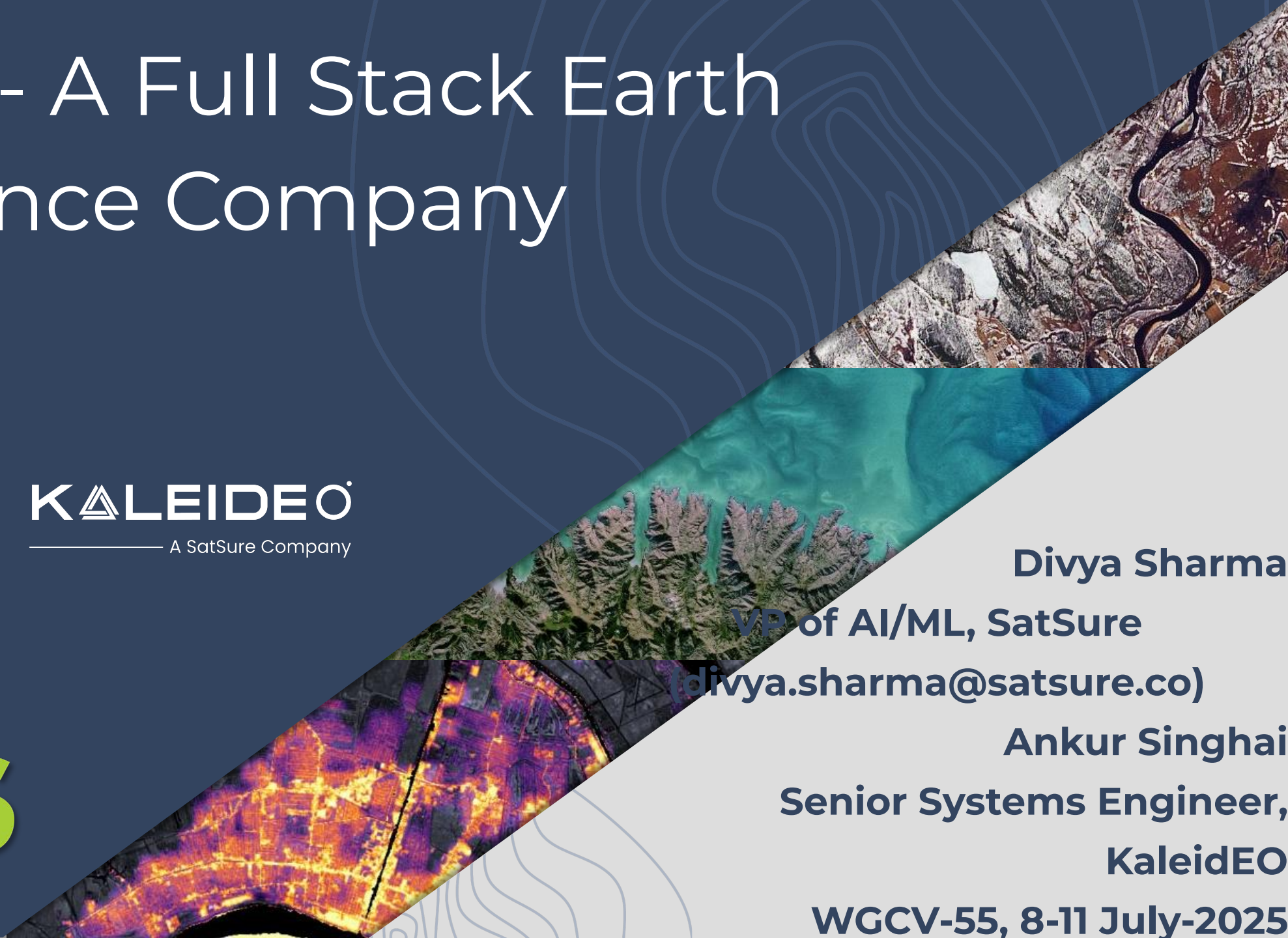
SatSure - A Full Stack Earth Intelligence Company



SATSURE

KALEIDEO
A SatSure Company

Divya Sharma
VP of AI/ML, SatSure
(divya.sharma@satsure.co)
Ankur Singhai
Senior Systems Engineer,
KaleidEO

WGCV-55, 8-11 July-2025

CEOS
Committee on
Earth Observation Satellites

SatSure's Journey So Far

8 Years

Founded in 2017, Series A Co.

$18.5 MN

Funding raised

160

Employee strength

ADB Asian Development Bank	GLOBAL WINNER	2019: ADB Ventures Grant Future Food Asia, 2019 - Singapore
Ministry of Agriculture & Farmers Welfare, Government of India	WINNER	2018: Agriculture Grand Challenge (Ministry of Agriculture, India)
Global Index Insurance Facility, Managed by World Bank Group	TOP 20 GLOBAL	2019: Global Agriculture InsureTech Challenge (World Bank)
MIT Inclusive Innovation Challenge	TOP 3 IN ASIA	2019: MIT Inclusive Innovation Challenge (Technology Access)
Bill & Melinda Gates foundation	TOP 3 GLOBAL	2017: Best AgTech Company Award, in collaboration with Govt. of Andhra Pradesh
World Economic Forum	MEMBER	Member of the World Economic Forum's Global Innovator Community

Baring Private Equity Partners India

ICICI Bank

kotak

HDFC BANK

i.e. Nurturing Ventures

promusventures

FORCE VENTURES

TransUnion CIBIL

OMIDYAR NETWORK

SatSure's Team

Prateep

Founder

ISRO NSR

Rashmit

Co-Founder

ISRO

Dhruva

CRO

esri UK

Founder

GeoSpoc

Deepak

CPO

amazon Flipkart

Abhishek

CGO

amazon Harvard Business School

Gopinath

CFO

ima

Varun

VP - Engineering

D E Shaw & Co

Founder

TENDER CUTS

Divya

VP – AI / ML

Magic Leap

USC

BLUE RIVER TECHNOLOGY

Creating impact across sectors

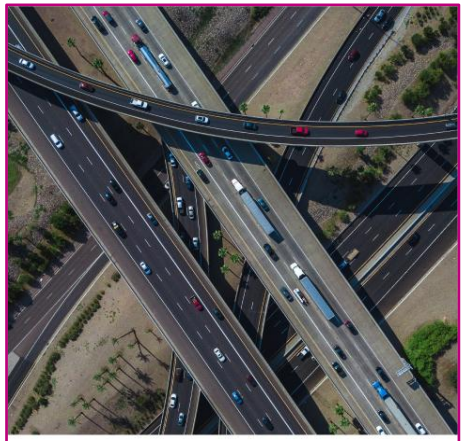
SatSure is a deep tech, decision intelligence company. We leverage advances in satellite remote sensing, machine learning, big data analytics and cloud computing to create products and solutions which help enterprises and their people make smart decisions.

BFSI

Banks, NBFCs, MFIs into Agri Lending + Govt (Agristack)

Agriculture

Agri businesses (Seeds, chemicals), Agri-Commodities, Insurance.Multi-laterals, FMCG



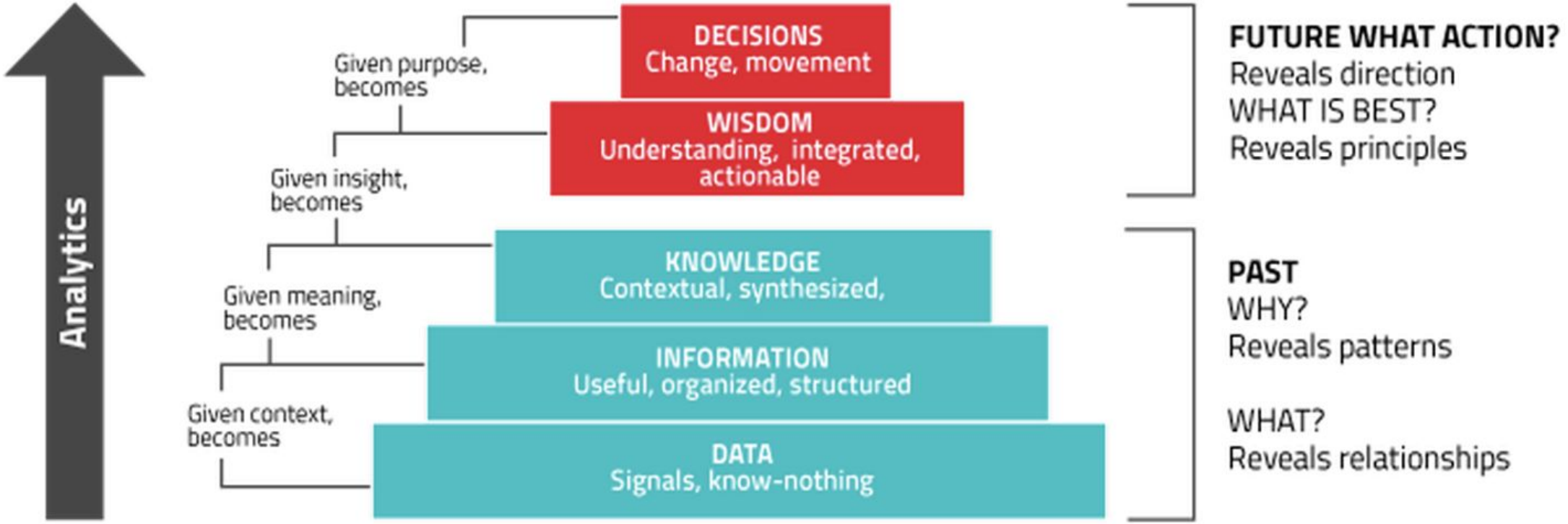
Infrastructure

Airport Operators, Airlines, Powerline Utilities, Roads, Urban Management

Govt and Space

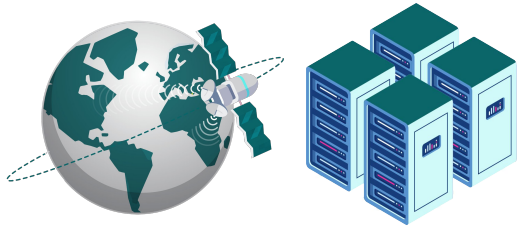
Defense, Civilian Govt, Space Agencies, Satellite Operators

Data to Decision Intelligence



Full stack EO company

Data Generation



KALEIDEO

A constellation of low earth orbit satellites with edge computing

Data Refinery

SATSURE SPARTA

Platform for application ready data products

Data Solutions

SATSURE SKIES

Aviation Solution

SATSURE SAGE

Agri-Lending Solution

45%

of the country's workforce is engaged in agriculture & allied activities

86%

of the operational landholdings is held by small and marginal farmers in India (< 2 ha)

Only 40%

of the small and marginal farmers are covered by formal credit.*

*Reserve Bank of India's Internal Working Group for Agricultural Credit

Empowering Lenders, Transforming Livelihoods

Our vision is to create a future where access to credit is not a privilege but a universal right for every farmer regardless of location or scale.

*FY 2023 – 24 (YTD)

Our goal is to facilitate access to formal credit for **10 Million** small and marginalized farmers by **2027.**

Crop monitoring using EO data

SATSURE SPARTA

Analytics Ready Data Products

Land monitoring

Crop monitoring

Farm boundary

Irrigation map

Crop rotation

Crop health

Sowing progression

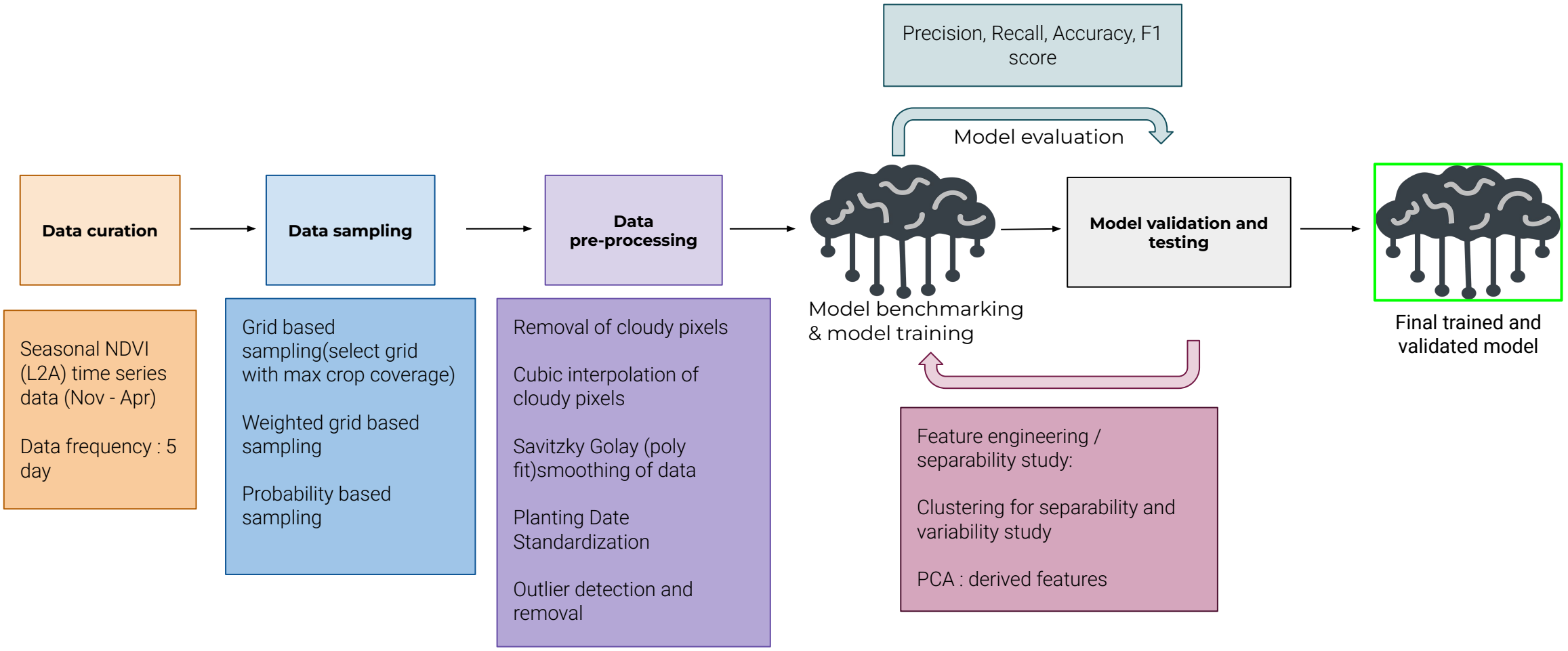
Potential yield

Harvest progression

Crop classification

Crop Classification

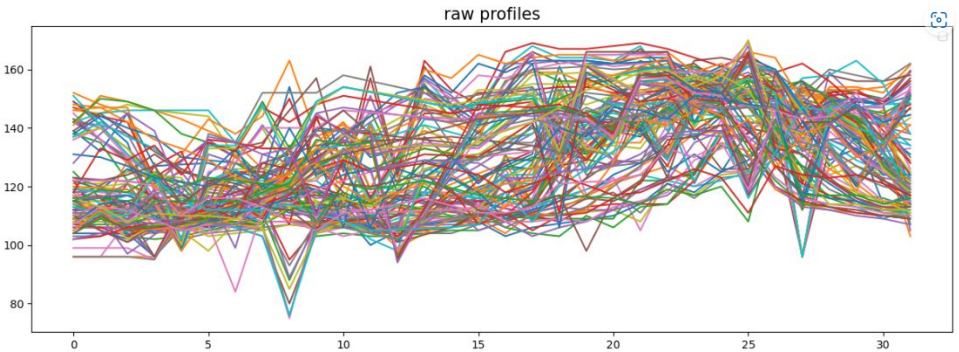
ML/DL Framework



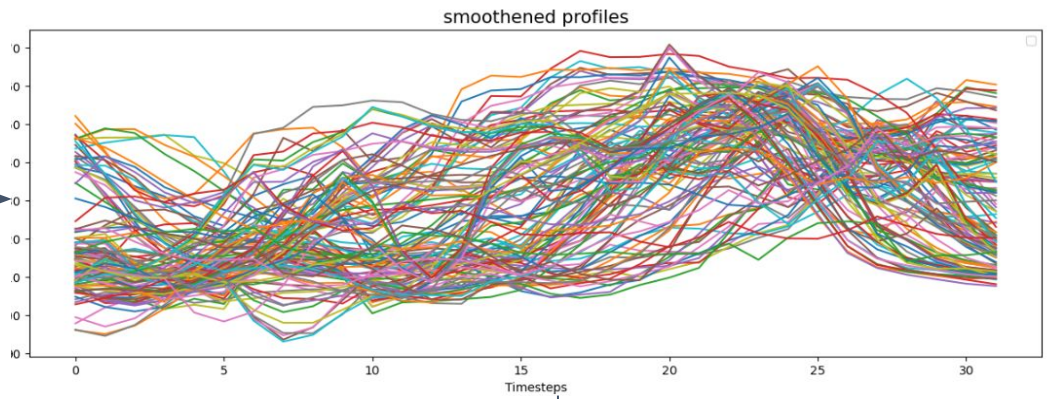
Agriculture Crop monitoring

TS/MP/RJ/HR Rabi 2022

Raw

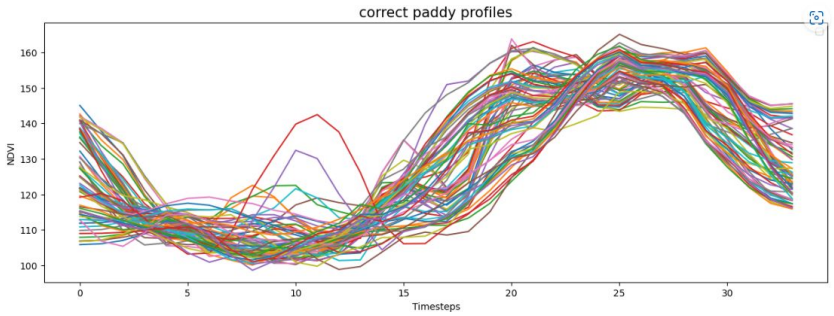


Smoothened

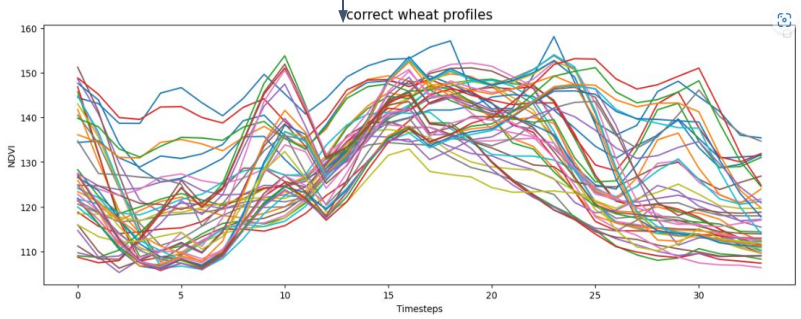


Data Modelling

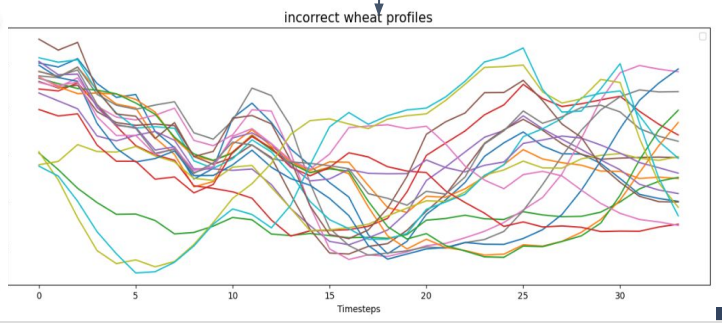
Paddy



Wheat

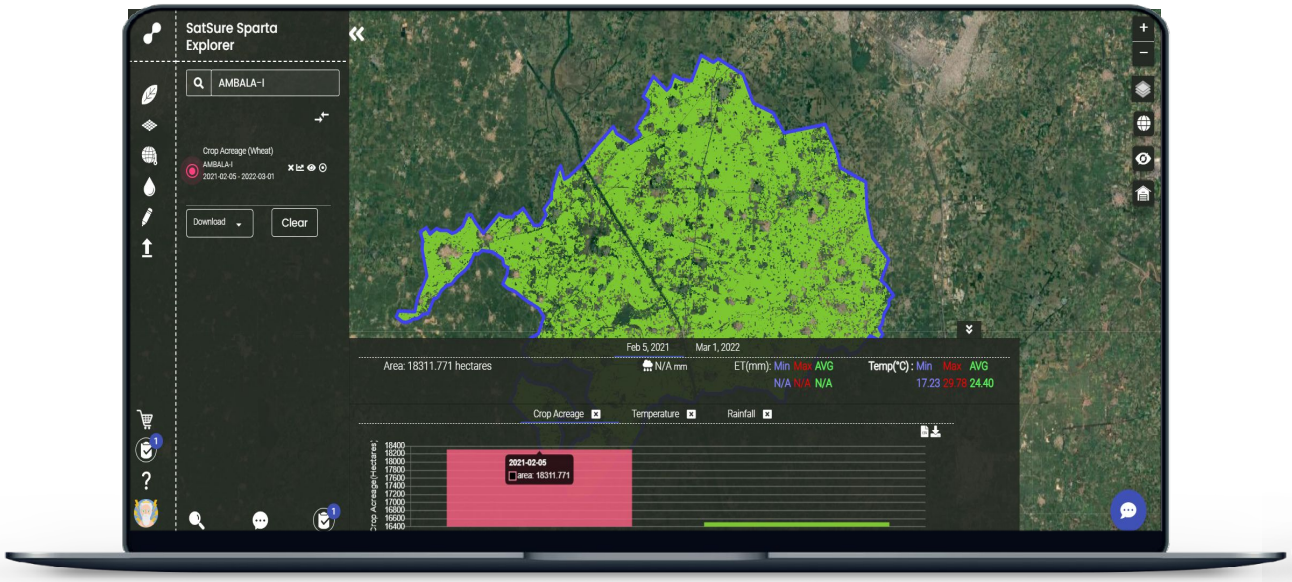


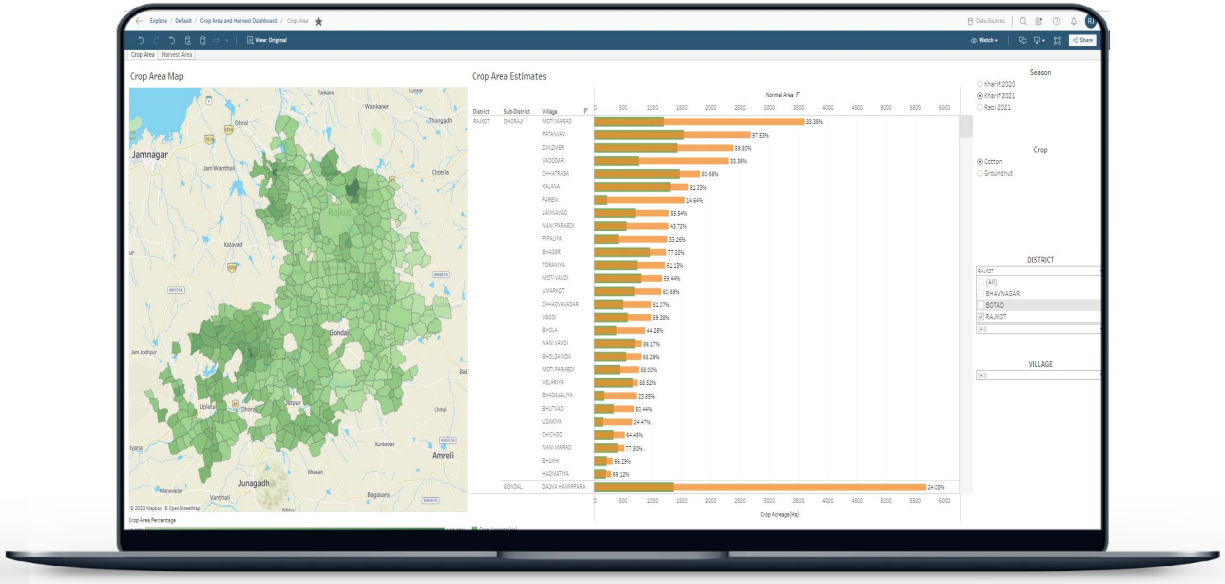
incorrect



Crop Area

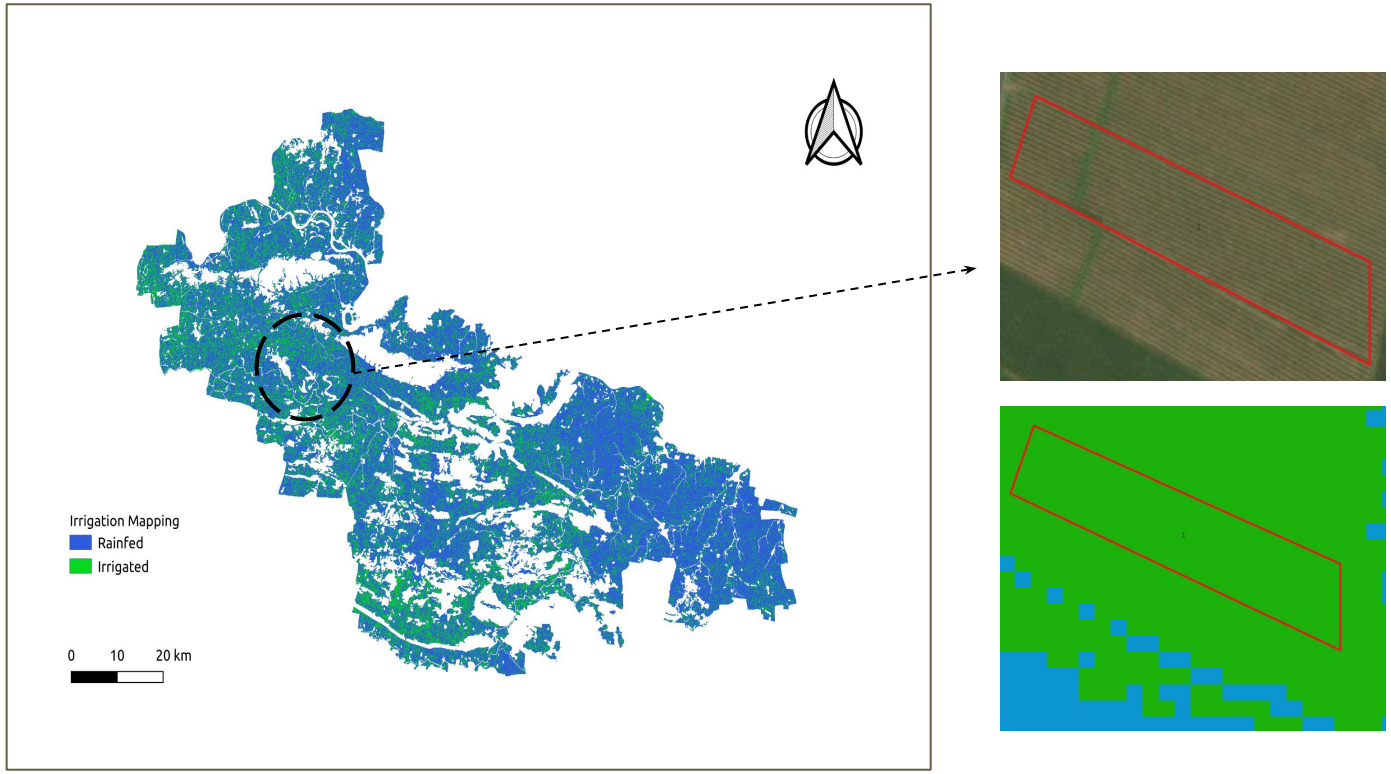
Area covered by a specific crop in a geography derived at the vegetative stage of the crop.
More than 18 crops classified





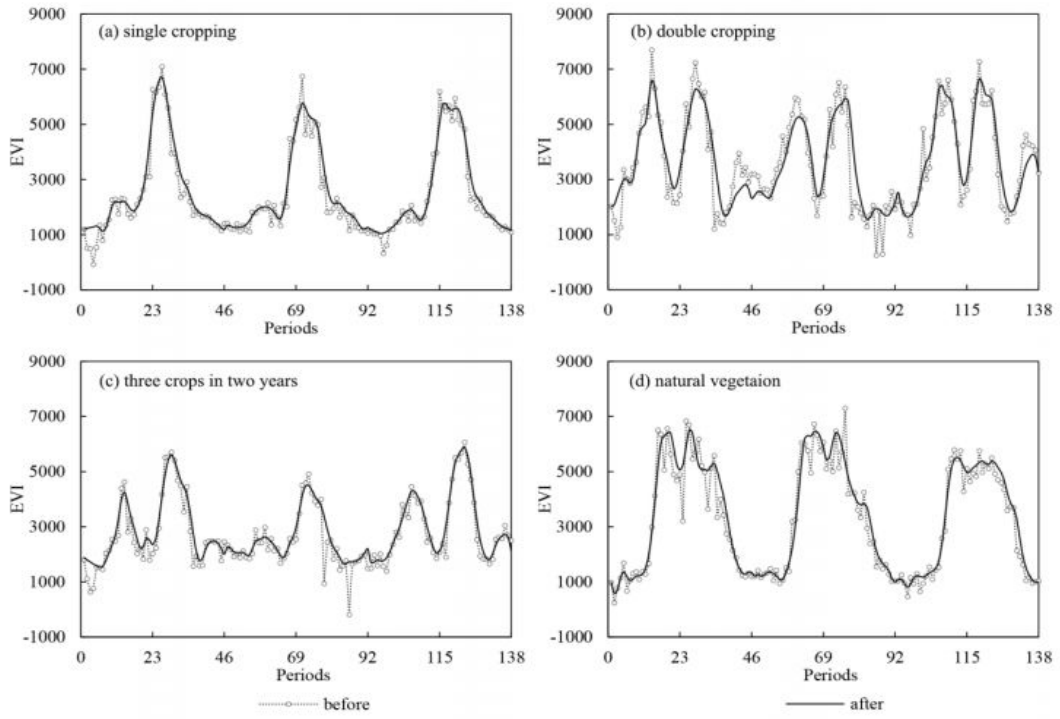
Irrigation Mapping

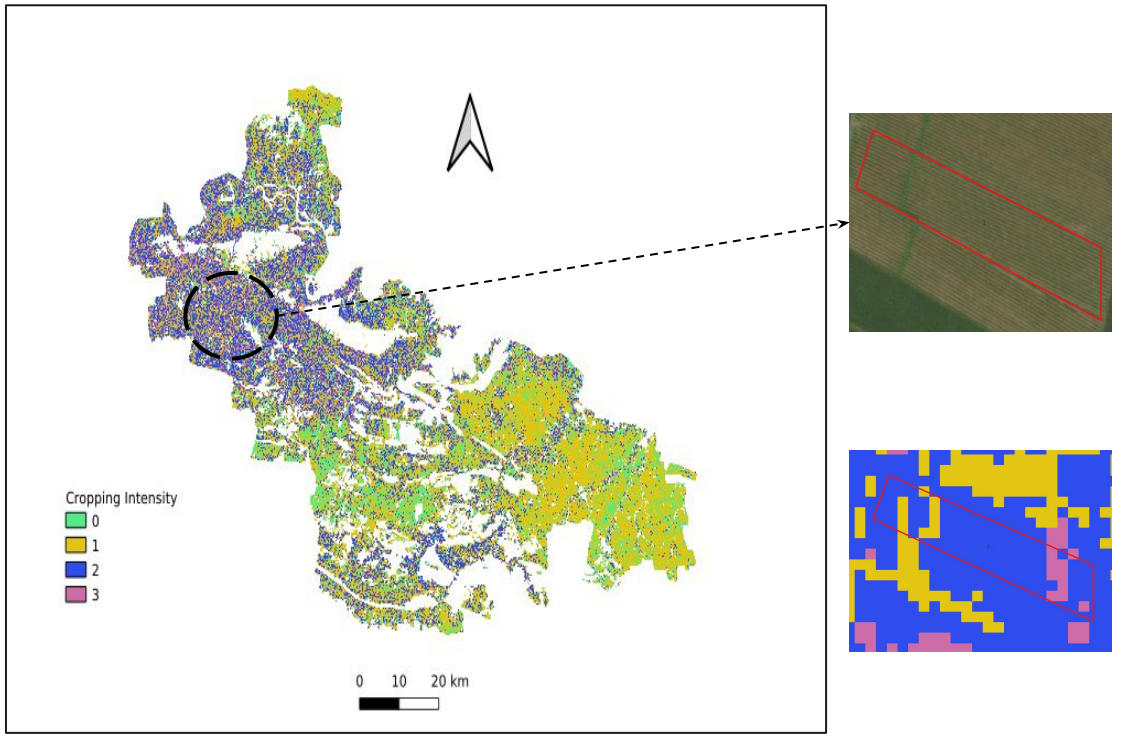
The framework employs pre-processed NDVI, MNDWI, LSWI from Sentinel 2 to analyse if a farm exhibits spectral signature similar to that of the agricultural farm that has had moisture presence due to irrigation in an year



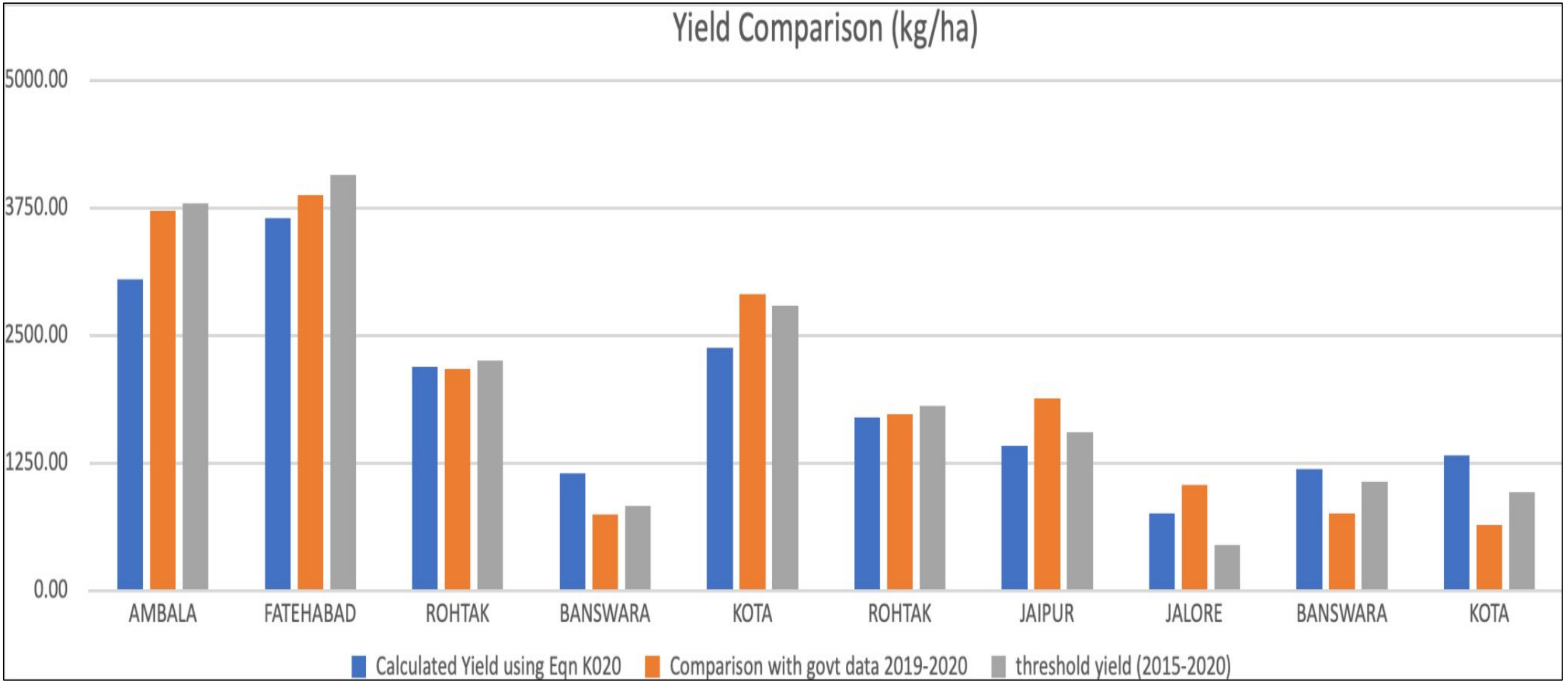
Cropping Intensity

The framework employs pre-processed NDVI from Sentinel 2 to analyse the number of times a particular farm exhibits spectral signature similar to that of the agricultural crop phenology in an year





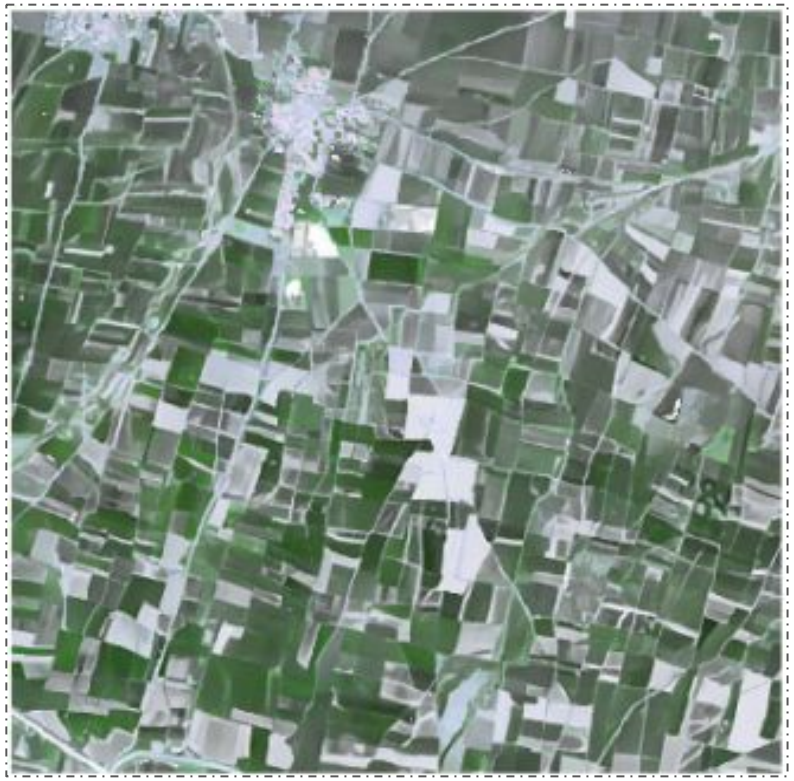
Crop Yield estimation



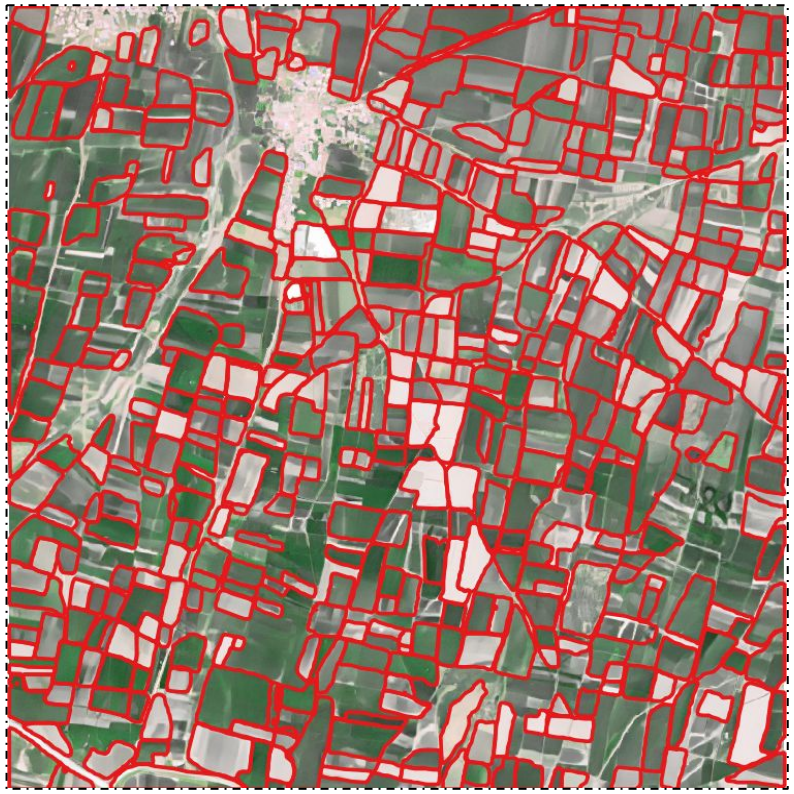
Farm Boundary

Identification of farm boundaries using satellite images with supervised image segmentation based approach.

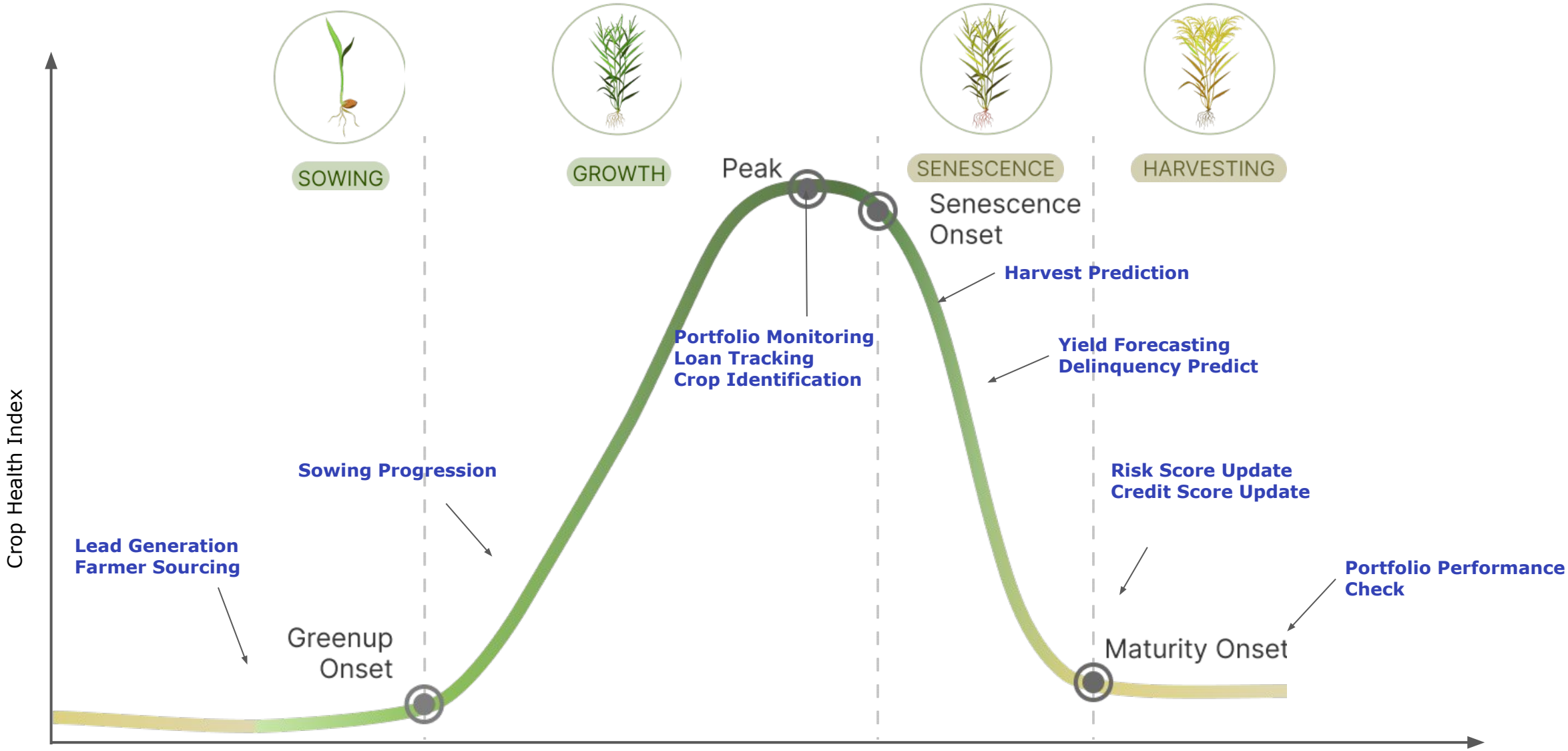
Input Image



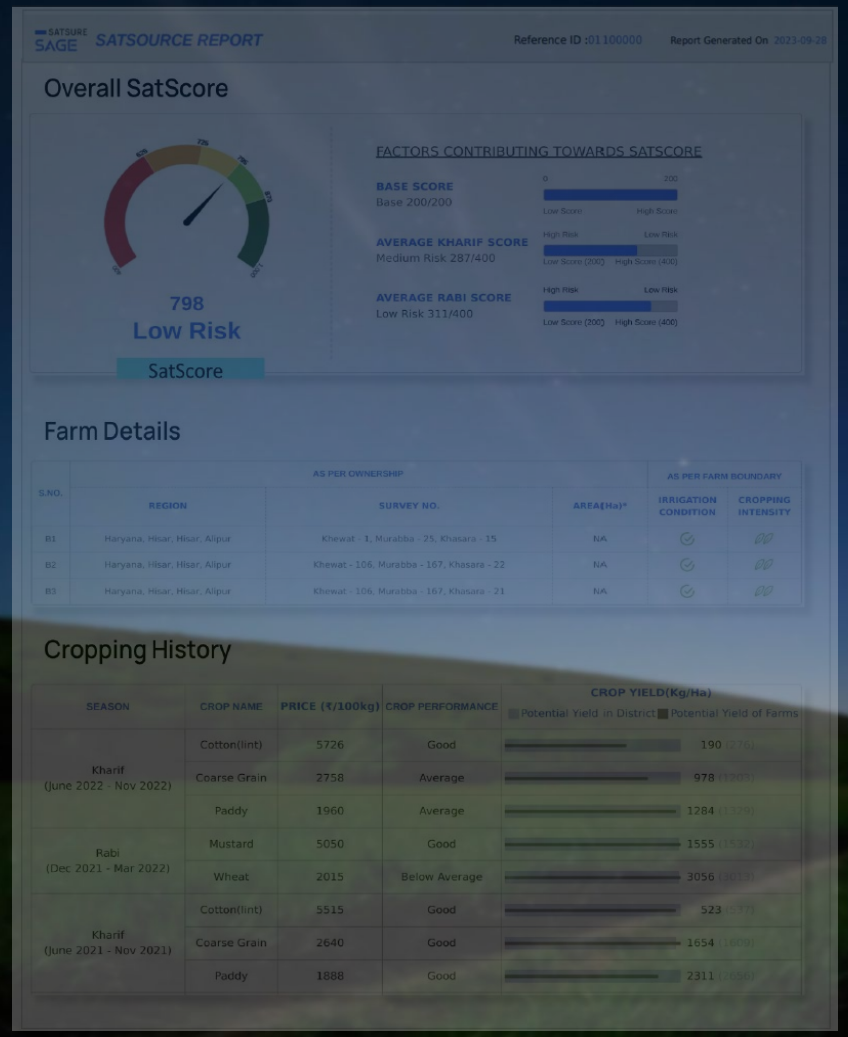
Output Image



Agriculture Crop monitoring



SatSure Sage: Empowering banks and NBFCs



Specific problem: To issue agriculture loans, banks need to verify the land, its usage, and other characteristics like soil type, etc.

Before SatSure

- High processing time and cost
- Poor performance of Agri-loan portfolio
- Low approval rate due to data unavailability
- Expensive end use monitoring

Value Unlock

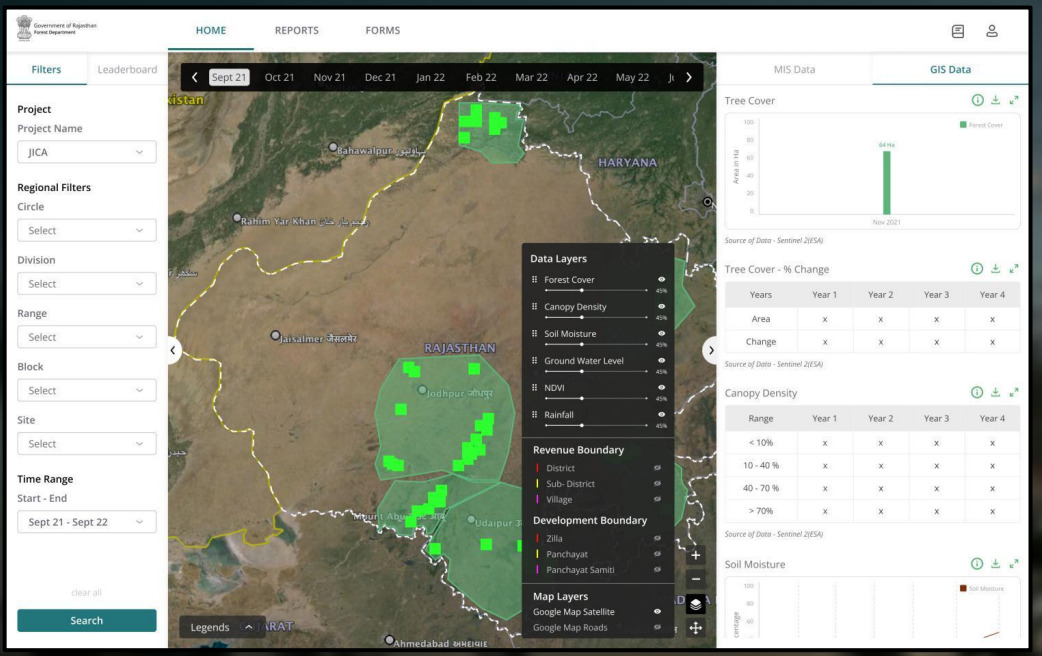
- Processing time brought down to **<1day** from multiple weeks
- Uplift of **15%** in quality of Agri-loan portfolio
- Increase in approval rate by **50%**
- Field visit costs down by **80%**

The Agri-BFSI EO TAM is upwards of $200Mn, just in India

SATSURE

Forestry: Enabling scale and faster decision making

Specific Problem: State-level Forest Departments need a digital platform for Monitoring Forest Health in respective states, enabling Decision Intelligence for Afforestation and Restoration efforts



Before SatSure

- Lack of Digitisation
- Absence of a Unified Platform
- Data Unavailability
- High Cost of Data Collection

Value Unlock

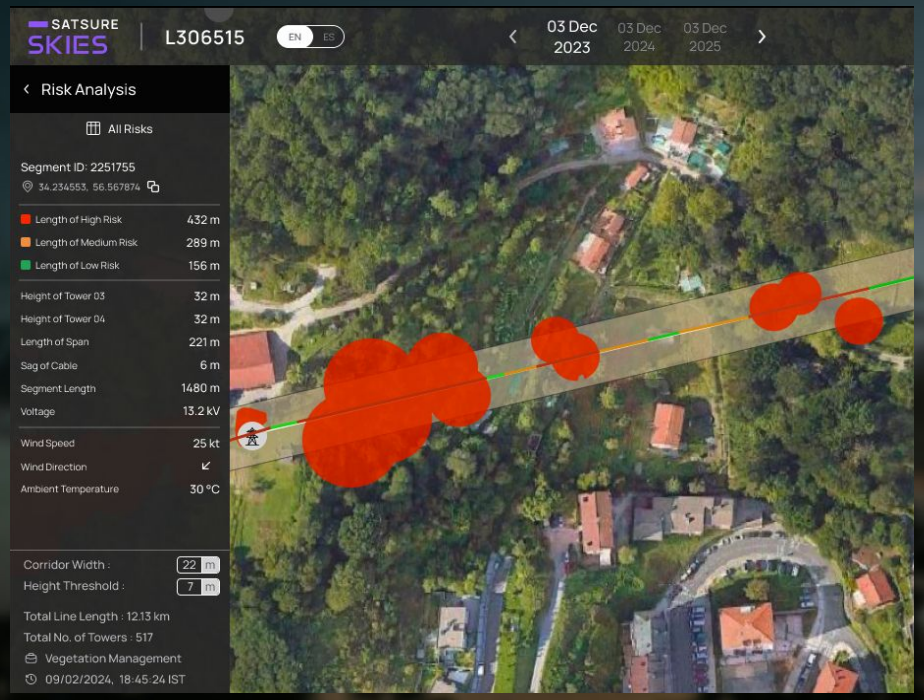
- Digital Platform
- Unlock usage across departments, and enable more use cases such as carbon credit generation
- 360 degree coverage enables monitoring at scale
- Cost Savings via Digitisation

The Forestry EO TAM is upwards of $60Mn, just in India

SATSURE

Utilities: Improving safety & lowering costs

Specific Problem: Energy companies need to manage vegetation to ensure uptime of power transmission lines & ensure safety



Before SatSure

- Expensive helicopter flights fitted with sensors
- Costly verification by human intervention
- Low frequency of data collection
- Expensive audit of clearing work done by contractor

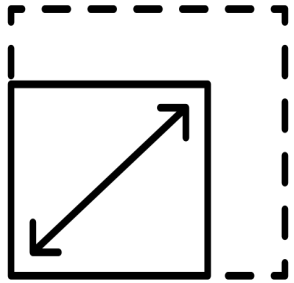
Value Unlock

- Cost savings ~ 42% in the O&M PnL
- Reduction in inspections
- Early detection of issues
- Reduced response time to incidents

The Power Transmission EO TAM is upwards of $500Mn, across India & EMEA

EO data product Challenges

Challenges



Spatial/Spectral Resolution

Data Gaps (illumination/clouds)

Development time

Scalability / Generalization

Lack of GT/labeled data

Building core tech for future

SATSURE
CYGNUS

Synthetic Cloud Free Satellite Imagery

Continuous monitoring capability for monsoons and heavy cloud cover areas

SATSURE
CYGNUS

Synthetic Super Resolution for Satellite Imagery

4X resolution improvement
10 m satellite image to 2.5 m
Improve your model accuracy

KALEIDEO
A SatSure Company

Own a fleet of high resolution optical, multispectral satellites
Easy access to high frequency, high resolution data for better insights

KaleidEO, a SatSure company, is focussed on upstream business for SatSure, that translates into jointly creation of a full stack EO company from India.

Our Vision

To Maximise the Value Derived from Earth Observation

KaleidEO's Approach

Demand First Business Model

KaleidEO follows a 'demand' first model, which focuses on segment and vertical applications and derives payload configurations to match the demand.

A Solution First Product Approach

KaleidEO's approach focuses on solution building in EO downstream first, to get the right business viability for a sector with currently available data and AI/ ML applications through backwards integration.

Technology Innovation

Rapid Prototyping and COTS approach to engineer payloads demand in house while following a decentralised realisation strategy, allowing faster GTM

Standardised Platform

KaleidEO has partnered with its parent company SatSure to enable access to its data platform which focuses on standardizing data storage and consumption for remote sensing data

Uplink
Command
S/W patch updates

Downlink
Image data
Metadata
Housekeeping data

Ground station

Mission Ops

Ground station server

Data Archival and Processing

UPSTREAM

Mission and Payload

- Mission definition - Orbit, Revisit, Duty Cycle
- Satellite requirements - power, data link
- Payload design and realisation (optics & electronics)
- **Edge AI/ML model dev**

MIDSTREAM

Payload Scheduling and Ops Software

- Optimal payload planning software - mission design
- Software platform to interface imaging requests and schedule interface with mission ops centre

DOWNSTREAM

SATSURE

Data Insights, Visualisation and Decisions

Pre-processing

- ARD: L0 to L2 Processing
- Archival on data platform

Solutions for End User Applications

KaleidEO's Offerings: For Ecosystem

Designed for Large Area Analytics

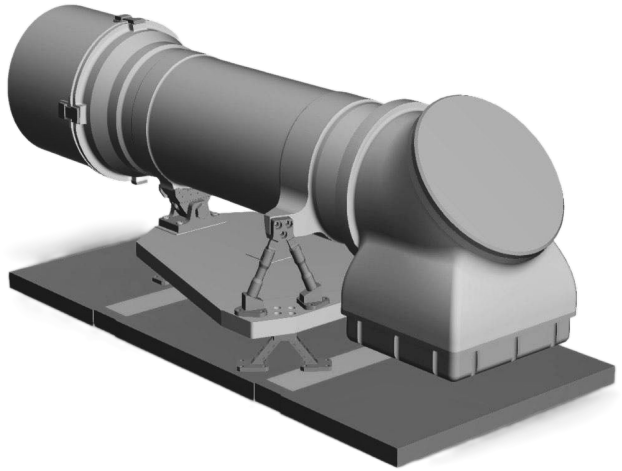
Nadir GSD (at 425 Km)	**PAN**	1 m GSD
	Multispectral	3.5 m in MS bands 5.3 m in Red Edge
Spectral bands		PAN, Red, Green, Blue, NIR, Narrow NIR, Red Edge (1-2-3), > 85:1 in PAN > 100:1 in MS bands > 75:1 in Red Edge
Swath		65 km
Bit Depth		10 Bit
Volume		400 x 350 x 900 mm
Mass		<50 kgs
Power		75 W

KaleidEO's Offerings: For Ecosystem

Key Differentiators

1 **Optical Innovation:**
High swath and High-Res in one solution enabling **Large Area** capture, i.e. capturing Bengaluru in one single image

2 **Modular and Scalable:**
Designed to be platform agnostic: can be put on multiple satellite bus options. Rapid scaling and reutilisation of technologies for derivative solutions



3 **Beyond resolution and swath:**
Designed for high Signal-to-noise Ratio (SNR) enables best-in-class image quality. Comparable to Sentinel-2 (ESA)

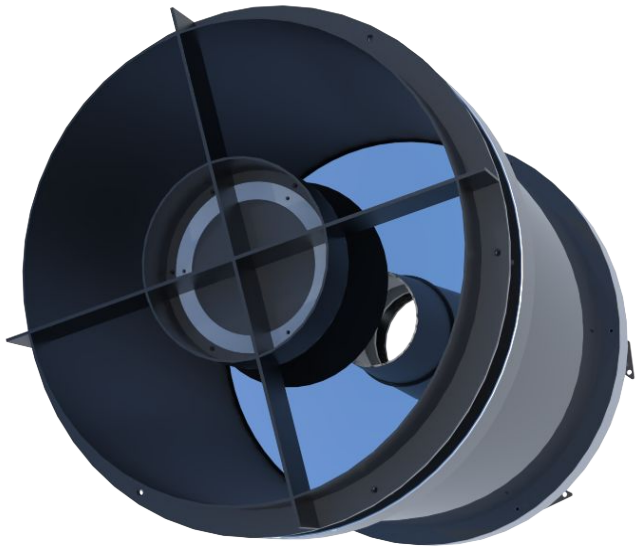
4 **COTS philosophy:**
Built around COTS (Commercially Off The Shelf) components. Enabling rapid product development and overcoming sourcing constraints

5 **AI/ML on board :**
On-board computing enables efficient AI/ML based processing. Generating Actionable Insights on demand, lower TAT and reduce downlink opportunity costs

KaleidEO's Offerings: For Ecosystem

Designed for Precise Object Identification

Nadir GSD (at 500 Km)	**PAN**	0.5 m GSD
	Multispectral	1.4 m (option to PAN sharpen)
Spectral bands		VIS-NIR (upto 7 bands) 100:1 SNR in PAN
Swath		11 km
Bit Depth		12 Bit
External volume		ϕ 500 x 850 mm
Mass		40kg
Power		60 W



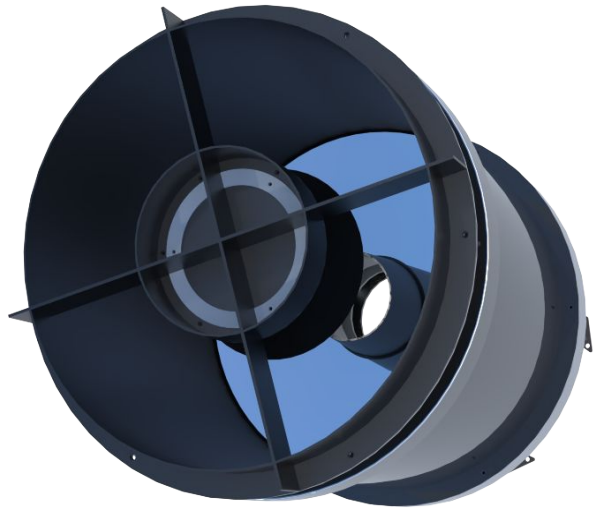
KaleidEO's Offerings: For Ecosystem

1 **SOTA Sensor**

High swath and High-Res in one solution enabling **high swath for comparable resolution from competitors**

2 **Modular and Scalable**

Designed to be platform agnostic: can be put on multiple newspace platforms meant for RC telescopes as central mount.



3 **Future Ready**

Meant for SSO and Inclined orbits, this platform can be scaled and iterated fast to reach upto 0.3m GSD from same sensor baseline. Reducing Engineering efforts.

4 **Reliability and Affordability:**

Built around carefully selected semi- COTS (Commercially Off The Shelf) and Rad-hardened critical components.

5 **AI/ML Ready**

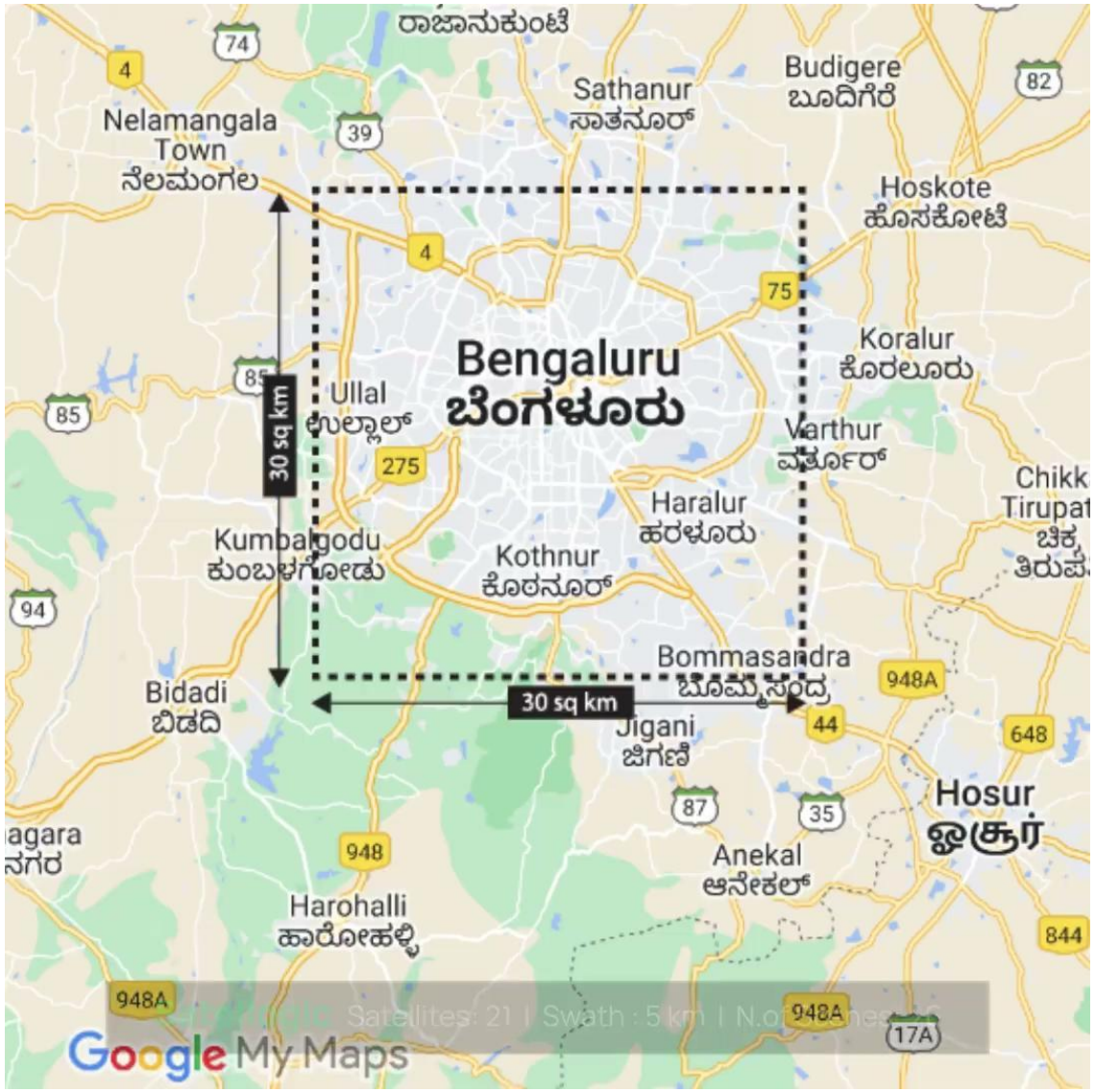
On-board computing enables efficient AI/ML based processing. Generating Actionable Insights on demand, lower TAT and reduce downlink opportunity costs

Enabling Large Scale Analytics through Large Swath and High - Res Satellites

1) Better Inputs: Moving away from time composites, better quality of insights

2) Machine Friendly: AI/ML model favorable data inputs requiring less manual intervention and/or pre-processing processes.

3) Higher Automation in data processing pipeline



Solving the Data Problem with KaleidEO

Image Providers	Resolution (m)	Swath	Coverage/satellite (km^2)	No. of satellites
KaleidEO (Wide Swath) (at 425 km)	1.0	65	250,000	2
KaleidEO (Sub-Meter) (at 500 km)	0.5	11	100,000	3
Competitor Landscape				
Satellogic	0.7	5	<75,000	26
Planet	0.75	5.5	<75,000	21

KaleidEO's capability to achieve multi-use, multi-resolution, high quality optical imagery will allow for better solution fit than single-size-fits-all strategy.

Key Milestones

1st Edge Computing

1st Payload Prototype

Live through the experience !

First private company from India to successfully **test edge-computing in space**

First private company from India to design, develop and test **high-resolution, multi-spectral, optical payload** through aerial tests

https://www.youtube.com/watch?v=_MXIy_Q1NAM

KaleidEO's Edge Computing

Optimized CPU+GPU Inferencing

25x faster edge case inferencing

Automated Georeferencing-Registration

Streamlined and automated georeferencing process

Fastest Tiling Algorithm

5x faster than gdal2tiles

GPU-Based Raster Calculation Kernel

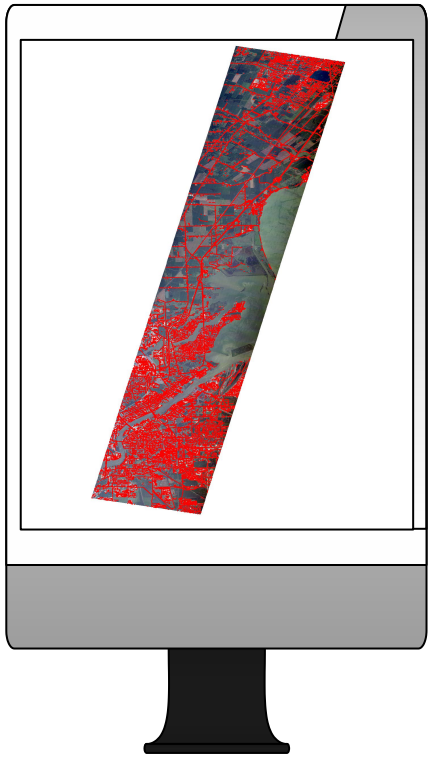
Significantly faster than CPU alternatives

Heterogeneous CUDA Grid Innovation

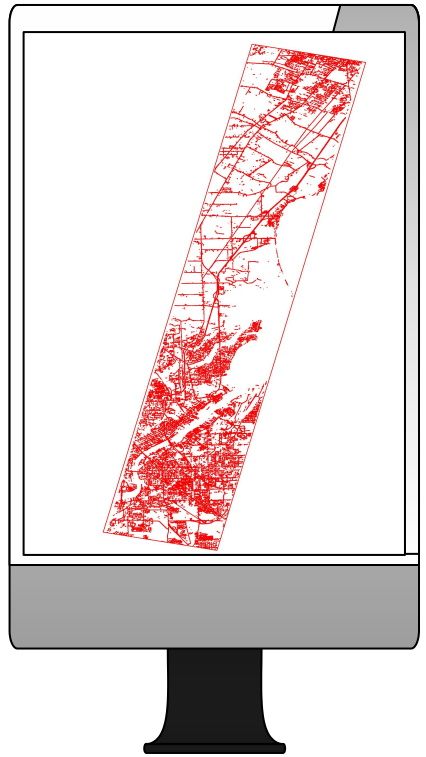
30% faster performance with CUDA

Road Network Delineation with Edge Computing

Original Image



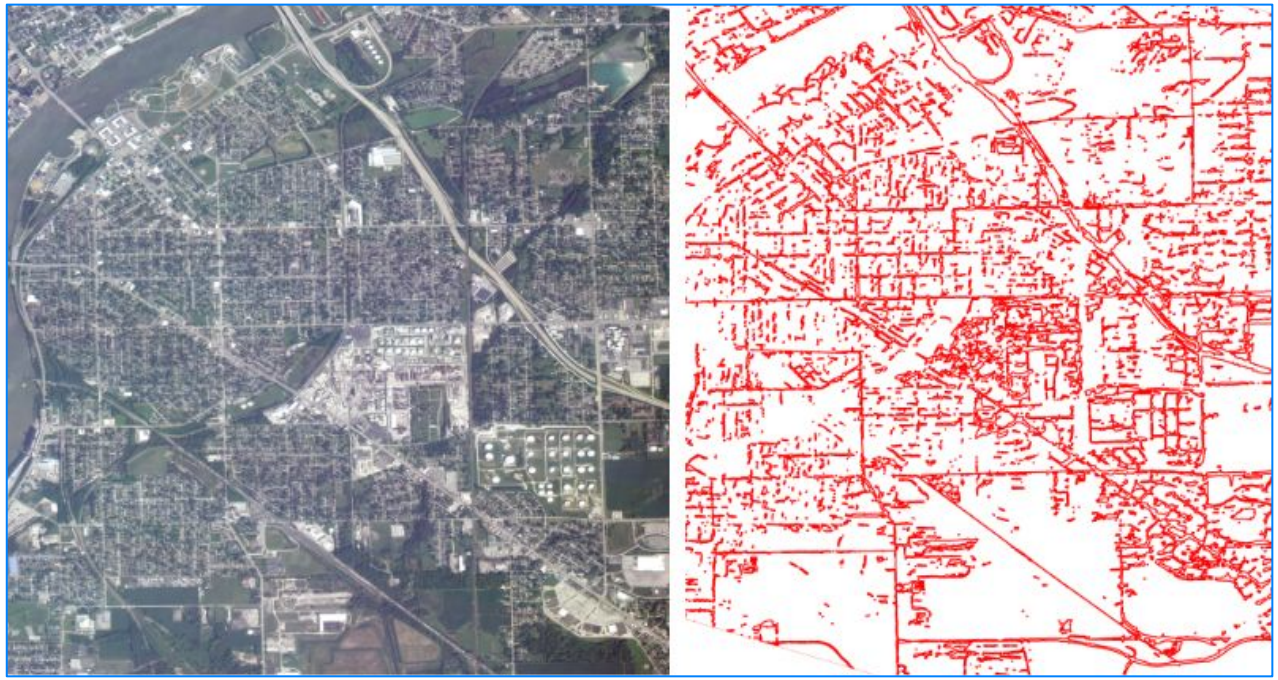
Road Network Identification



Road Network Delineation

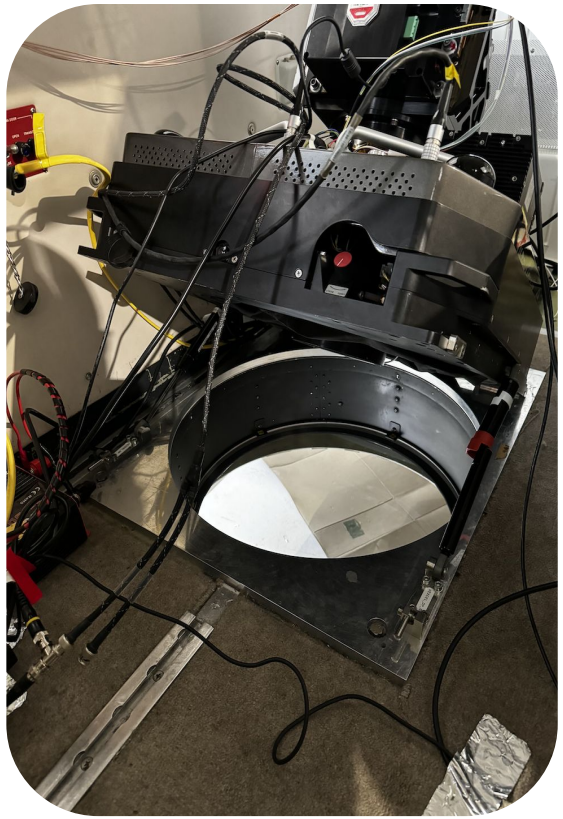
Edge Data Processing: Results

- **In-Orbit Partnership with Spiral Blue**
  Collaboration on hardware/software interface integration
- **NVIDIA Jetson-Based GPU**
  Leveraging GPU for processing
- **U-Net Based Road Network Algorithm**
  Advanced algorithm for road network detection
- **Data Volume Reduction (~99%)**
  Reduced data size from ~900 MB to ~6 MB
- **Execution Time: ~1.5 Minutes (24.5kmx5.2km)**
  Fast processing with minimal delay



Successfully Demonstrated in Space
September 2023

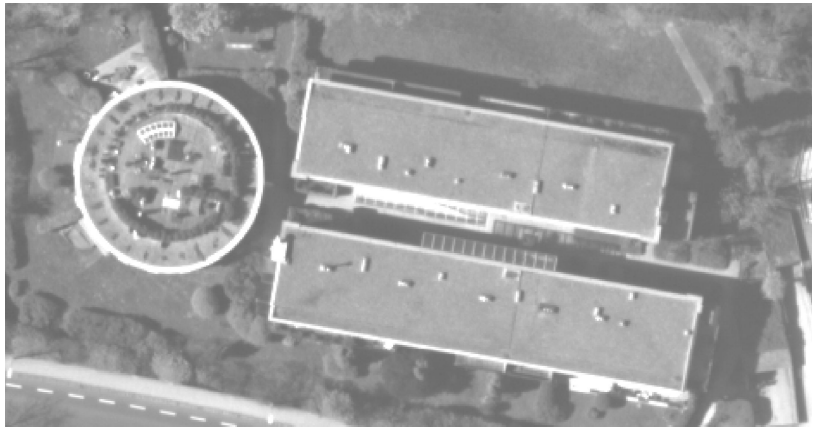
A Glimpse into Payload Aerial Testing



A Glimpse into Aerial Test Results

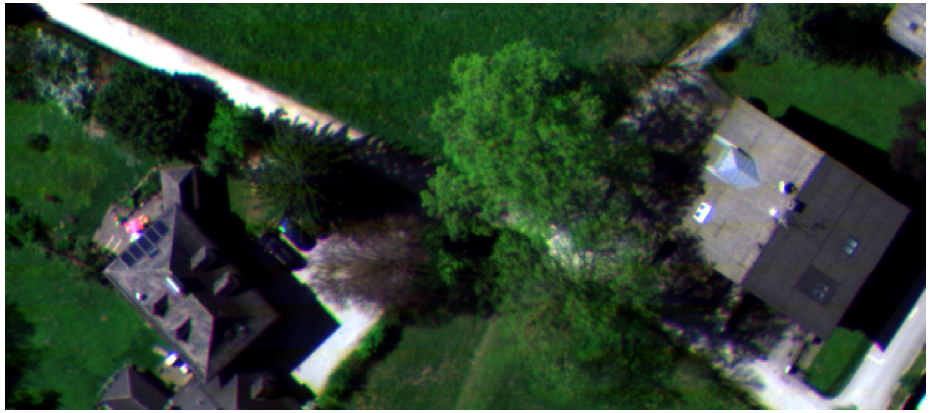
Resolution: 16cm
Location: Austria (Besides the Alps)

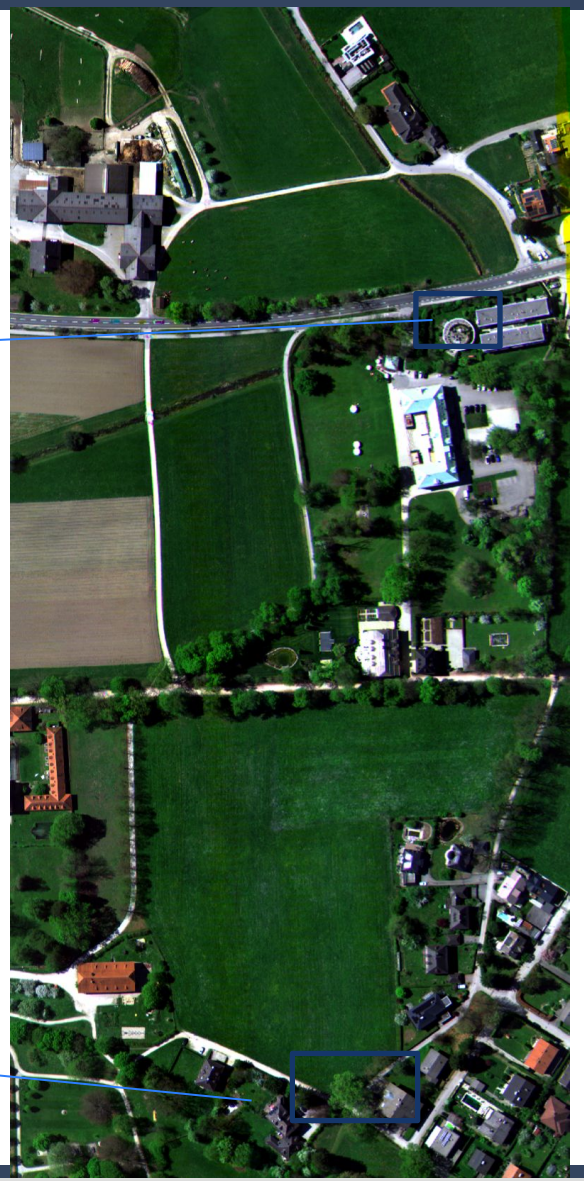
Output: Visualised Green Band



Output: Visualised Green

Output Visualized (RGB)





KaleidEO's Team

Founders

PRATEEP BASU
CEO

RASHMIT SINGH SUKHMANI
CDO

ARPAN SAHOO
COO

AKASH YALAGACH
CTO

Leadership Team

Lt Col Ramanathan V (Retd)
VP- Govt Liaison

Shashank Kumar
Senior Project Manager

Sandeep Ramanath
Head- Operations

Yamin Noor
Project Manager

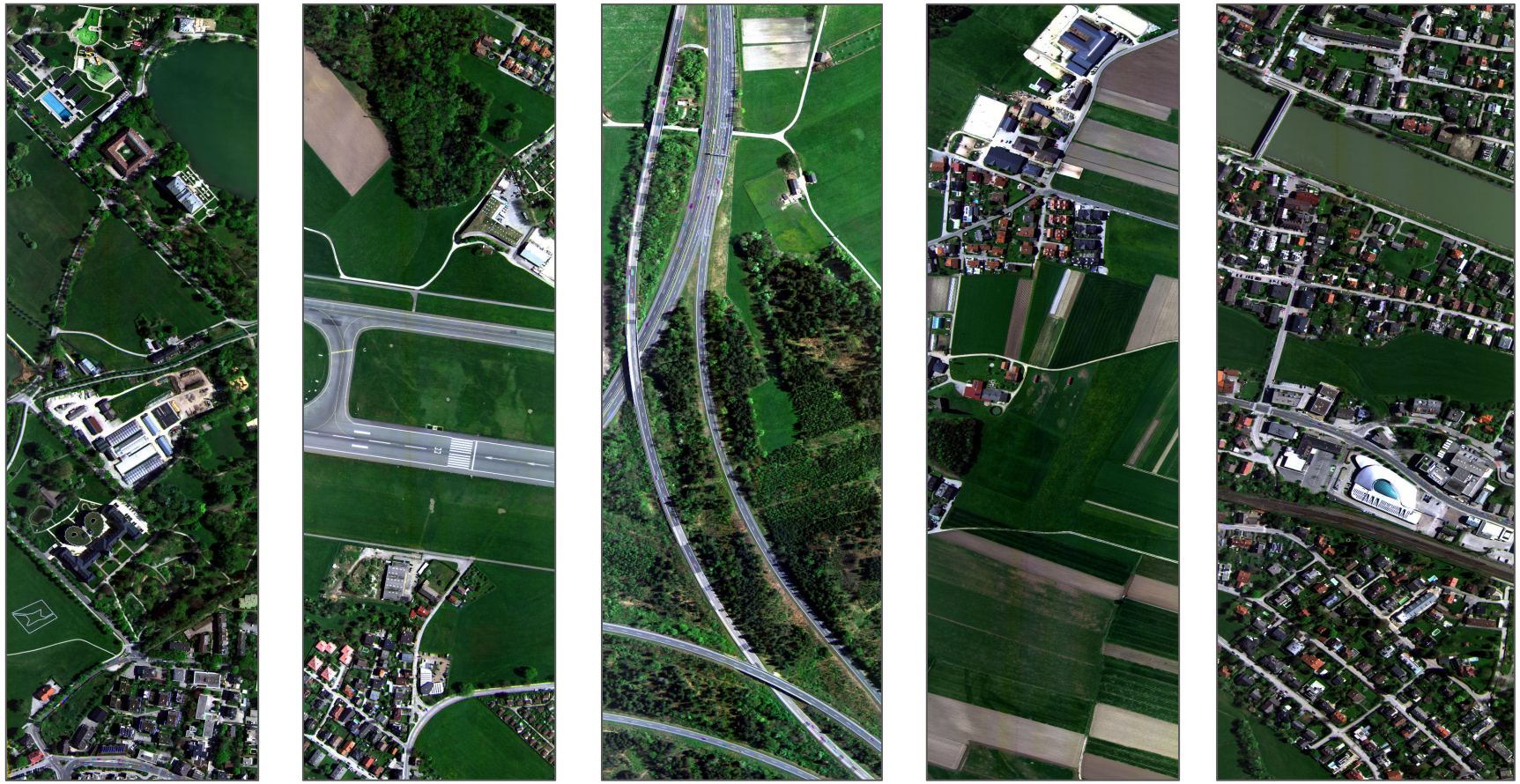
Shantanu Kulkarni
Lead Electronics Engineer

Ankur Singhai
Senior Systems Engineer

Call to action

- Working alongside CEOS for characterization of image quality of aerial data, peer reviewed products
- Opening the Aerial data for various scientific studies like ARD standardization, Radiometric and Geometric assessments
- Mentorship on Cal/Val both on-ground and in-orbit.
- Be an active participant and contributor to IVOS, CEOS ARD, pre-flight calibration discussion groups.
- Happy to also collaborate with CEOS on LPV validation esp forestry and agriculture related.

Thank You



SATSURE

KALEIDEO

A SatSure Company

Images captured during the successful aerial testing of KaleidEO's prototype payload.

info@satsure.co | www.satsure.co

info@kaleideo.co | www.kaleideo.co