GWF

GEOSPATIAL WORLD FORUM

CLICK TO KNOW MORE

KALEIDEO

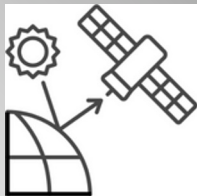## A SatSure Company

GWF 2024
Session: AI/ML Revolution Transforming Intelligence Fusion

16th May 2024

How Are We Building SatSure

Data Origin

Data Refinery

Data Solutions

KALEIDEO

Sending 4 low earth orbit
satellites with edge computing.
Enable Upstream integration

SATSURE
SPARTA

Platform for application ready
data products
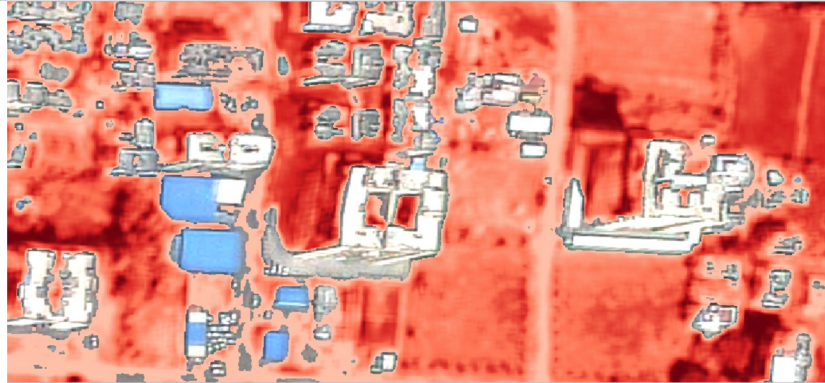
SATSURE
SKIES

Infrastructure
monitoring

SATSURE
SAGE

Farm credit
management

Change Detection

The modified index now neglects the changes due to illumination difference and view angle.

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Automated Georectification

Matched template (High Res of 1m GSD)

Template (Low Res of 10m GSD)

Super Resolution

Mumbai Airport

Sentinel 2 data (10m GSD)

Super-resolved (2.5m GSD)

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Super Resolution

Area near northern Kashmir

Sentinel 2 data (Superresolved 2.5m GSD)

Super-resolved (1.1m GSD)
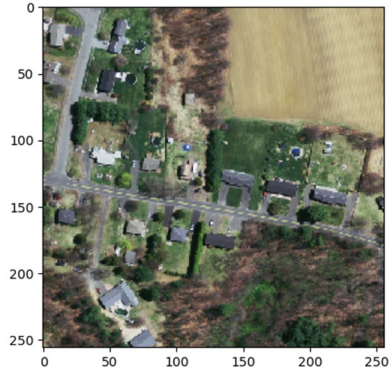
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Edge Processing

Model Selection and Training

Road Network
Deep Learning Model

Enhanced model robustness with **physical modeling** for **diverse sensor** and **weather conditions**.

Sensor and **Resolution** Agnostic

Downscaled from 70cm - 100cm Without any loss of features
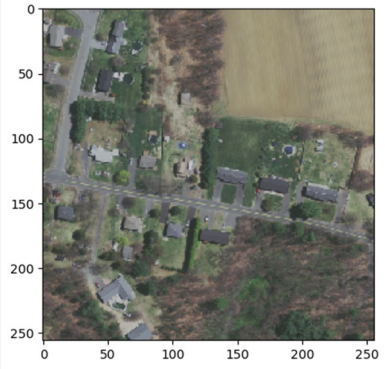
Compatible with any Edge Device
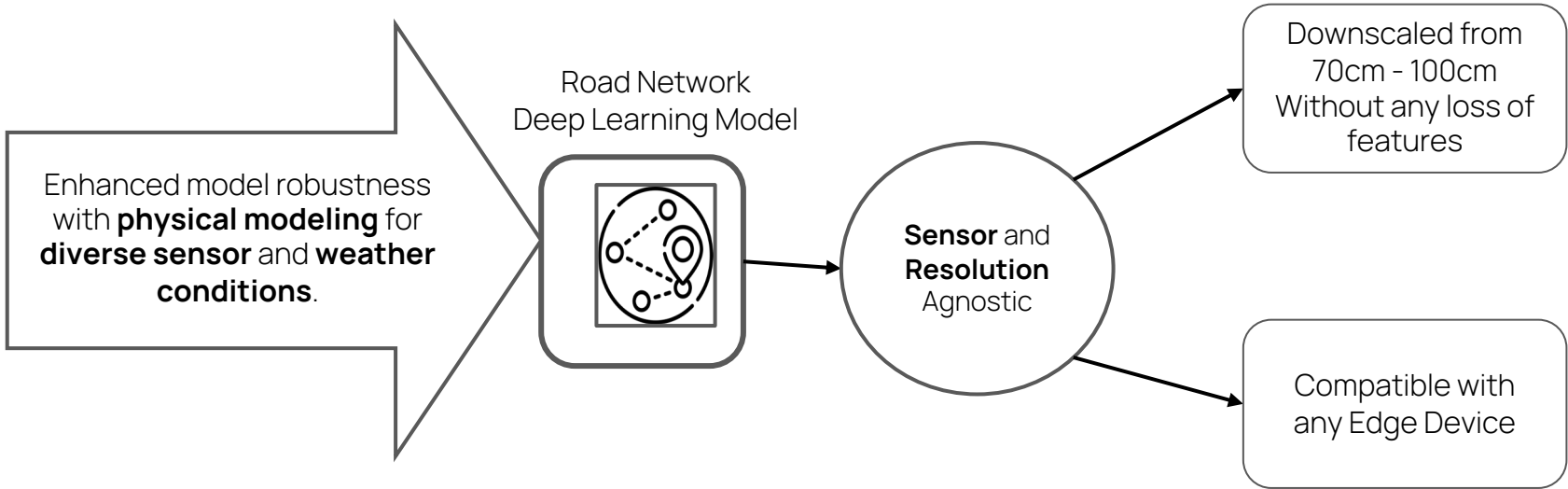
Edge Processing: Augmented Results

Input

Output
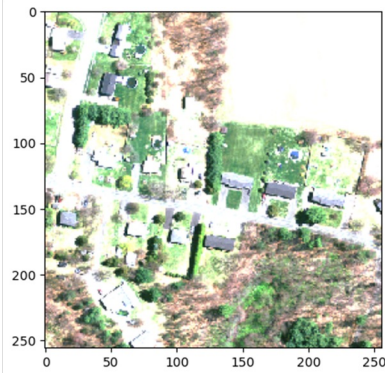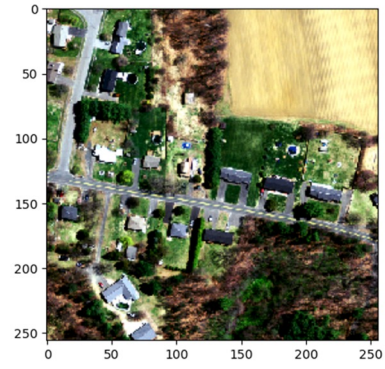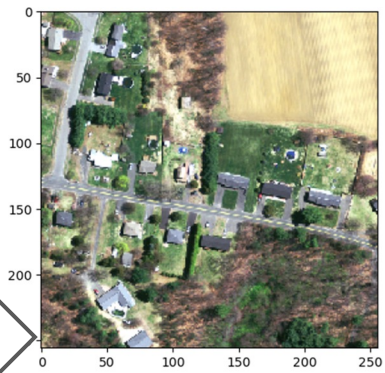
Edge Processing: Results

> 1m resolution image consisting of 554 km^2 area was processed on the edge

Tasks	Using general approach	Innovation at the edge	Magnitude
Neural network based inferencing	3 hours execution time	1.5 minutes	Fastened the process to over 80 times
Data volume reduction	1000 mb	6 mb	>99% volume reduced ready to be downlinked

Edge Processing: Results

Edge Data Processing

- Spiral Blue as on-orbit hardware/software interface partner.

- NVIDIA Jetson based GPU.

- Demonstrated on Satellogic: 0.7-0.8m PAN Image.

- U-Net Based Road Network Algo.

- Data volume reduction ~99% (~500 MB)

- Time of execution ~1.5 minutes.

Demonstrated on-orbit

Milestones - Aerial Testing

Post Processed Image

Zoomed-in Image

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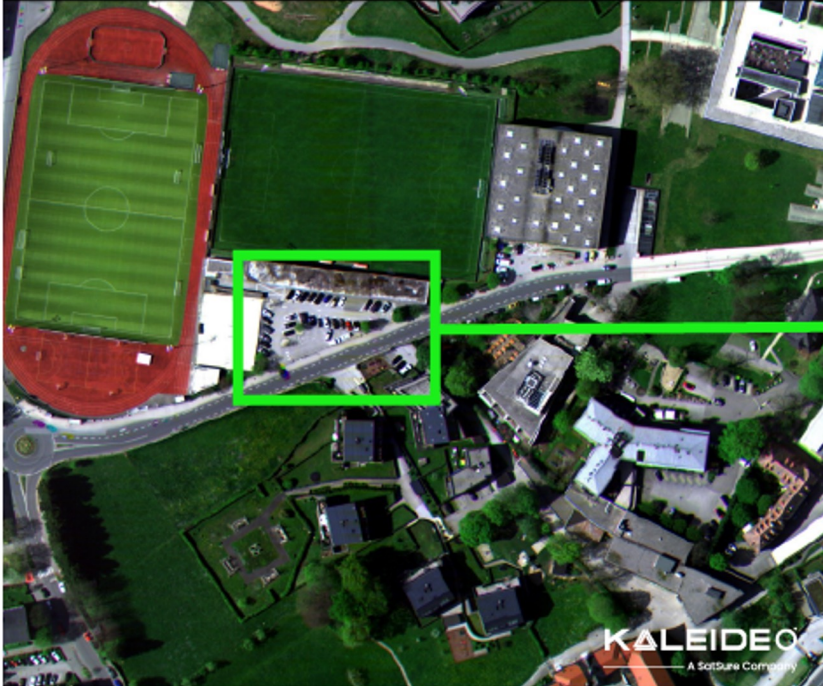
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Resolution: 16cm
Location: Austria (Besides the Alps)

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KaleidEO Fleet at a Glance- ARGUS

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What?
Four satellites in VLEO (200 kgs, approximately, with Edge Analytics on-board

Which Applications?
Utility, Agriculture, Carbon, Infrastructure and Forestry

Who is it for?
Governments, Enterprise, and Strategic Users

EDGE ready
Processing on-board compresses the downlink data size

When?
2026, from India

Where?
380 km Very Low Earth Orbit (VLEO), high SNR

How much?
In-orbit deployment at TBD

Revisit
Daily revisit globally: Coverage of **1 million sq km**

Differentiator
Sub-metre resolution with a **65 km** wide swath

SatSure Sparta

A one of its kind **Earth observation DataOps platform**, revolutionizes management of enterprise's spatial datasets.

- Seamlessly integrating data from diverse sources, it allows **efficient data processing** and enables generating **application-ready products** accessible to the organization through STAC APIs.

- Provides tools for efficient enterprise level spatial data operations management, while enabling the **optimal IT resource deployment and data quality**.

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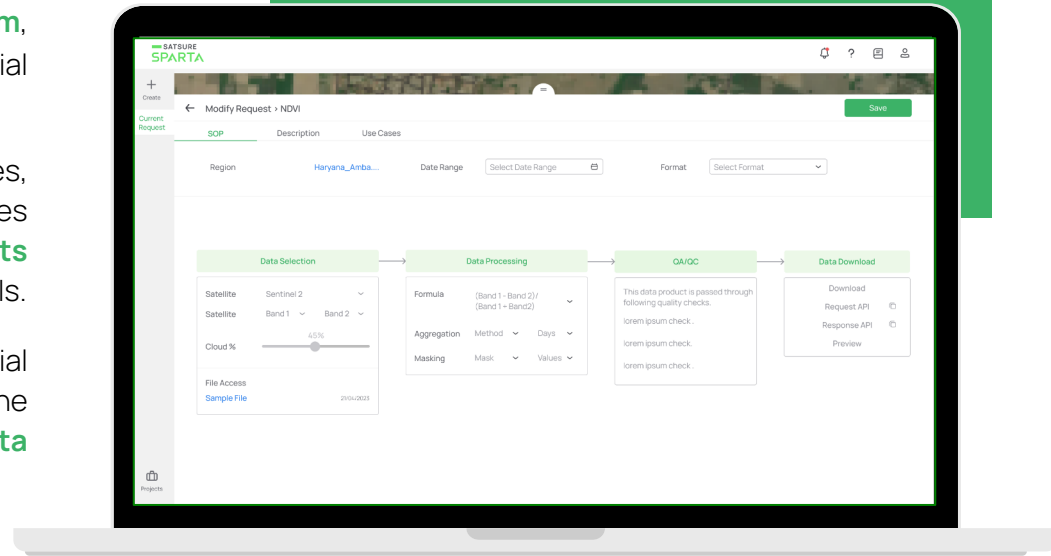
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Key data operations blocks I SatSure Sparta

Data Selection	Pre- processing	Post- processing	Validation
Data Imagery Pipeline	**Image Processing**	**Classification**	**Validation**
Optical and SAR	Mosaicking	K-means clustering	Vector based raster validation
Product level selection	Clipping of Geotiff images	**Conversions**	Vector vector validation
Level 1C or 2A or 3B	Time-series data stacking	16 to 8 bit	
LULC layers	Cloud masking	Geotiff conversations	
Global 10m LULC 2022	Color balancing	Raster CRS conversions	
	Normalization 17	**Indices**	
	Data enhancement	NDVI, NDWI, MNDWI, EVI	
	Cloudy pixel reconstruction (SAR → Optical)	**Intermediary products**	
	Haze removal	FCC, Image temporal stack	
	Super resolution		

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