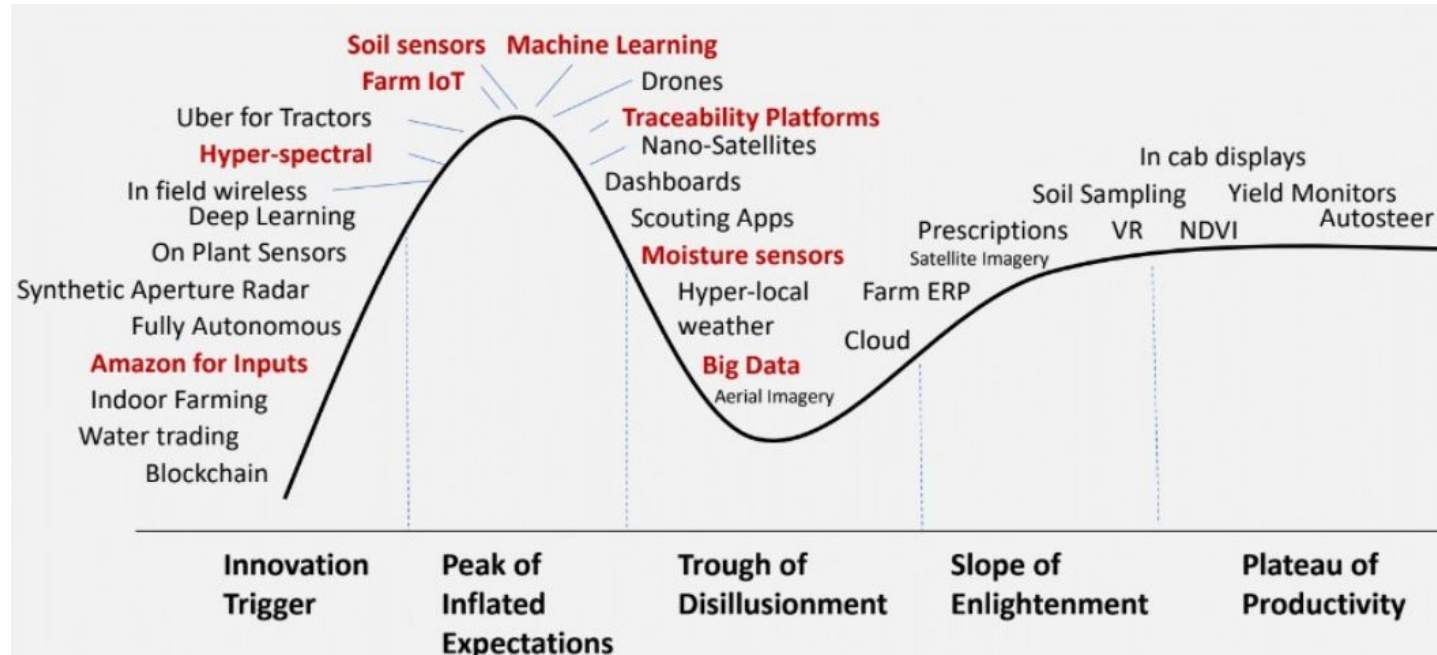
- Fuel
- Fertilisers
- Chemicals
- Water
- Manual Labor

## SUSTAINABILITY

- Yield
  - Quality
  - Environment
  - Business Strategy
-  **SUSTAINABLE DEVELOPMENT GOALS**

# AGRICULTURE INNOVATION ADDOPTION CURVE

Still long way to go...



...PARTNERSHIPS OPPORTUNITIES  
for businesses, start-ups, & academia

# Forbes

Gamaya is one of the 4 European AgTech startups with a potential to become a \$1 billion dollar company

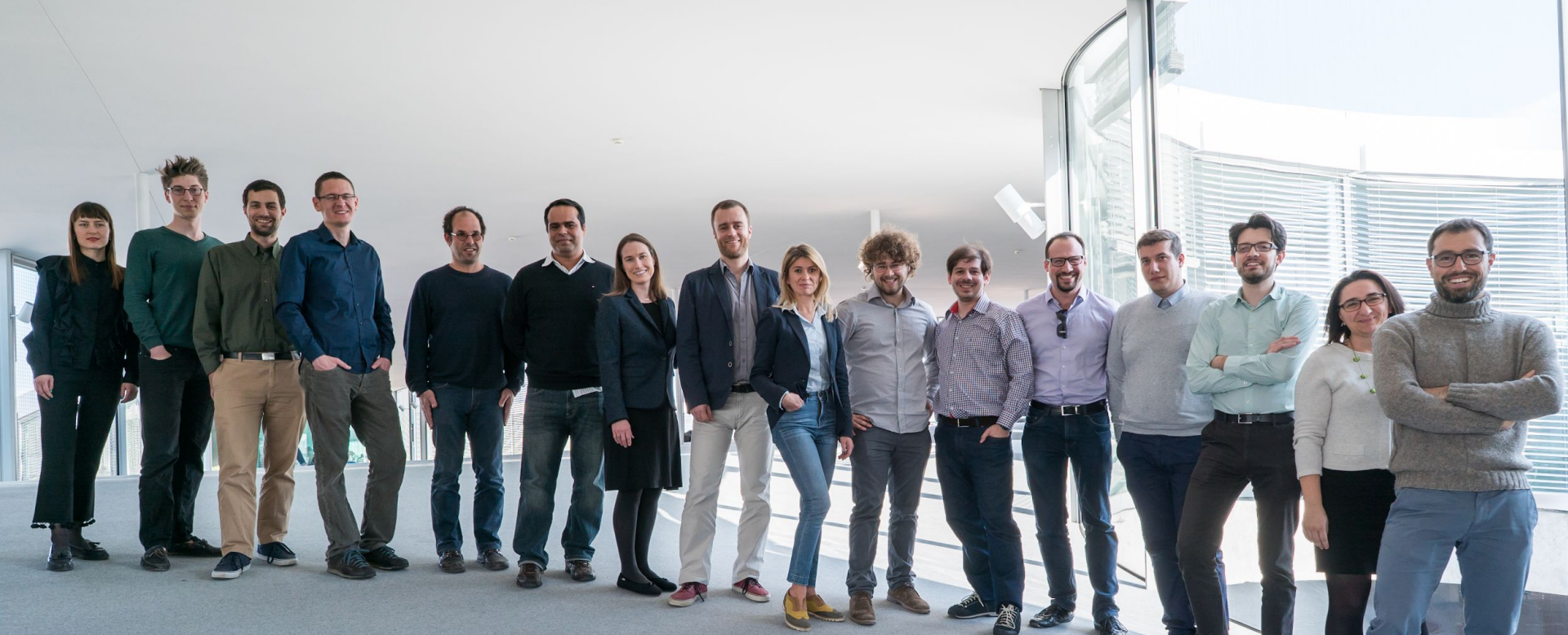
# BUSINESS INSIDER

Gamaya is one of the 12 hottest startups in Switzerland based on the amount raised, headcount, and developed technology

# FORTUNE

Gamaya is changing farming with drones and artificial intelligence





UNIVERSITY OF  
OXFORD



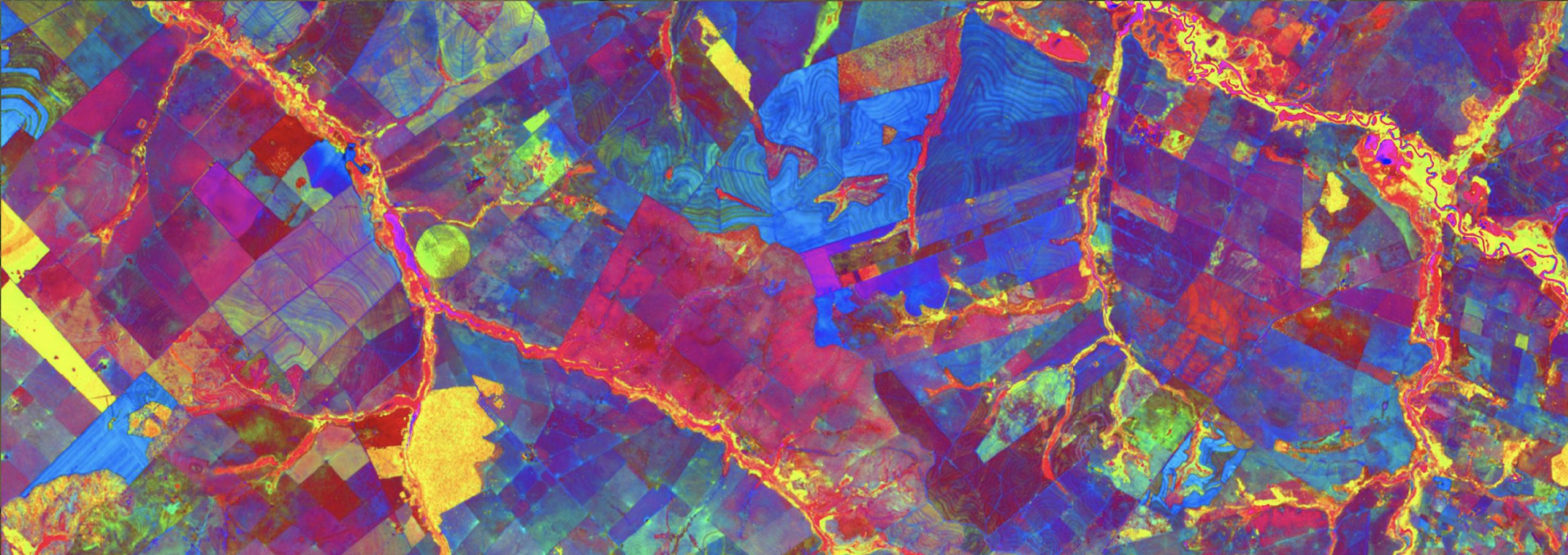
ETH zürich



esa







# ENVIRONMENTAL INTELLIGENCE

## From Theory to Practice

[www.gamaya.com](http://www.gamaya.com)  
[vadim.lysenko@gamaya.com](mailto:vadim.lysenko@gamaya.com)

