Environmental Law Institute Workshop

EXAMPLES OF REMOTE SENSING TECHNOLOGIES

Andrew Mindermann
Geospatial Operations Manager
Skytec LLC

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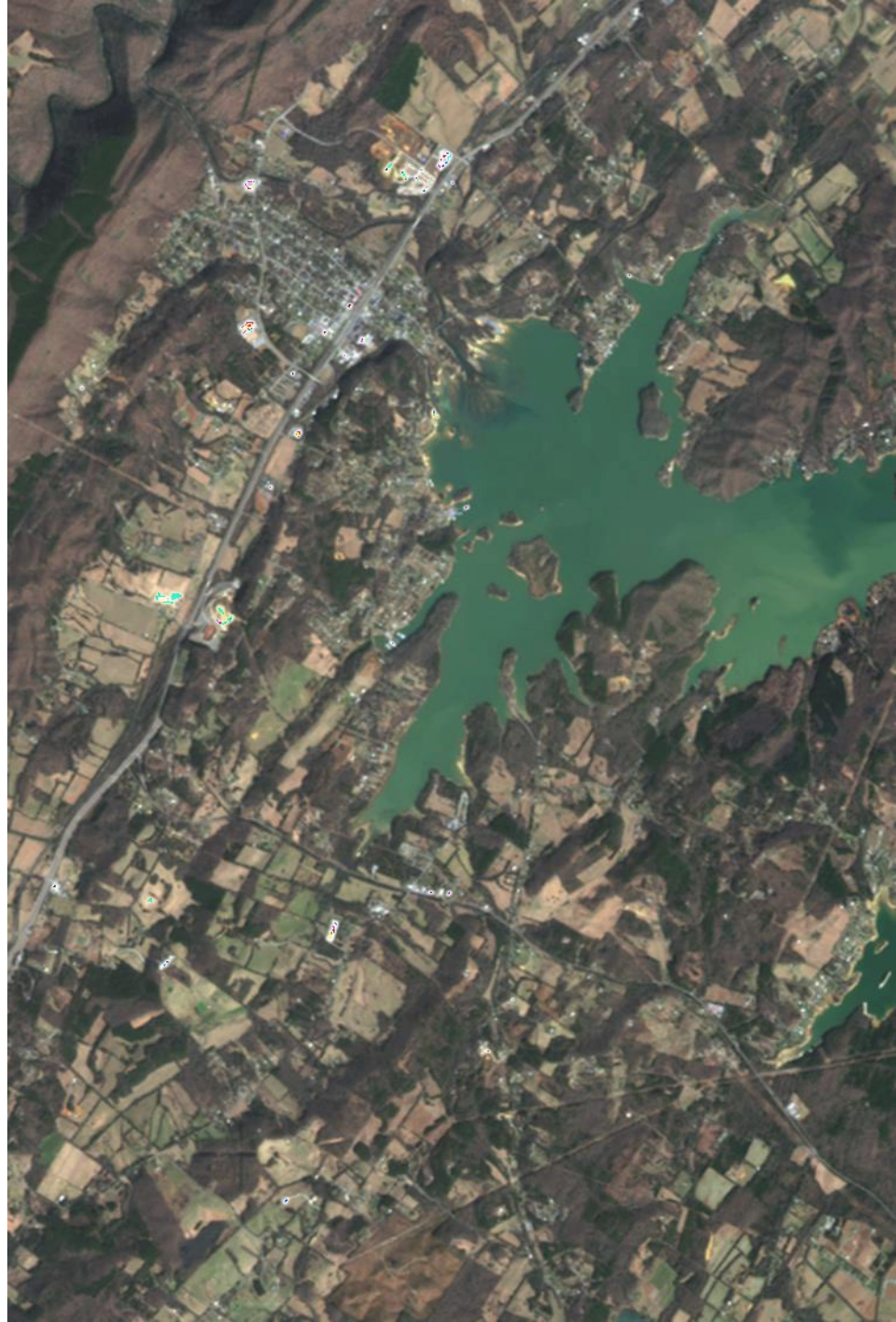

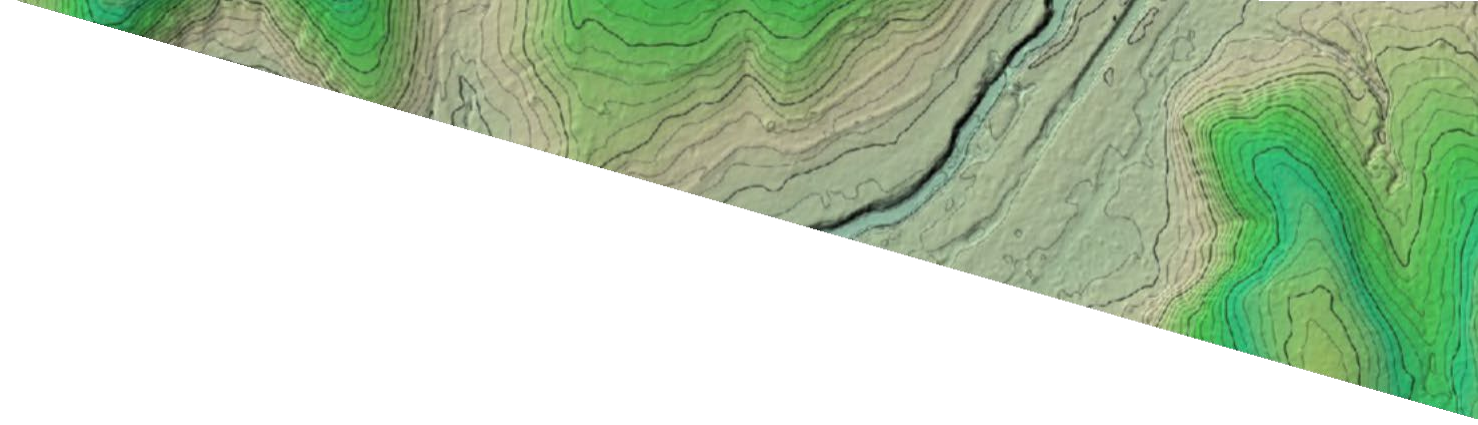

Skytec

About Us

- Est. in 2015
- Based out of Chattanooga, TN
- 50+ years of GIS expertise

Services

- Ranger –Remote Monitoring
- Geospatial Consulting
- Drone Mapping & Analysis

esri Partner Network Silver

ArcGIS Marketplace Provider

Nonprofit Specialty

ArcGIS System Ready Specialty

planet.orbit The Planet Partner Ecosystem GOLD PARTNER

Picterra

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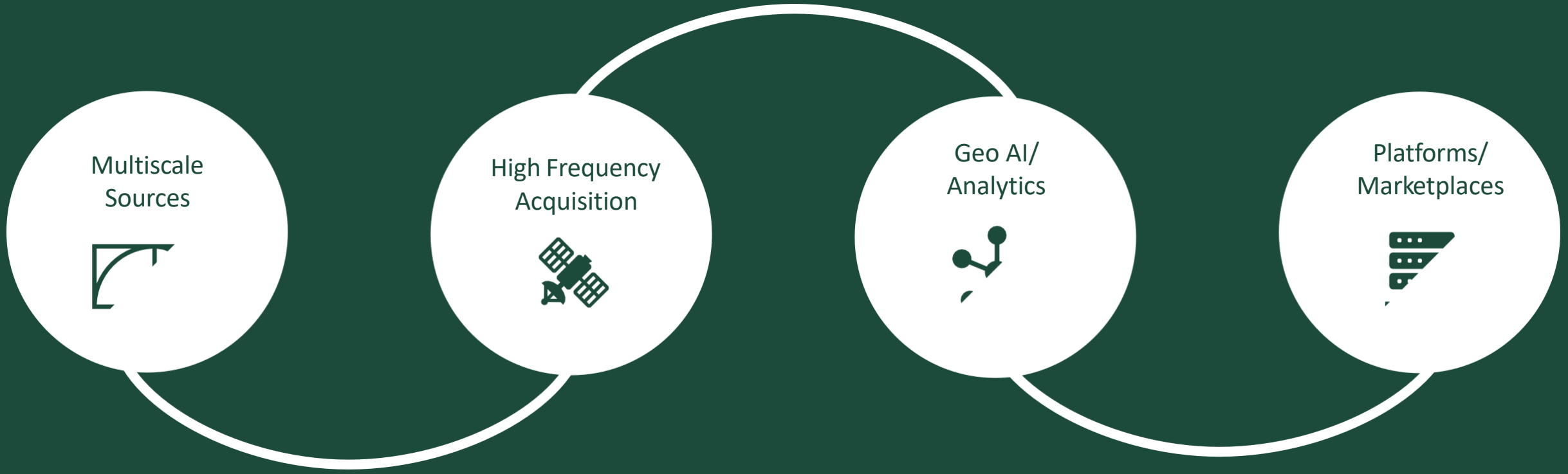
Key Technology Advancements

of remote sensing & remote monitoring



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Multi-Scale Sources

Get the resolution you need from the ground up.

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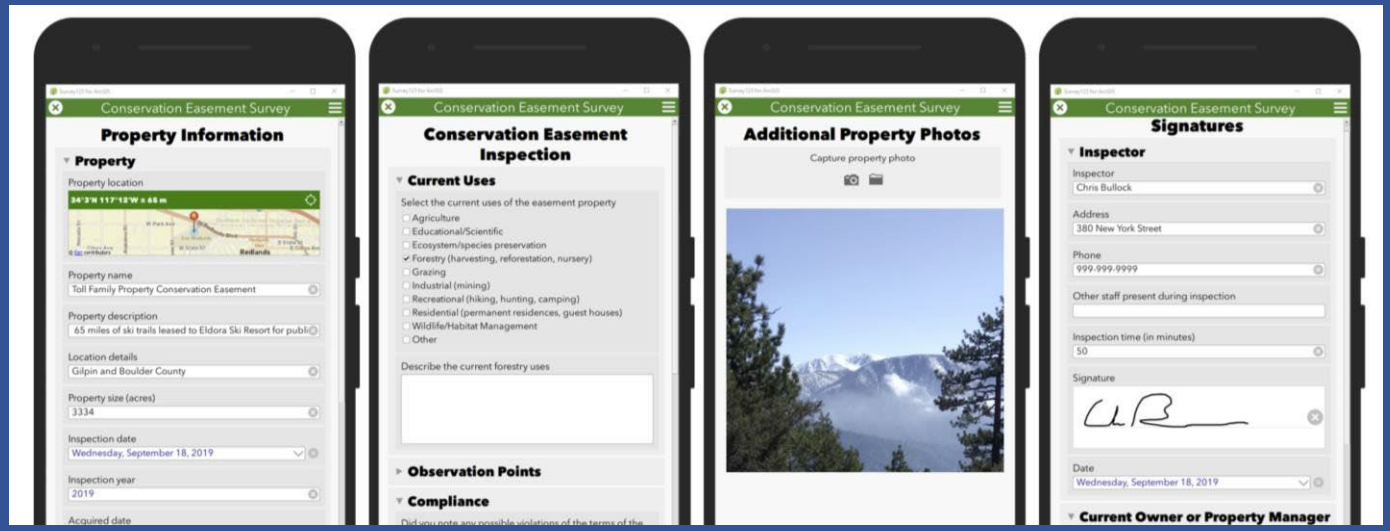
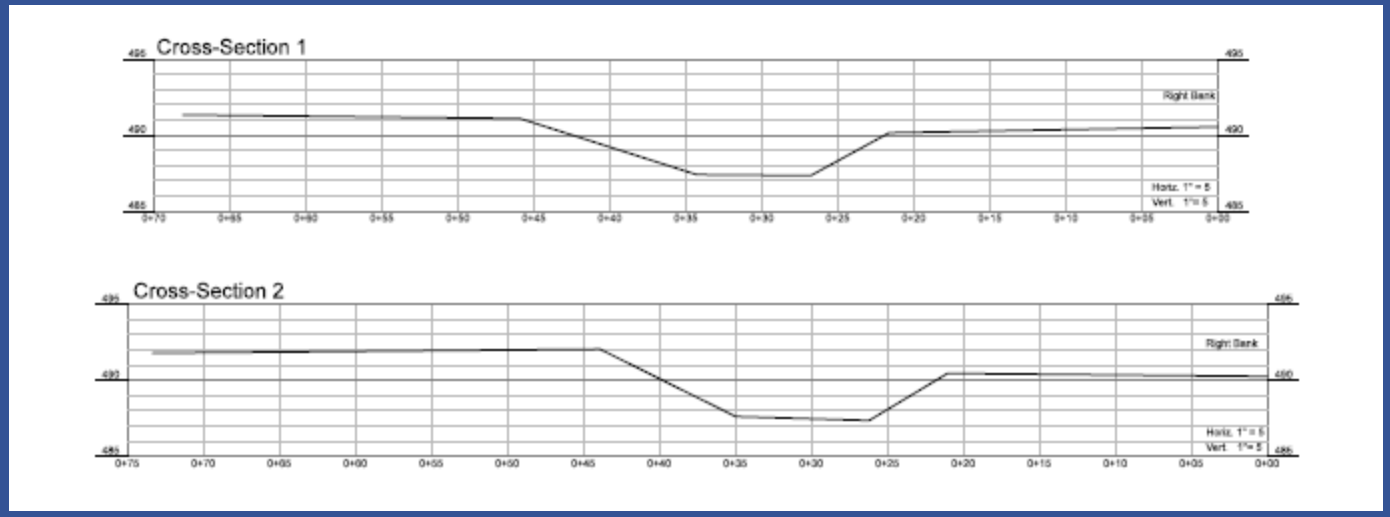
Image courtesy
https://www.sensefly.com

Field Monitoring

- Ground Control Points
- Oblique Imagery/Property Photos
- IoT/Sensors
- Traditional Field Monitoring





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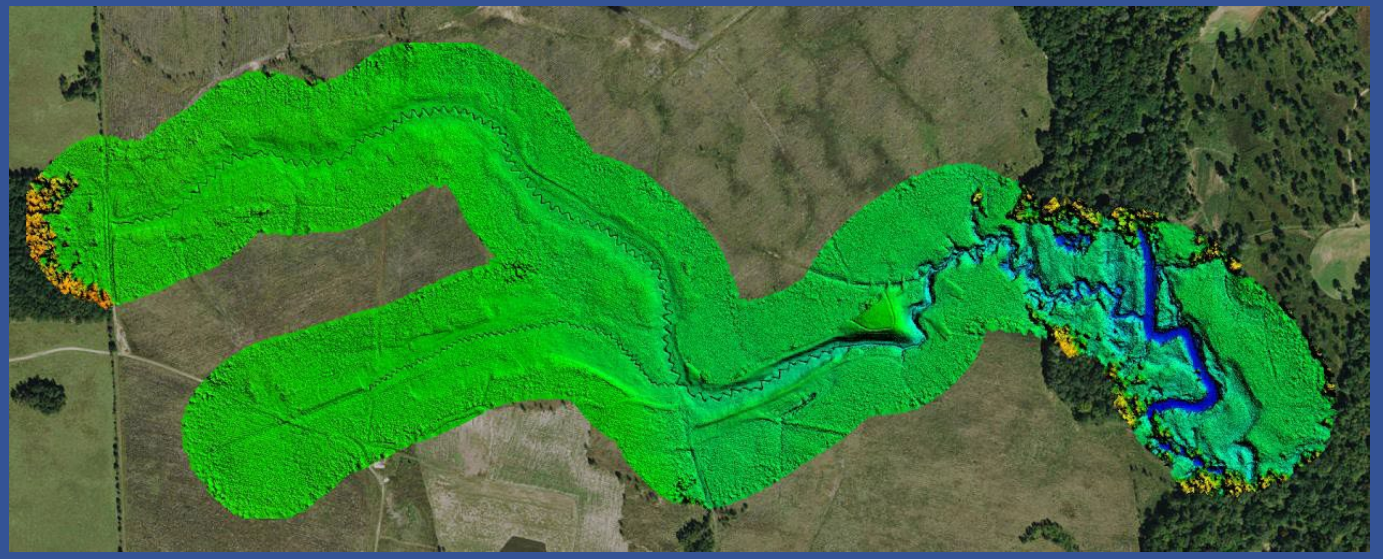
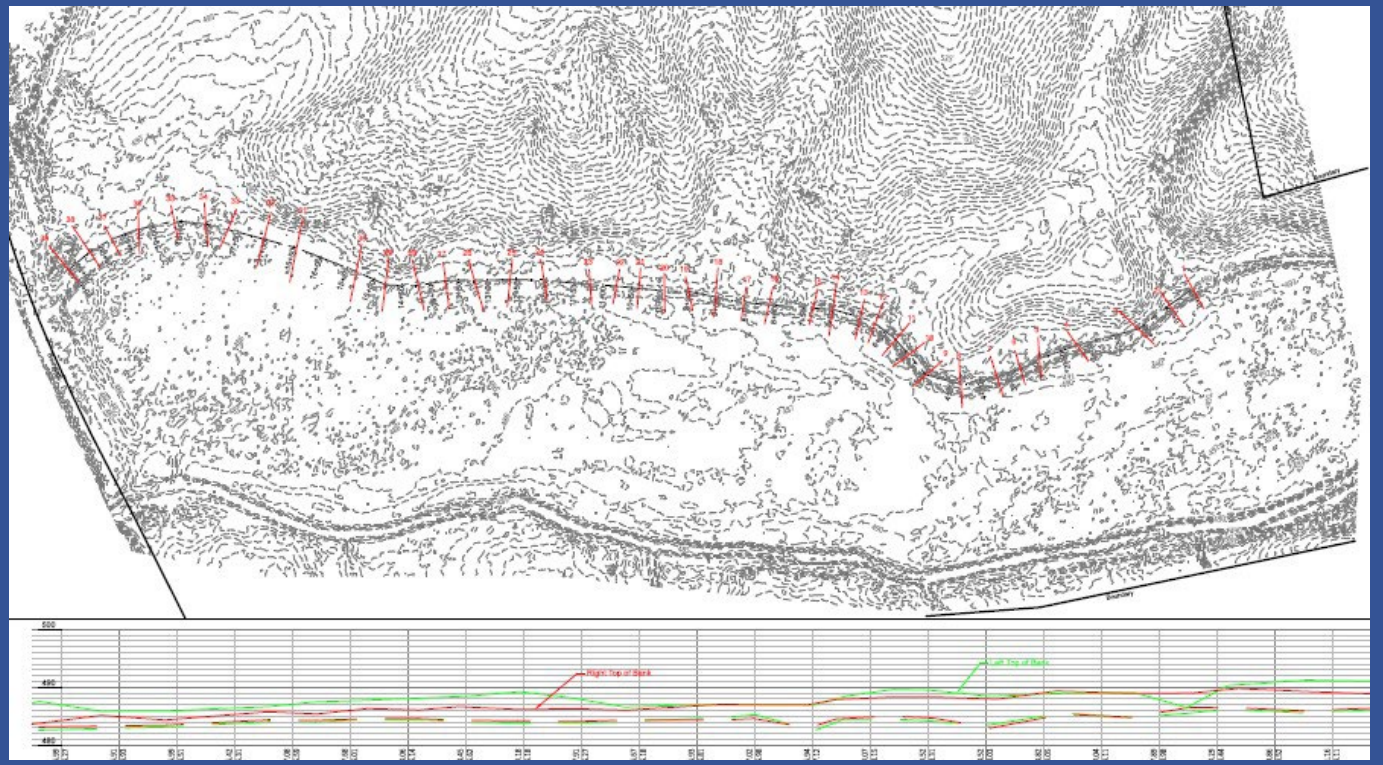
UAS/Airborne

- High density LiDAR point cloud
- High resolution imagery

- Integrated with survey control set by Professional Land Surveyor

- Creates authoritative baseline
- Future protocol for long term monitoring programs





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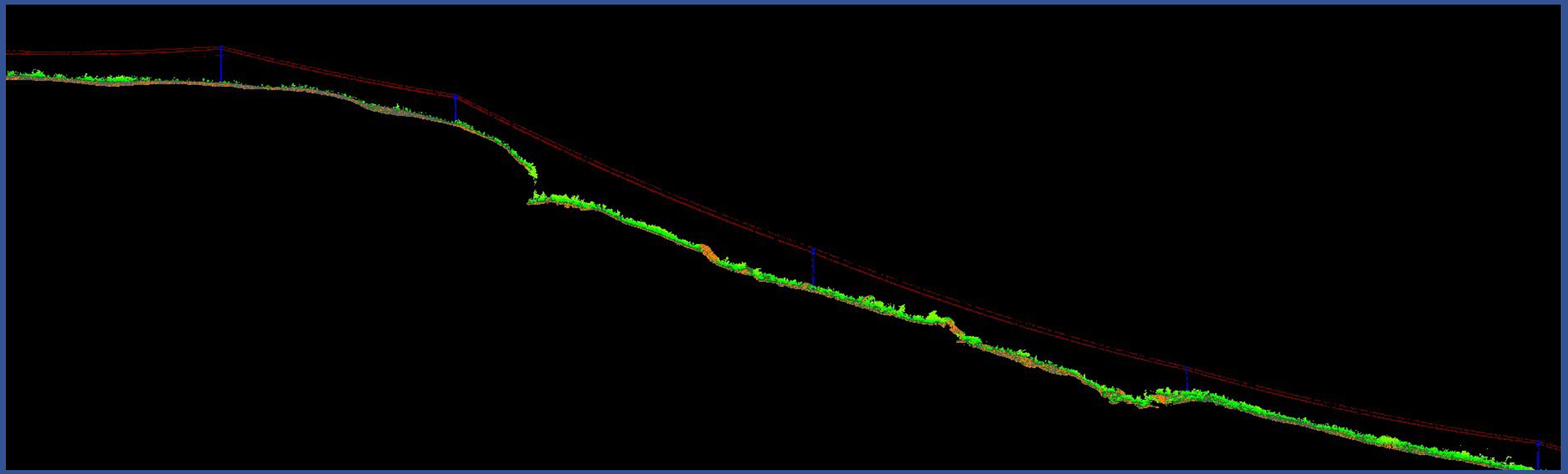
UAS LiDAR



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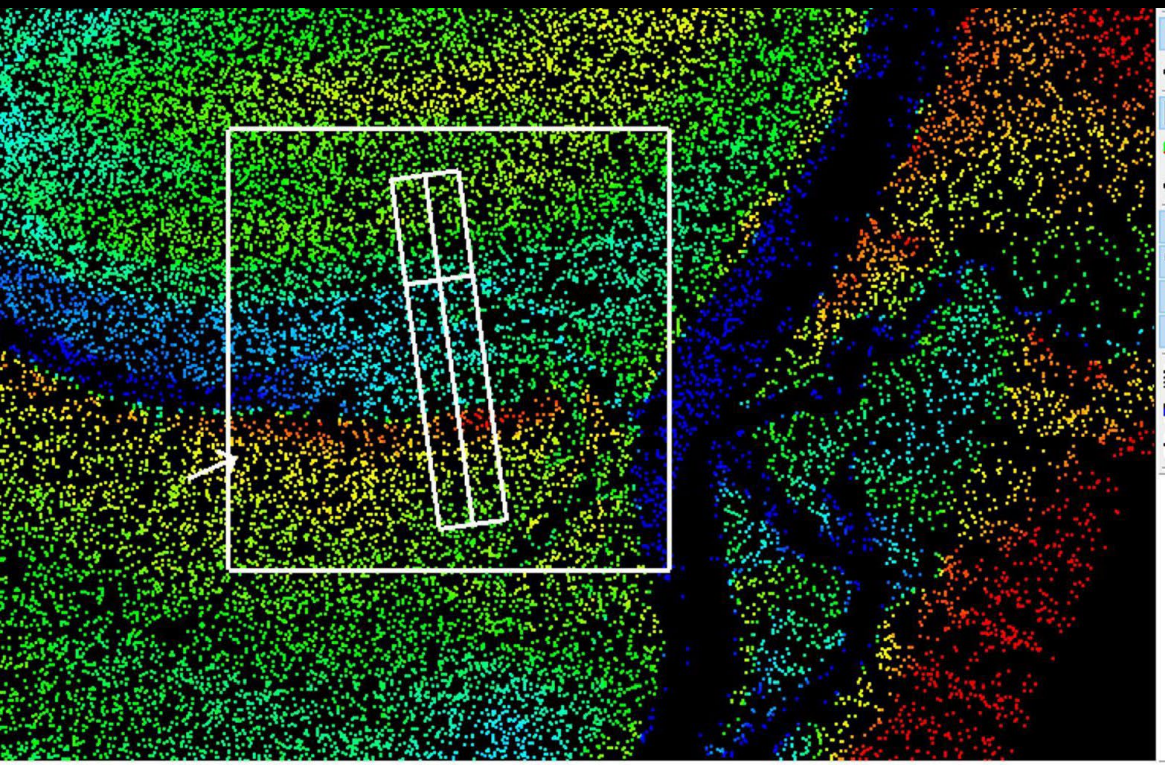
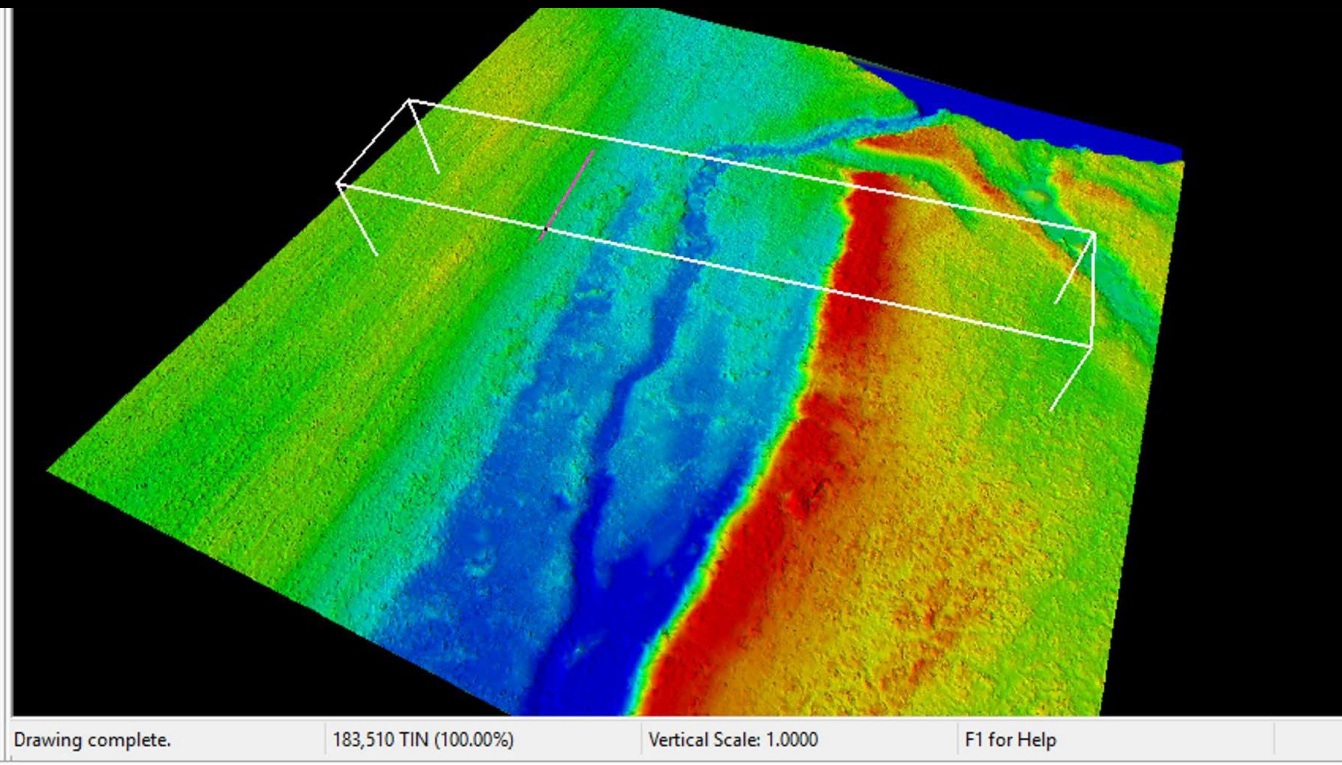
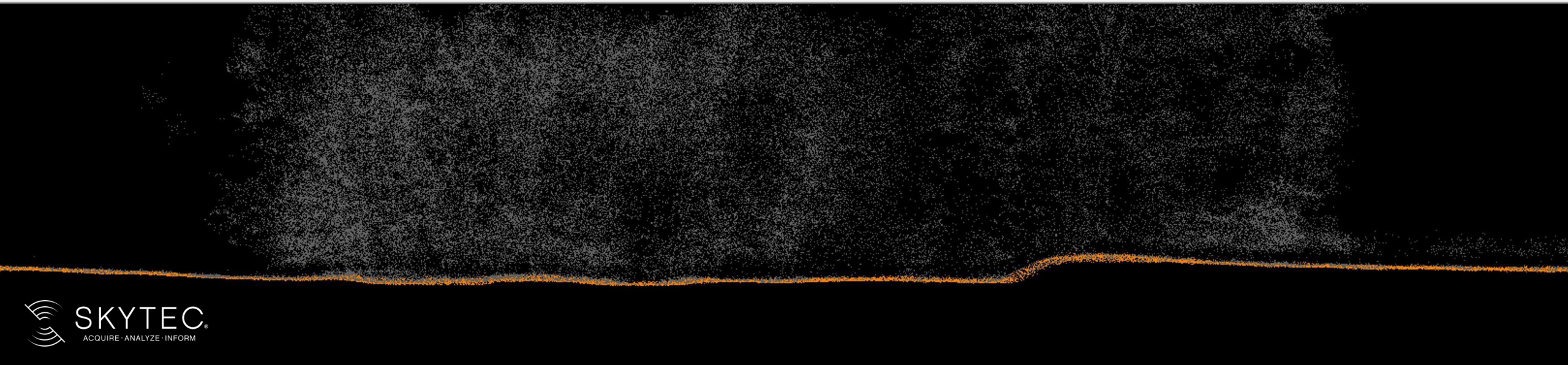




Drawing complete. | 183,510 TIN (100.00%) | Vertical Scale: 1.0000 | F1 for Help

Filter: No Noise

Destination Class & Flags:



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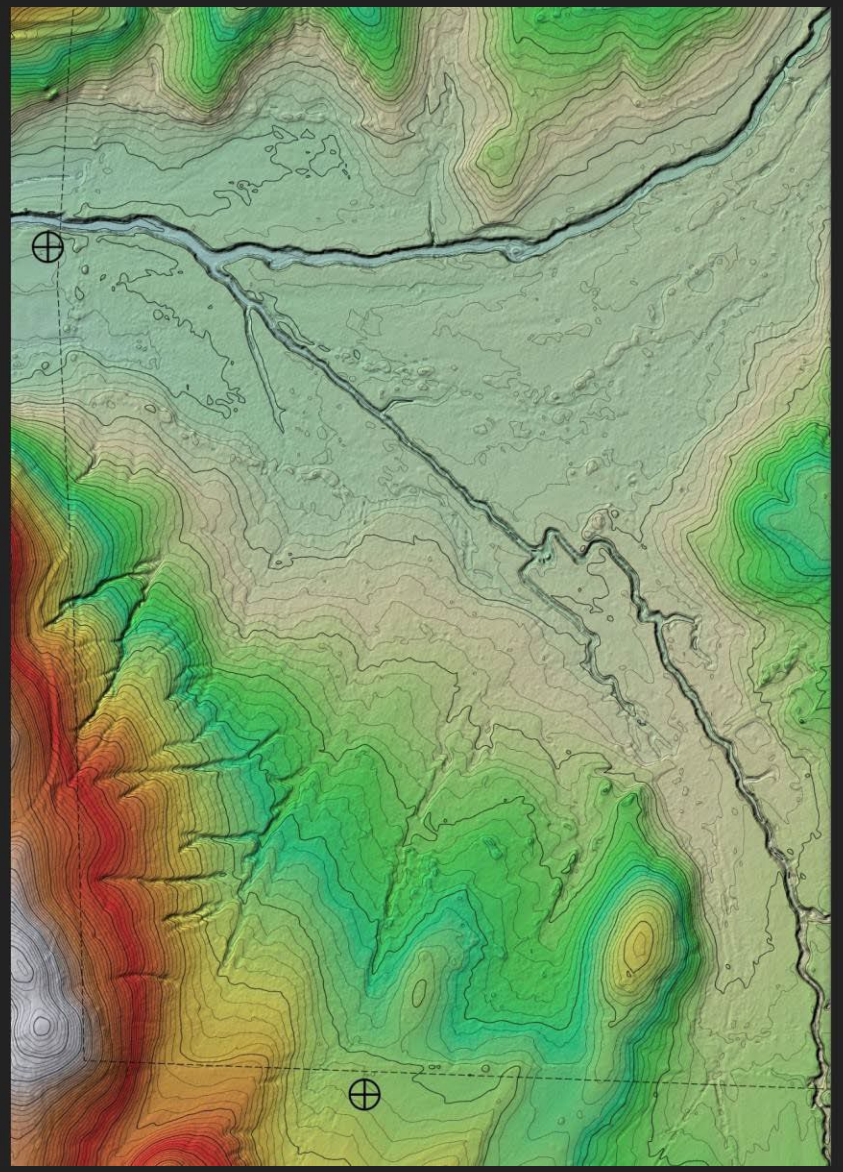

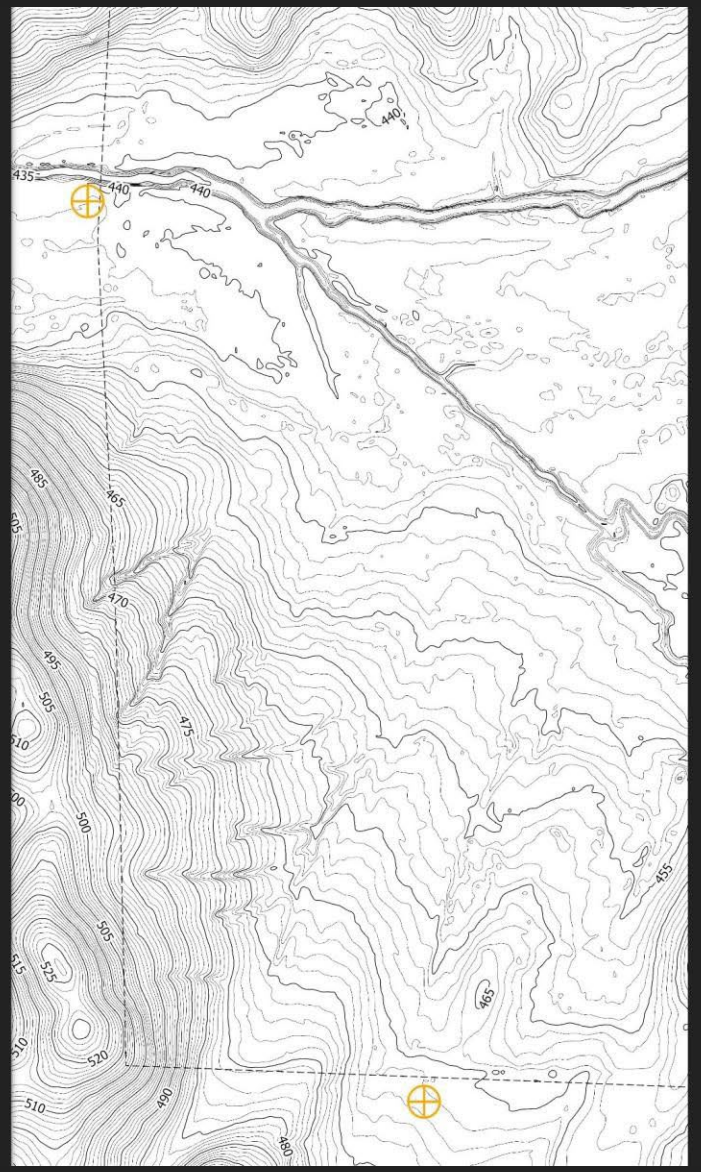

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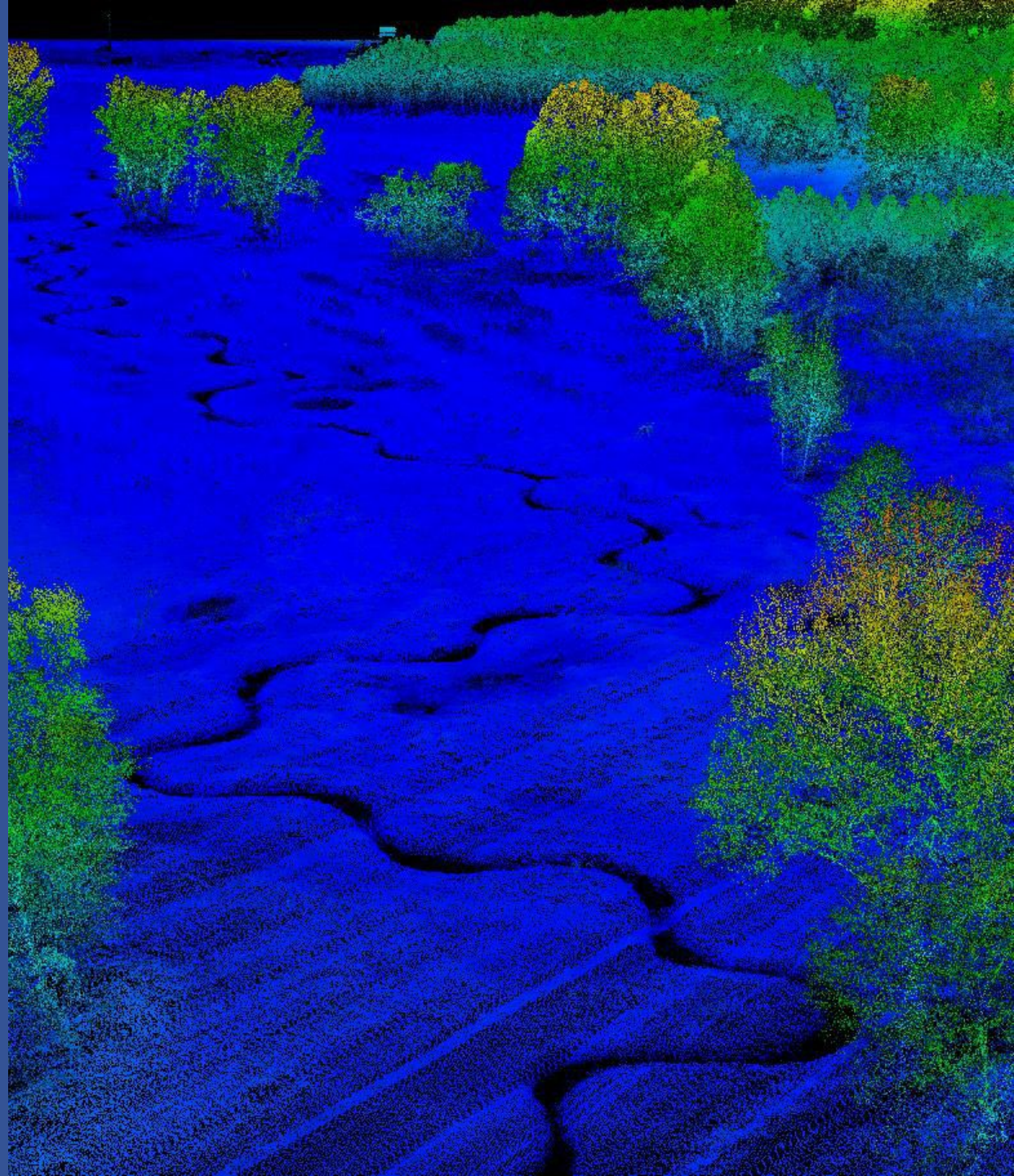
Digital Twins for Baseline Conditions

UAS/Airborne

- 3D design grade digital models of built & natural features
- Definitive baseline for future monitoring
- Commonly used in mitigation projects (pre and post design)



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Satellite Imagery

Frequency

- Coverage ranges from daily up to every 8-16 days

Varying Resolution Based on Product

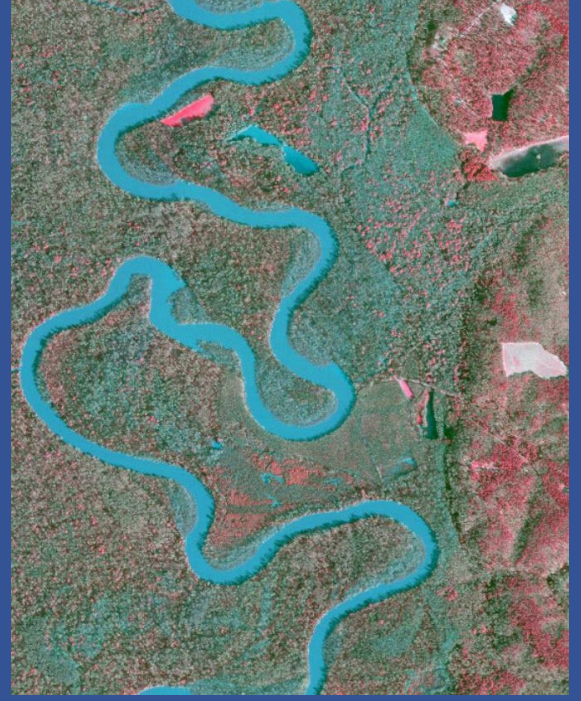
- 15 m resolution down to 24 cm

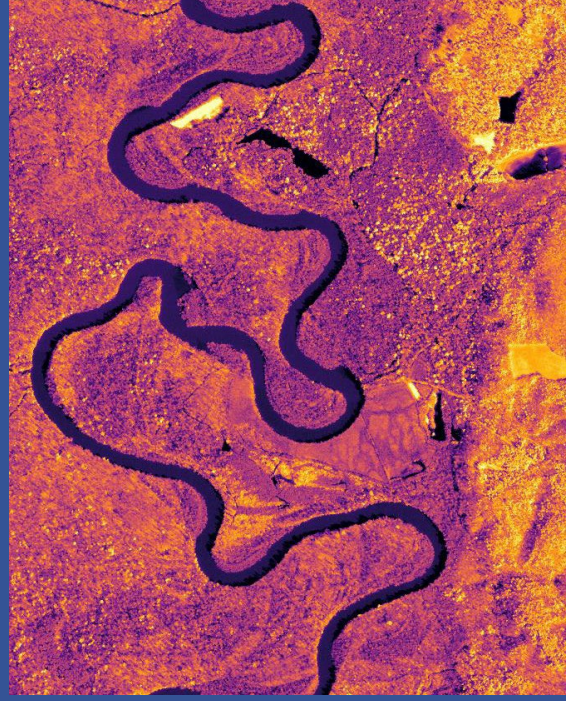
Cost Savings

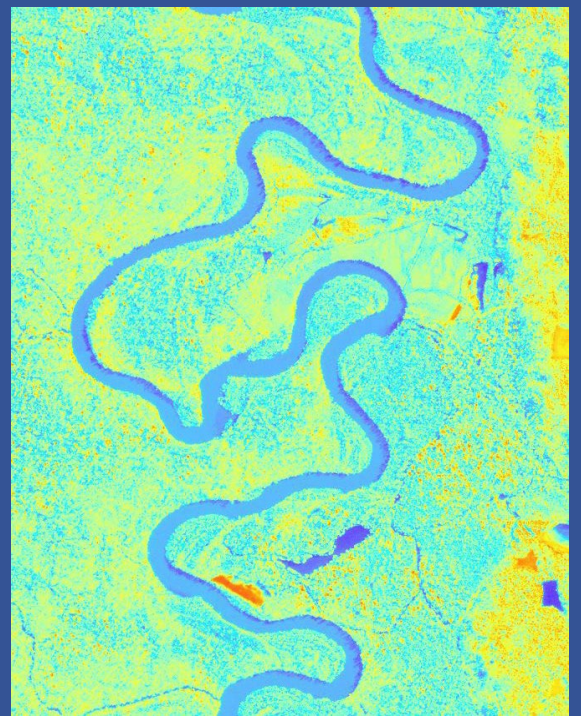
- Prioritization of field work
- Desktop site discovery
- Remote assessments of vegetation establishment
- Continuous monitoring of numerous sites for changes to land use or site conditions

Spectral Bands

- 4 bands up to 300
- Each band corresponds to a specific range of wavelengths that convey specific information on feature of interest







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High Frequency Acquisition

Images courtesy of Planet Labs PBC

High Resolution Satellite Tasking

- Growing number of < 1-meter resolution tasking options on the market
- Most include multispectral with hyperspectral on the rise
- Great option for verification & high-resolution change detection

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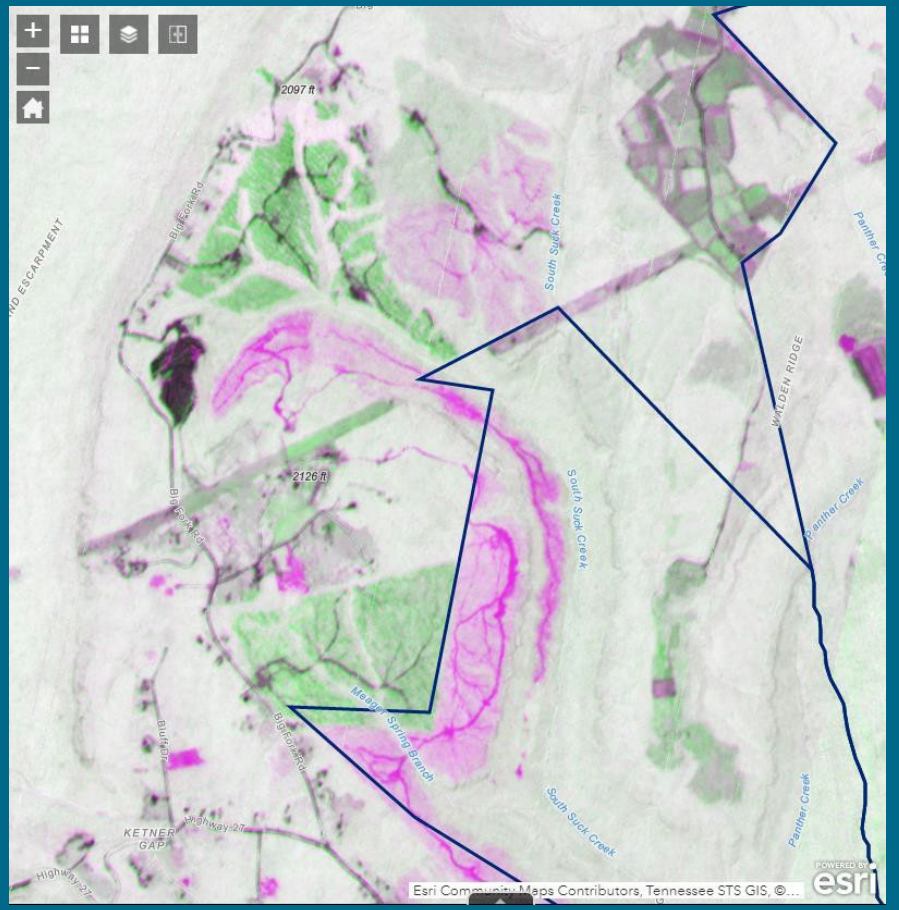
Images courtesy of Planet Labs PBC, 2022

Geo AI/Analytics

- Satellite imagery used for automating change detection
- Near Infrared band of imagery used to create indices
- **Green** areas represent vegetation growth
- **Magenta** areas represent harvesting or land disturbance
- Combination of spectral difference over time and machine learning feature extraction



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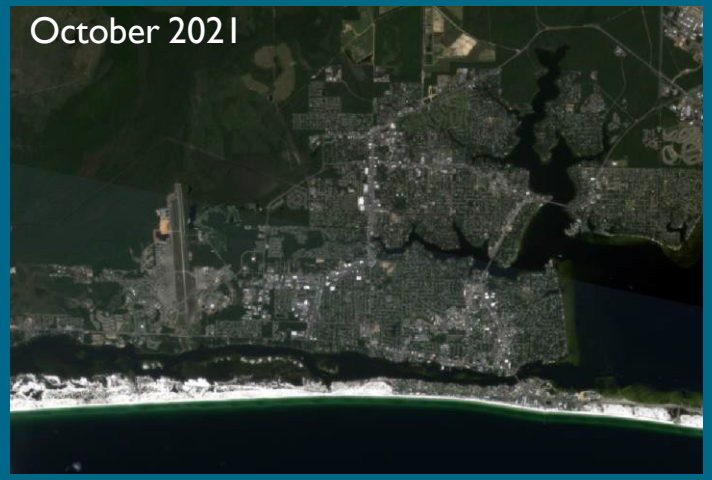
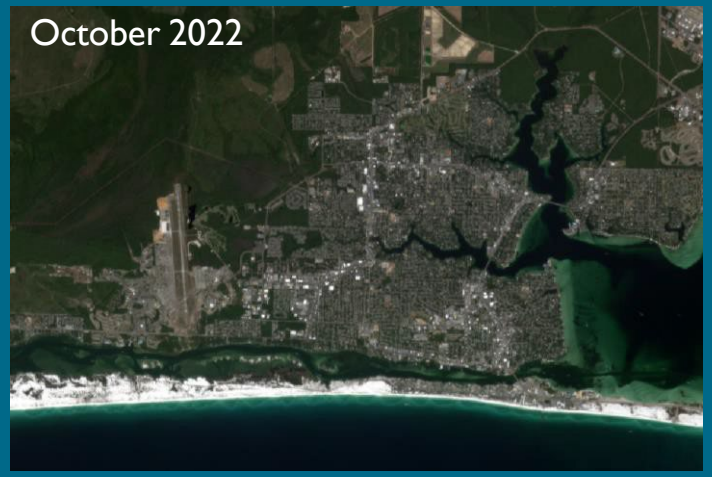
Geo AI/Analytics





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Geo AI/Analytics

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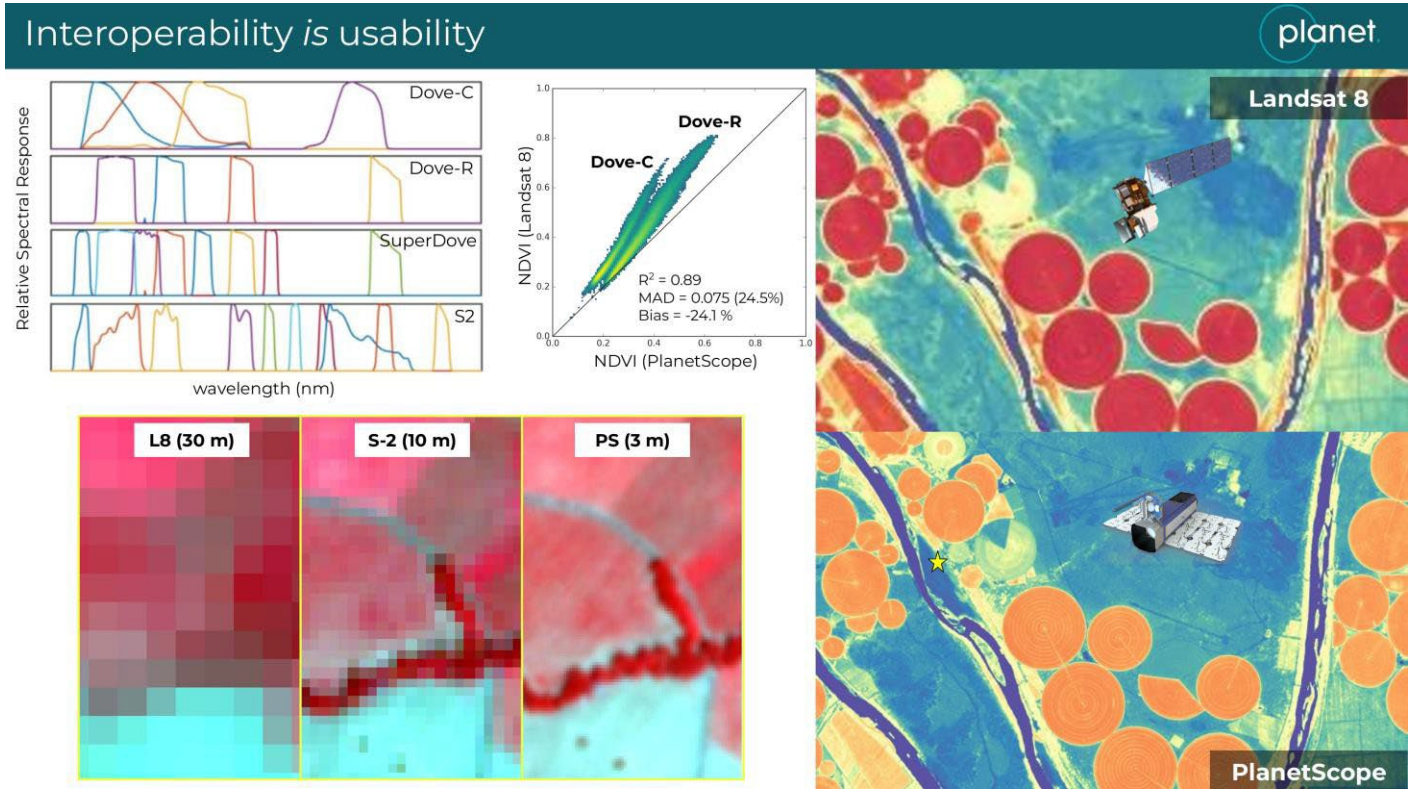
Platforms & Marketplaces

Source: Aravind, TerraWatch Space

Challenges & Limitations



Source: "Planet Fusion Monitoring: Next generation ARD via a CubeSat enabled sensor fusion approach", Rasmus Houborg, JACIE 2022, Link to Slides

Cost Restrictions

High resolution/high cadence data can be expensive.

Acquiring Data

Data providers often have subscription models (often unclear). Many serve as data vendors without analysis capabilities.

Best Fit Option

Rapidly growing number of sensors, bundles, offerings, & solutions. Image resolution can make or break.

Misleading

Competitive market results in potential misleading features (ex. 3D when feature is only 2.5D)

Traceability

Fusion data and derivative products can be very difficult to verify or trace back to the image pixel level.

Often contains high interpretation values.

No notification if images are reprocessed in image stacks.

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The Problem

Natural resources and built assets are impacted and impaired by increasing rate of change

While management responses are slow, reactive, and built on limited older technologies

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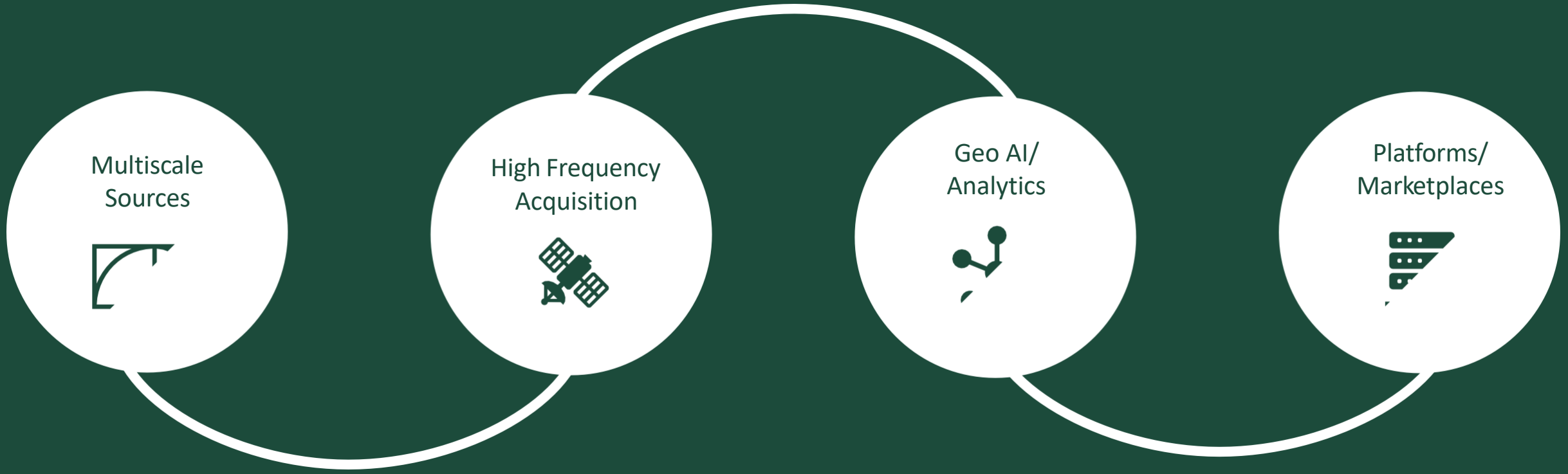
RANGER™

Our Solution

- An earth observation platform that allows near real-time monitoring at a global scale
- For natural and built environments so clients can **Monitor What Matters**™ to them

Key Technology Advancements

of remote sensing & remote monitoring



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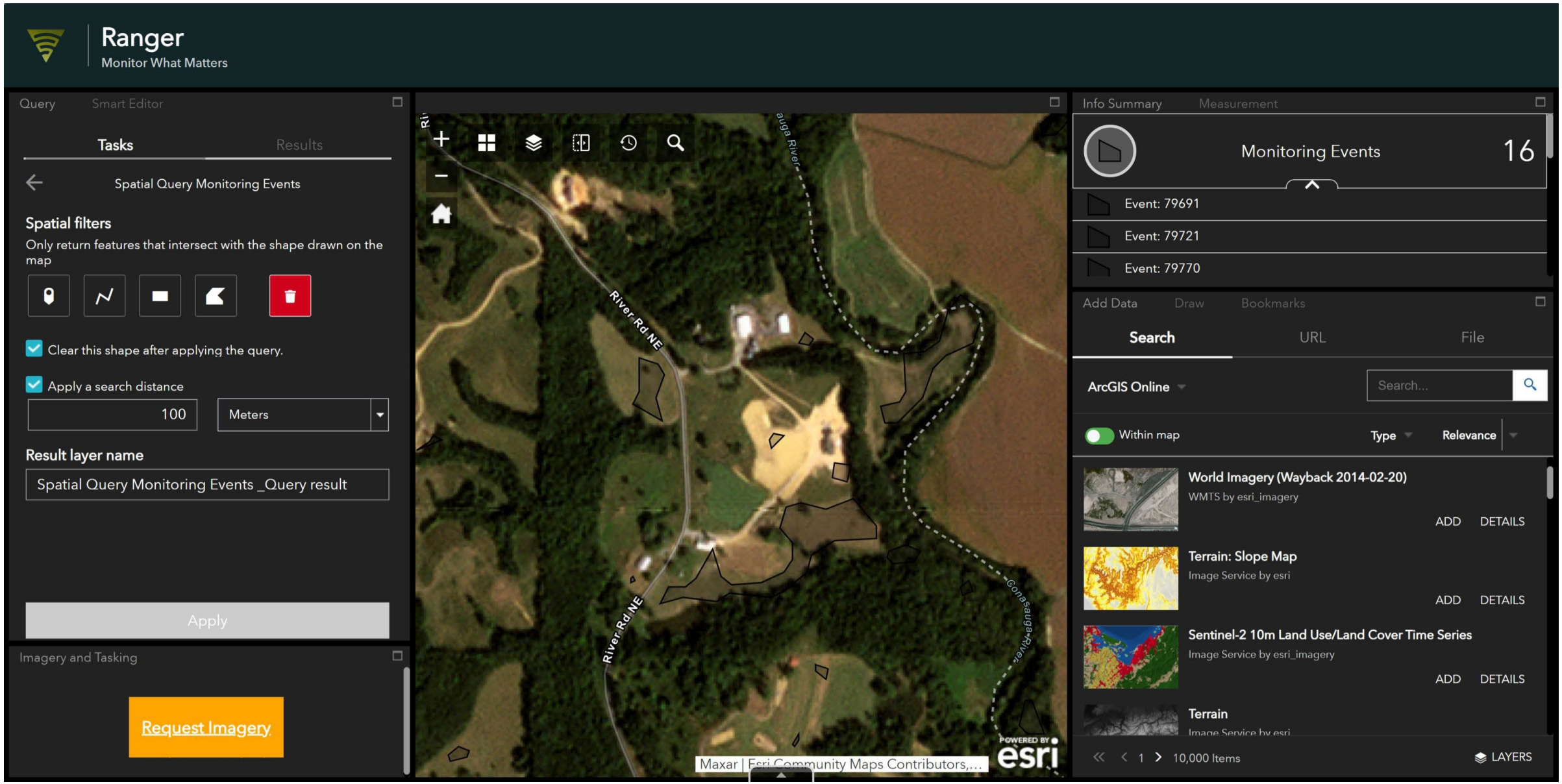

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esri ArcGIS Industries About Support

Live Feeds Status (arcgis.com)

ArcGIS Living Atlas of the World - Live Feeds Status

Sort By: **Status** / Title / 1 Hour Usage

Live Stream Gauges

Warning

Stream gauge observations of stage height and discharge contributed by the GIS community.

Last Updated	Next Update Check	Usage Trend
Mar 25, 07:30	Mar 25, 11:22	Increasing

6 Hour Usage	1 Hour Usage	Feature Count
10,839 feature requests per hr	20,101 feature requests per hr	34,007

- USA Short-Term Weather Warnings — Normal
- Active Hurricanes, Cyclones and Typhoons — Normal
- USA Weather Watches and Warnings — Normal
- Recent Earthquakes — Normal
- USA Current Wildfires — Normal
- Satellite (VIIRS) Thermal Hotspots and Fire Activity — Normal
- Current Weather and Wind Station Data — Normal

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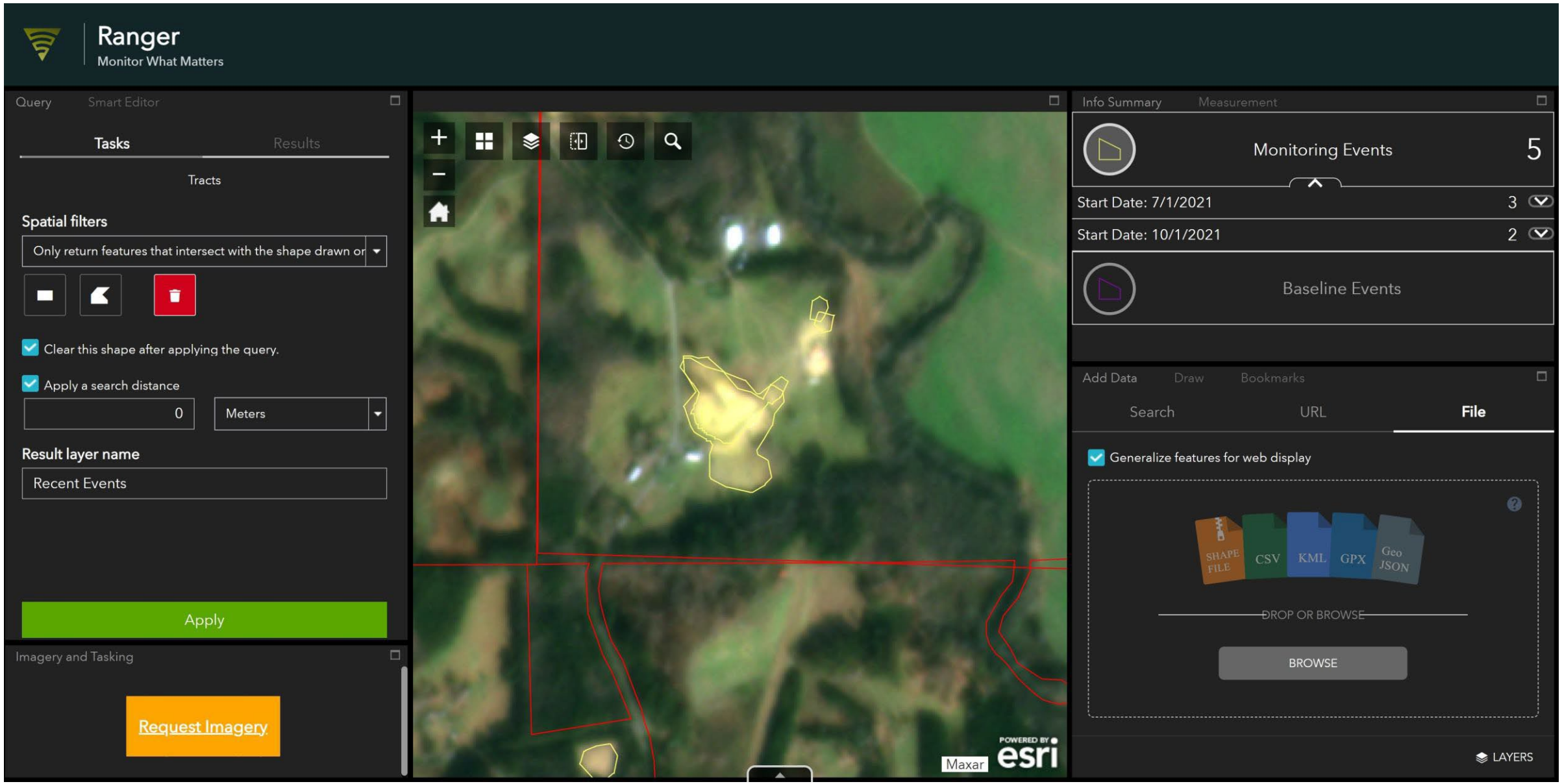

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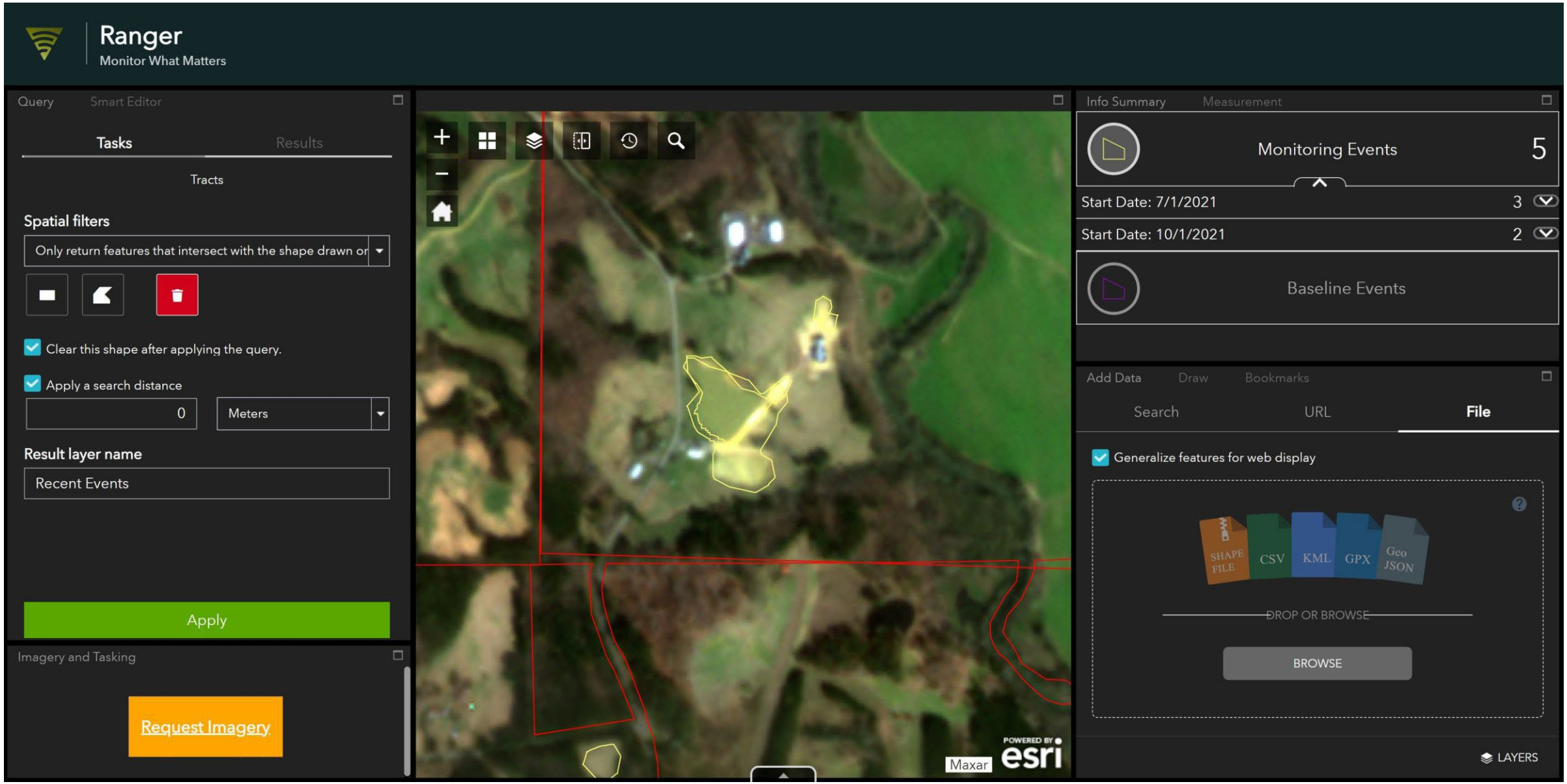

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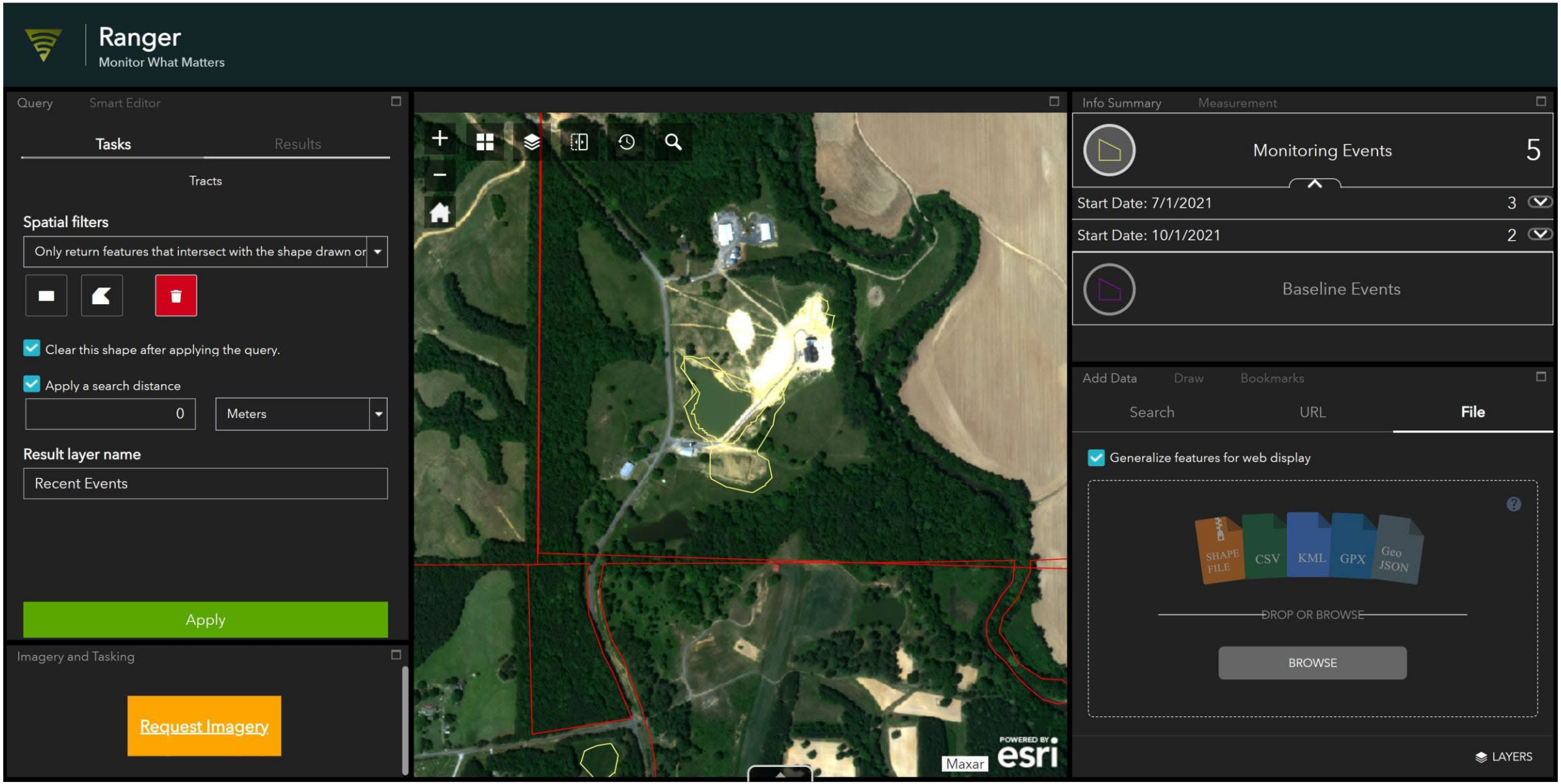

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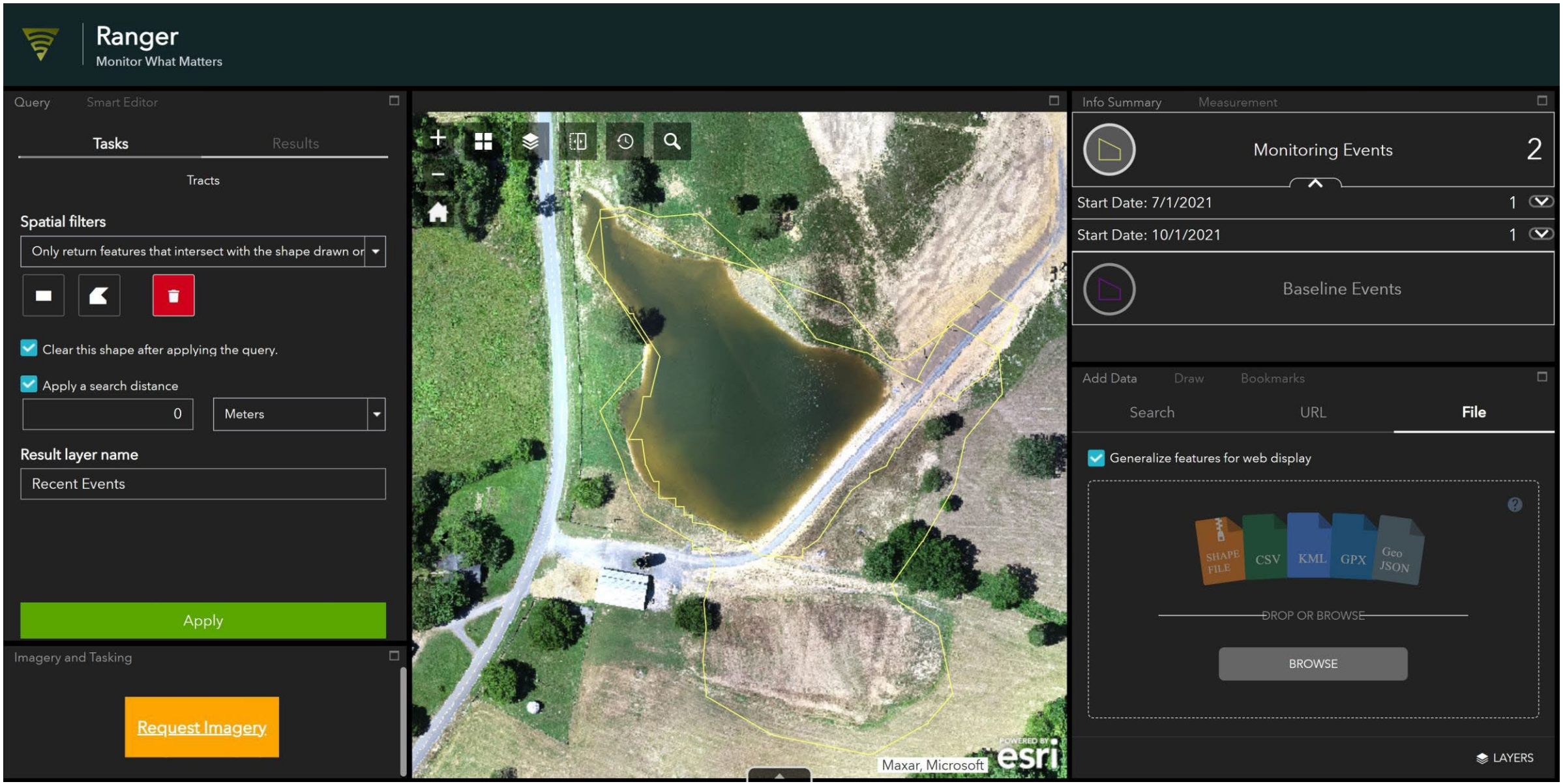

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Questions?

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www.SkytecLLC.com

Link: Ranger Story Map

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Planet Labs SkySat Imagery - 3/11/2024