Satelytics

Satelytics AI Driven Algorithms in Vegetation Management

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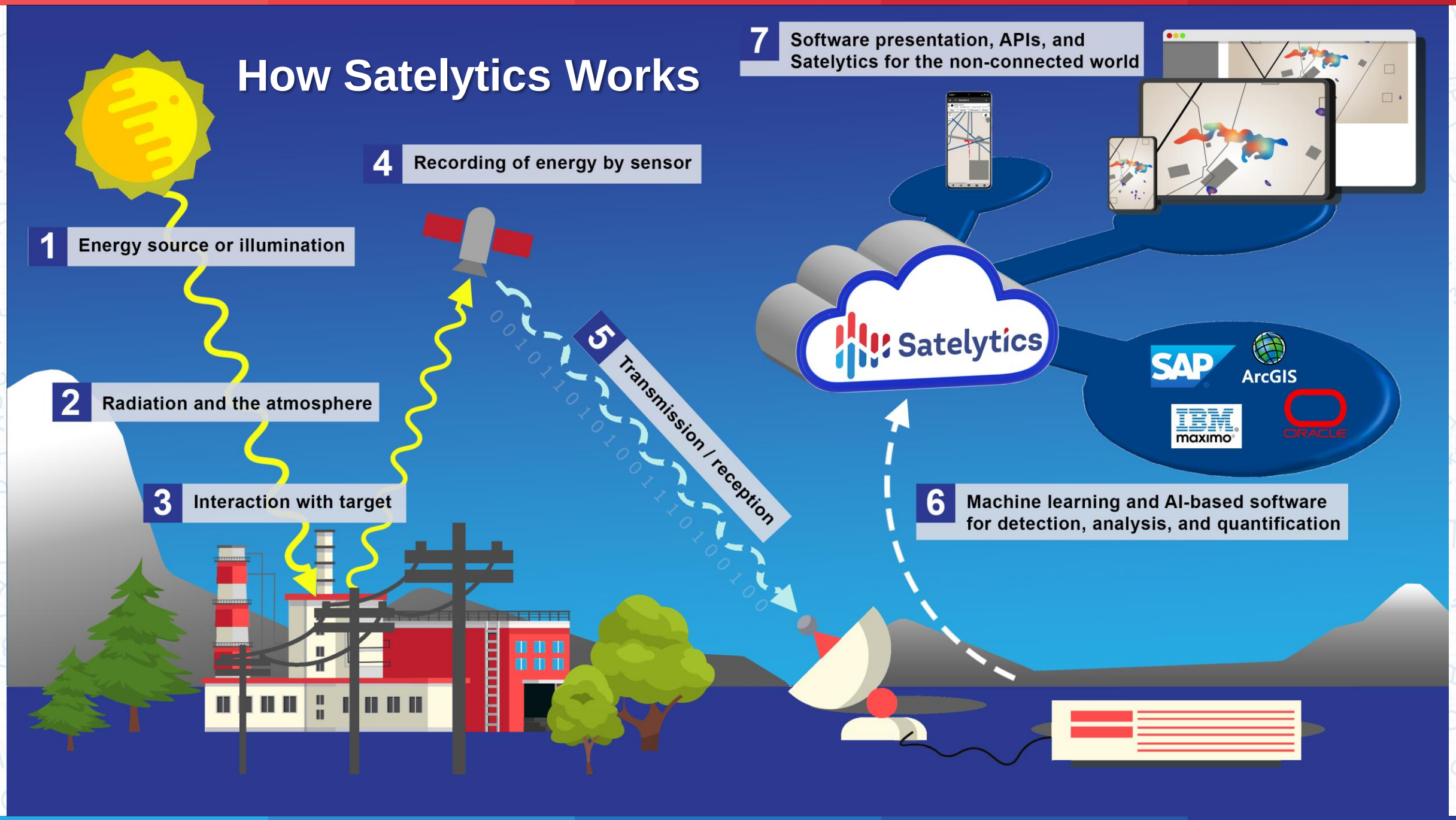
How Satelytics Works



What Are the Sources of Data?

Data Acquisition, From Where, How Often, and What the Future Holds

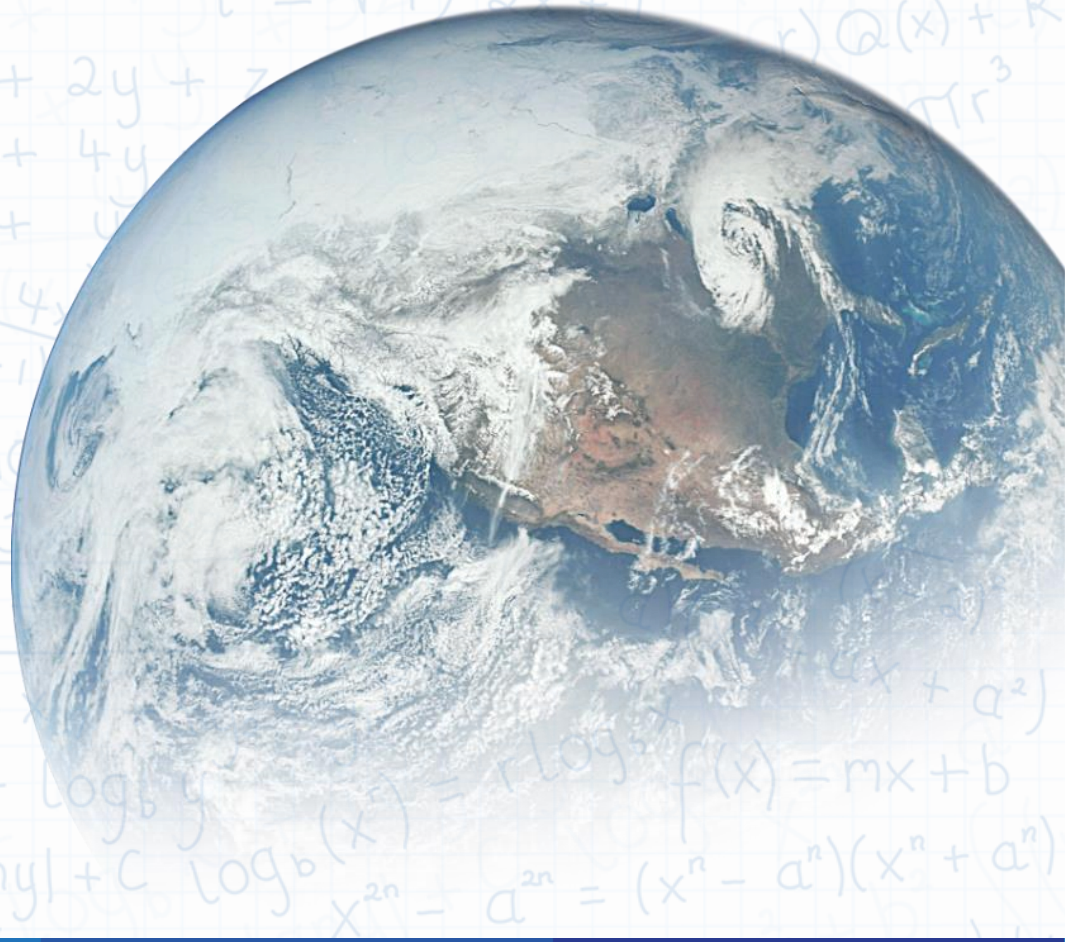
Satelytics takes in multi- and hyperspectral data from a variety of third-party sources, including enterprise satellite data providers using conventional and nano-satellite arrays, plane or drone aerial imagery, and fixed or persistent camera platforms.

Perspective on Scale and Capture

3,000 km² over the Bakken, ND

Satellite	11 minutes
Plane	2 days
UAV	25 hectares 6 hours

- Satellites
- Nano-satellites
- Aircraft
- Drone/UAV
- Fixed/Persistent Platform



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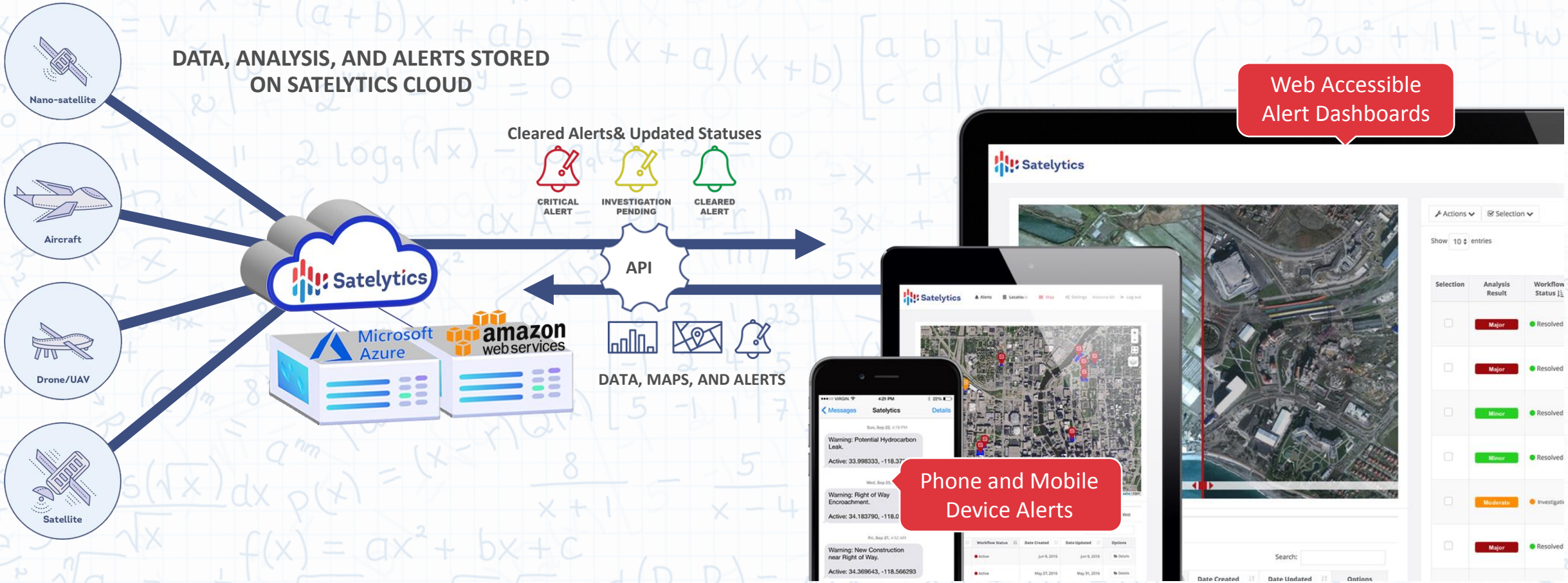
Integration With Other Software Applications on Multiple Platforms



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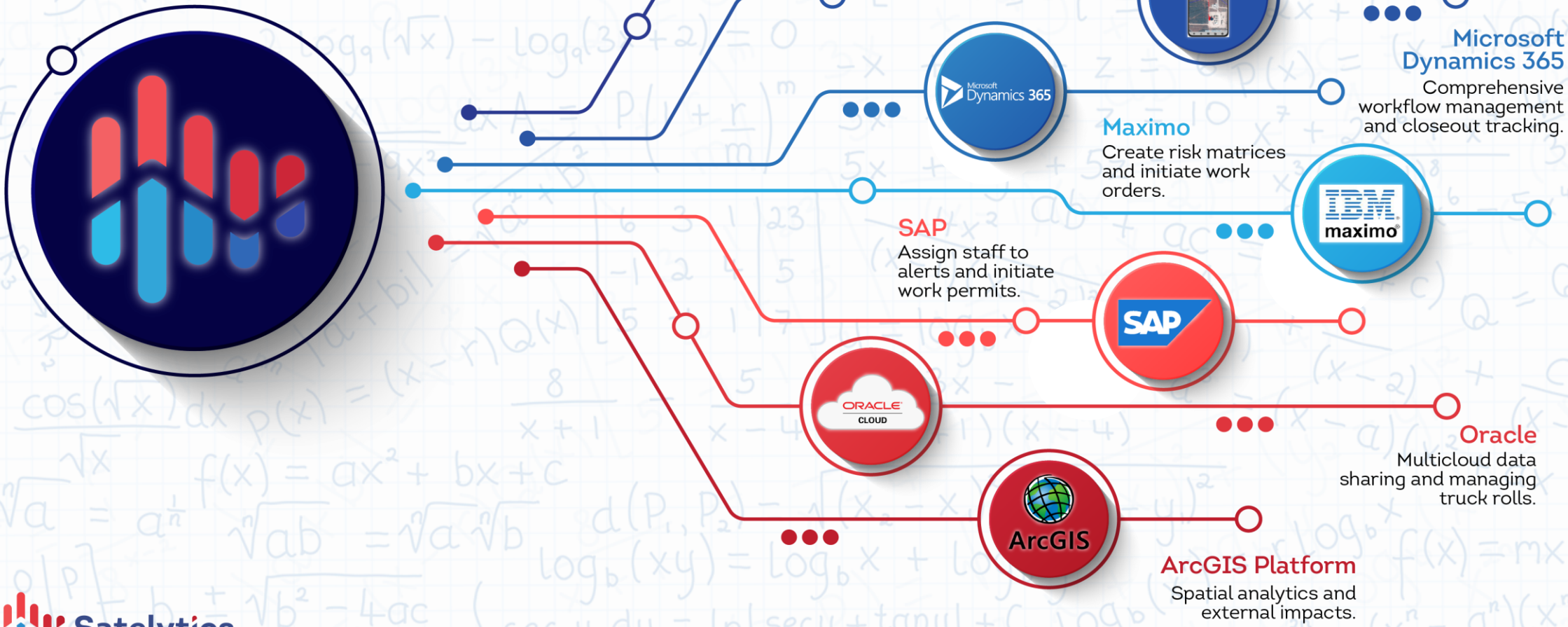
Web Services & APIs



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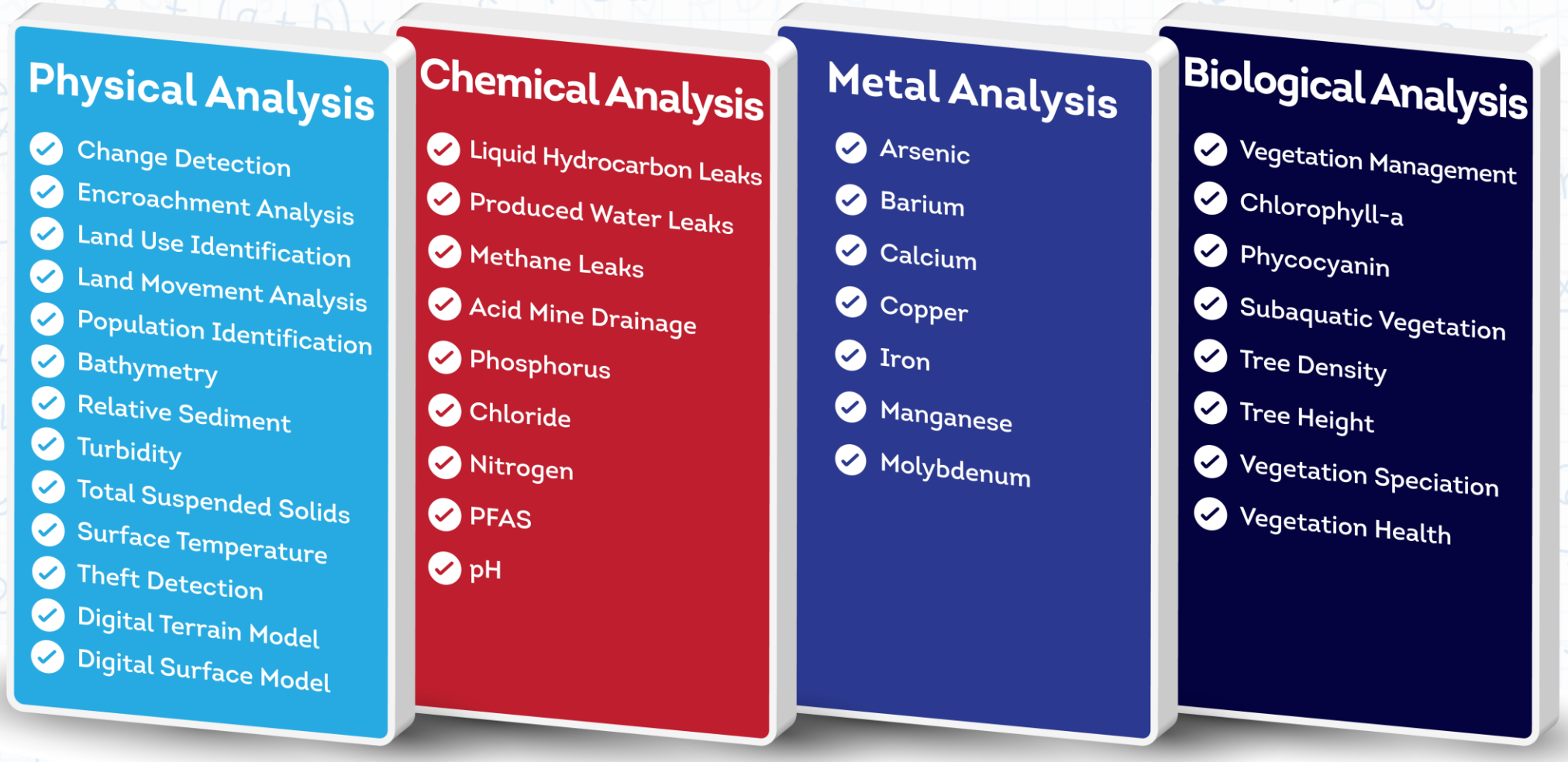
Our Algorithms



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Our AI Driven Algorithms

Liquids and Gases
Methane - Onshore and Offshore
Liquid Leak – Onshore and Offshore
Produced Water
H2S
Nox
Sox
Ethane
Butane
Propane
CO2

Vegetation Mgt
Grass speciation
Shrub speciation
Tree Speciation
Grass health
Shrub Health
Tree Health
Shrub Height
Tree Height
Sub Aquatic Speciation
Sub Aquatic Health
Soil moisture

Change Detection
Right of Way structures
Right of Way land use classification
Water Crossings depth cover exposed pipe
Water Crossings Erosion and Deposition
Water Body Bathymetry

Water Chemistry
Phosphorus
Chlorophyl A
Chlorophyl B
Phycocyanin
Turbidity
Relative Sediment
Arsenic
Manganese
Copper
Iron
PFAS – as to the use of AFFF fire fighting foam
PH
Nitrogen
Salinity
Barium

Asset Analysis
Electrical Span analysis
AI driven predictive health of asset and risk
Wildfire Mitigation

Pre and Post Storm Assessment
Structure, Asset, Mother Nature Debris, Change Detection, and Enchroachment

Land Movement
Land Slips
Sink Holes
Pad and Roadway condition
Land use change
Rail Corridor
Burn Scar Analysis

Land Chemistry
Phosphorus
Chlorophyl A
Chlorophyl B
Phycocyanin
Turbidity
Relative Sediment
Arsenic
Manganese
Copper
Iron
PFAS
PH
Nitrogen
Aluminum
Calcium
Zinc
Lead
Molybdenum
Magnesium
Vanadium
PFAS – as to the use of AFFF fire fighting foam

Temperature
Land Surface Temperature
Water Surface Temperature

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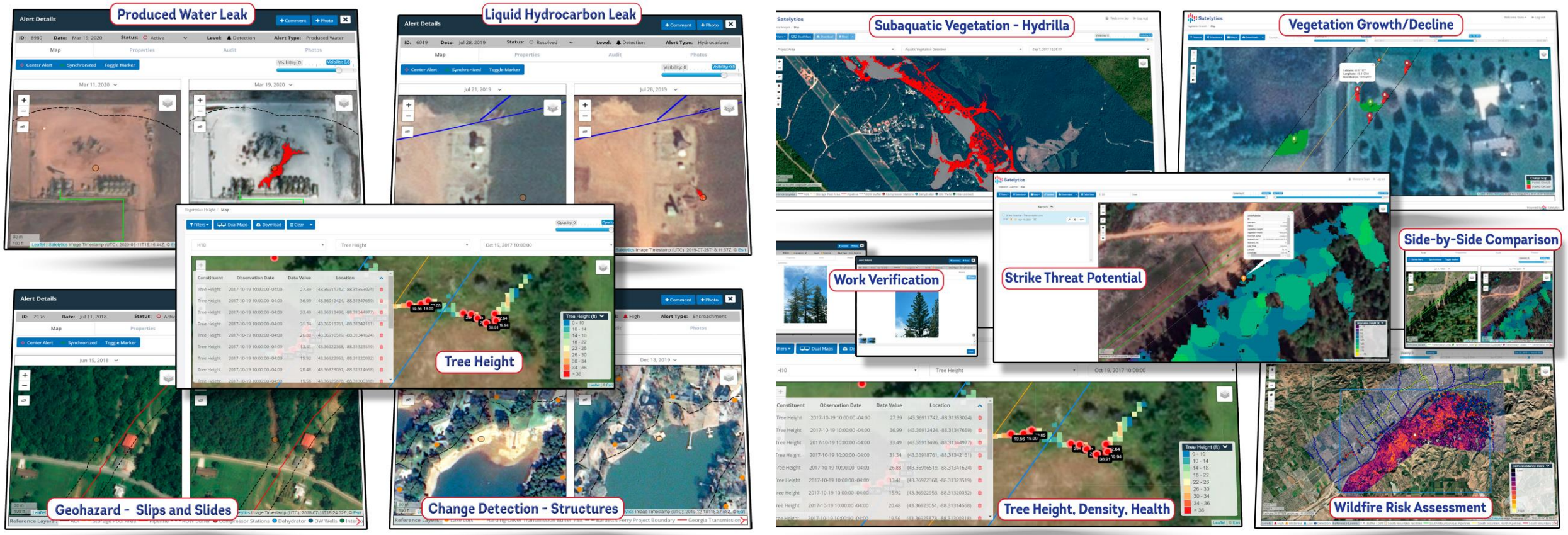
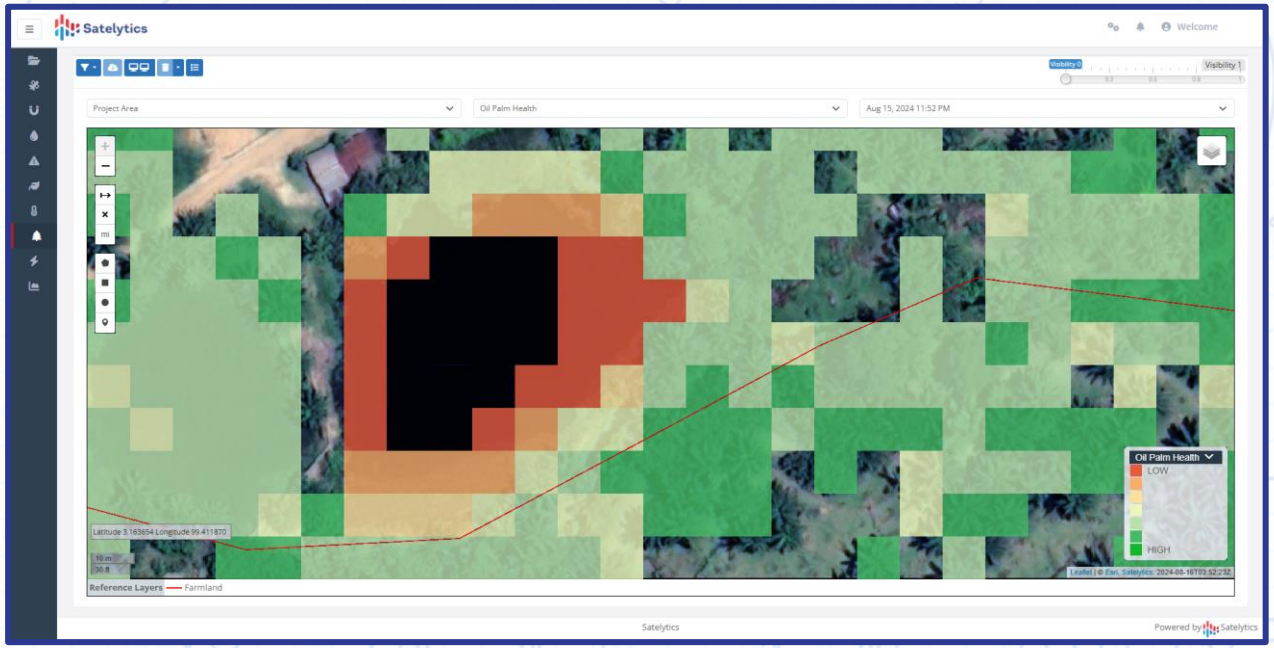
Run one or ALL algorithms at the same time….

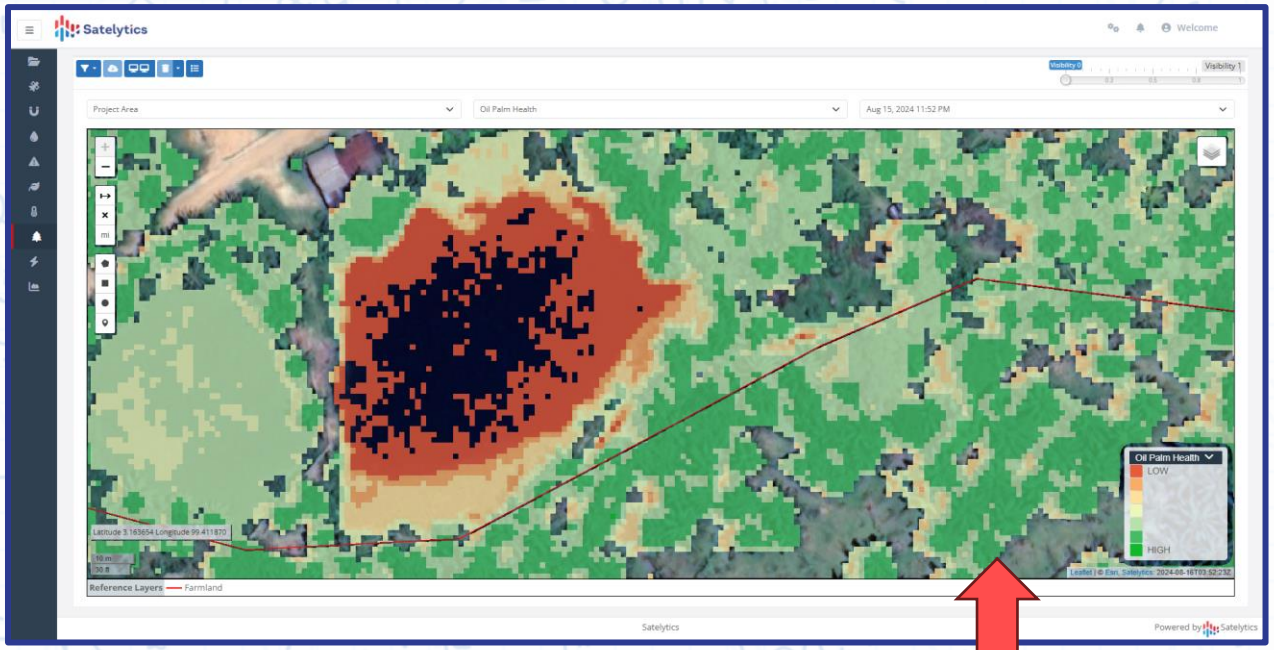


Not All Resolutions Are Created Equal

Using 10m Sentinel Resolution



Satelytics Uses 30cm Resolution from Either Airbus' Pléiades Neo or Maxar's Worldview-3



Significantly improved detail helps you pinpoint the tree health, tree count, and total canop

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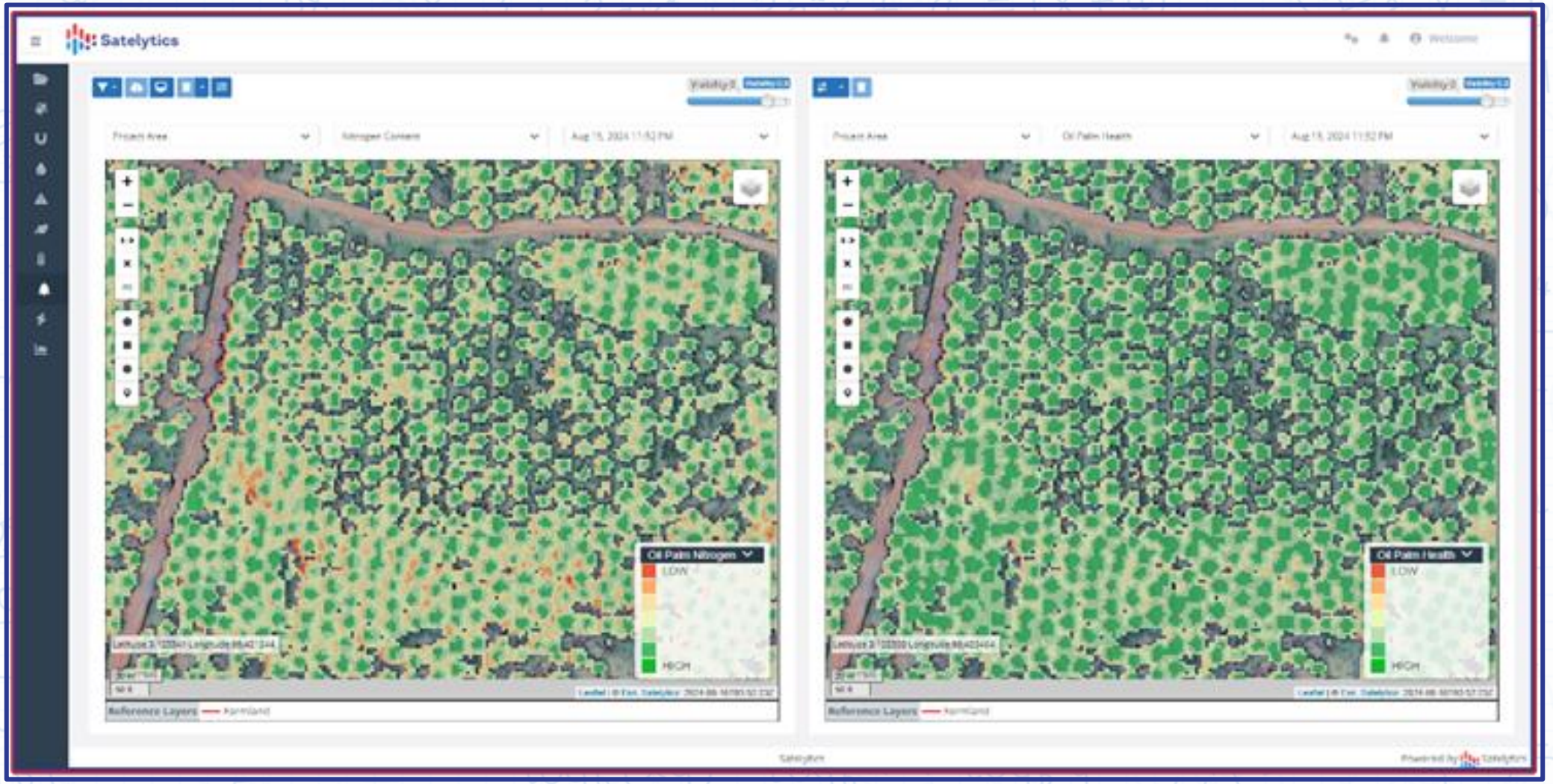
Comparisons of Nutrient Levels



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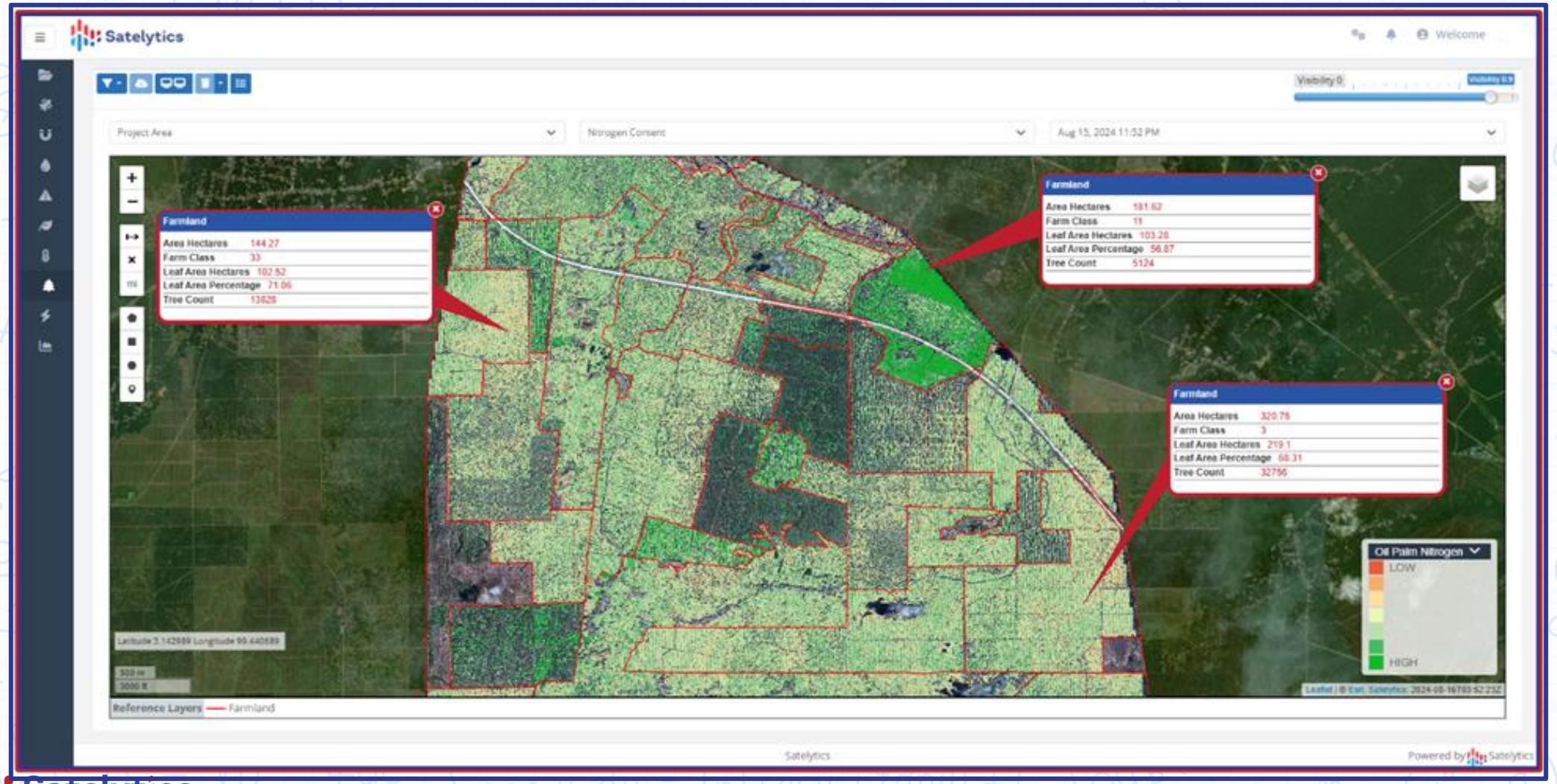
Automatic Tree Counts; Hectare Coverage, Percentages and Foliage Cover



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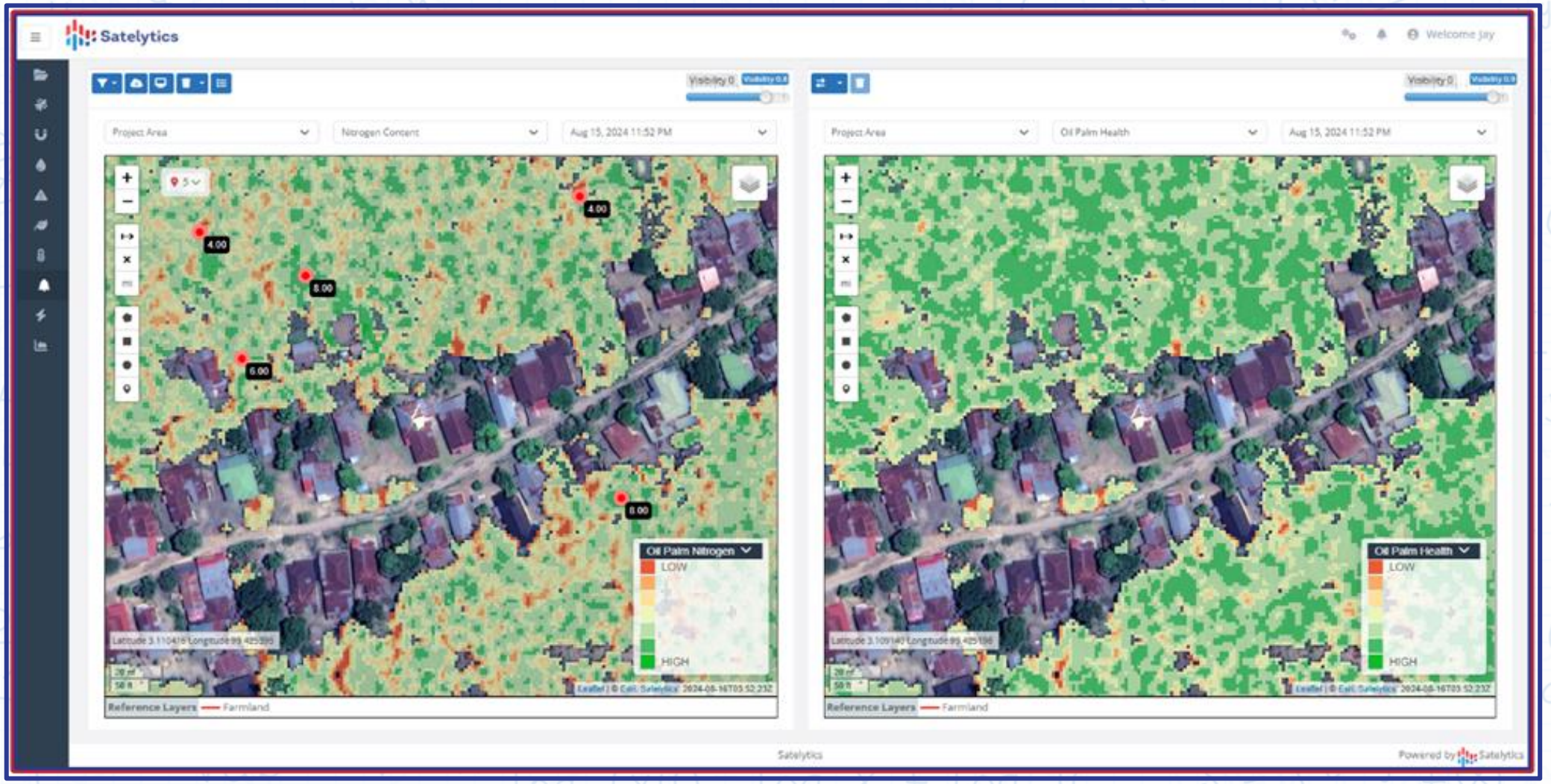
Any Road Conditions or Third Party Encroachements can be Detected



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Efficiencies using Satelytics AI Algorithms

- Data is examined across the entire plantation within hours of raw data being gathered.
- Data can be examined more frequently, which translates to earlier detection of deficiencies or areas that need attention.
- Alerts and alarms may be set to specific levels of conditions, allowing your experts to address problems, rather than search for them.
- Data can be extracted every 30 cm by 30 cm across the entire plantation.
- Tree counts are more accurate.
- Tree speciation and tree height are measurable.
- Tree health can be examined for each tree and its foliage.
- All new plantings can be monitored and alerted for success or failure.

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Efficiencies using Satelytics AI Algorithms

- NVDI is a simple standard of tree health, but Satelytics also has its own vegetation health measurement, derived from many years of data collection and AI use.
- Satelytics can detect and measure the nitrogen levels of foliage.
- Soil and water bodies may be analyzed for constituents such as nitrogen, phosphorous, and others.
- All data may be used in other software applications and for reporting purposes.
- The efficacy of all actions taken in the field can be verified.
- Road conditions within the plantations can be examined for changes in condition.
- Any third-party encroachments can be detected.
- Infestations of pests and blight may be detected.

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Vegetation Management in Agriculture

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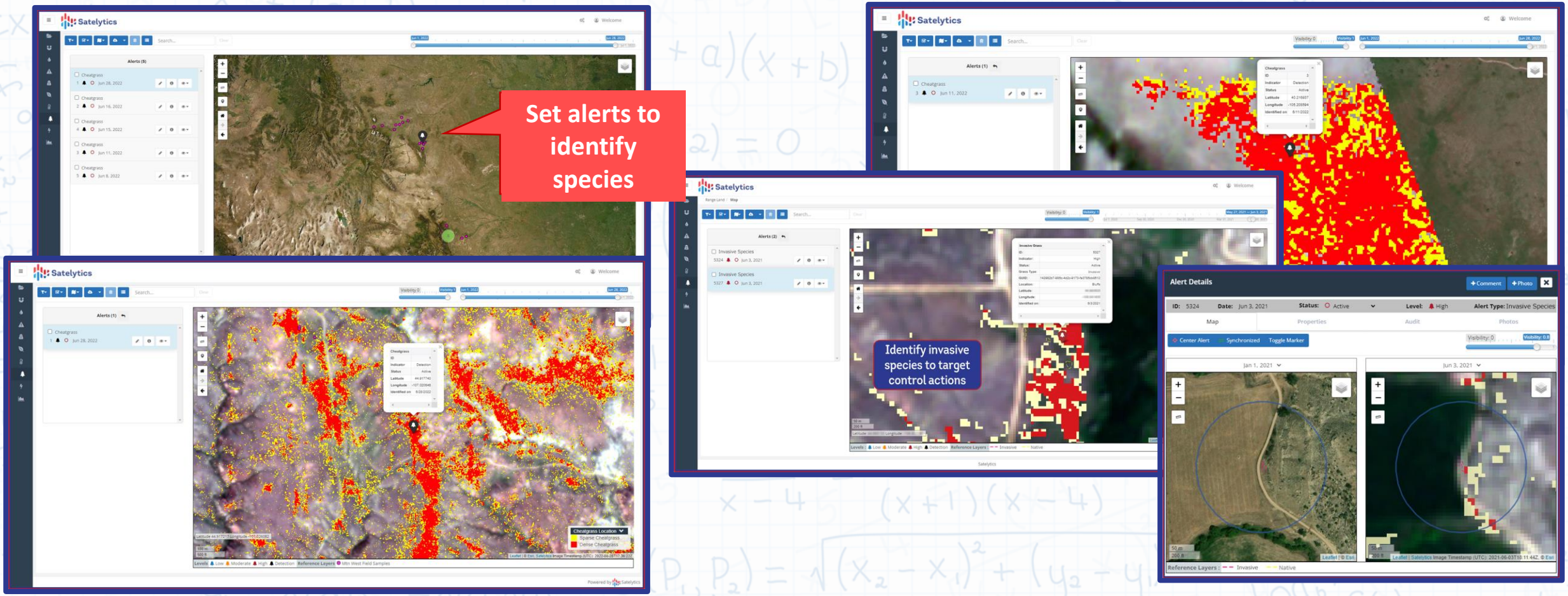
Invasive Grass Species – Cheatgrass Identified and Restored with Envu® Chemical Applications



Vegetation analysis can include identifying species, look at growth rates, yield, output, and even success of remediation treatments.

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Vegetation Management

Work Verification

Transmission

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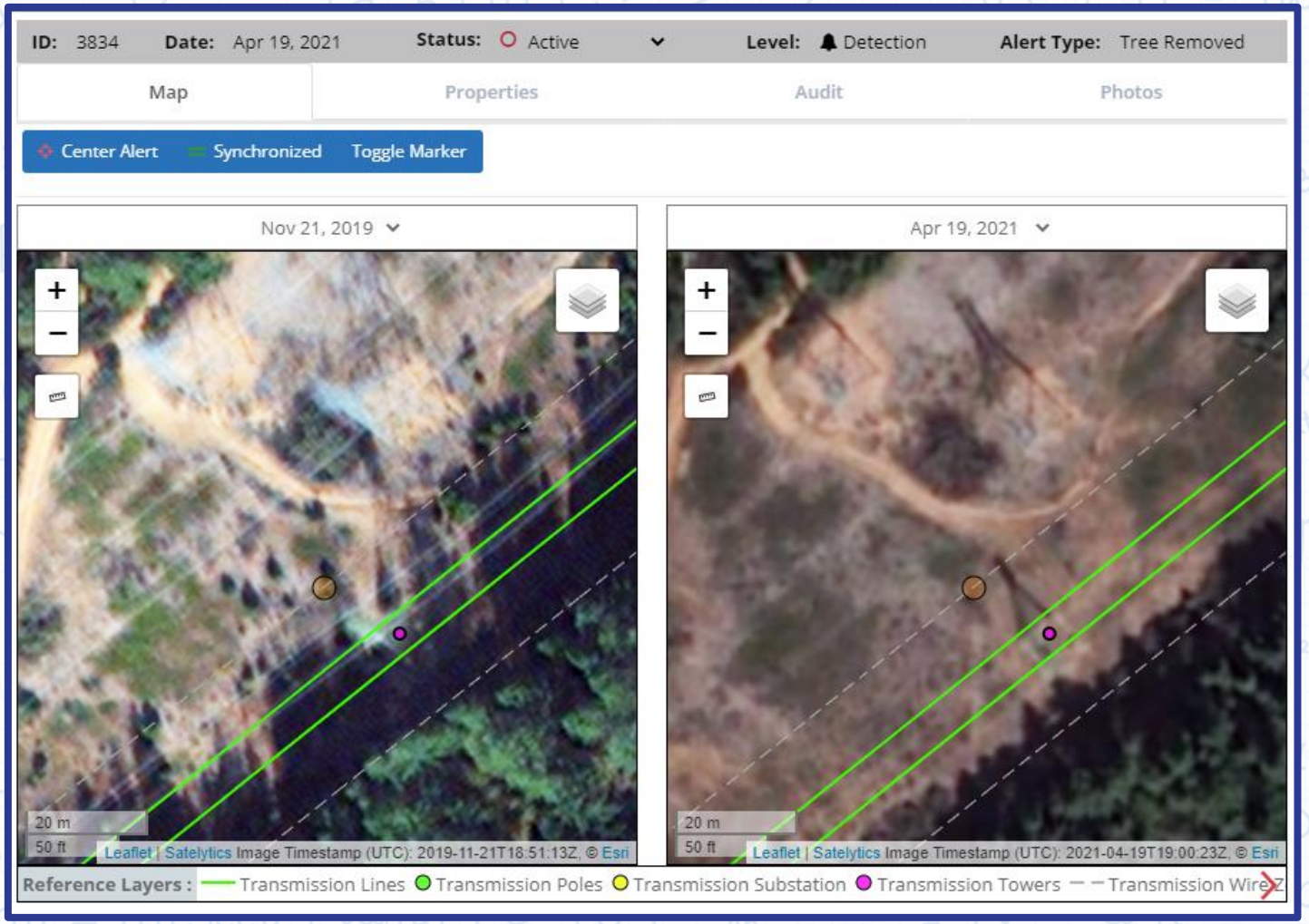
Work Verification Detections

Criteria

- Tree present in 2019
- Tree not present in 2021



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Soil, Nutrients and Other Factors affecting Yield

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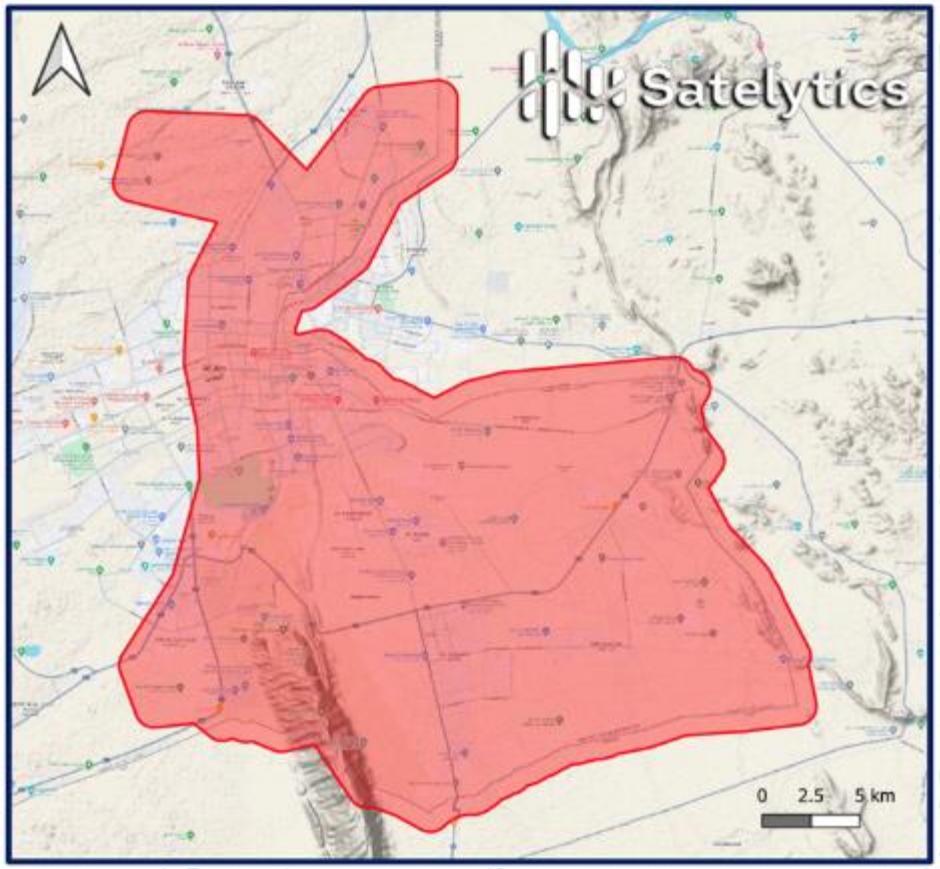
Project Goals – Agriculture Yield, Soil Conditions, and Nutrient Loading

- Satelytics coordinated the collection of high-resolution satellite imagery over the Al Ain, UAE area.
- Satelytics performed proprietary algorithms for the detection and quantification on land and in water.
- Data outputs are delivered via Satelytics.io and hosted in the cloud.



Al Ain Area of Interest for Space 42
787 km^2 (304 miles^2) coverage

Completed Analytics

GENERAL

- Natural Color (raster)
  - Raw imagery stack (.zip file)
- Land Classification Map (raster and vector)
- Soil Classification (raster and vector)
- Change Detection (vector)
- DEM meters (raster)

WATER

- Relative Sediment in water (raster)
- Arsenic in water in ppb or ug/L (raster)
- Barium in water in ppb or ug/L (raster)
- Copper in water in ppb or ug/L (raster)
- Water Turbidity in NTU (raster)

LAND

- Soil Calcium in ppm or mg/kg (raster)
- Soil Salinity in dS/m (raster)
- Soil Magnesium in ppm or mg/kg (raster)
- Soil Potassium in ppm or mg/kg (raster)
- Soil Phosphorus in ppm or mg/kg (raster)
- Soil pH in standard units (raster)

Derivative Analysis

LAND

- Slope Degree (raster)
- Soil Population definition based on Salinity (raster)
- Soil Population Clustering (2 Major Soil Population)
  - Ca/Mg unitless (raster)
  - Ca/K unitless (raster)
  - Salinity/K unitless (raster)
  - Mg/K unitless (raster)
  - Salinity/(Ca/Mg) unitless (raster)
  - pH/K unitless (raster)
  - pH/P unitless (raster)
  - pH/(K/P) unitless (raster)
  - Na on land ppm (raster)
  - Water Infiltration mm/h (raster)

Natural Color

- Natural color image
  - 3-band image
  - Raw imagery stack
    - Native 6-band
- Airbus Pleiades NEO
  - 30cm
- 3 days merged into final product
  - 20240926
  - 20240927
  - 20240929

Change Detection Map

- Change Detection map
  - Identify changes from September 2024 (analysis) and October 2023 (base)
    - Road
      - New road built
    - Water
      - Water in analysis not in base image
    - Vegetation
      - New growth or removed
    - Structure
      - Added or removed
    - Construction
      - Multiple new structures in a dense location
    - Surface disturbance
      - Any moved or disturbed soil
  - Delivered in vector format

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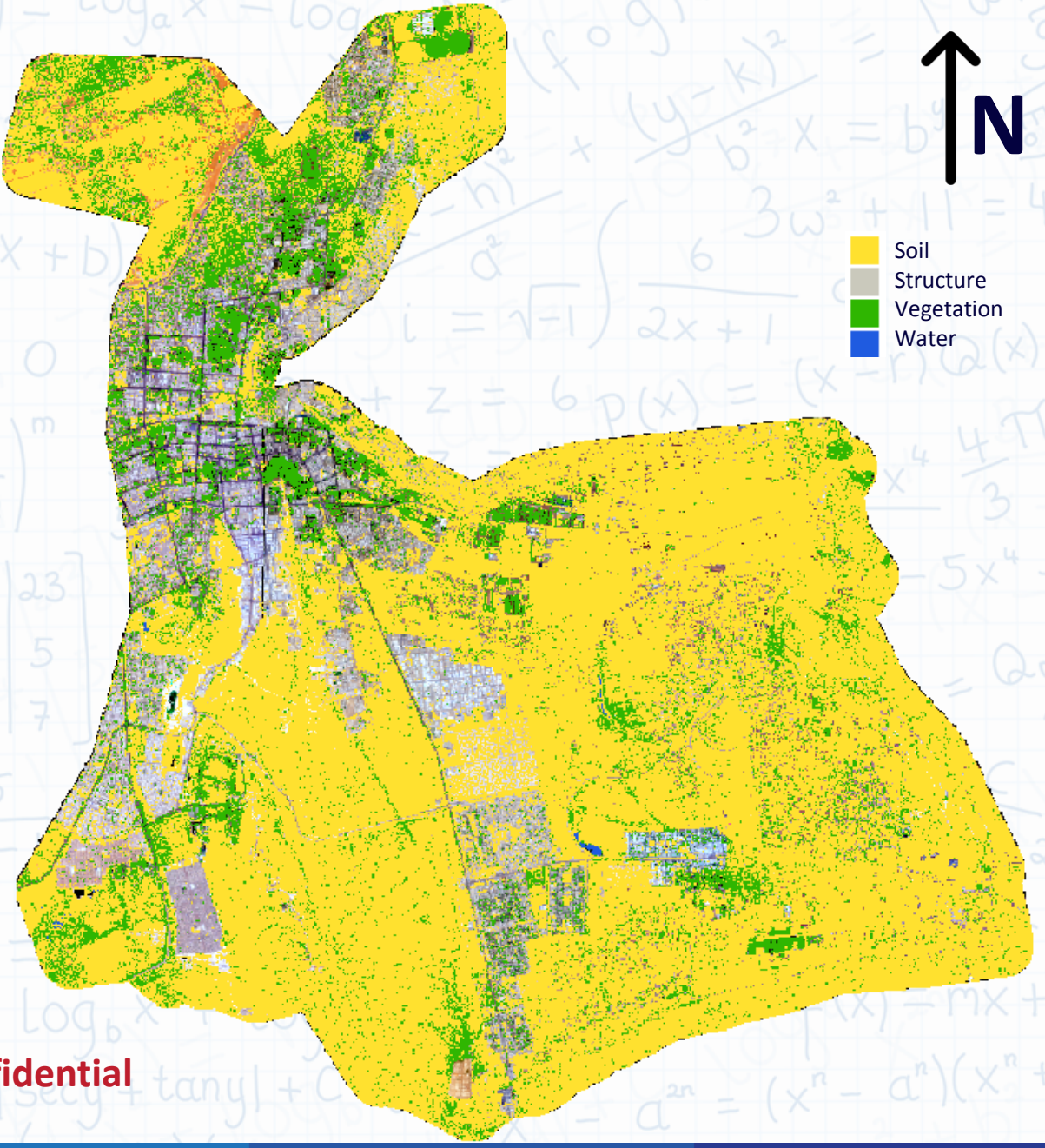
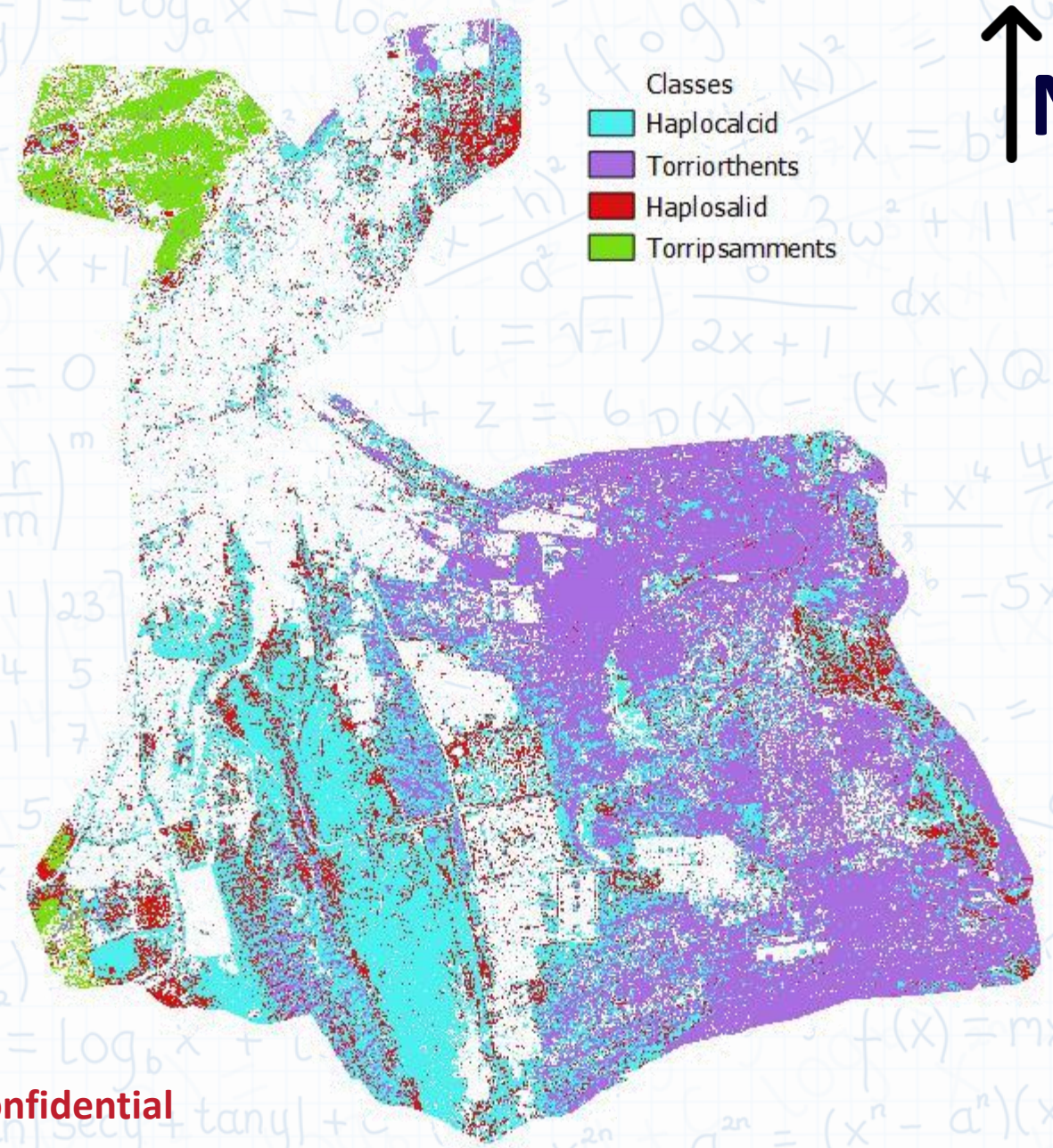
Land Classification Map

- Land classification map
  - Identify 4 major surface cover areas
    - Soil
    - Structure (impervious surface)
    - Vegetation
    - Water
  - Delivered in raster and vector format



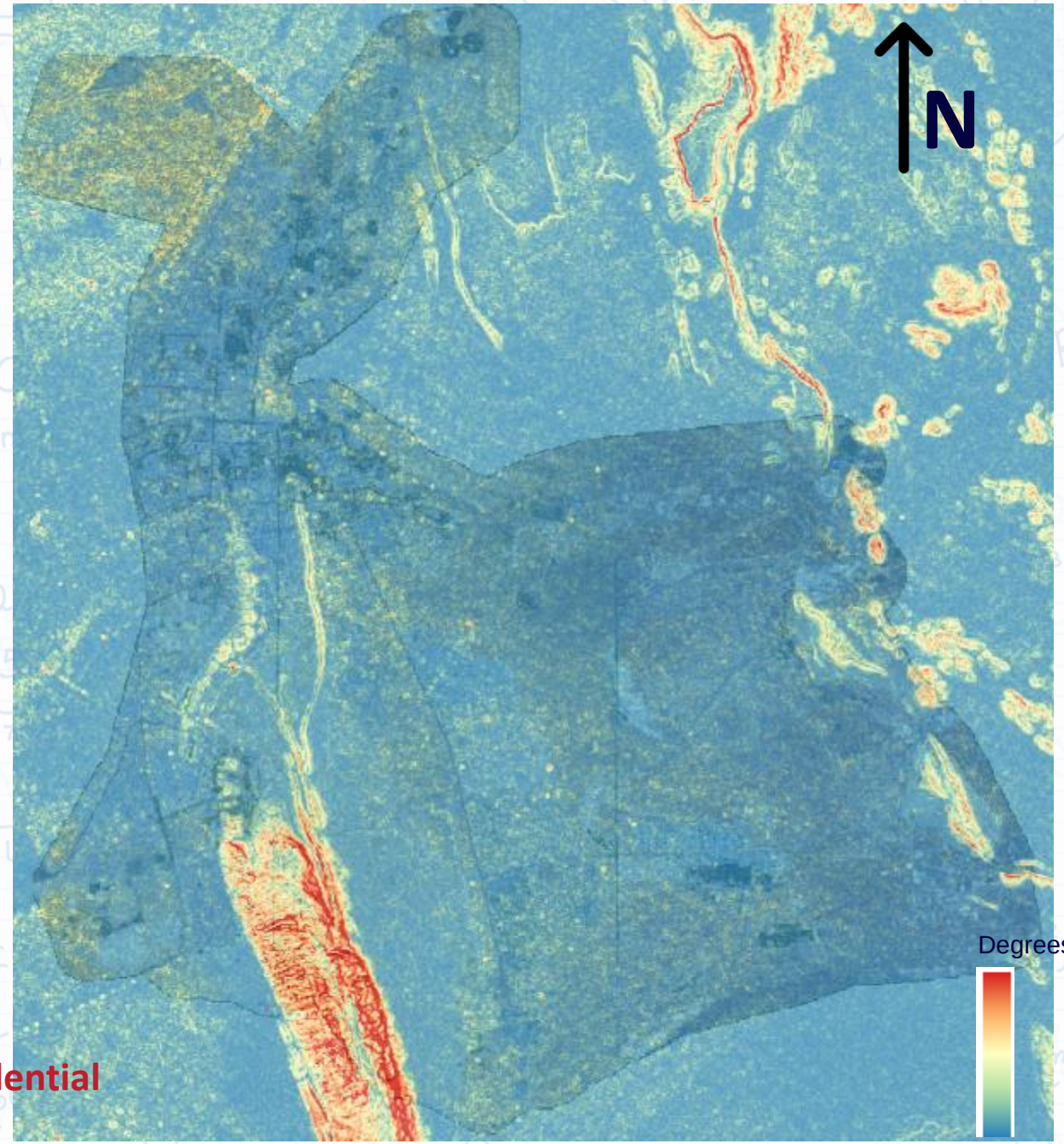
Soil Classification Map

- Soil classification map
  - Identify 4 unique surface soil types
    - Haplocalcid
    - Torriorthents
    - Haplosalid
    - Torripsamments
  - Delivered in raster and vector format



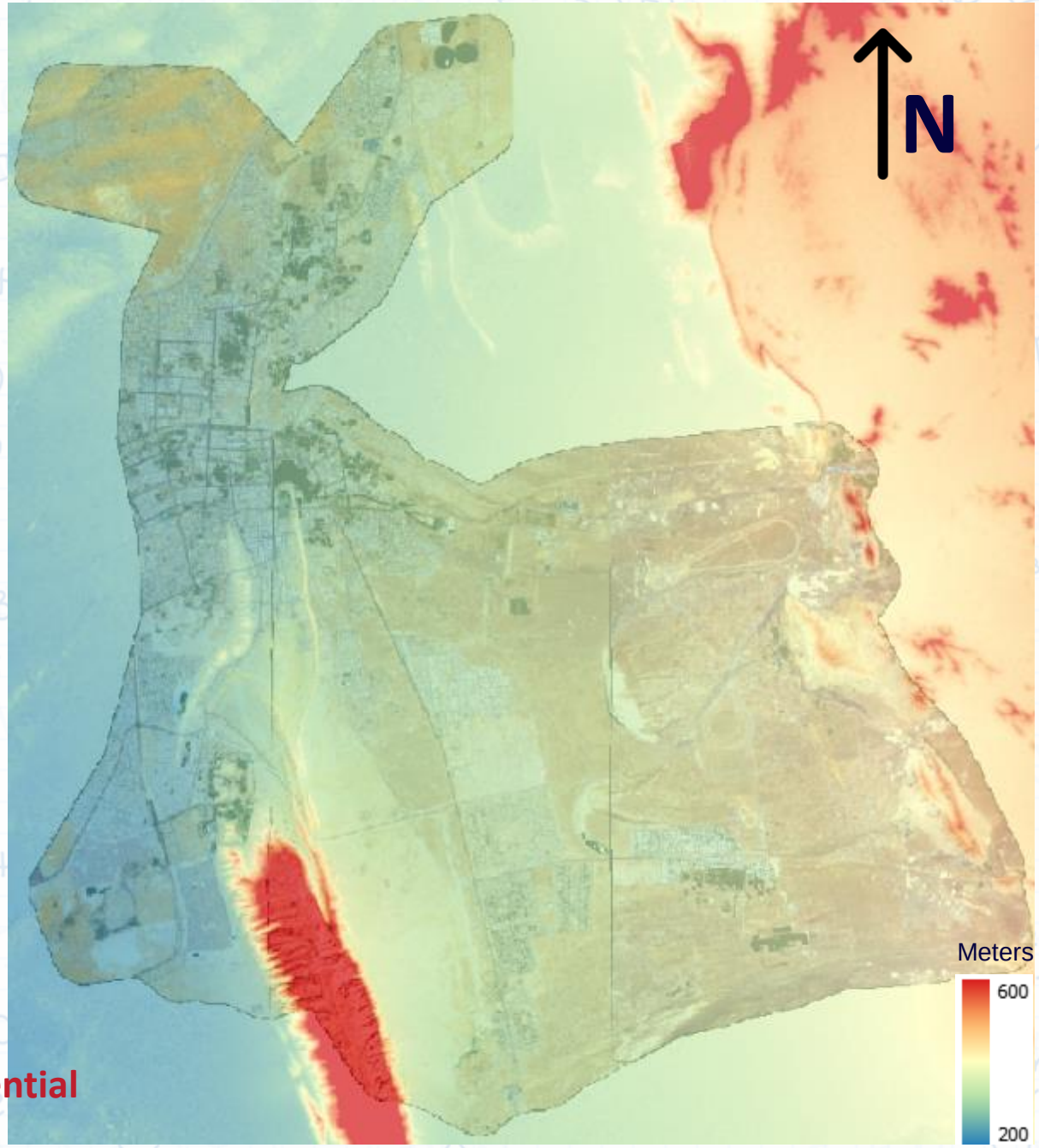
Slope Map

- Derived from Digital Elevation Map (DEM)
  - Provided from USGS
    - 1-meter pixel
  - Units are in slope degrees
  - Delivered in raster format



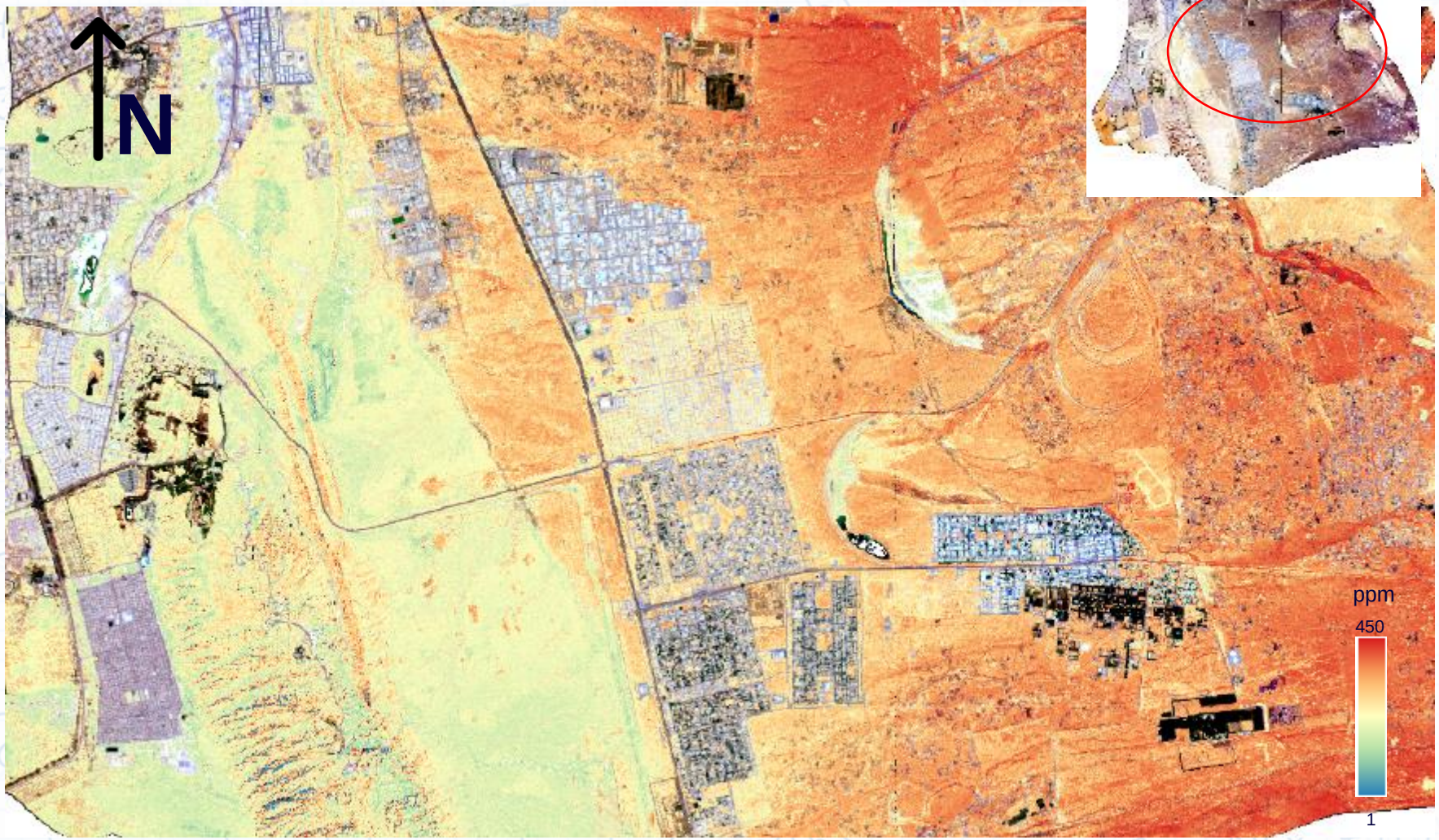
Digital Elevation Map

- Digital Elevation Map (DEM)
  - Provided from USGS
    - 1-arc sec
  - Delivered in raster format



Calcium on Land Analysis

- Land analysis for surface soil calcium (Ca)
  - Single band raster
    - Measured in ppm or mg/kg
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



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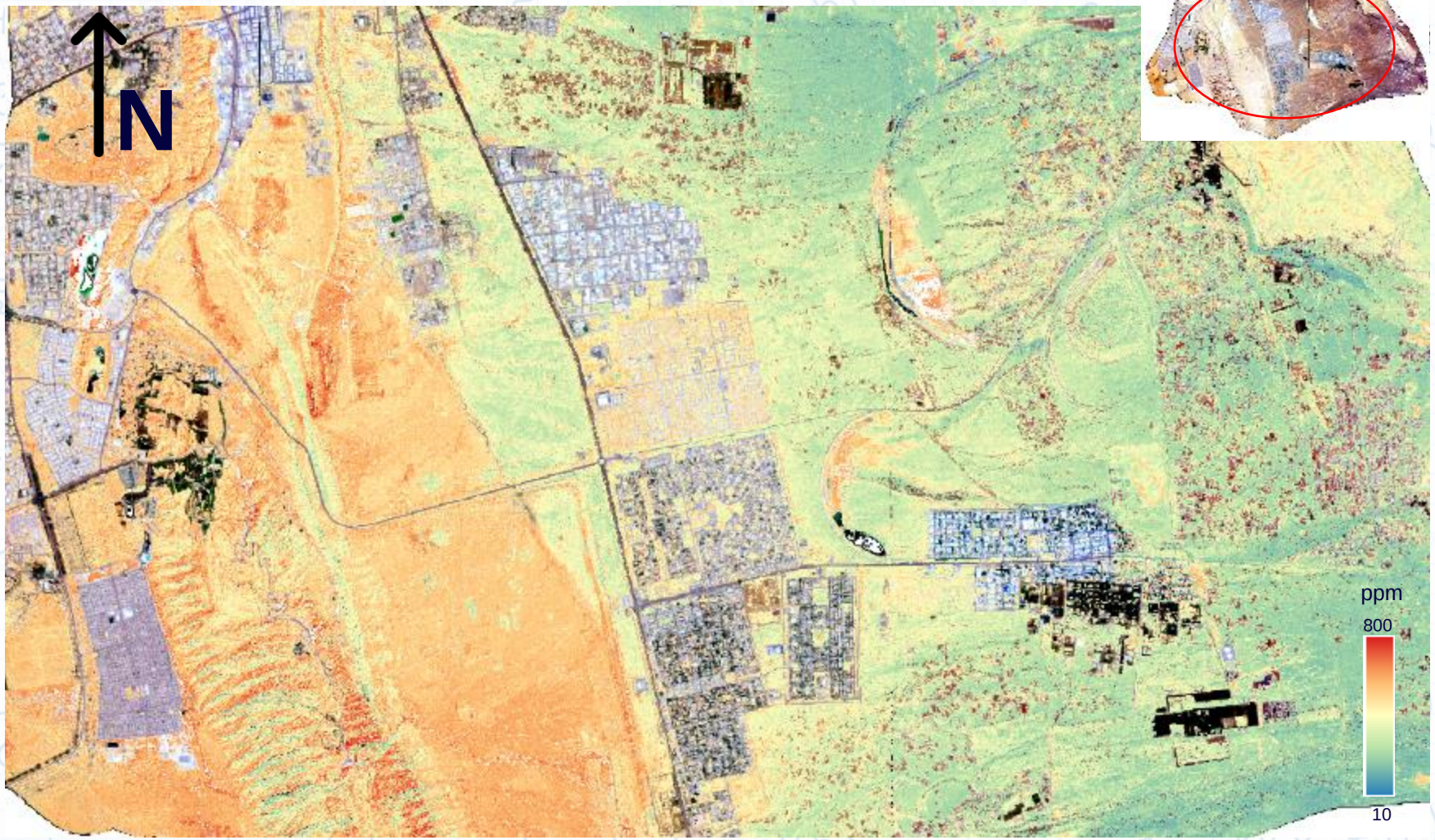
Magnesium on Land Analysis

- Land analysis for surface soil magnesium (Mg)
  - Single band raster
    - Measured in ppm or mg/kg
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



Satelytics

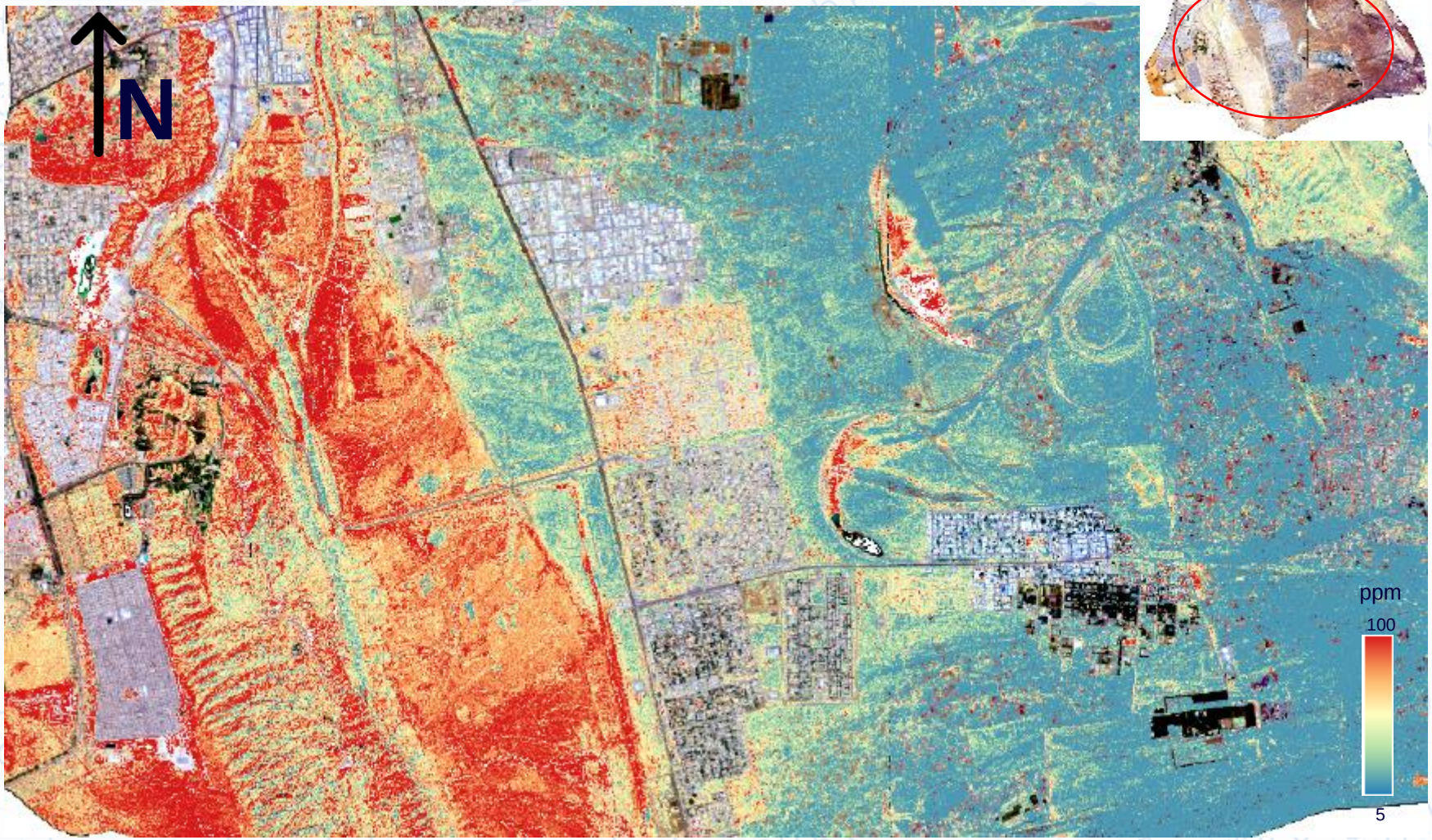
Phosphorus on Land Analysis

- Land analysis for surface soil phosphorus (P)
  - Single band raster
    - Measured in ppm or mg/kg
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format

Satelytics

Potassium on Land Analysis

- Land analysis for surface soil potassium (K)
  - Single band raster
    - Measured in ppm or mg/kg
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



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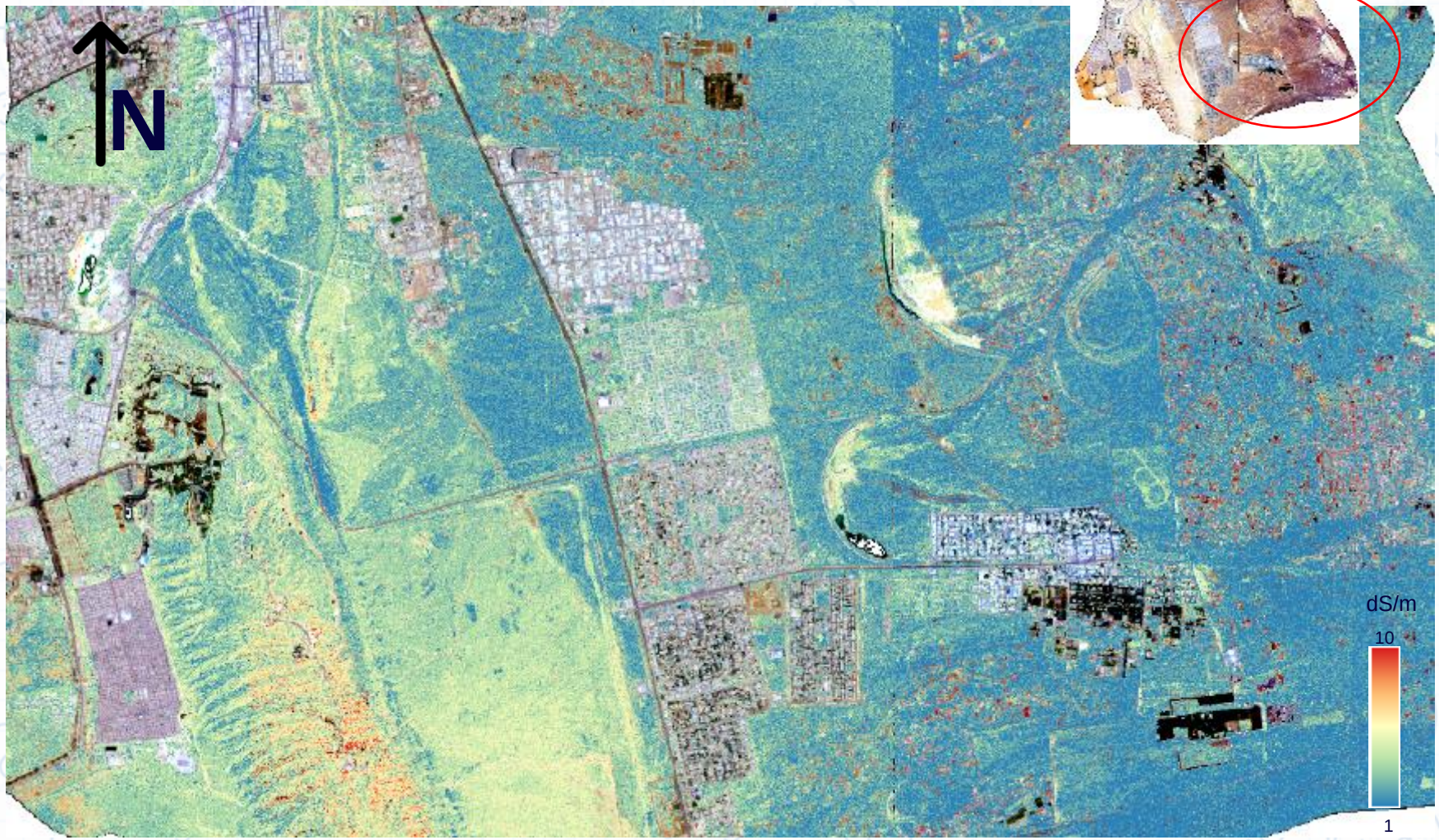
Salinity on Land Analysis

- Land analysis for surface soil salinity
  - Single band raster
    - Measured in dS/m
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



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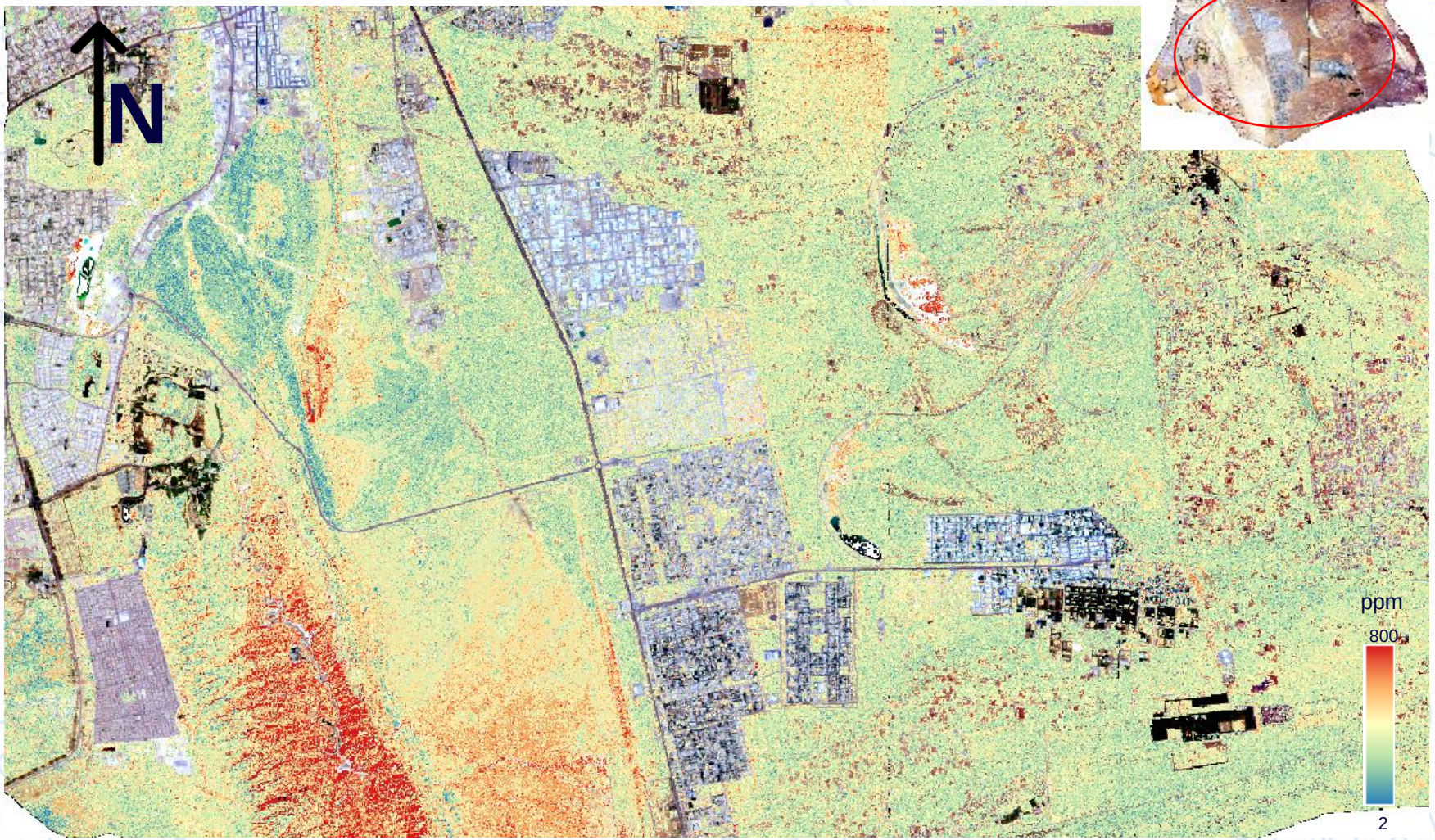
Sodium on Land Analysis

- Land analysis for surface soil sodium (Na)
  - Single band raster
    - Measured in ppm
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



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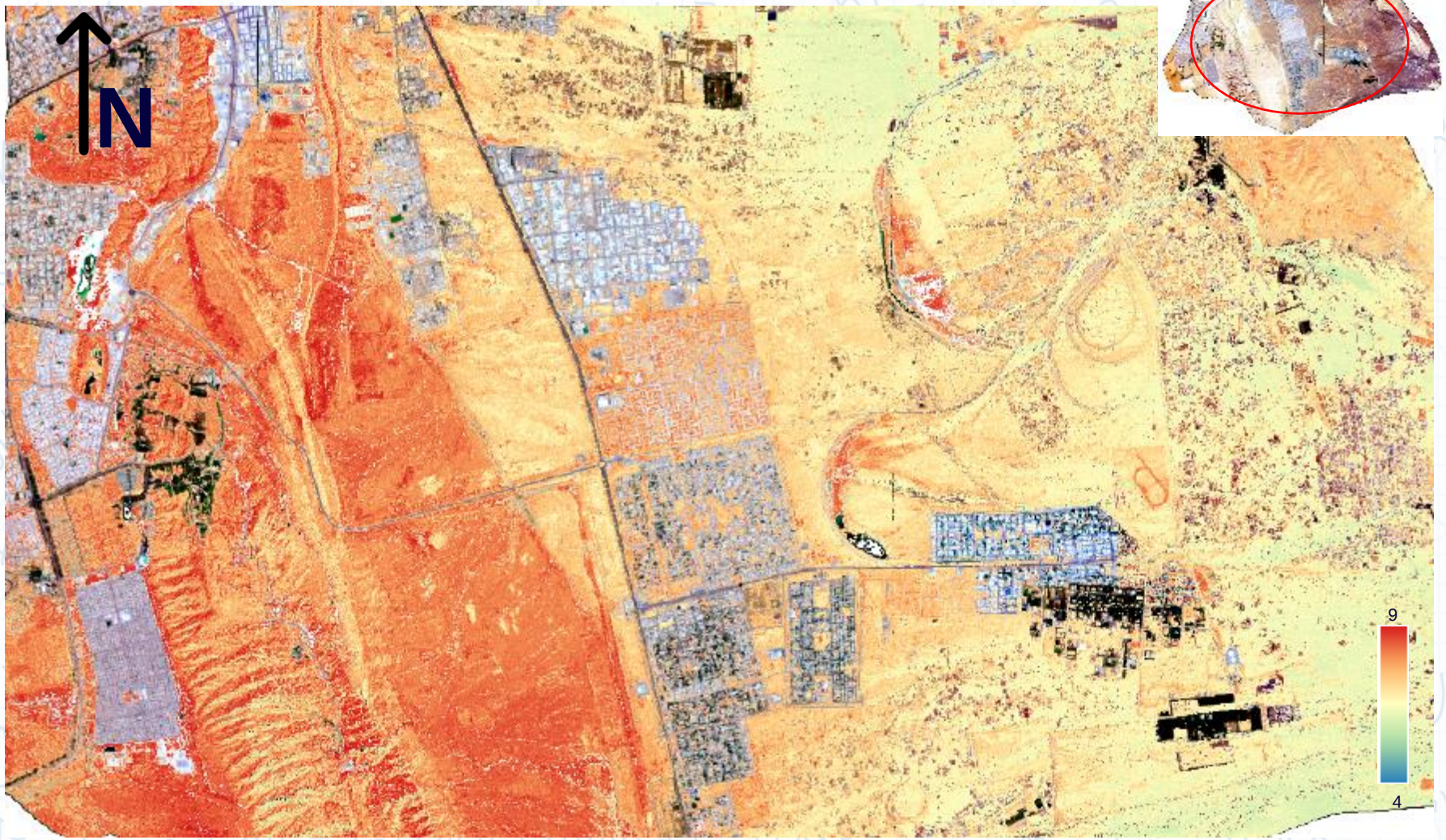
pH on Land Analysis

- Land analysis for surface soil pH
  - Single band raster
    - Standard units
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



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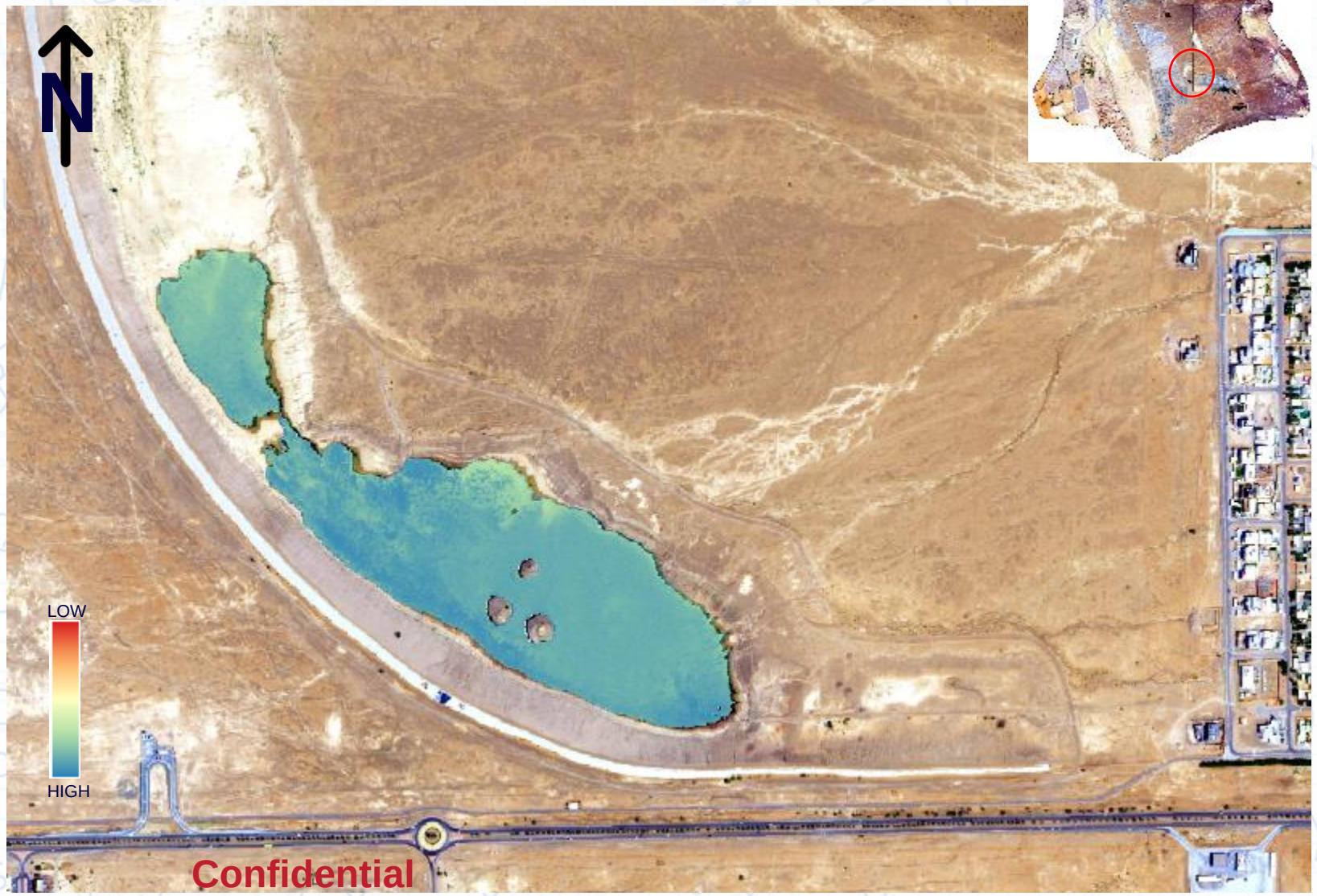
Relative Sediment Analysis

- Water analysis for sediment content
  - Identifies clastic sediment in water
  - Single band raster
    - Range 1 (low) to 100 (high)
- Zoomed image
- Red circle indicates the zoom area



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Turbidity Analysis

- Water analysis for turbidity
  - Single band raster
    - Measured in NTU
- Zoomed image
- Red circle indicates the zoom area

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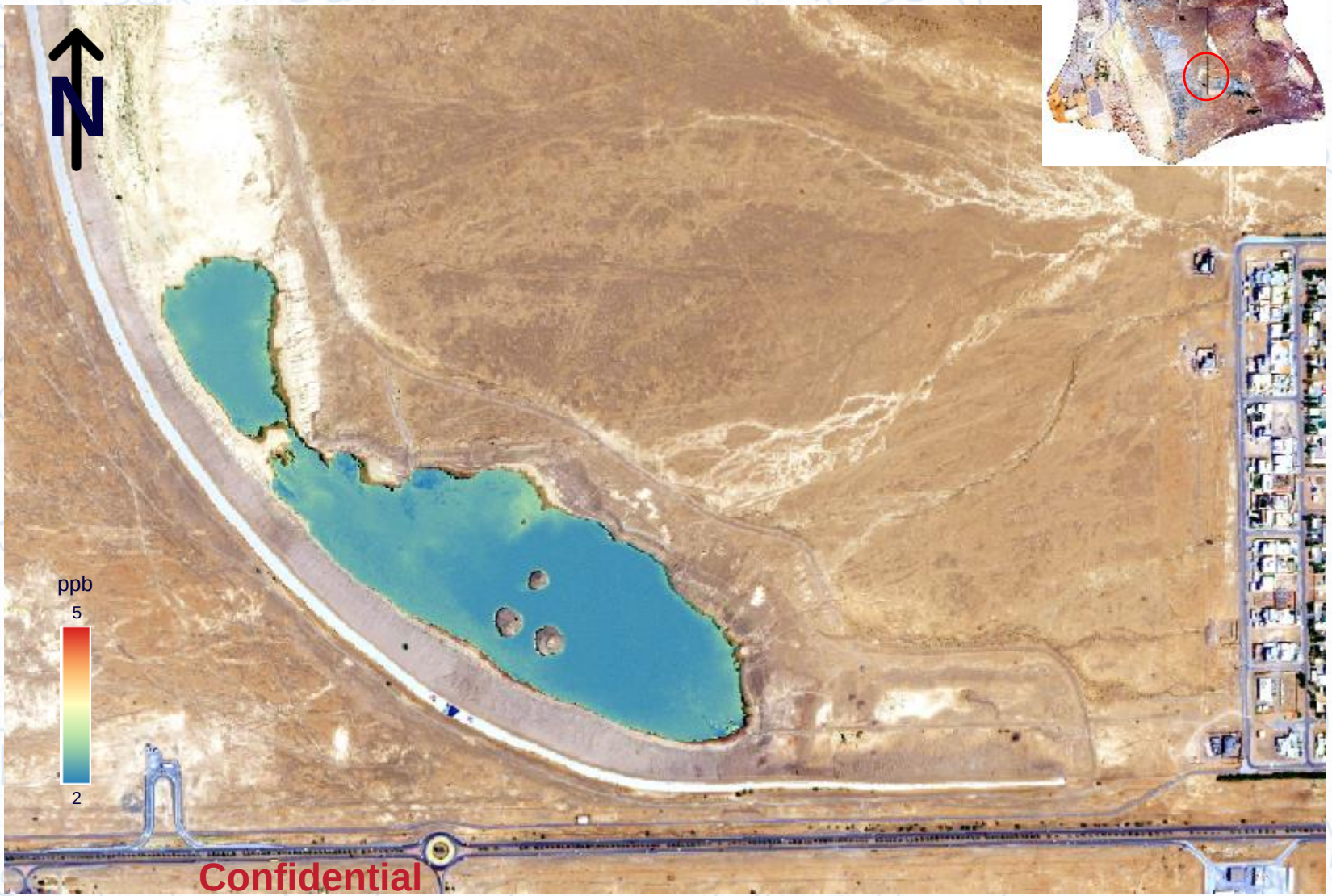
Arsenic in Water Analysis

- Water analysis for Arsenic (As) in water
  - Single band raster
    - Measured in ppb or ug/L
- Zoomed image
- Red circle indicates the zoom area



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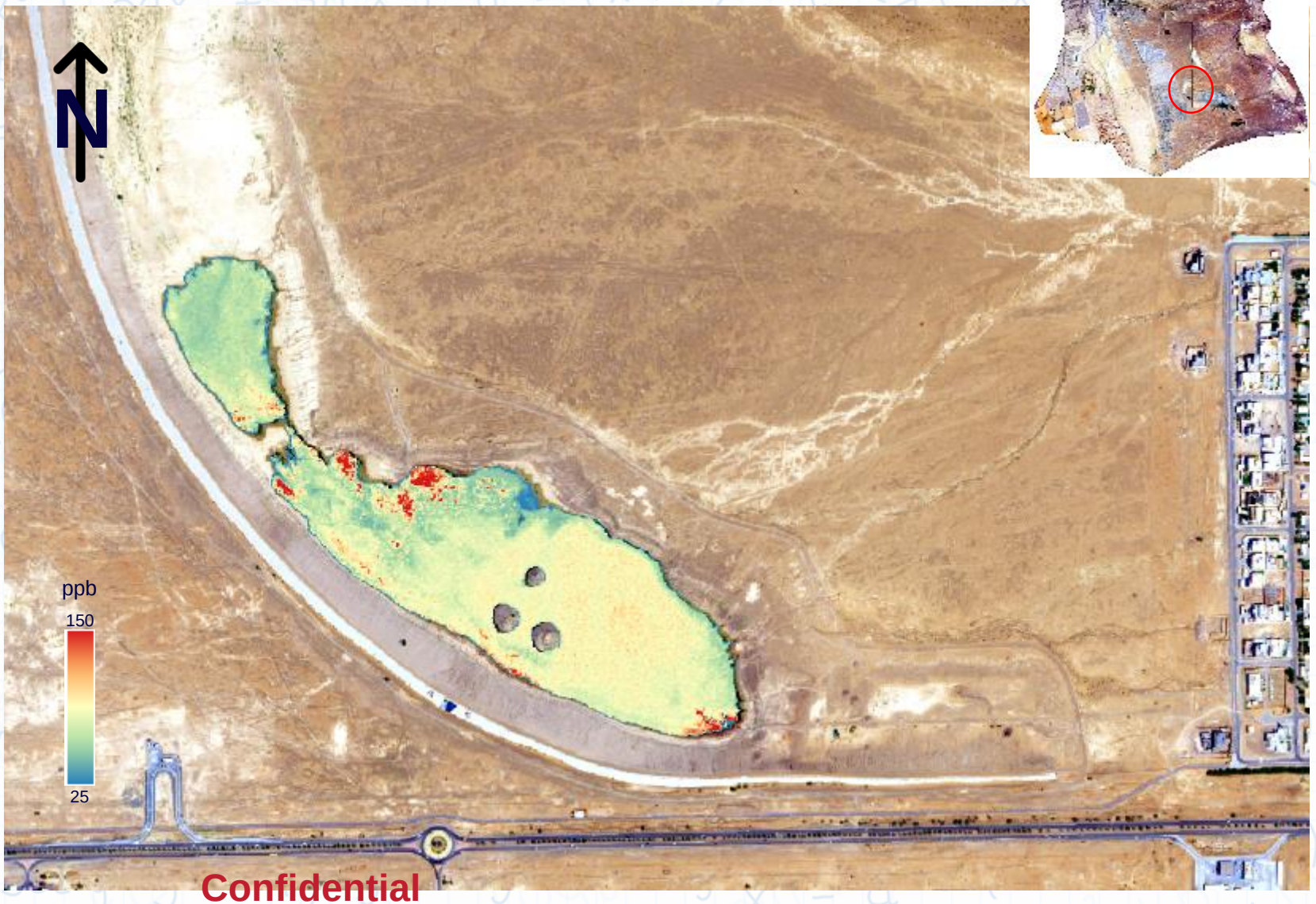
Barium in Water Analysis

- Water analysis for Barium (Ba) in water
  - Single band raster
    - Measured in ppb or ug/L
- Zoomed image
- Red circle indicates the zoom area



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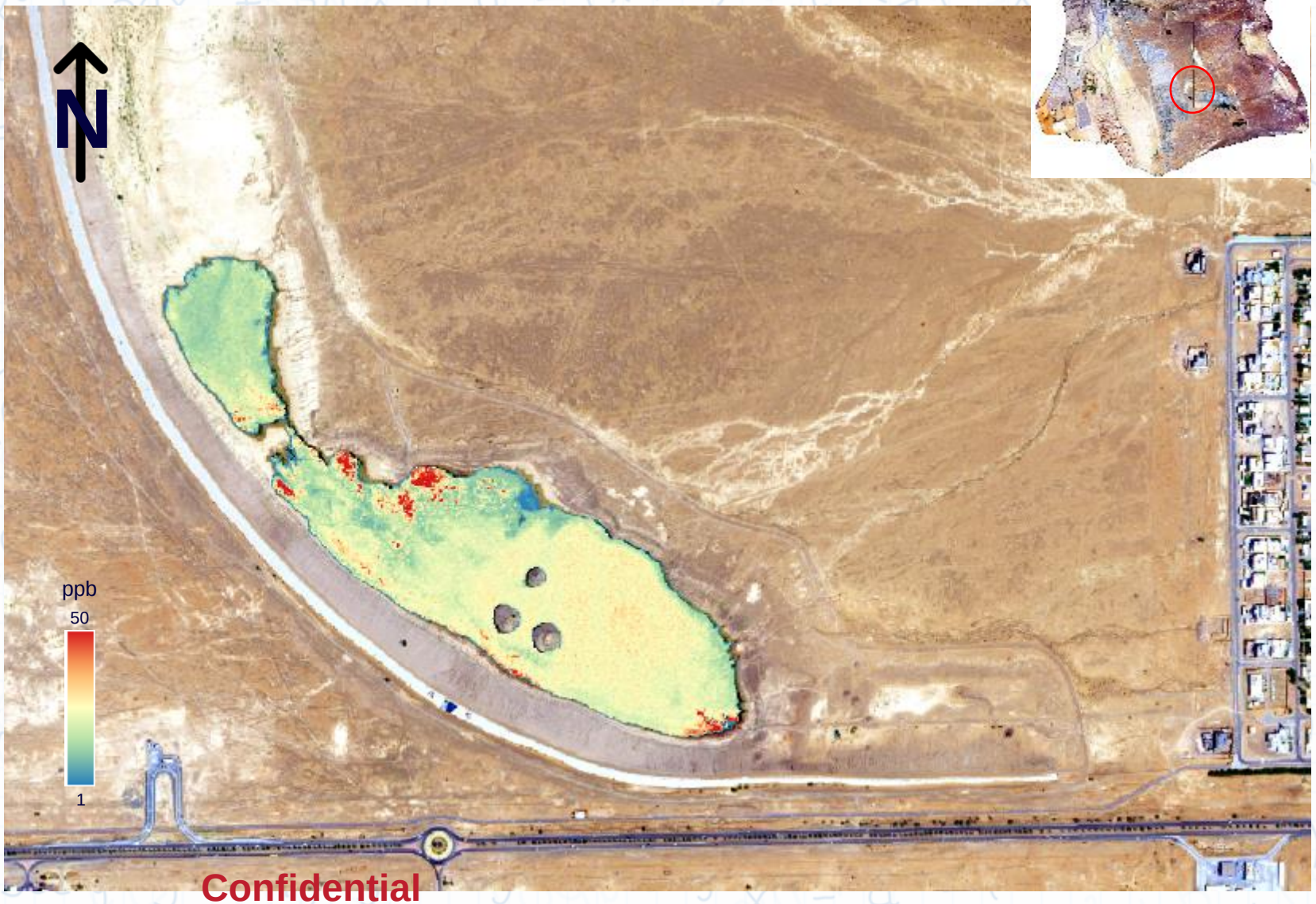
Copper in Water Analysis

- Water analysis for Copper (Cu) in water
  - Single band raster
    - Measured in ppb or ug/L
- Zoomed image
- Red circle indicates the zoom area



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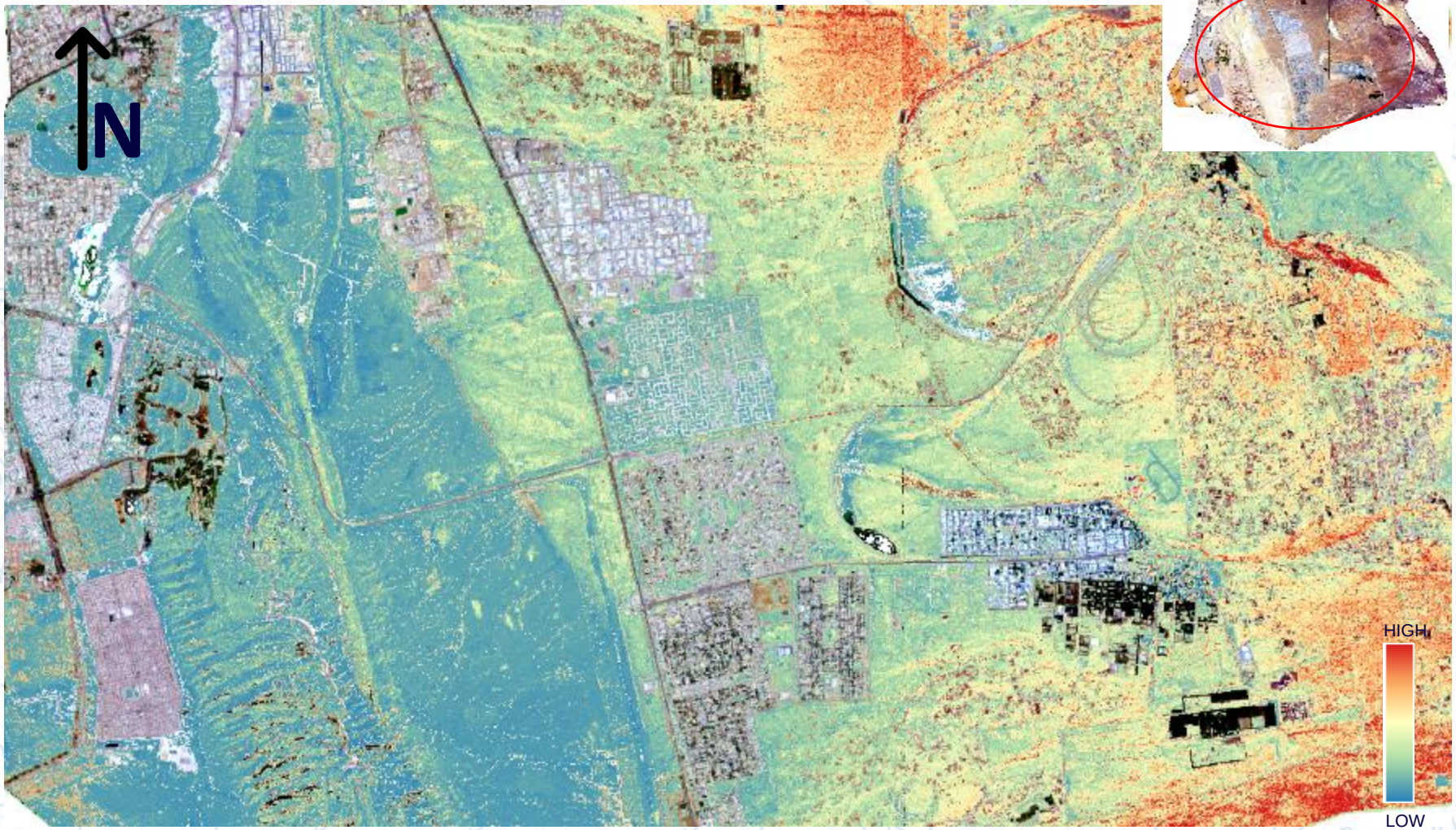
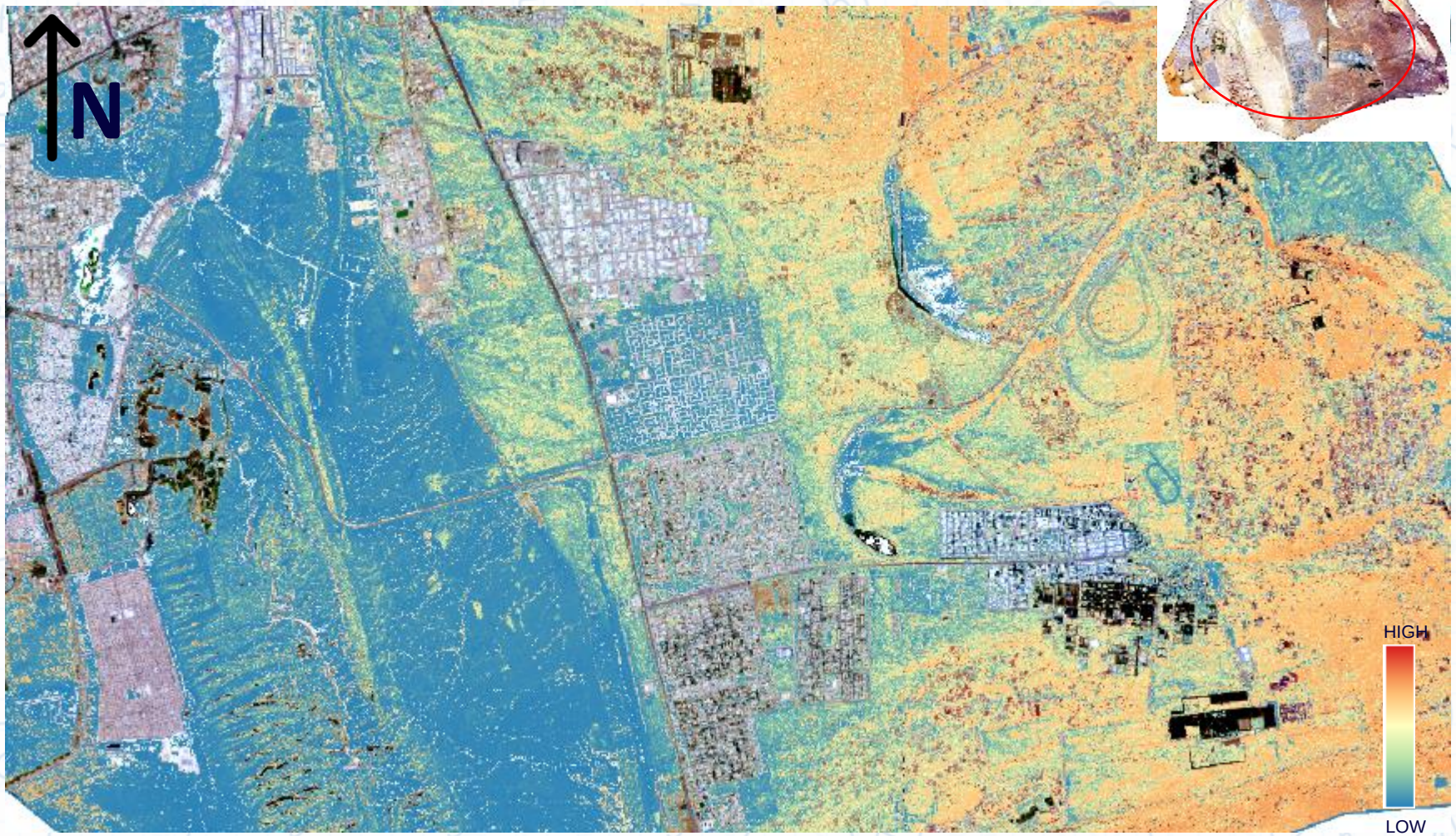
Ca/Mg Ratio on Land Analysis

- Land analysis for surface soil Ca/Mg ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



Ca/K Ratio on Land Analysis

- Land analysis for surface soil Ca/K ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



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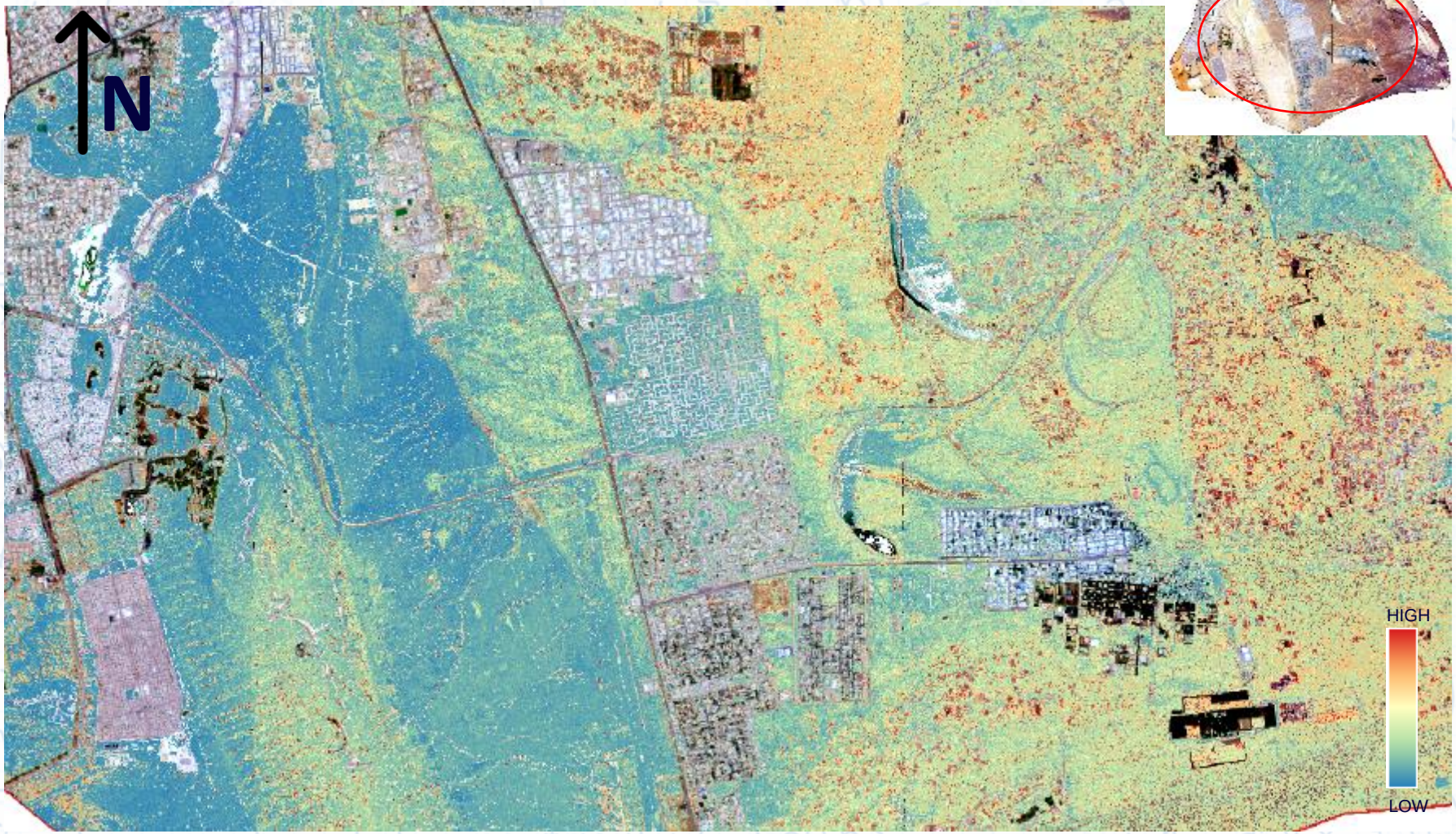
Salinity/K Ratio on Land Analysis

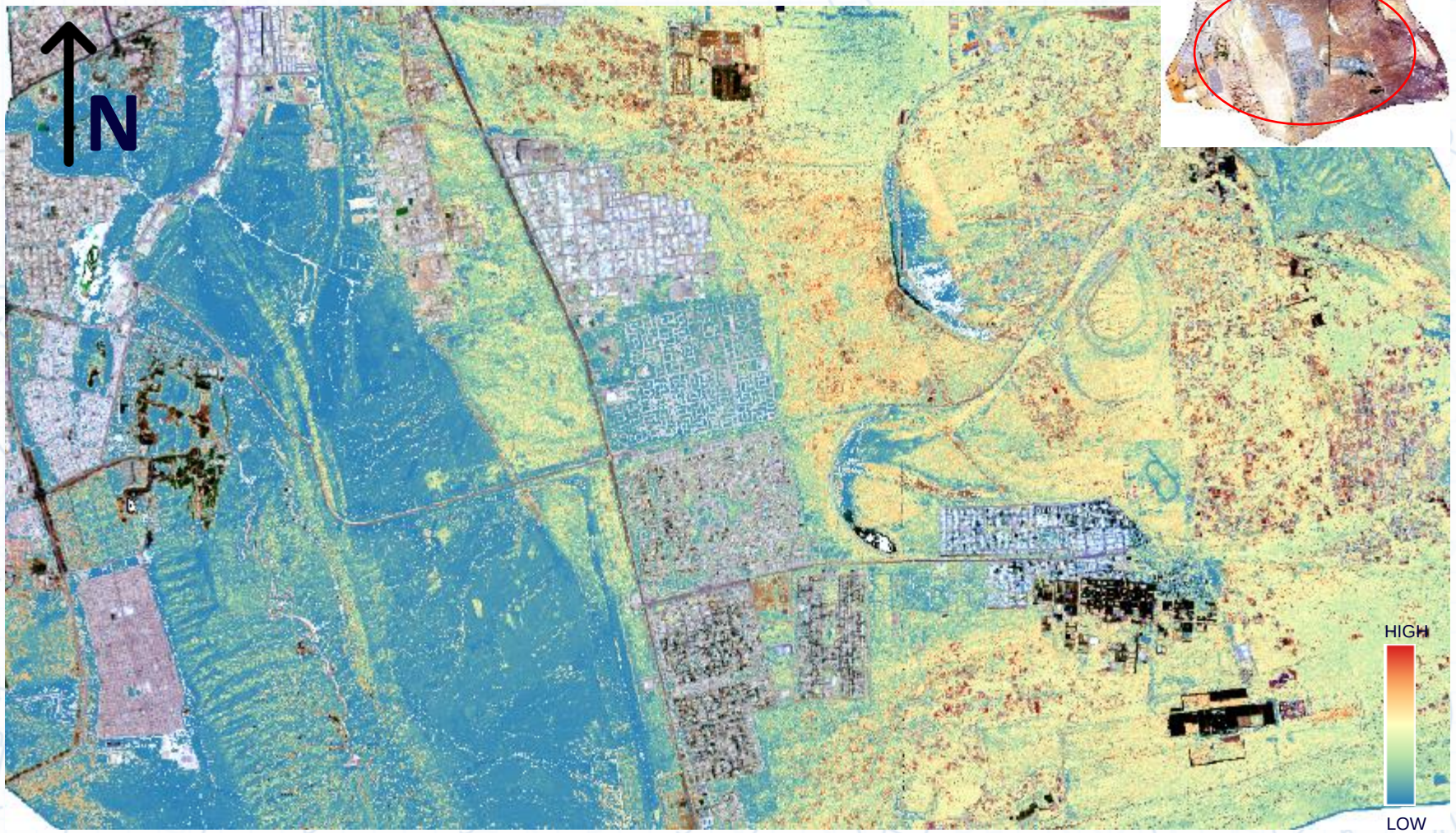
- Land analysis for surface soil salinity/K ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



Satelytics

Mg/K Ratio on Land Analysis

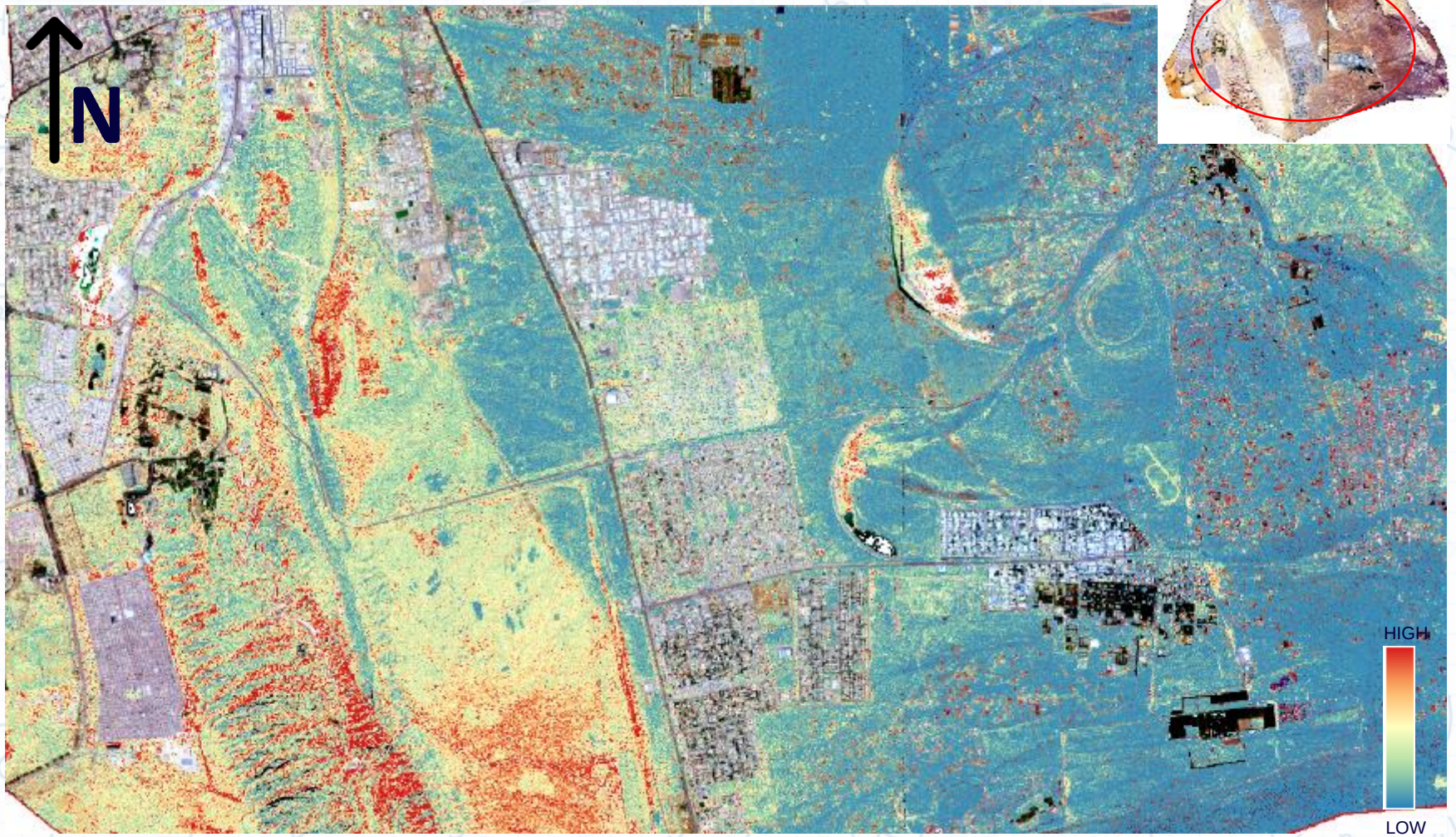
- Land analysis for surface soil Mg/K ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



Satelytics

Salinity/(Mg/K) Ratio on Land Analysis

- Land analysis for surface soil salinity/(Mg/K) ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



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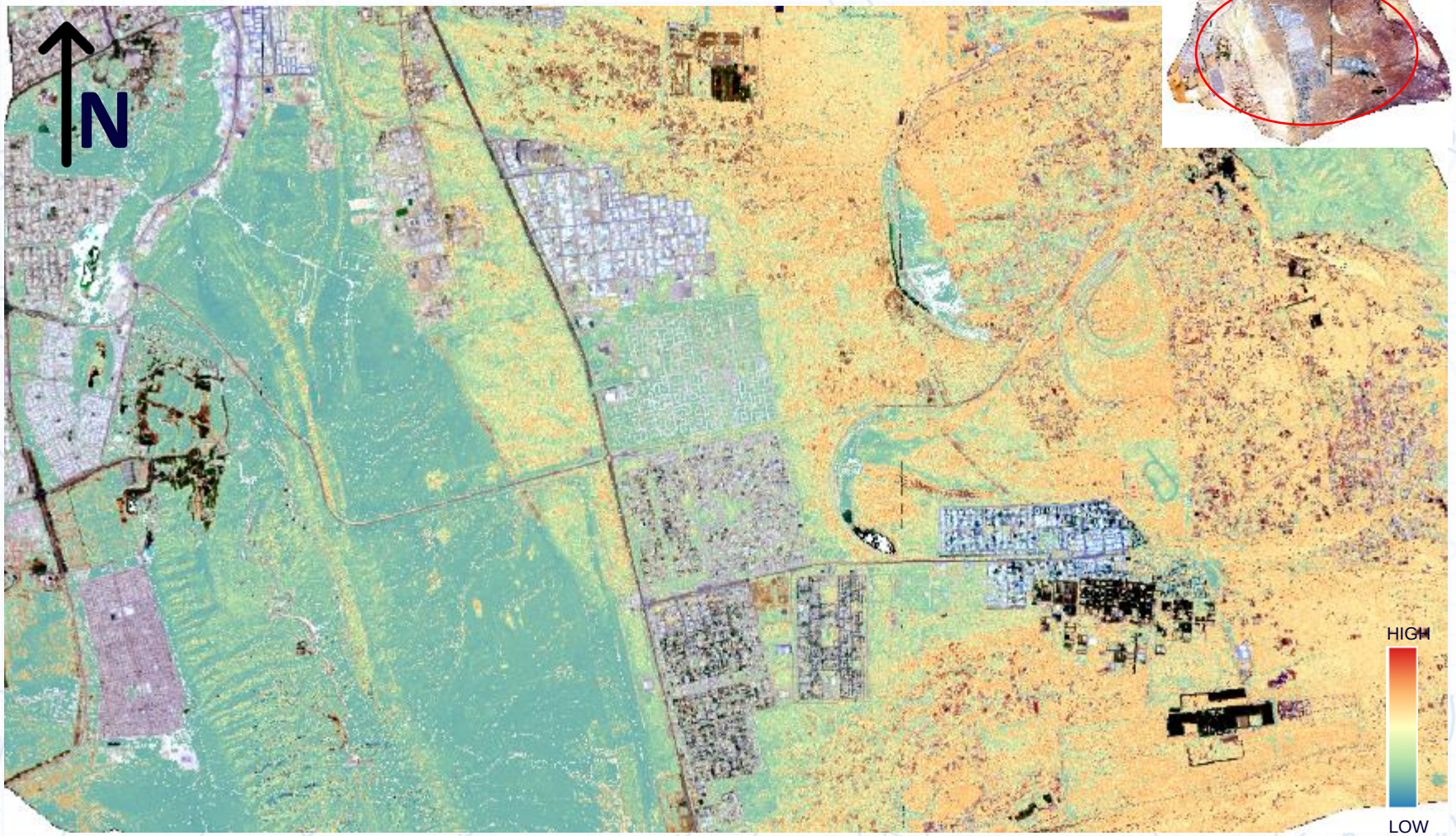
pH/(K/P) Ratio on Land Analysis

- Land analysis for surface soil pH/(K/P) ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



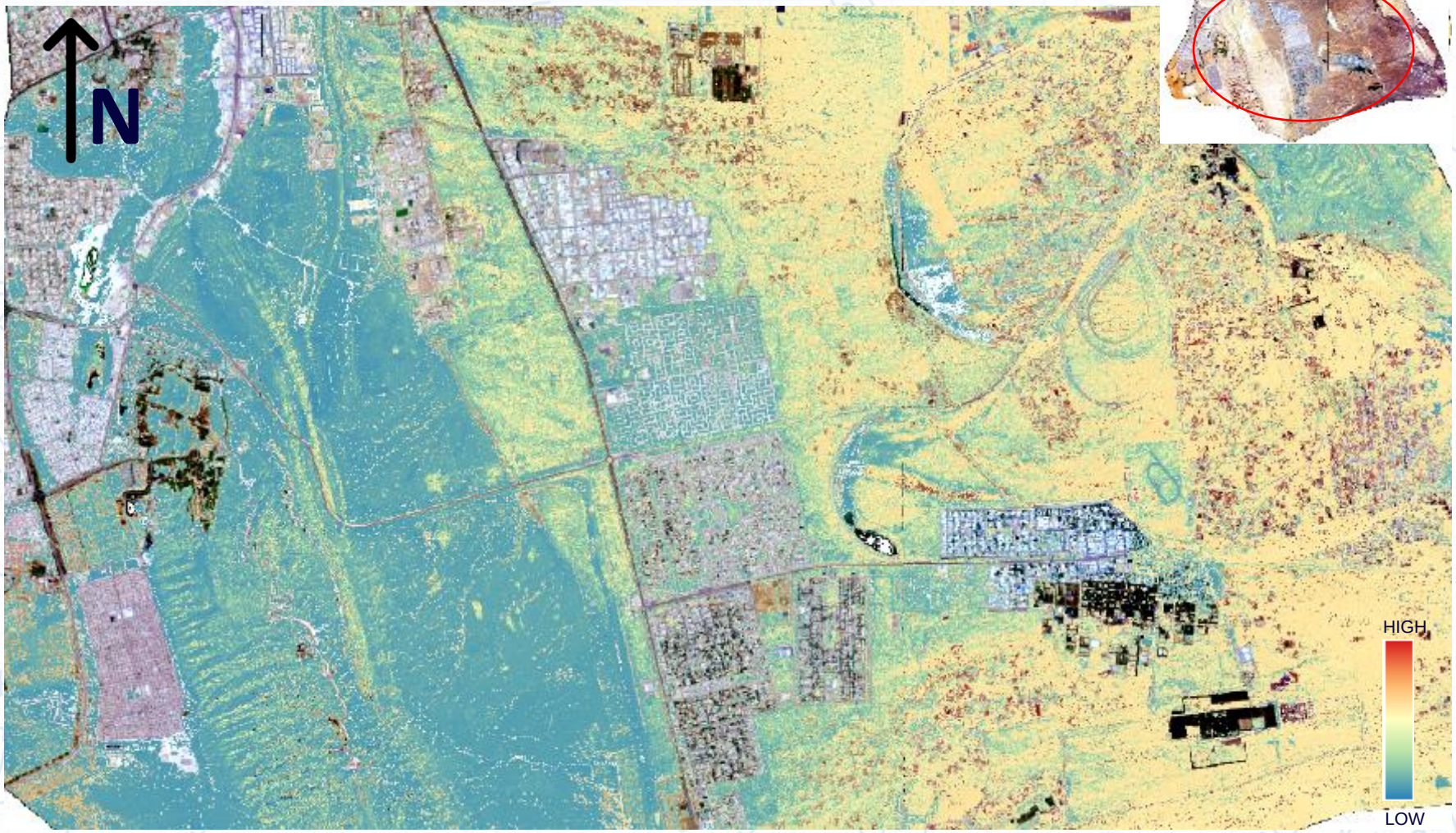
Satelytics

pH/P Ratio on Land Analysis

- Land analysis for surface soil pH/P ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format

pH/K Ratio on Land Analysis

- Land analysis for surface soil pH/K ratio
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



Satelytics

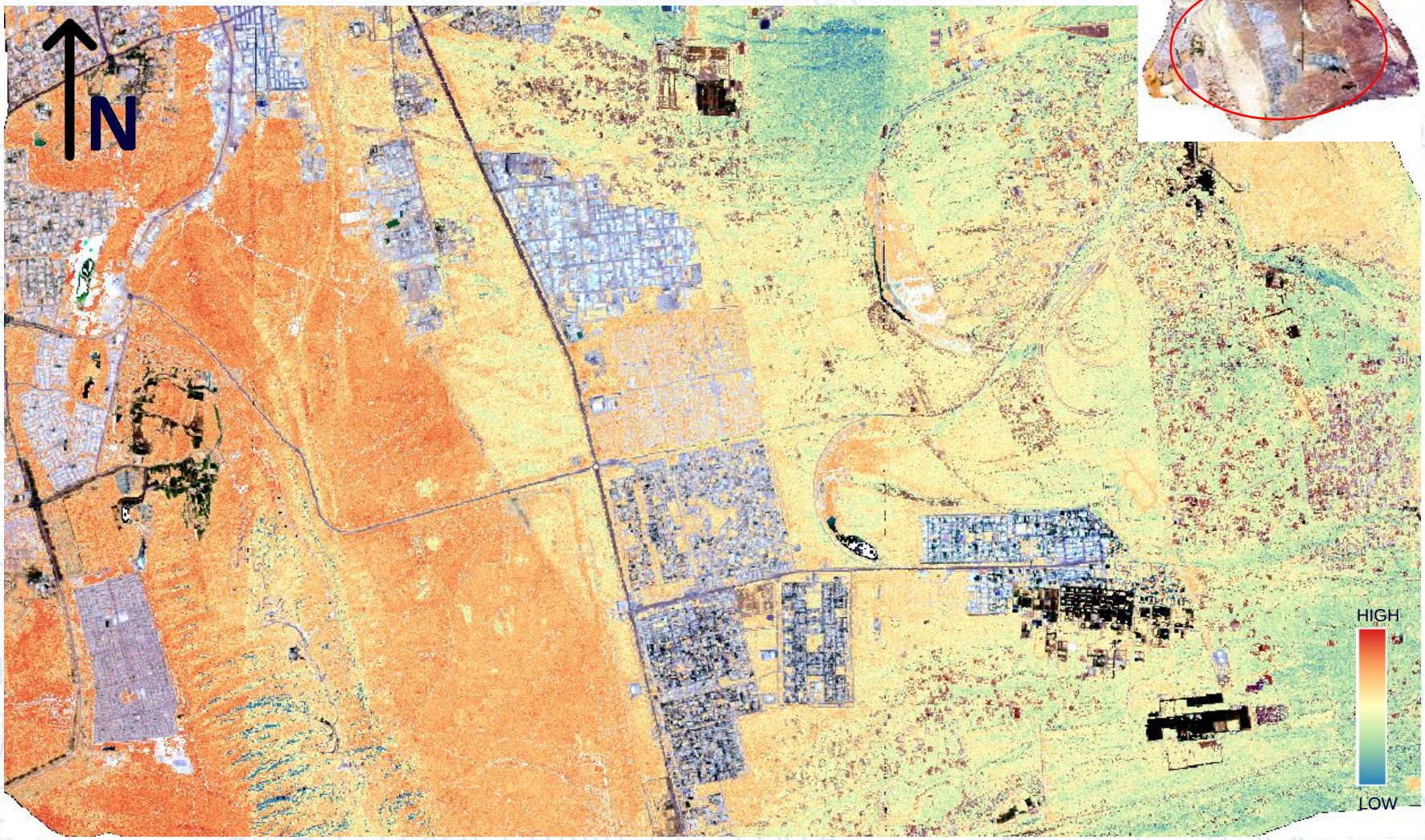
Sodium Absorption Ratio on Land Analysis

- Land analysis for surface soil sodium absorption ratio (SAR)
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format

Satelytics

Soil Infiltration Rate on Land Analysis

- Land analysis for surface soil infiltration rate
  - Single band raster
    - Measured in mm/h
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format



Satelytics

Generalized Chemical Soil Analysis

- Land analysis for surface generalized soil chemistry
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format

Satelytics

Specialized Chemical Soil Analysis

- Land analysis for surface specialized soil chemistry
  - Single band raster
    - Unitless
- Zoomed image
- Red circle indicates the zoom area
- Delivered in raster format

Satelytics

Vegetation Management

Satelytics

Satelytics

Benefits of Satelytics Service

- Reduced Vegetation-related Customer Interruptions and Customer Minutes Lost Service
- Reduced Vegetation Management costs – Only trim where needed / Reduced Emergency Call Out's / Reduces wasted journeys
- Outage reductions lead to additional incentives, amplifying and data collection savings per survey from the solution
- Enables further efficiencies – (hazard tree detection, work verification) releasing resources for critical tasks.
- Provides data needed to determine field level resource and equipment
- Scale of capture and monitoring can be run frequently, results within hours
- Using historical and current data with AI for future growth predictions, resources and circuit risk
- Monitoring Complete Network, or selected high consequence areas, both Distribution and Transmission
- Directs trim teams to within "1 foot" of issue
- AI using data can be foundation of vegetation Management budget process for money and resource
- Enable Data driven decision making
- Alerts can include fallen / displaced poles and trees
- Conflation where are the assets located on the ground compared to asset recording in GIS

Satelytics

CI – Customer Interruptions
CMLs Customer Minutes Lost
VM – Vegetation Management

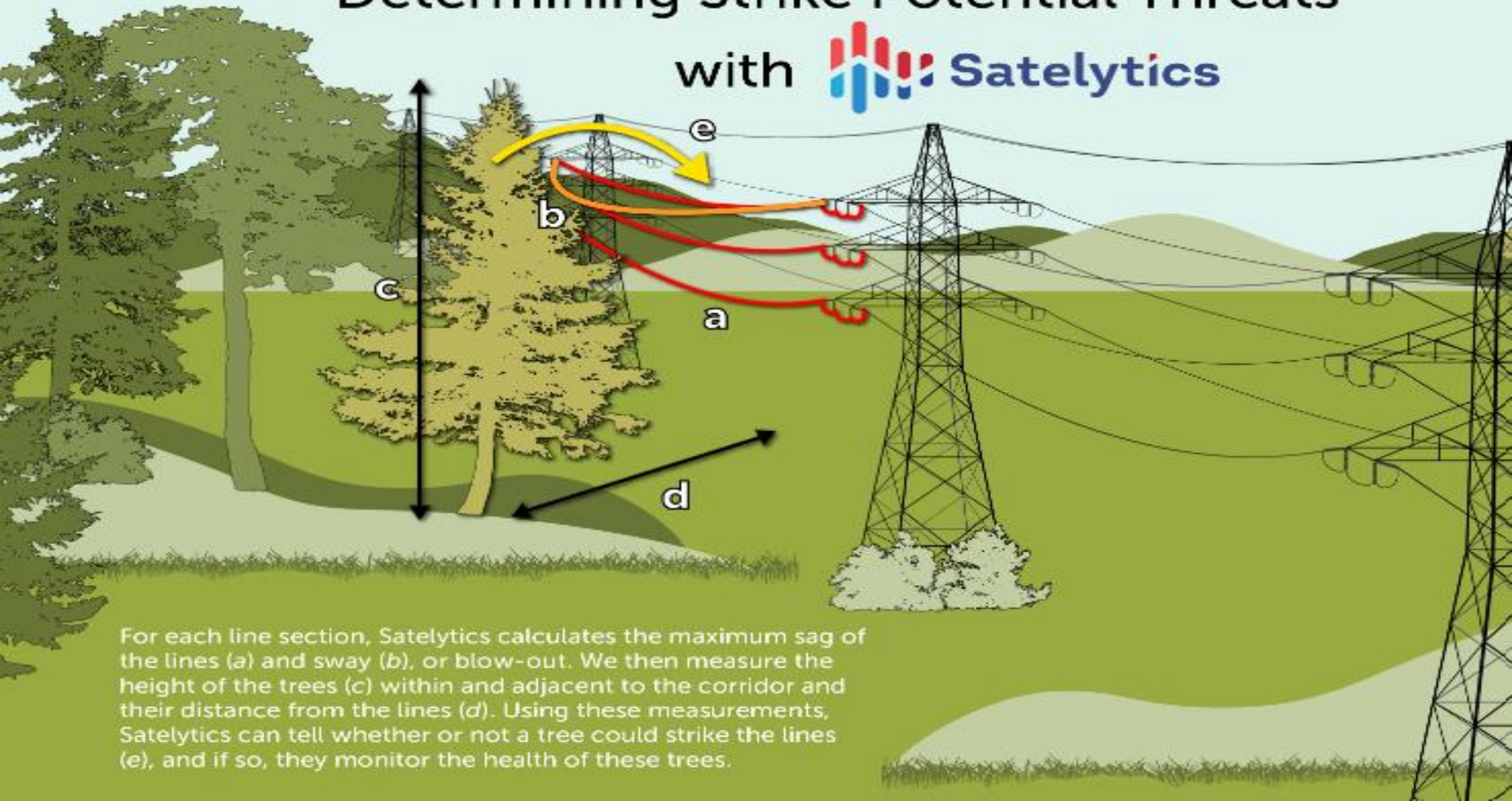
Where Satelytics Delivers Value

- **10 YEARS EXPERIENCE –** Proven capability, continuous improvement of Algorithms.
- **ACTIONABLE ALERTS / QUANTIFICATIONS:** within hours of data capture.
- **MONITORING OF ENTIRE AREA / ALL ASSETS** – Where and when required
- **ACCESS TO SUPPORTING IMAGES** – Current and Historic
- **PERSONALISED ALERTS** – Your data / metadata / include additional external data
- **SOLVE MANY BUSINESS CHALLENGES:** with a single set of data (40+ Algorithms).
- **WE QUANTIFY:** where some other solutions only detect.
- **AVOID COSTS:** Manual monitoring, environmental impacts, public exposure, insurance premiums
- **DIRECT YOUR RESOURCES:** where expertise is needed, not on generic schedules.
- **NO SOFTWARE INSTALLATION:** minimal disruption & minimal Data Storage Costs
- **NO CHARGE FOR SOFTWARE LICENCES** – Unlimited users at no extra cost.
- **NO SET UP FEE** – In most cases no set up fee / Service available – 15 days from contracting
- **ACCESS TO NEW ALGORITHMS** – Add data from new algorithms, where relevant, when released
- **ECONOMIES OF SCALE** – For larger areas, increased frequency and over multiple years

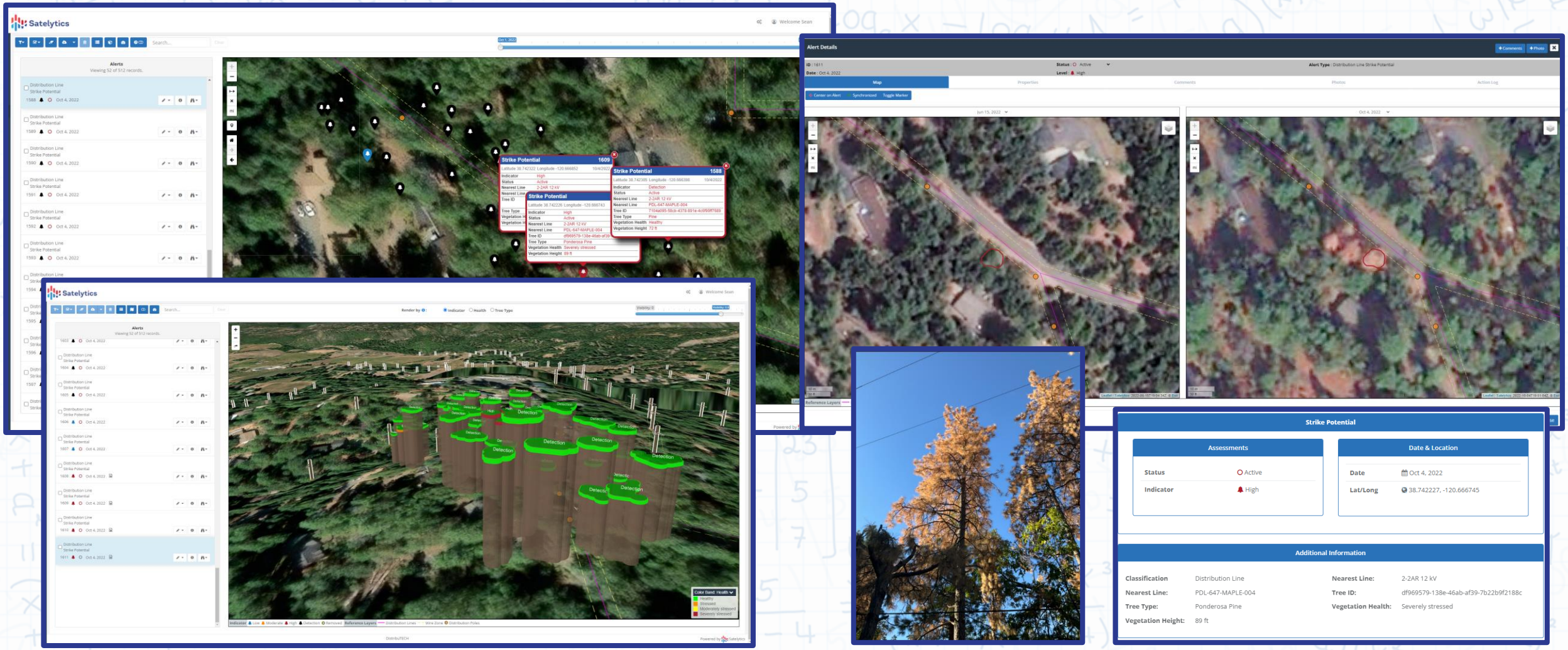
Satelytics

Determining Strike Potential Threats

with Satelytics

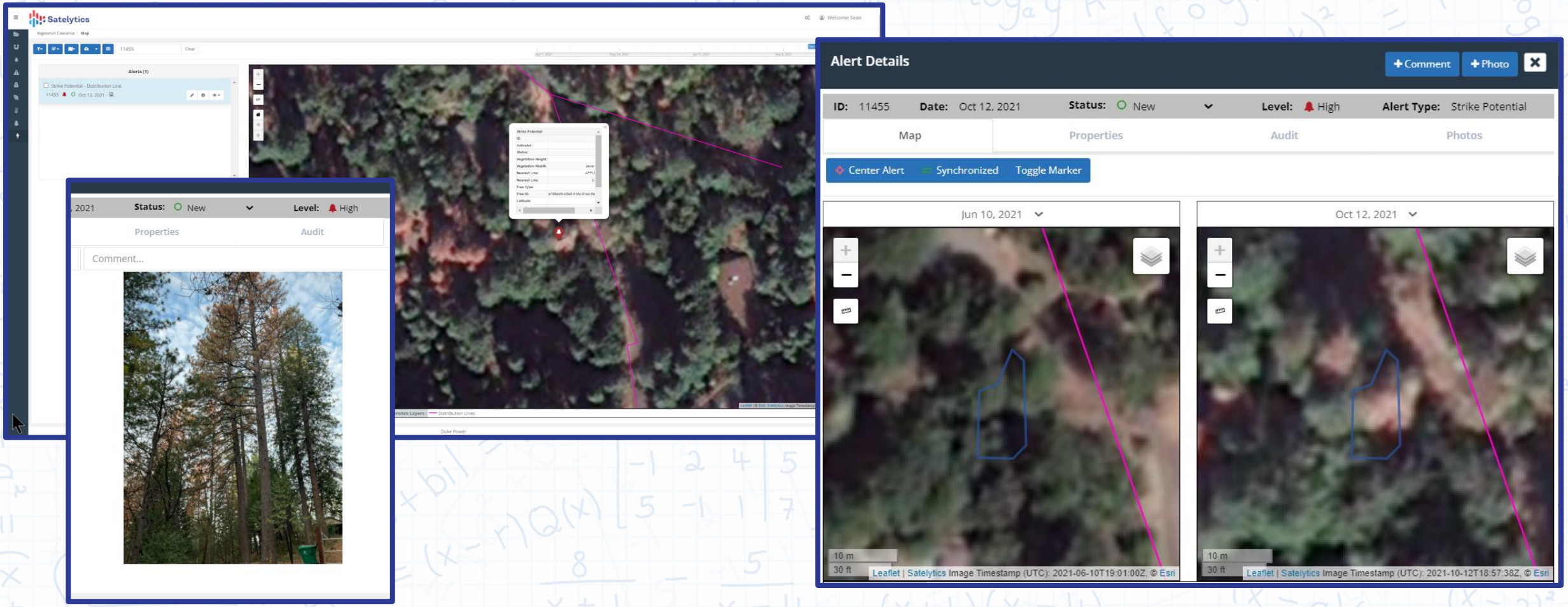


For each line section, Satelytics calculates the maximum sag of the lines (*a*) and sway (*b*), or blow-out. We then measure the height of the trees (*c*) within and adjacent to the corridor and their distance from the lines (*d*). Using these measurements, Satelytics can tell whether or not a tree could strike the lines (*e*), and if so, they monitor the health of these trees.



Vegetation Management – Tree species, health, height, and strike threat; accounting for soil moisture, weather influences, and topology.

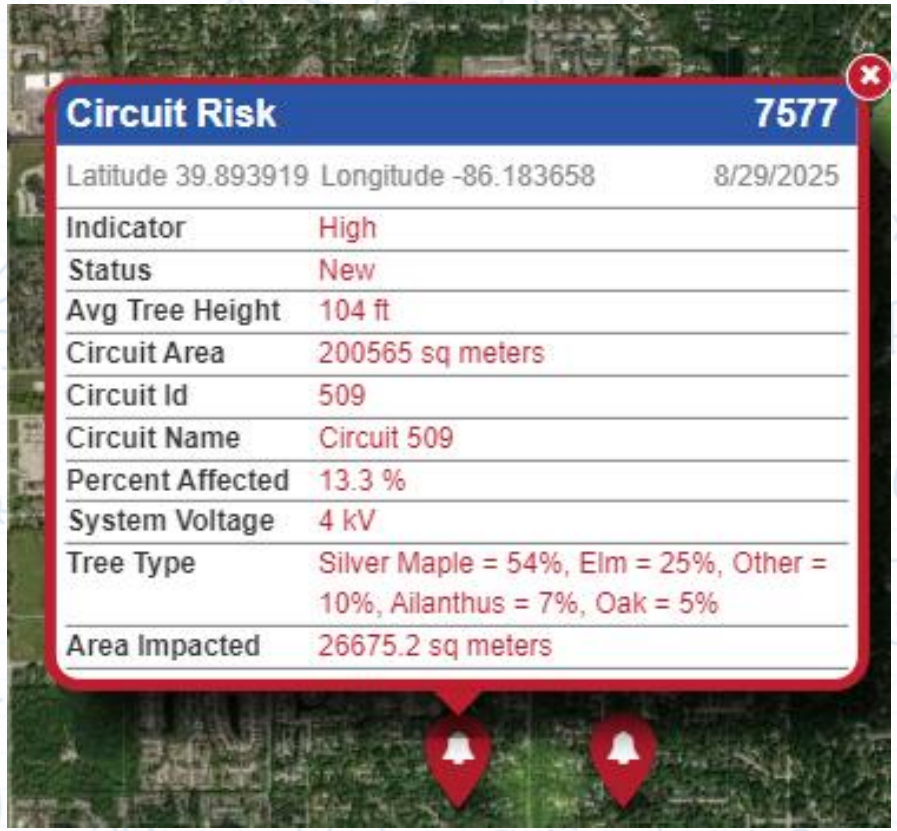
Satelytics



Vegetation Management – Tree species, health, height, and strike threat; accounting for soil moisture, weather influences, and topology.

Satelytics

Example Alert for forecast tree strike threat



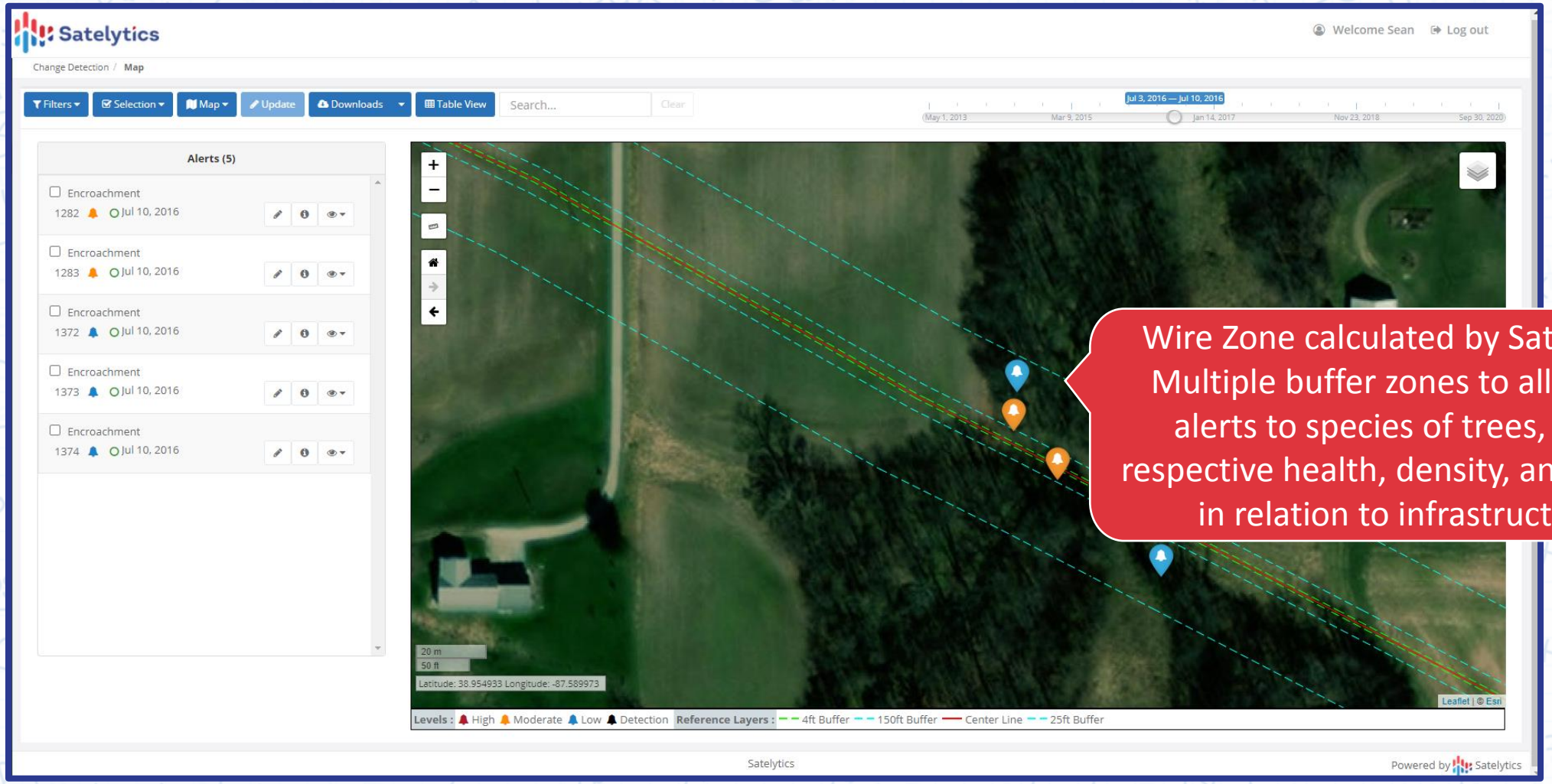
Example of additional Data that could be provided for each alert (In addition to standard alert data):

- Required clearance from conductor
- Team / Contractor Area of Operation
- Cost of Trim
- Number of Customers per feeder
- Historical number of outages for that circuit
- Number of high-risk Customers for that circuit
- Tree Growth Rates
- Land Classification – Urban, Rural, Private Land
- Arborist derived data / feedback
- Etc,

(Clients specify required Metadata and data)

Satelytics

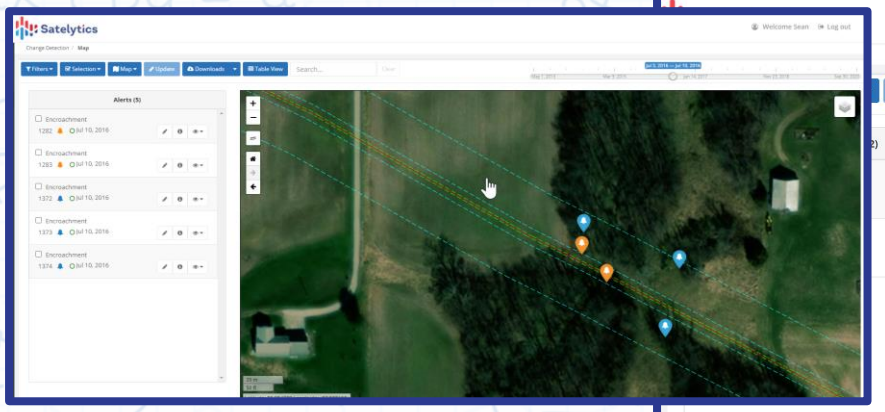
Understanding the “Wiring Zone” for Transmission and Distribution Corridors, Using Analytics to Alert on Vegetation Proximity, Health, Height, and Speciation

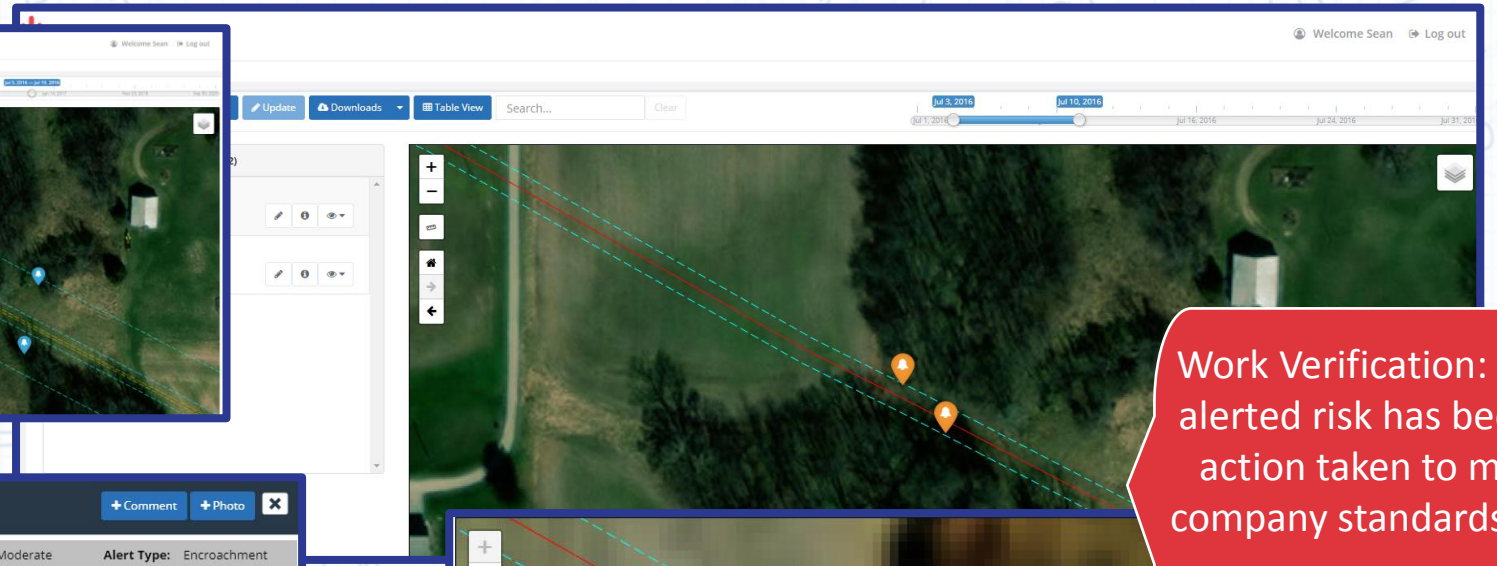


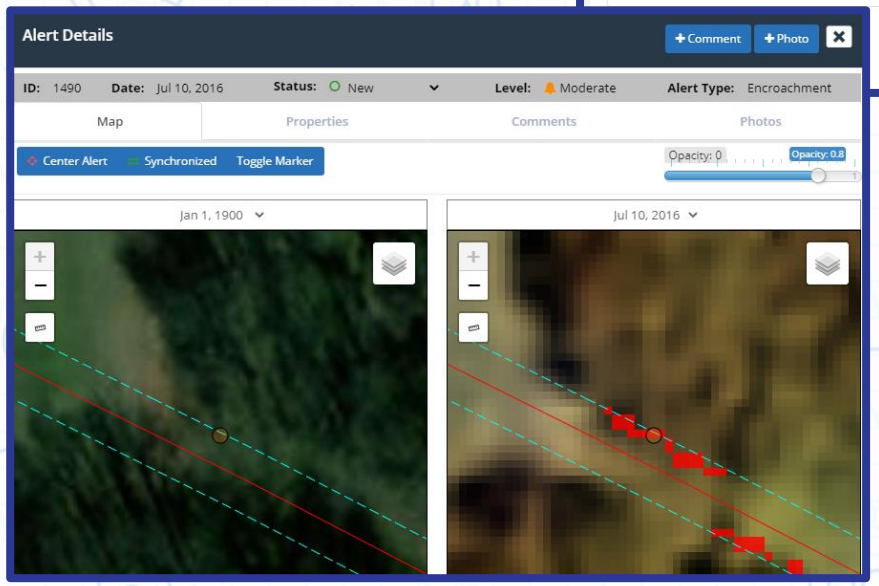
Wire Zone calculated by Satelytics. Multiple buffer zones to allow for alerts to species of trees, their respective health, density, and height in relation to infrastructure

Satelytics

Work Verification- Ensuring Areas That Pose Risk Threats Are Reduced







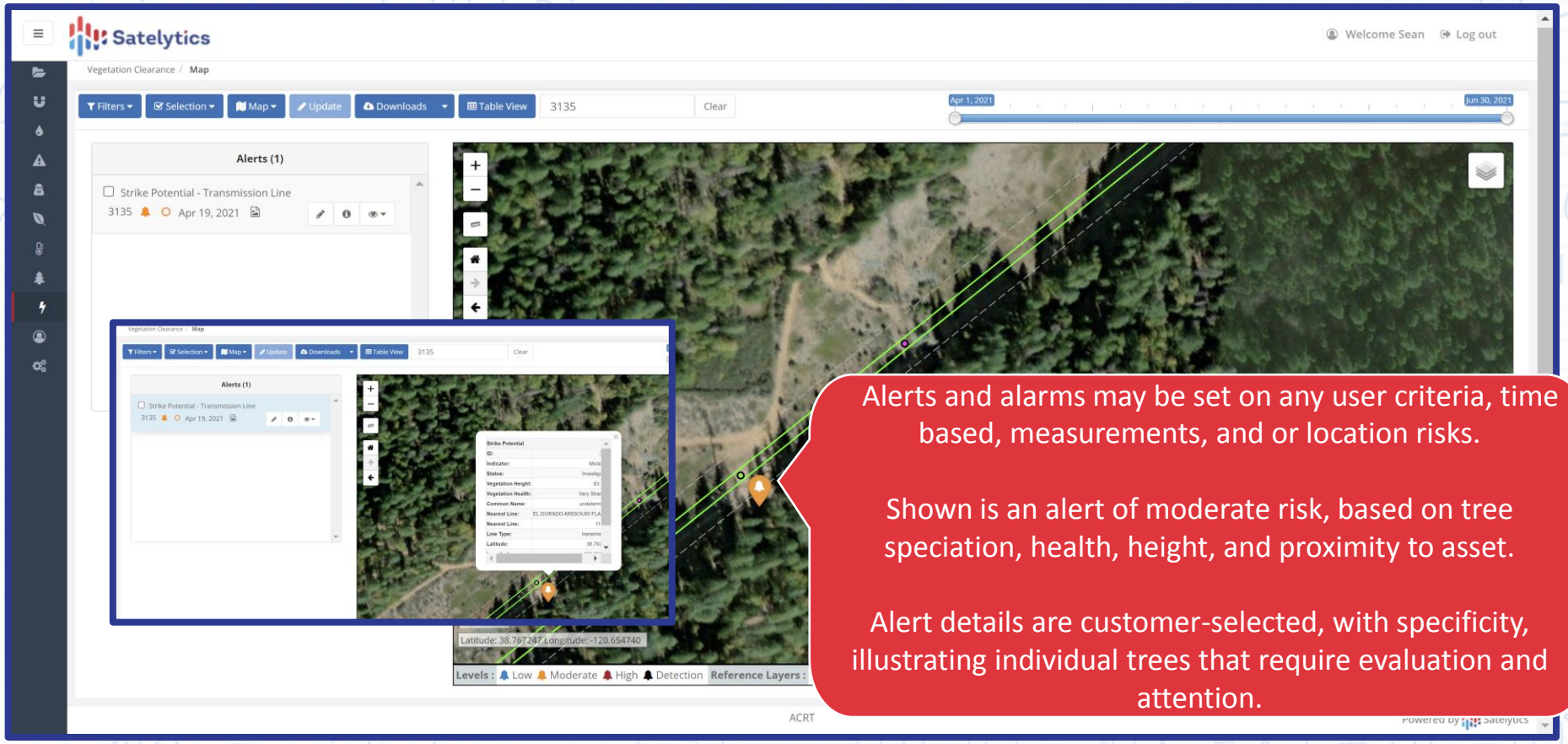
Work Verification: ensuring that the alerted risk has been reviewed, and action taken to meet regulations, company standards, and reduce risk.

Location of the risk can be outlined in a color code to suit the customer.

Even comparison views for ANY date where data exists

Satelytics

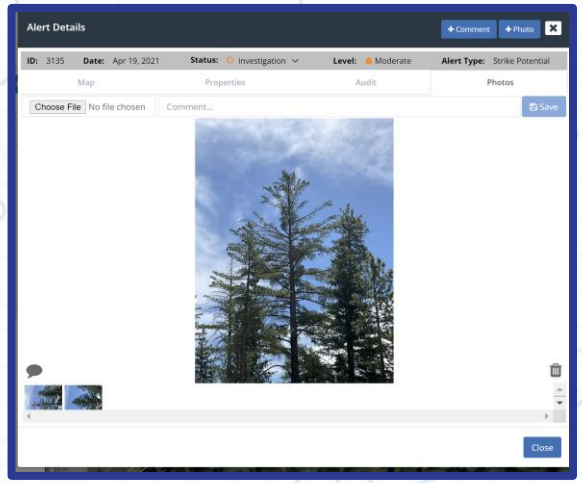
Specificity… Identifying Species, Locations, Threats to Individual Trees



Alerts and alarms may be set on any user criteria, time based, measurements, and or location risks.

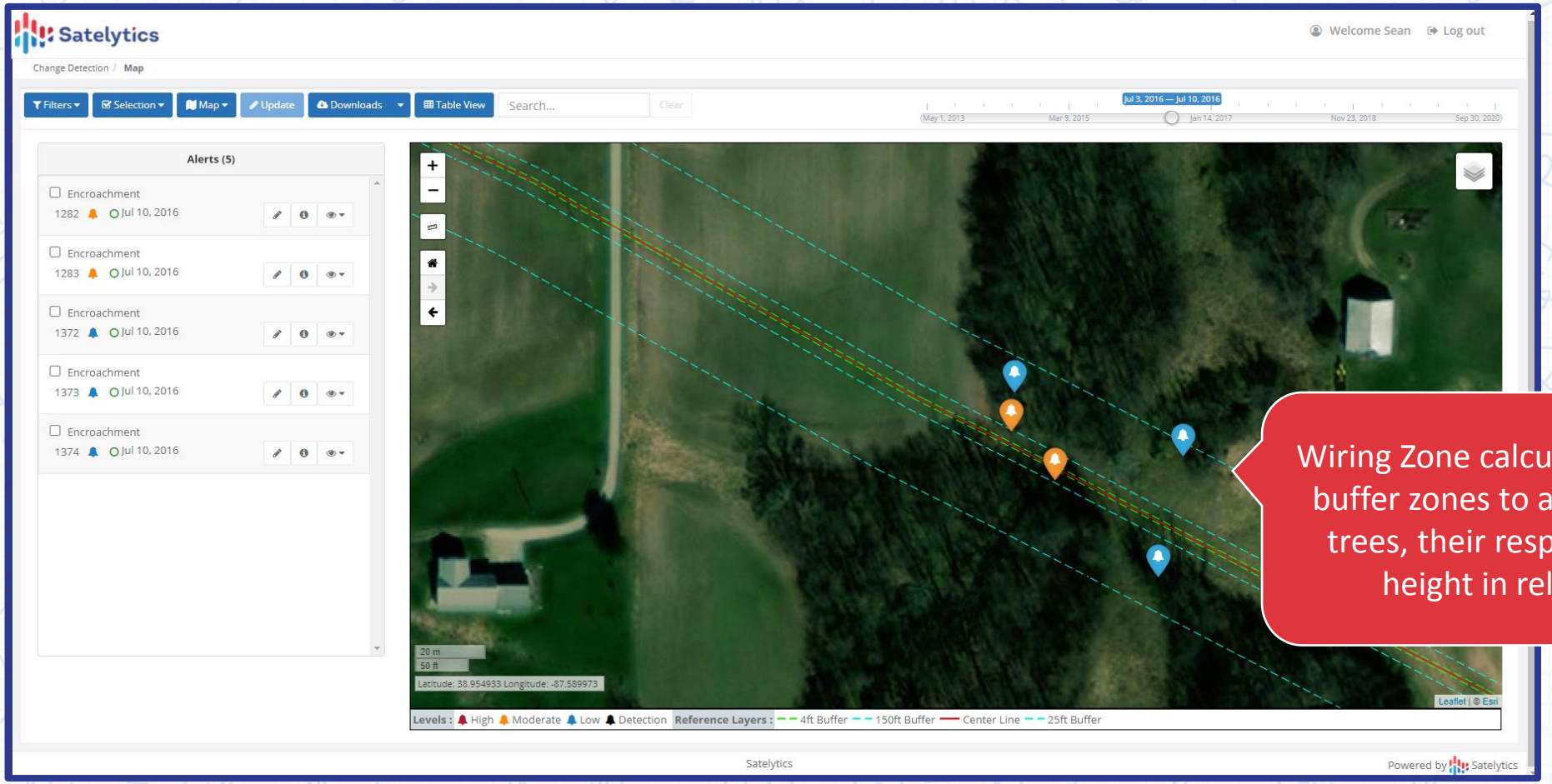
Shown is an alert of moderate risk, based on tree speciation, health, height, and proximity to asset.

Alert details are customer-selected, with specificity, illustrating individual trees that require evaluation and attention.



Satelytics

Understanding the “Wire Zone” for Transmission and Distribution Corridors, Using Analytics to Alert on Vegetation Proximity, Health, Height, and Speciation



Wiring Zone calculated by Satelytics. Multiple buffer zones to allow for alerts to species of trees, their respective health, density and height in relation to infrastructure

Satelytics

Wire Zone Alerts

Transmission

Satelytics

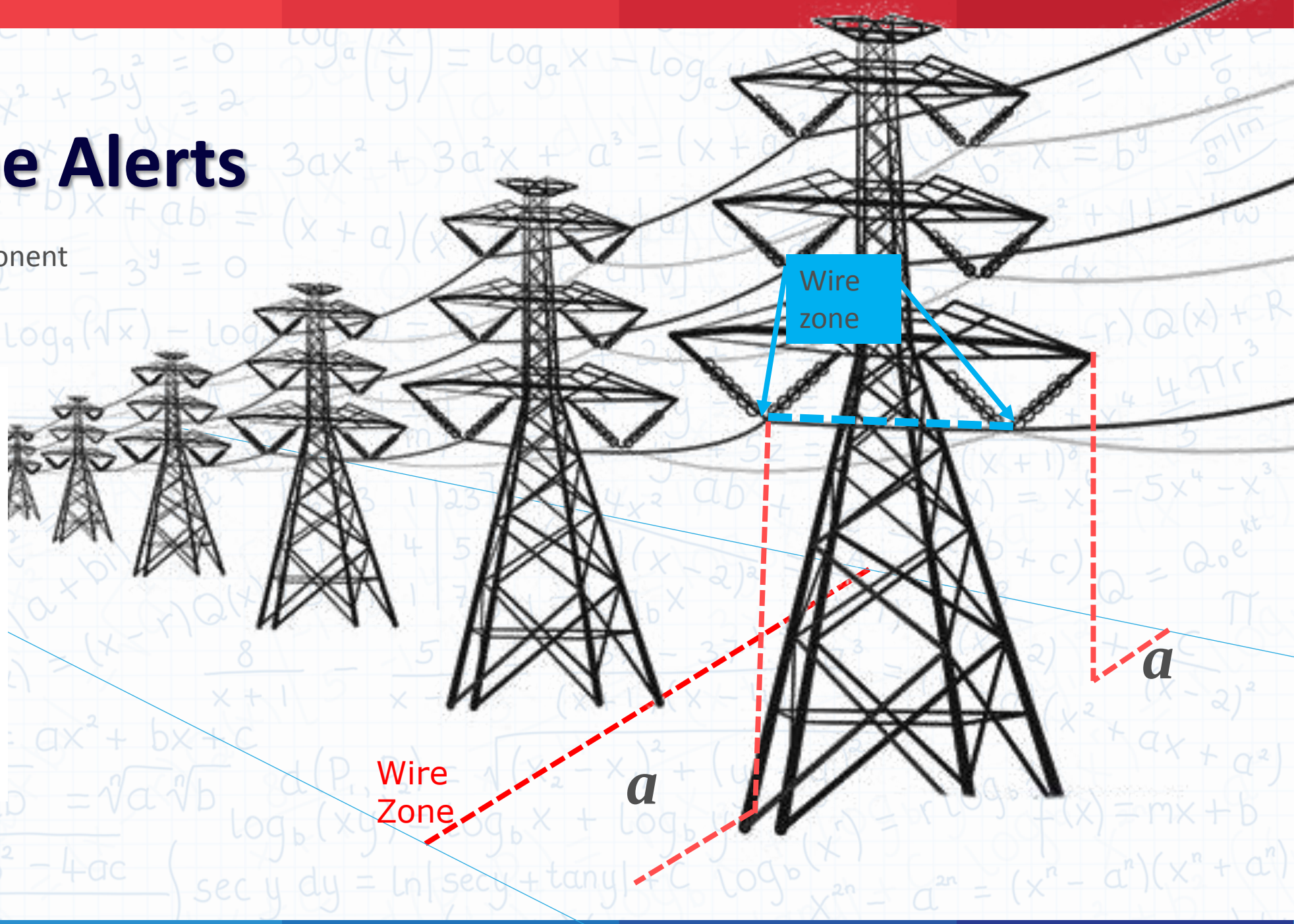
Wire Zone Alerts

Models: Horizontal component

Wire Zone = SPAN + *a* + *a*

kV	a (ft)
60/70	10
115/230	15
500	20

Example: 115 kV
SPAN = 20 ft.
a = 15
Wire Zone = 50 ft.
(centered at tower)



Satelytics

Wire Zone Alerts

Models: Vertical component

Using charts and tables provided:

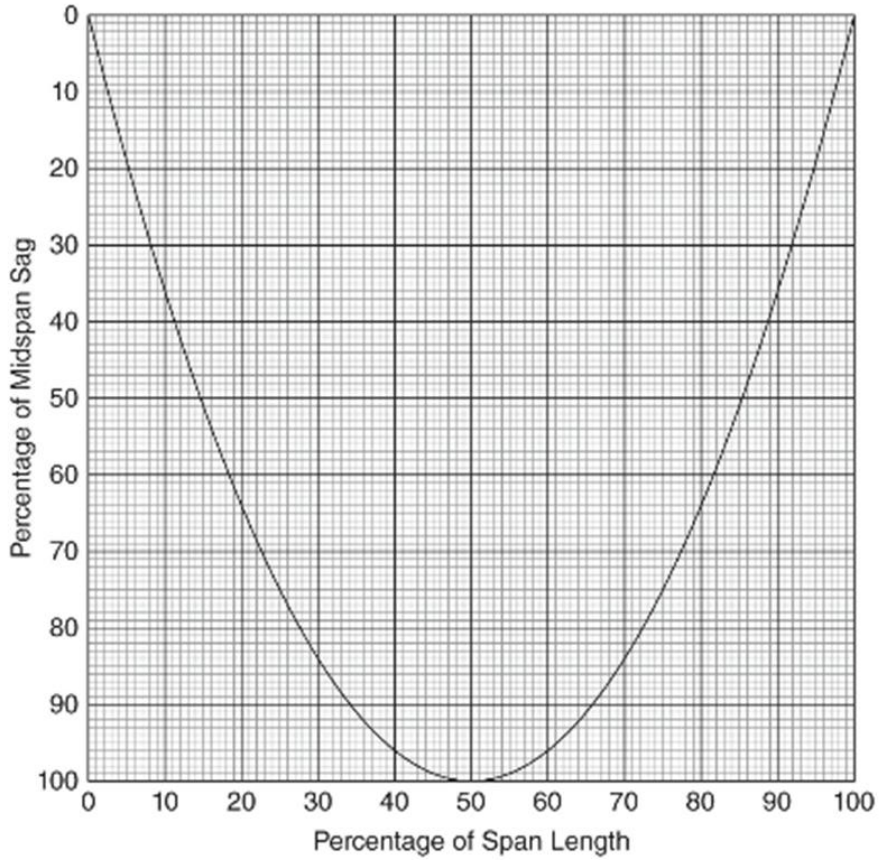
- Create model to calculate span length, sag, blow-out

Apply model to:

- Interpolate points along span
- Calculate “straight line” wire elevation
- Apply sag coefficient based on location along the line span

Table 5. Sag and Blow-out Table

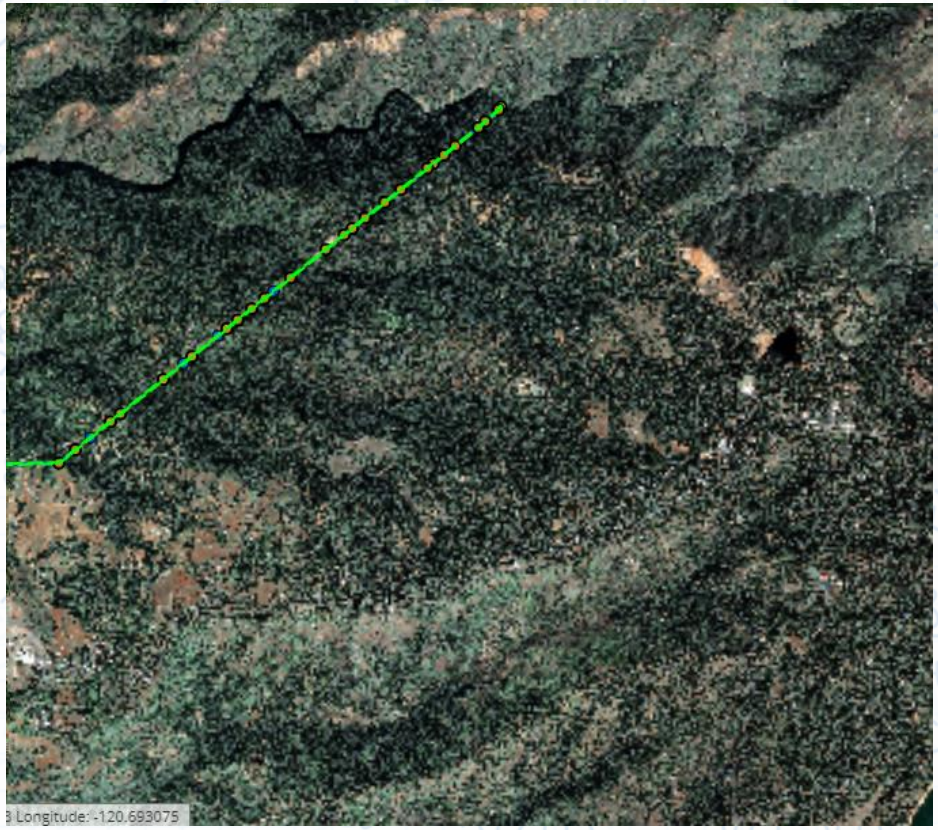
Span Length (feet)	600 ft.	800 ft.	1000 ft.	1500 ft.	2000 ft.
Sag					
Quarter Span (feet)	0	9	11	12	13
Mid span (feet)	0	12	14	16	17
Blow-out					
Quarter Span (feet)	0	5	9	20	36
Mid span (feet)	0	7	12	27	48

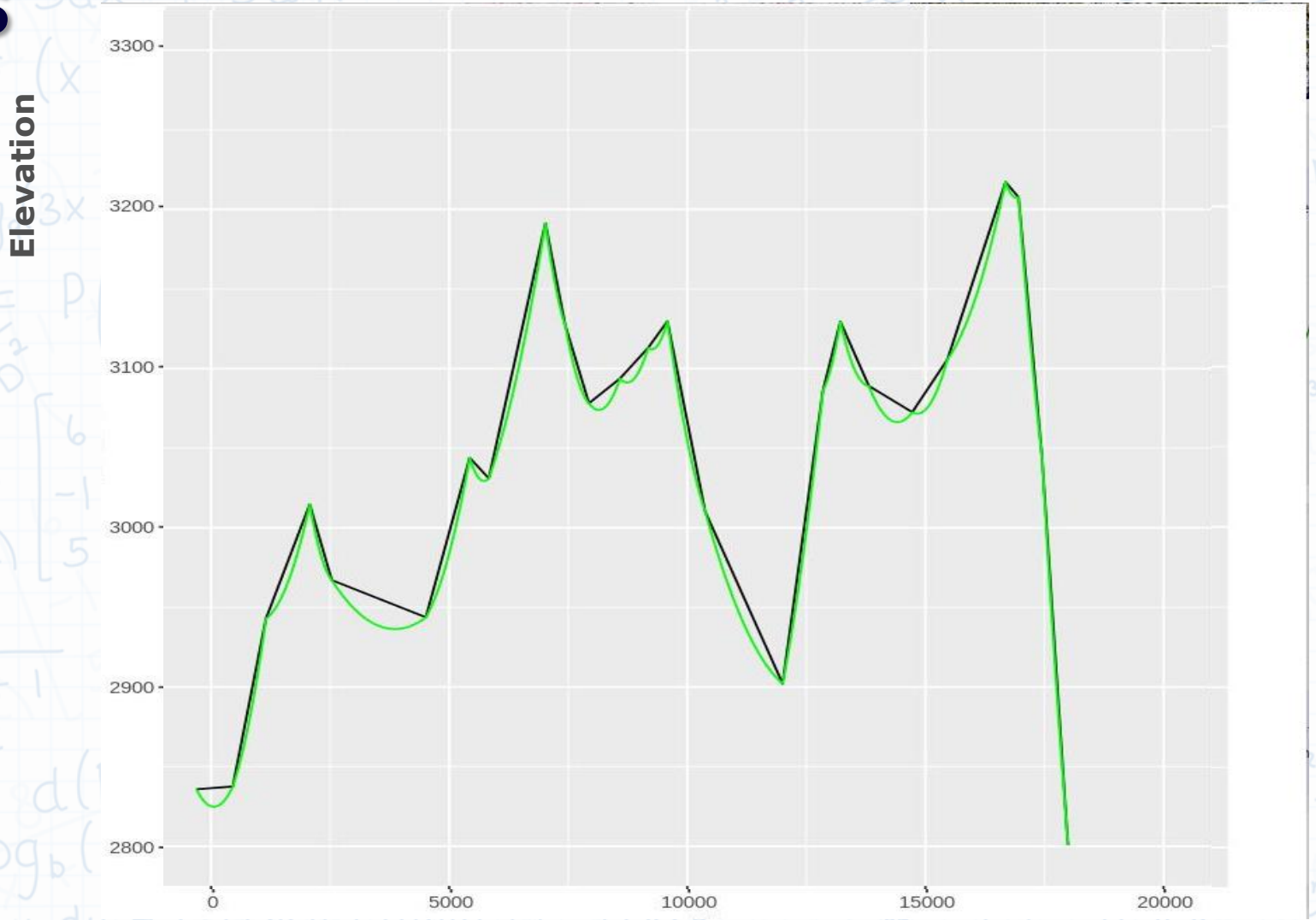


Satelytics

Wire Zone Alerts

Models: Vertical component

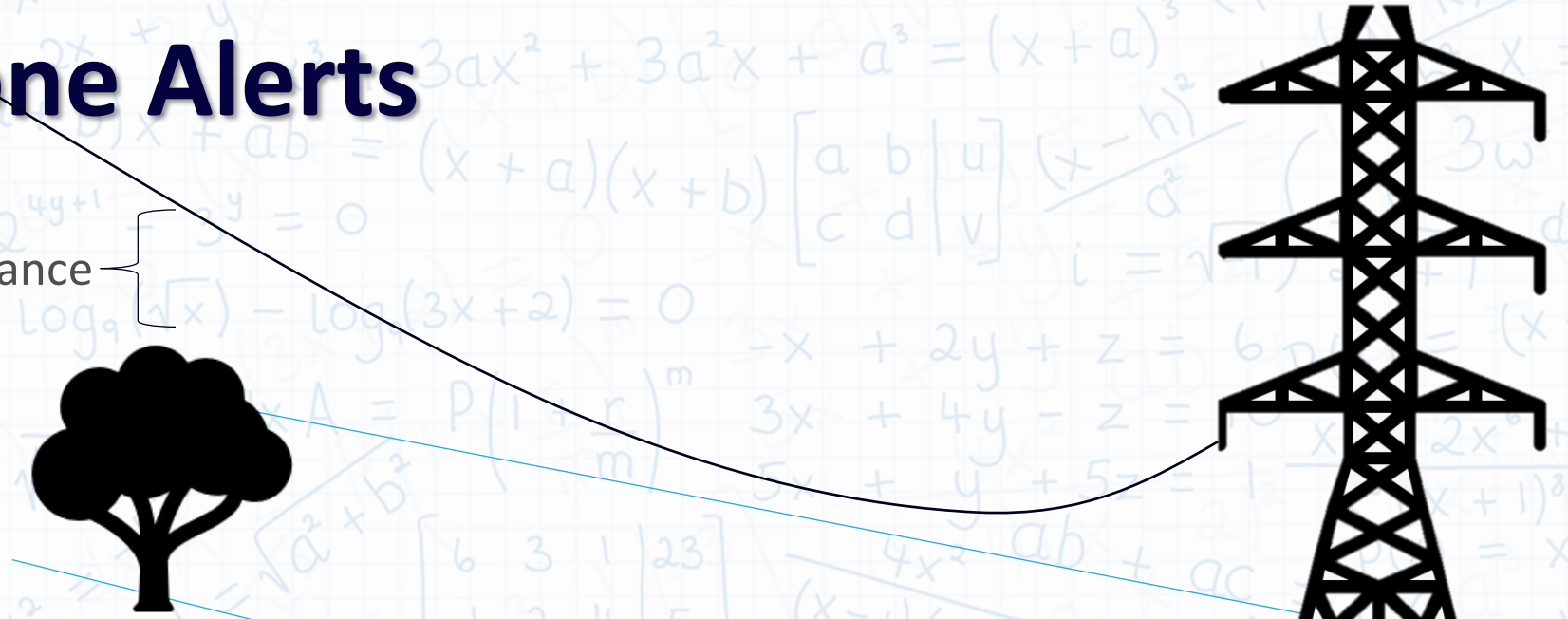




Satelytics

Wire Zone Alerts

Alert Criteria:



- Tree (or any part) is within wire zone
- Tree (or any part) is within a given clearance

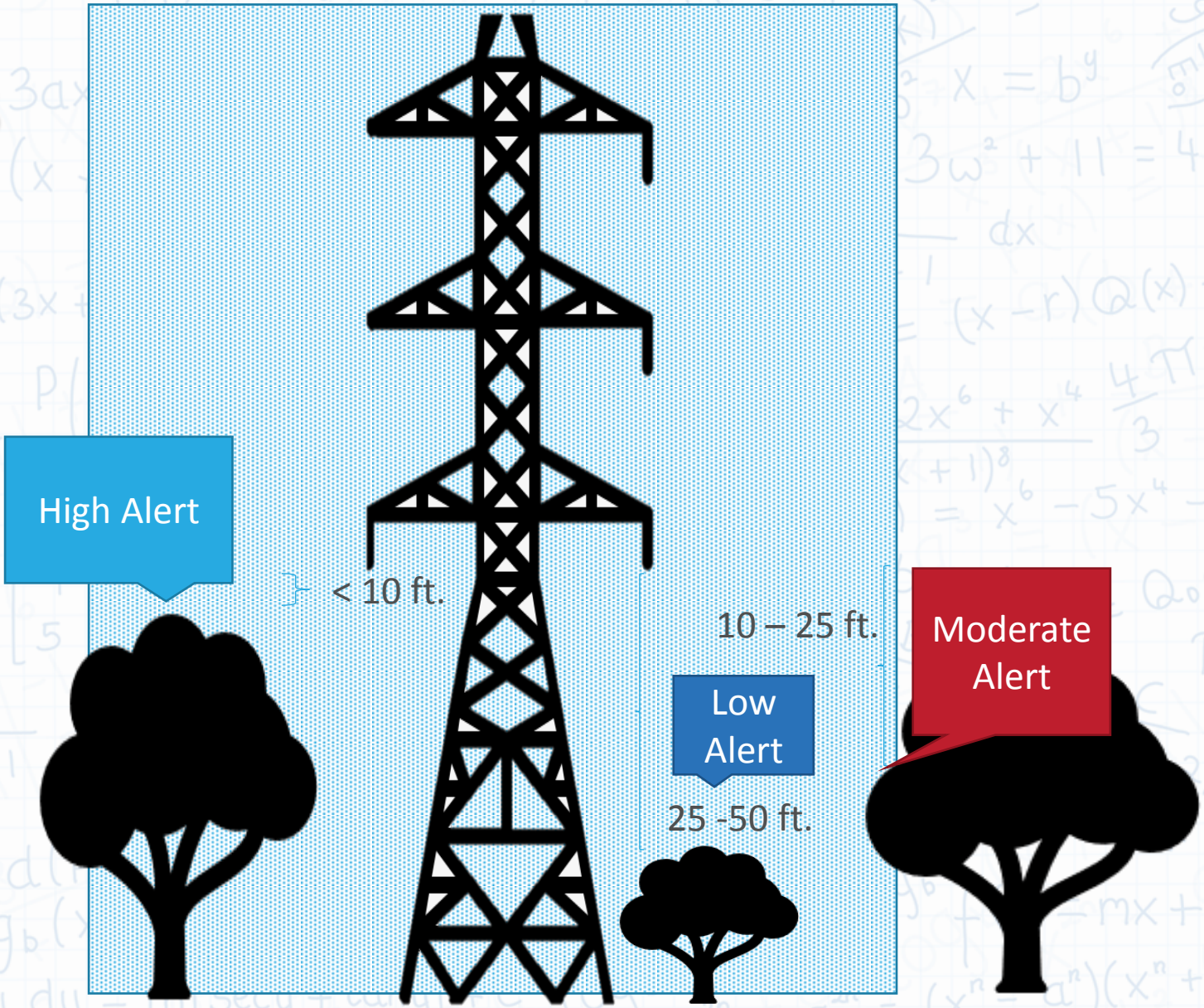
Satelytics

Wire Zone Alerts

1. High:
   Clearance < 10 ft.

2. Moderate:
   10 ft. > clearance < 25 ft.

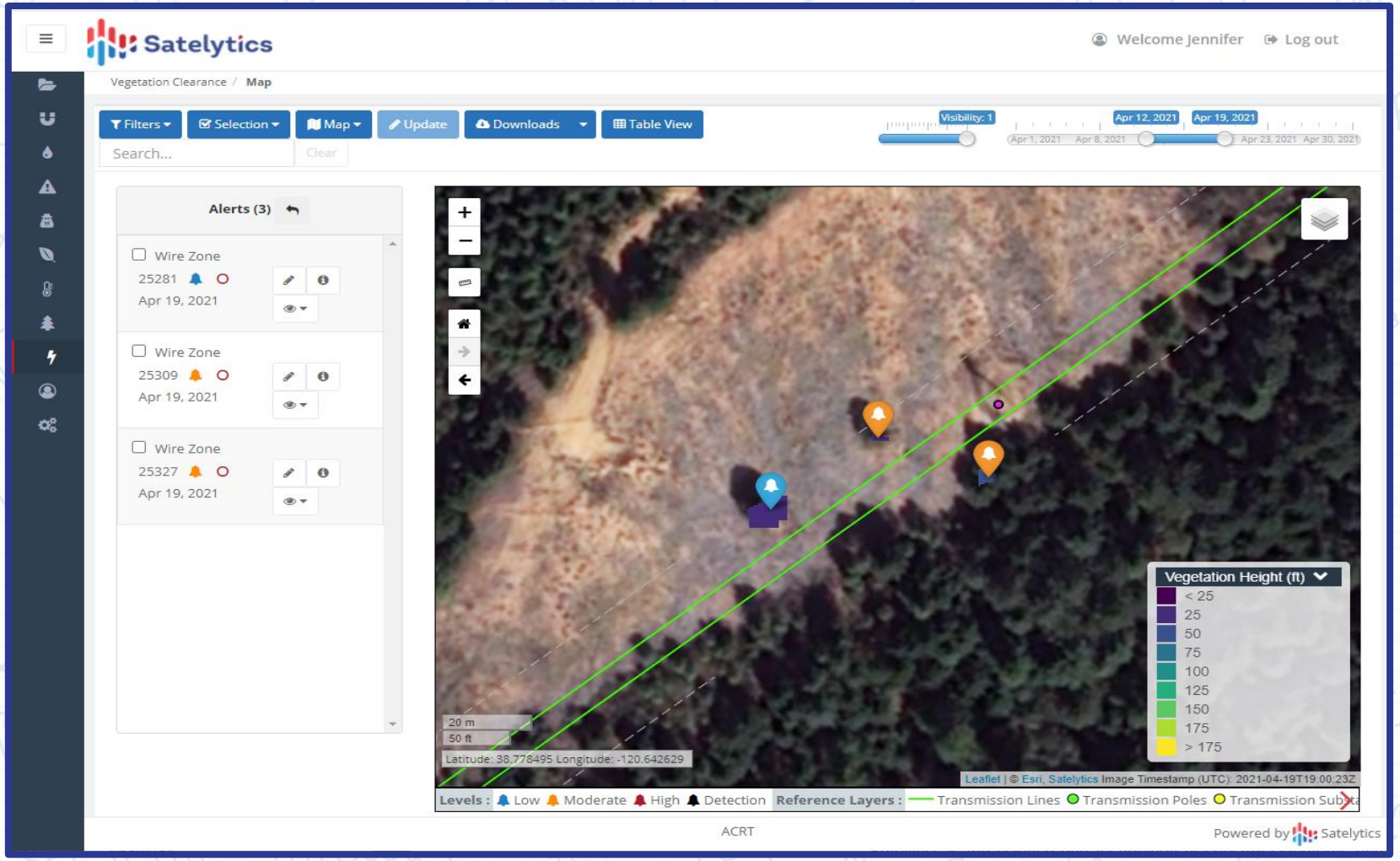
3. Low:
   25 ft. > clearance < 50 ft.



Satelytics

Wire Zone Alerts

Satelytics.io



Satelytics

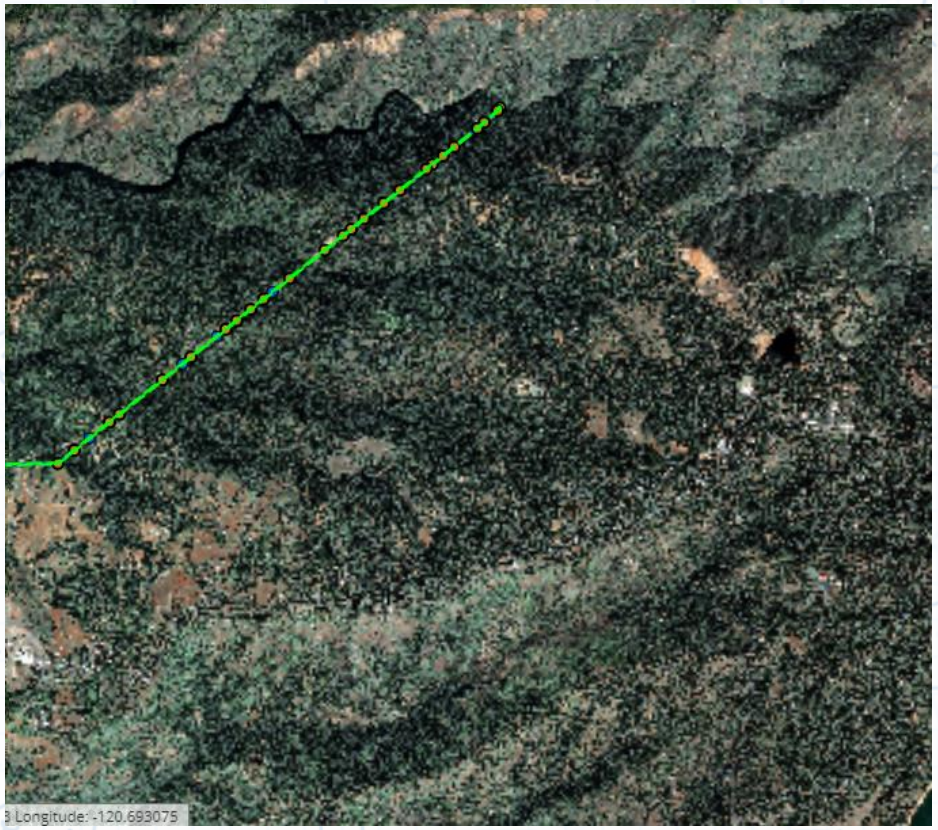
Strike Potential Alerts

Transmission

Satelytics

Strike Potential Alerts

Transmission



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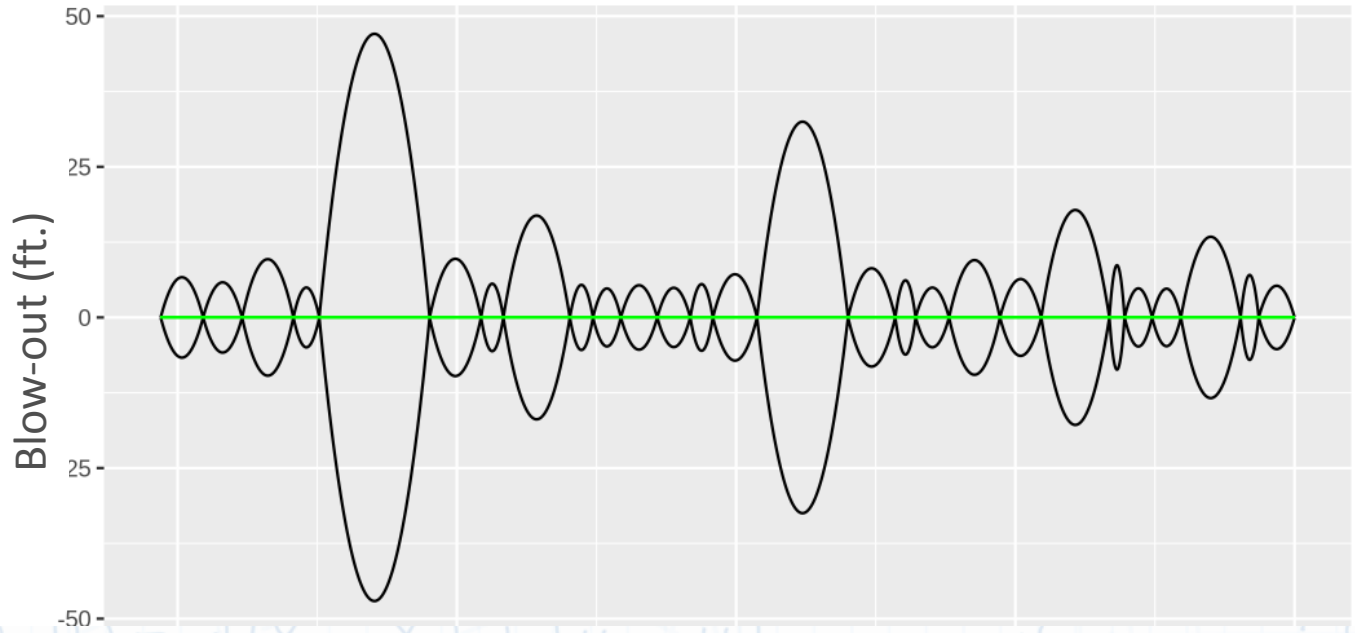
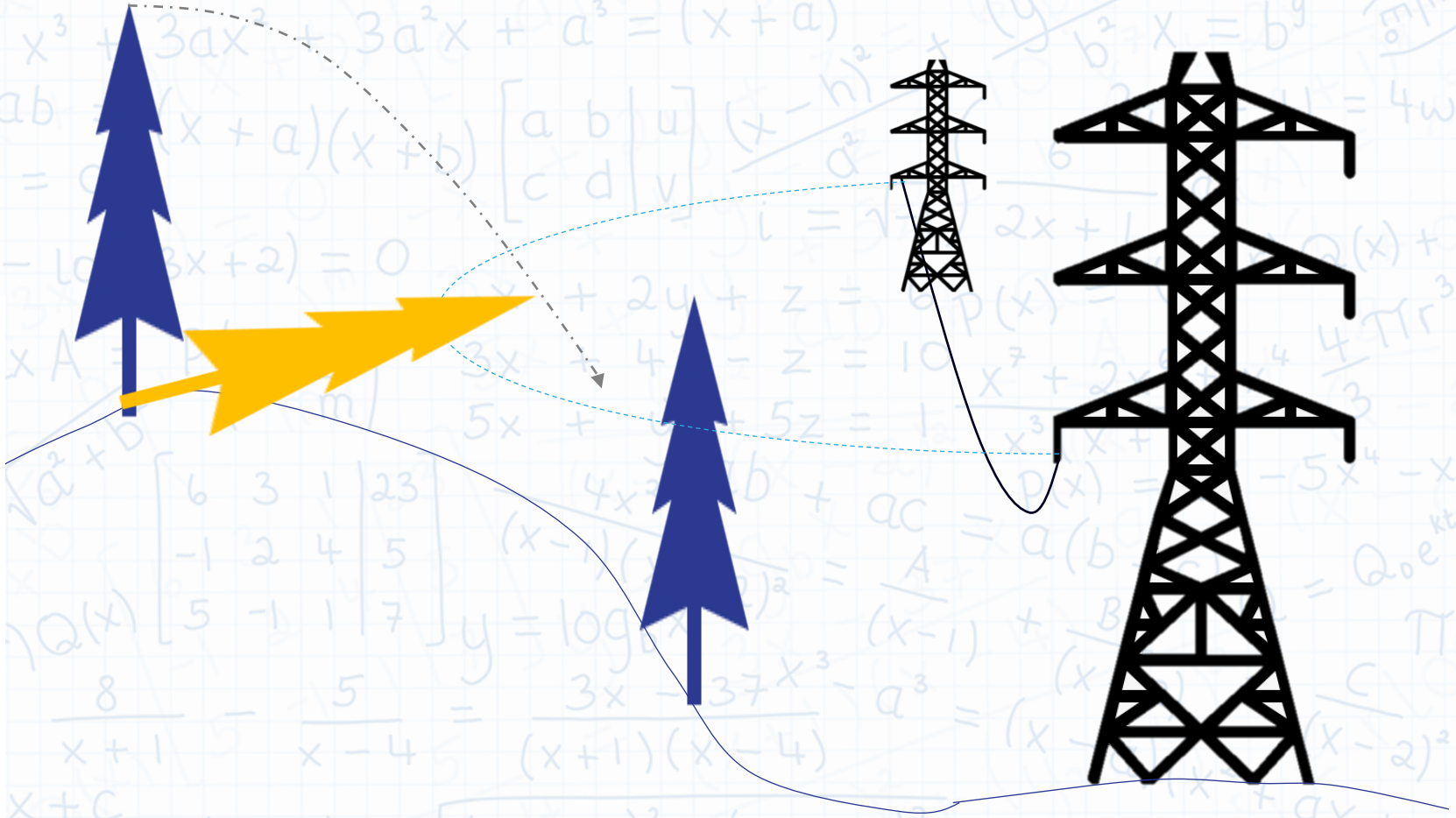


Satelytics

Strike Potential Alerts

Transmission



Criteria

- If the tree fell, the arch would intersect the wire (wire + blow-out)
- Any part of the canopy is within the potential blow-out + clearance of the line

Levels based on vegetation health

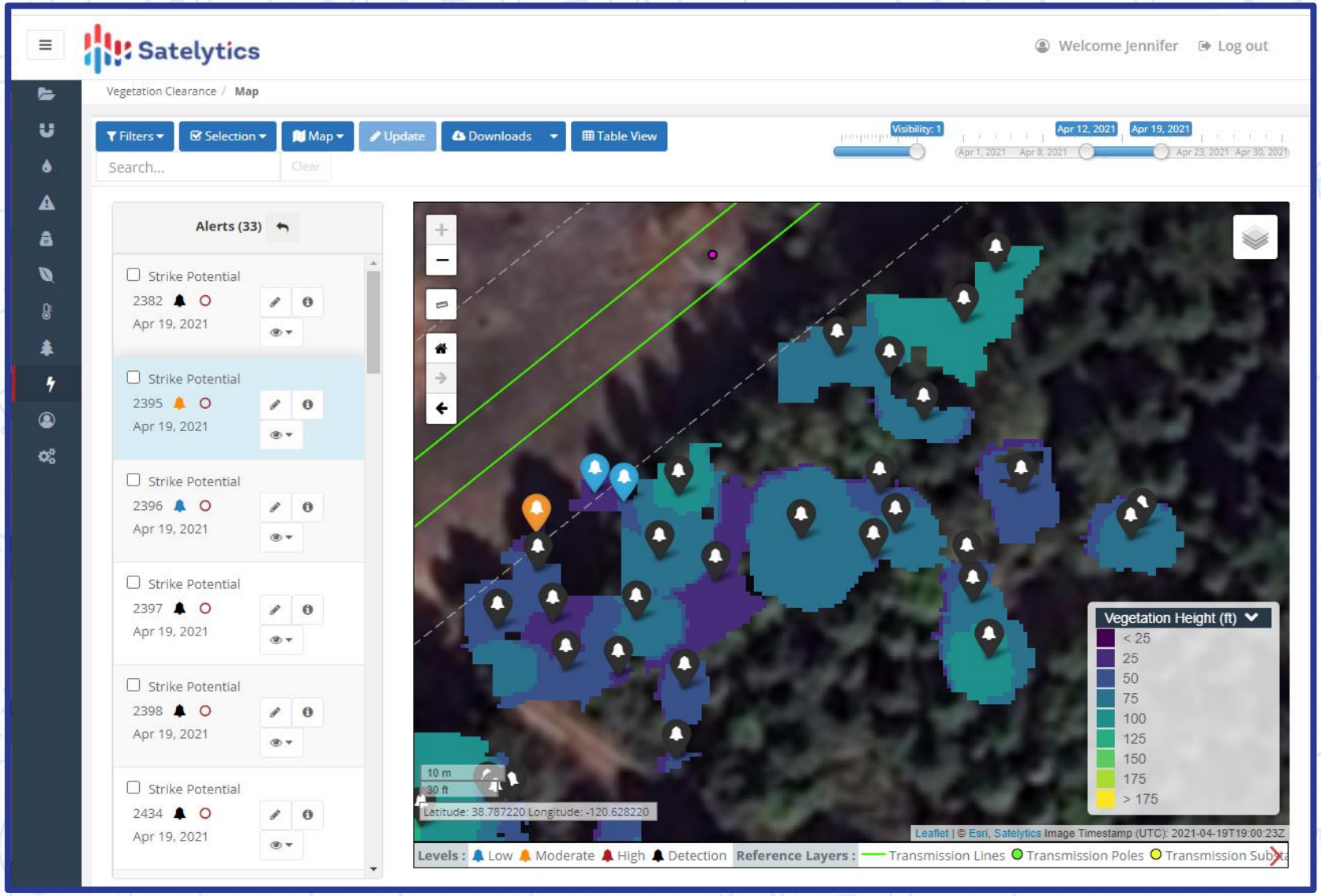
1. High: Severely Stressed
2. Moderate: Very Stressed
3. Low: Stressed
4. Detection: Healthy

Satelytics

Strike Potential Alerts

Transmission

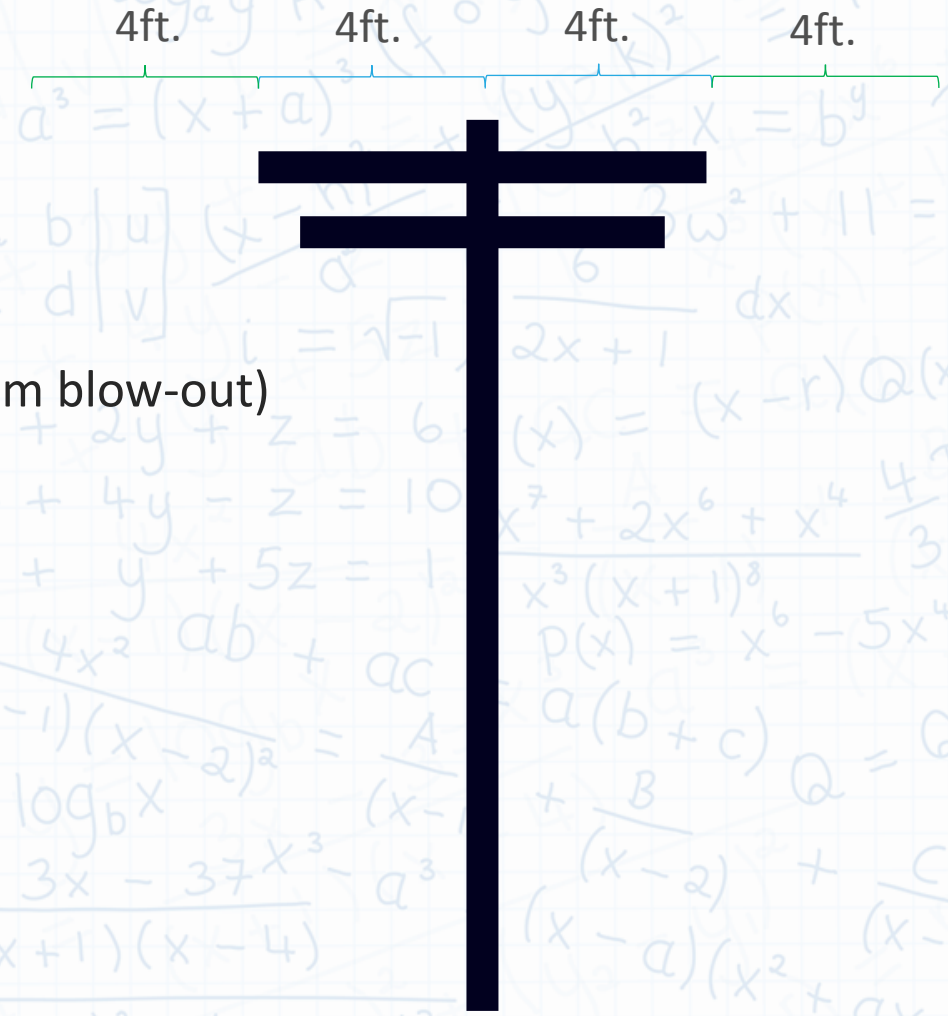
High: Severely Stressed
Moderate: Very Stressed
Low: Stressed
Detection: Healthy



Satelytics

Strike Potential Alerts

Distribution



Calculated the same way as transmission, with minor changes:

1. Vegetation clearance requirement is 4 ft. from wire (maximum blow-out)

High: Severely Stressed
Moderate: Very Stressed
Low: Stressed
Detect: Healthy

Satelytics

Strike Potential Alerts

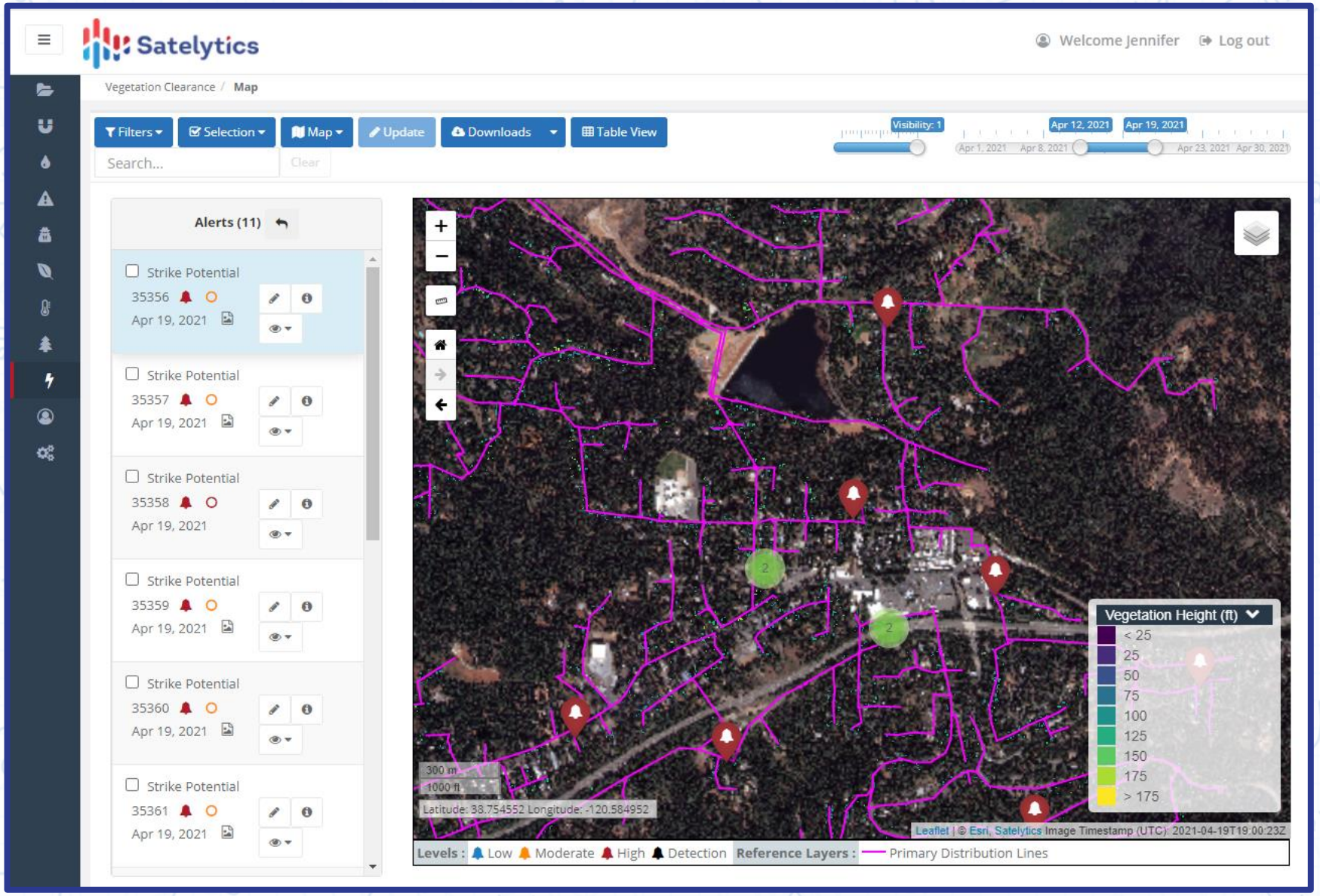
Distribution

High: Severely Stressed

Moderate: Very Stressed

Low: Stressed

~~Detection: Healthy~~



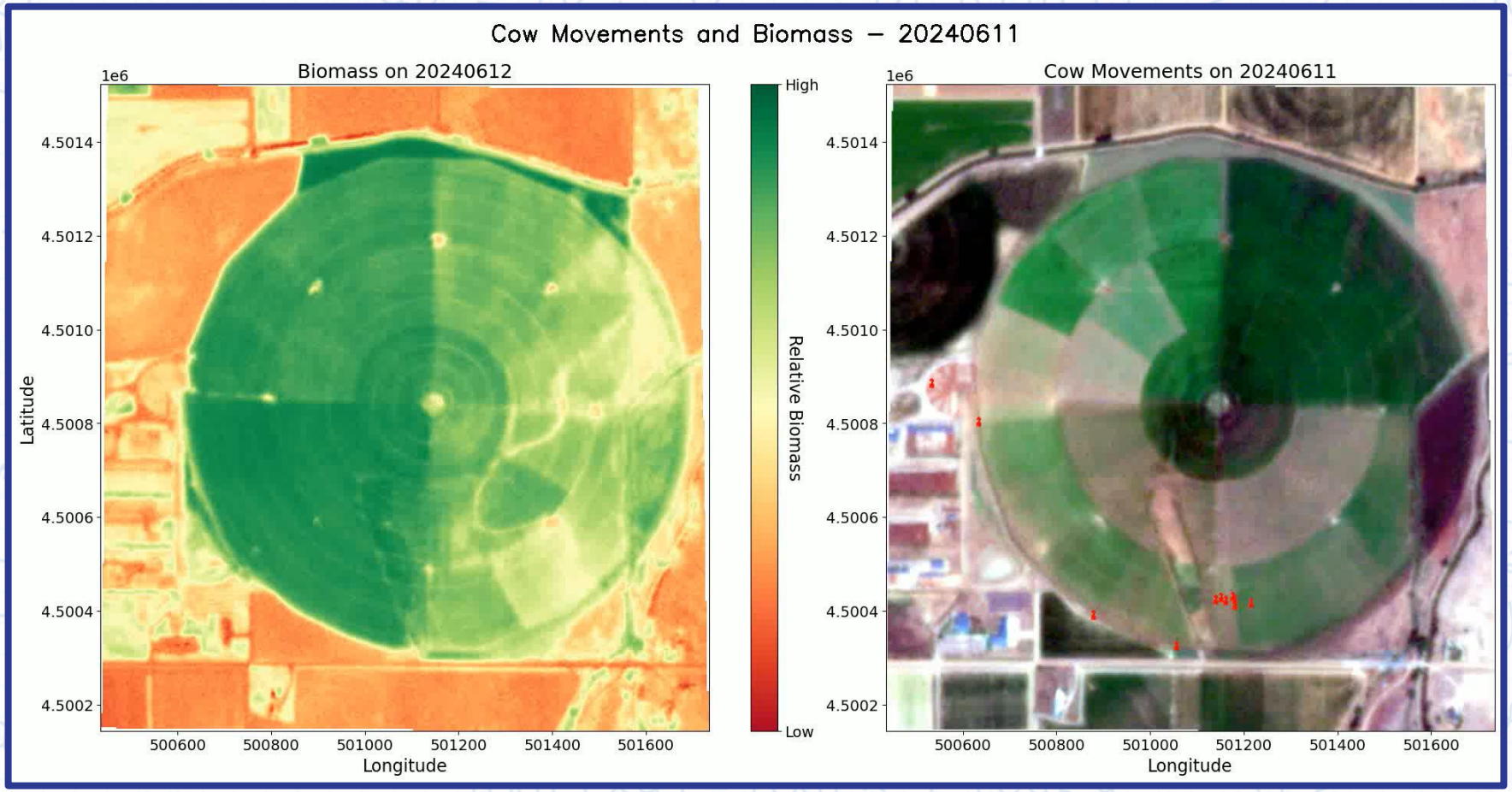
Satelytics

Wildfire Mitigation – Time Series Data using Satelytics

Satelytics

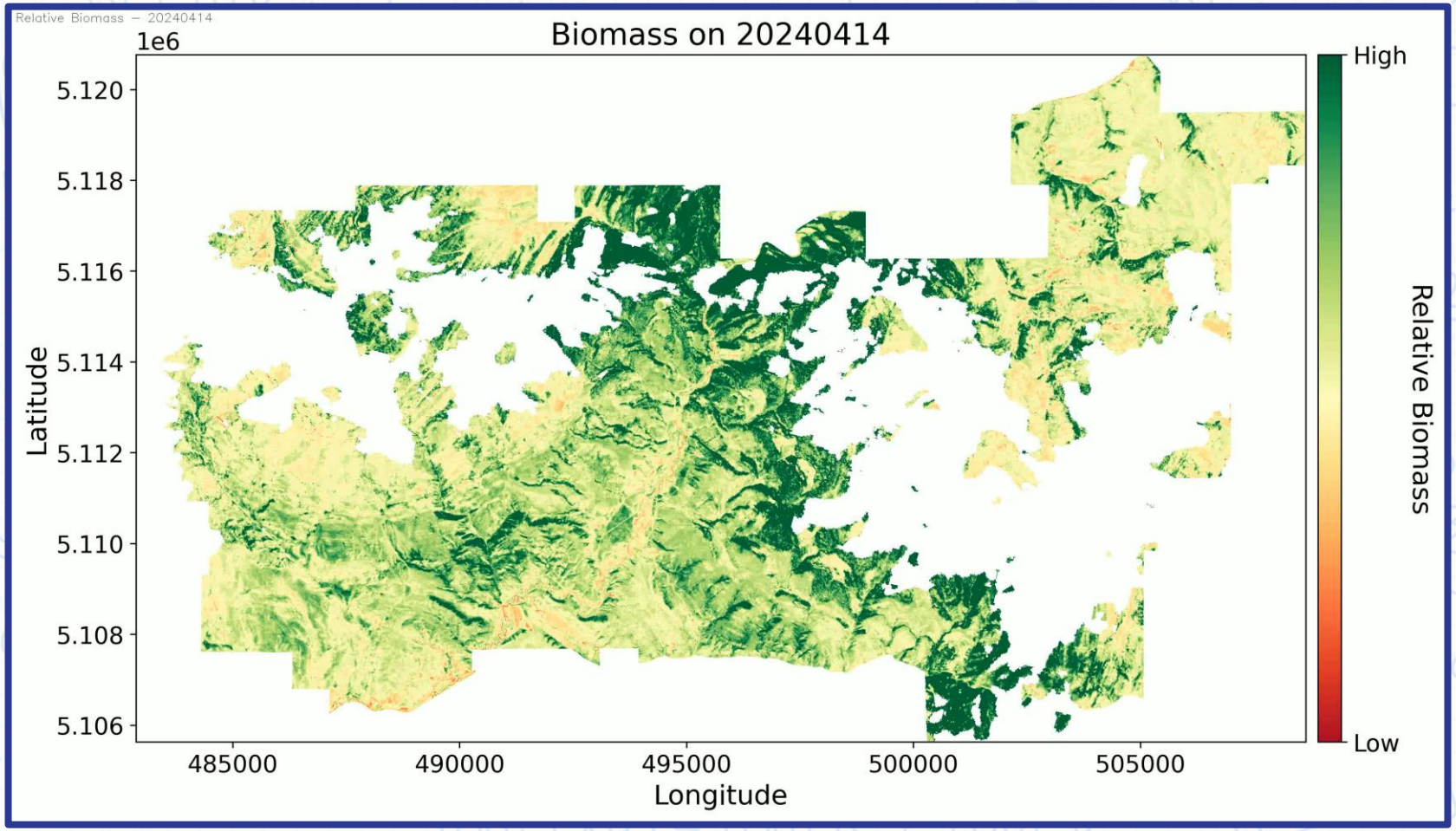
Satelytics

Biomass – Vegetation, Health, Water Content, Cattle Production – Time Series Data Using Satelytics Algorithms



Satelytics

Wildfire Mitigation – Vegetation Overtime Looking at Knowledge of Where Resources Need to Be Deployed to Reduce Risk



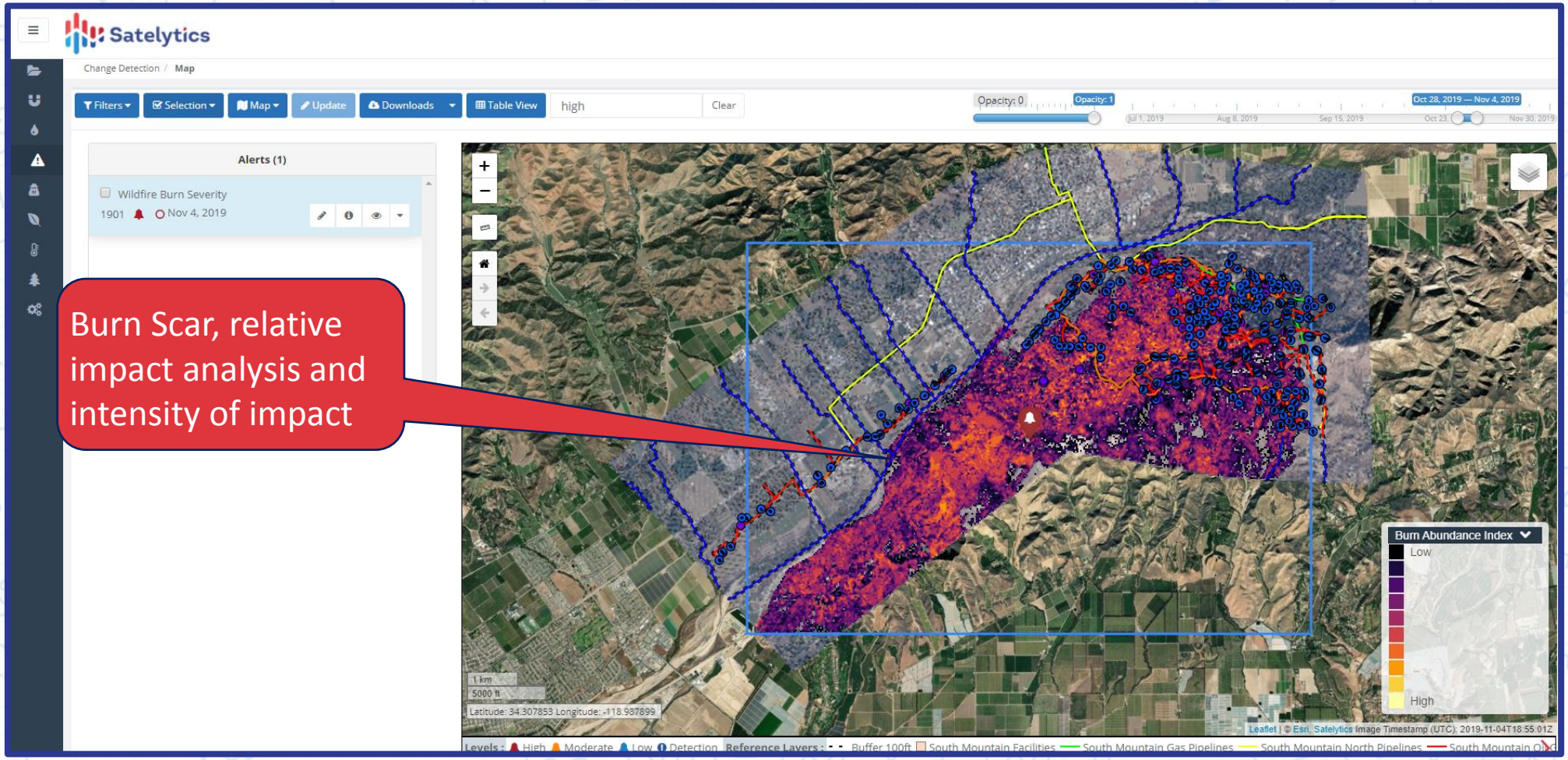
Satelytics

Wildfire Management and Change Detection

Satelytics

Satelytics

Wildfire Management – Impact, Burn Scar and Intensity of Impact

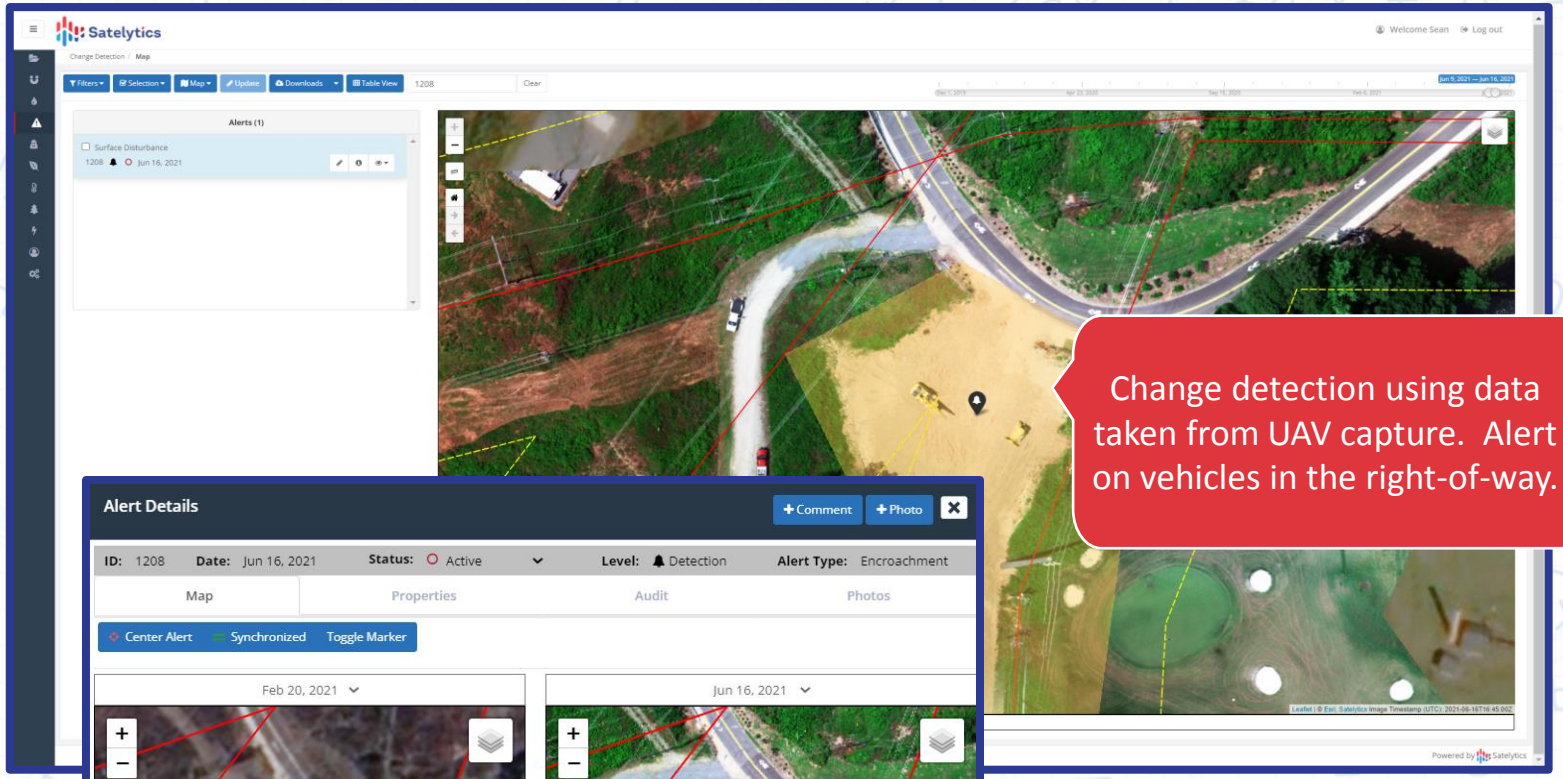


Satelytics

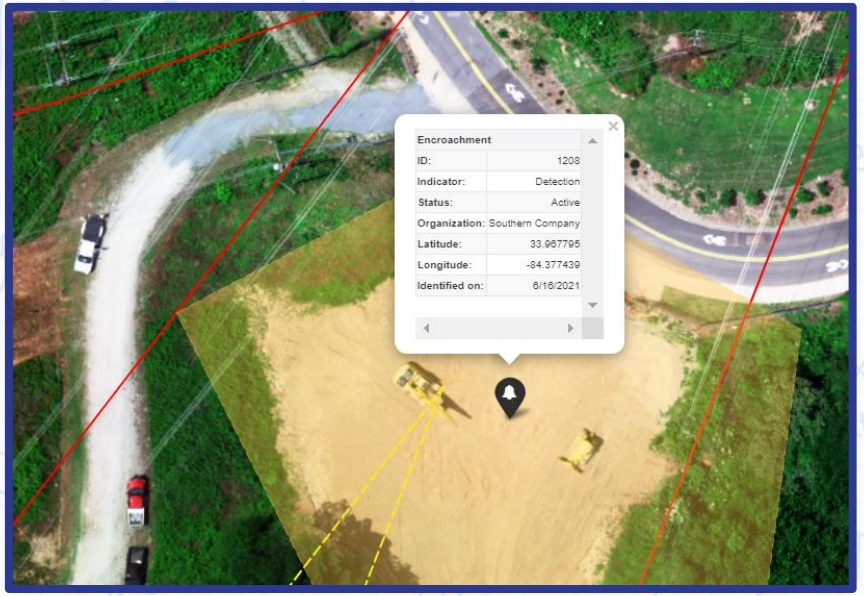
Change Detection using UAV data – Right of Way

Satelytics

Change Detection Using UAV as the Input Data



Change detection using data taken from UAV capture. Alert on vehicles in the right-of-way.



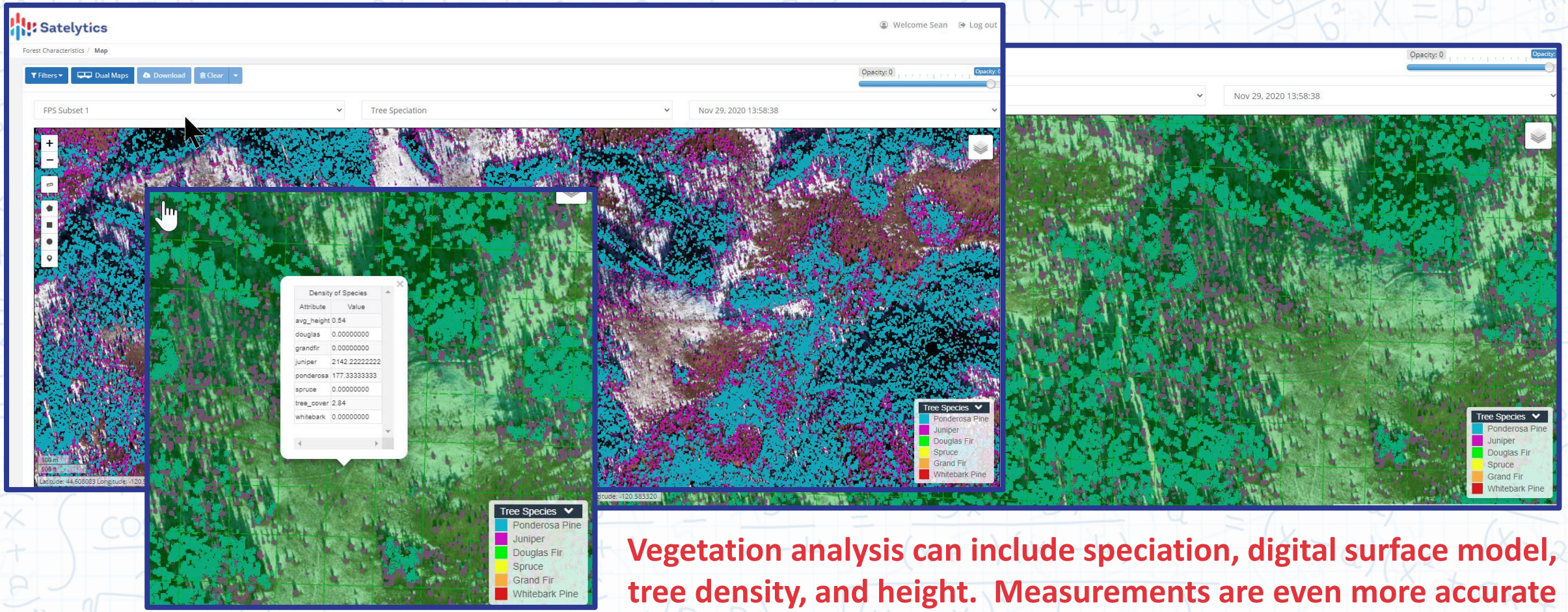
Satelytics

Vegetation Management in Carbon Offset

Satelytics

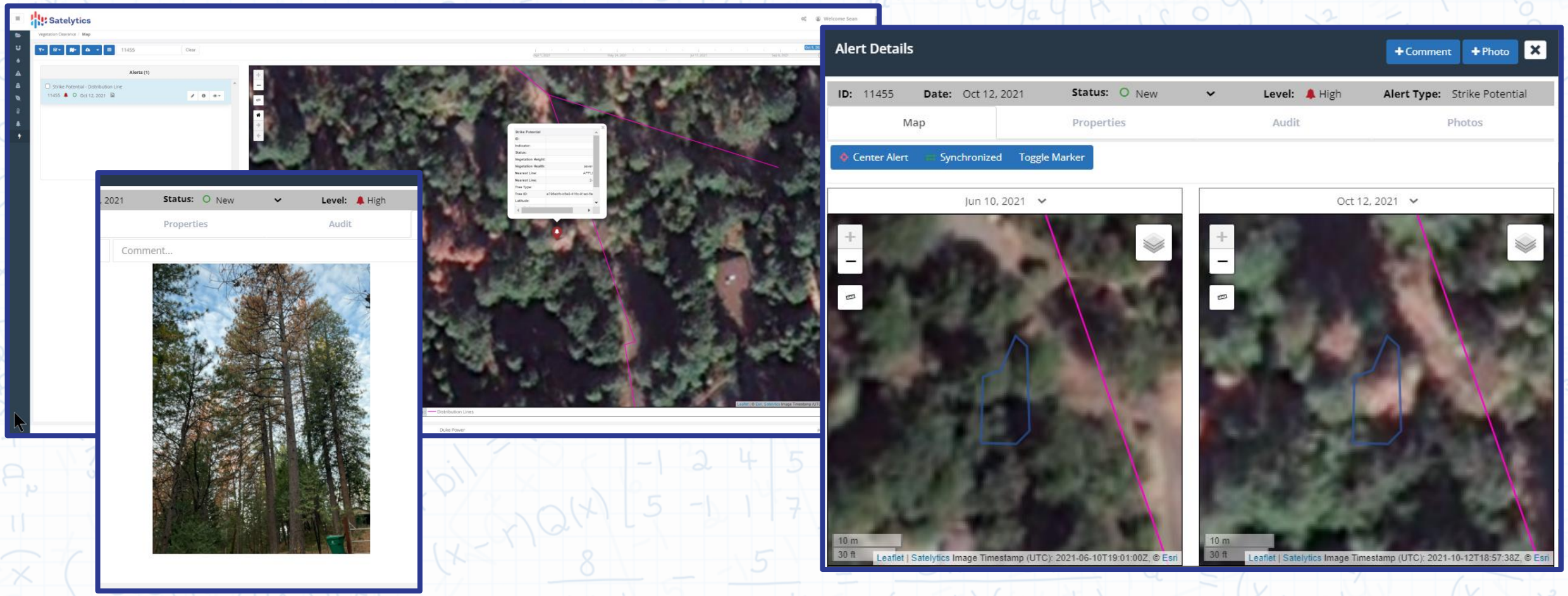
Satelytics

Vegetation Analysis: Speciation, Height, and Density Using Stereo Pairs



Vegetation analysis can include speciation, digital surface model, tree density, and height. Measurements are even more accurate when using “stereo pairs.”

Satelytics



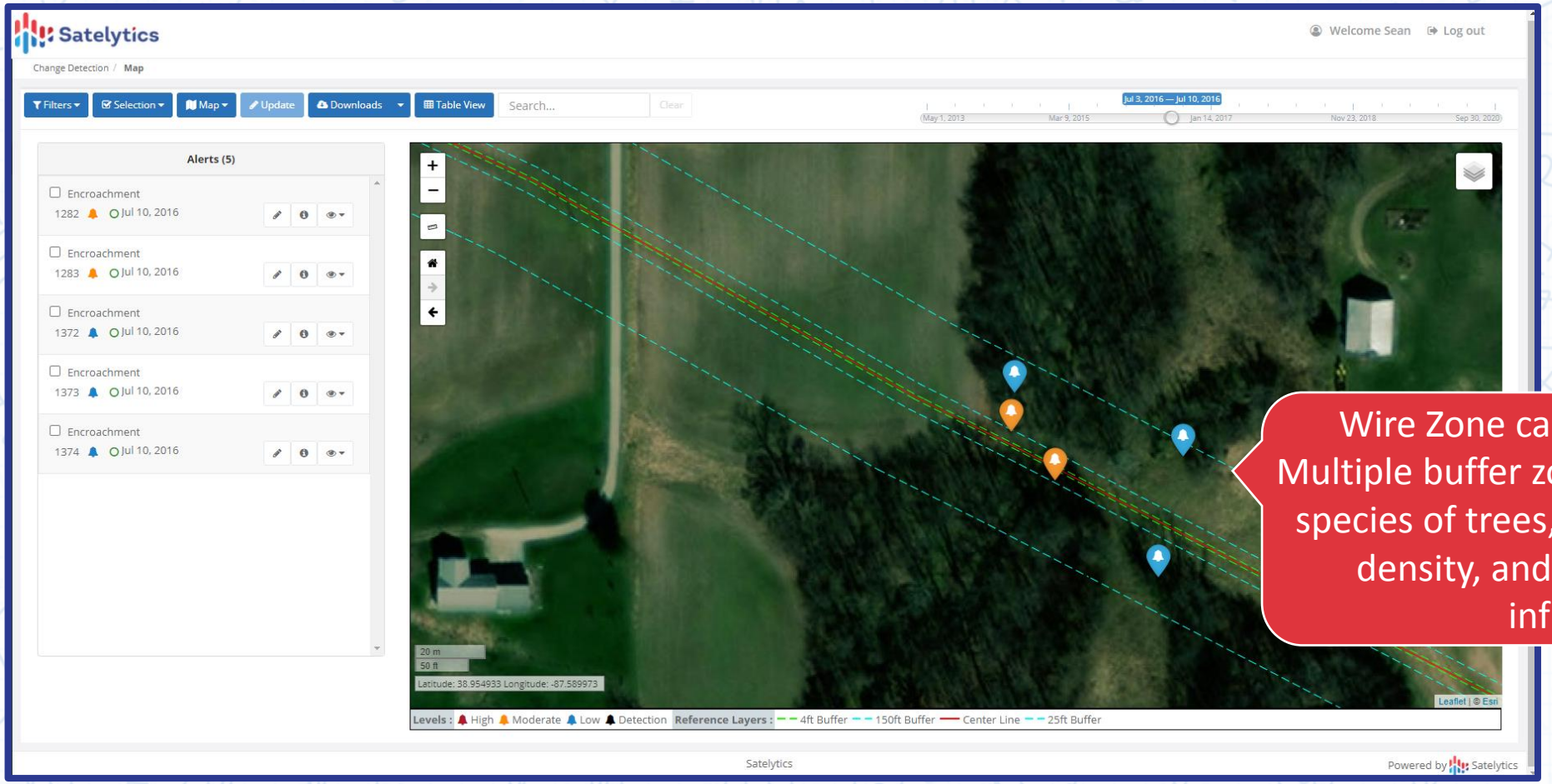
Vegetation Management – Tree species, health, height, and strike threat, accounting for soil moisture, weather influences and topology.

Satelytics

Vegetation Management: Area 1 , Madison County, Illinois

Satelytics

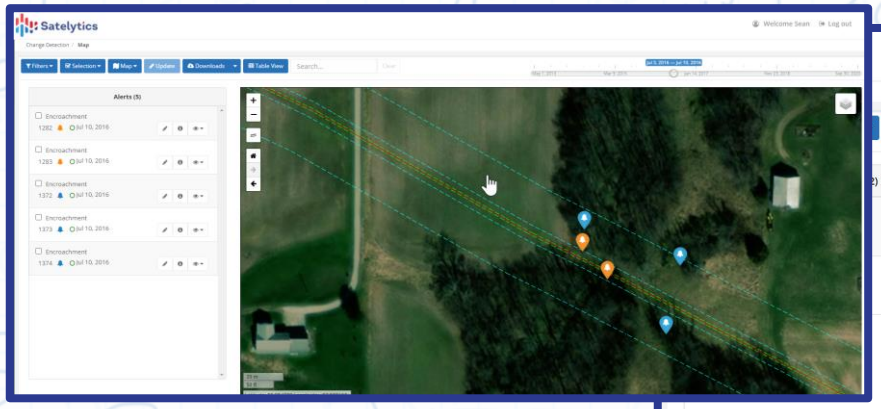
Understanding the “Wire Zone” for Transmission and Distribution Corridors, Using Analytics to Alert on Vegetation Proximity, Health, Height, and Speciation

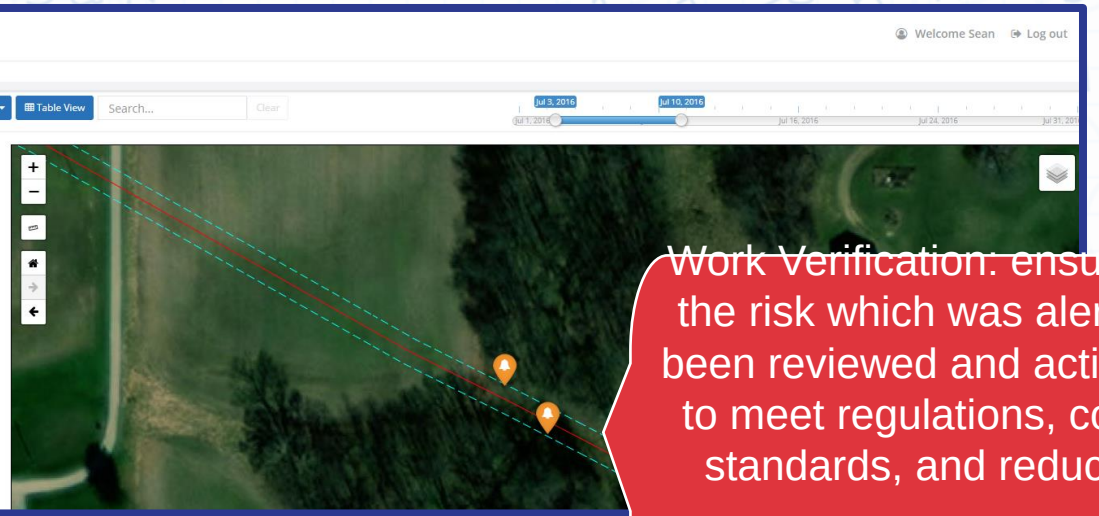


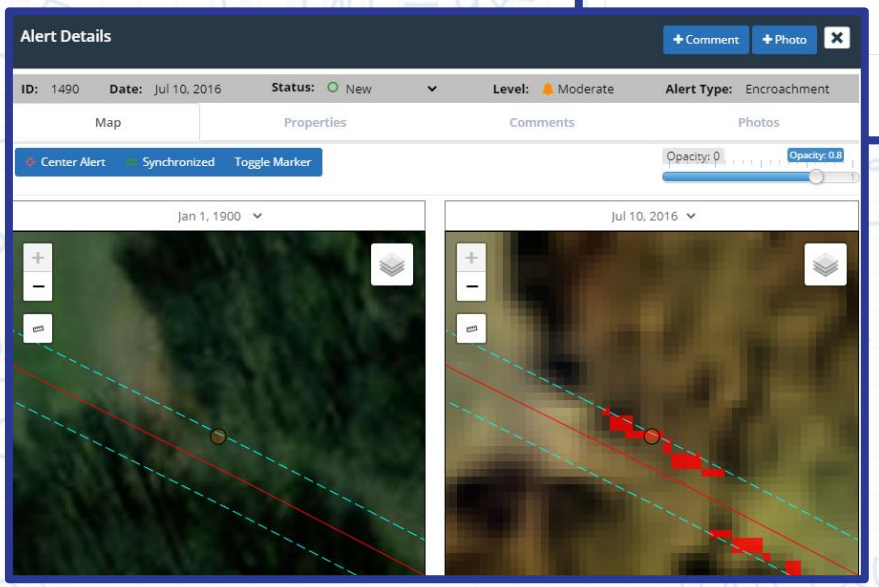
Wire Zone calculated by Satelytics. Multiple buffer zones to allow for alerts to species of trees, their respective health, density, and height in relation to infrastructure

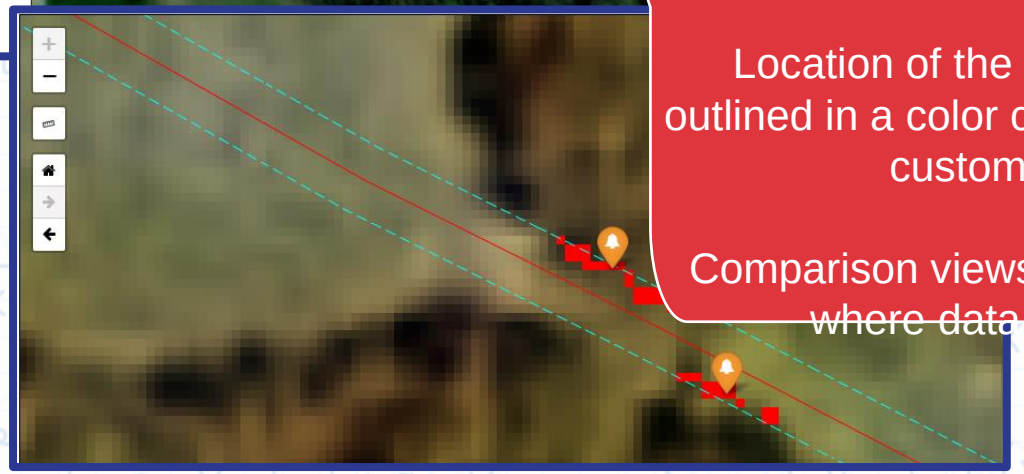
Satelytics

Work Verification- Ensuring Areas That Pose Risk Are Reduced









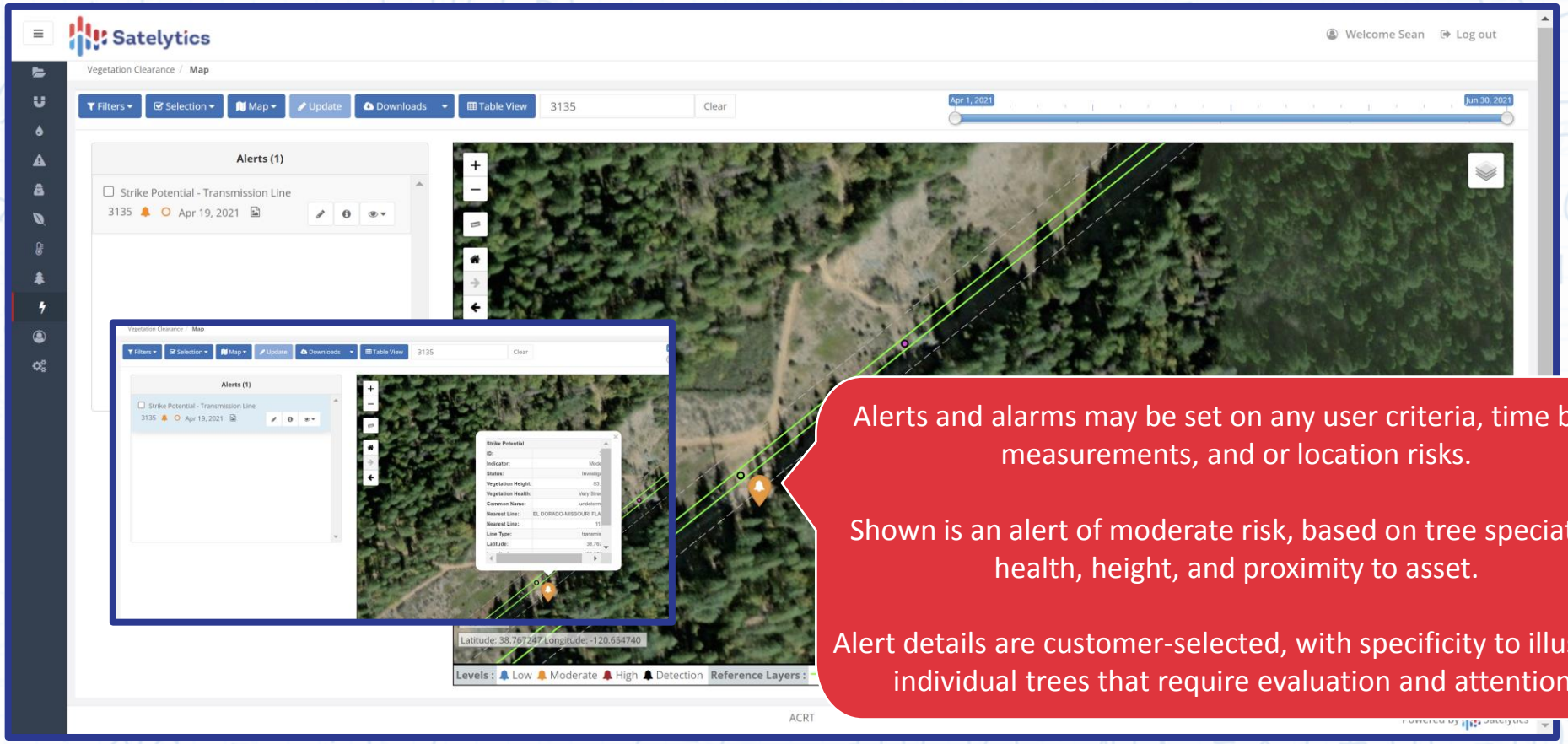
Work Verification: ensuring that the risk which was alerted has been reviewed and action taken to meet regulations, company standards, and reduce risk.

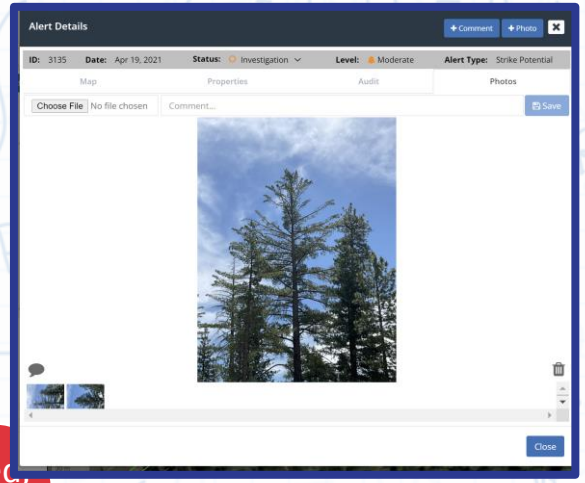
Location of the risk can be outlined in a color code to suit the customer.

Comparison views for any date where data exists

Satelytics

Specificity… Identifying Species, Locations, Individual Tree Threats





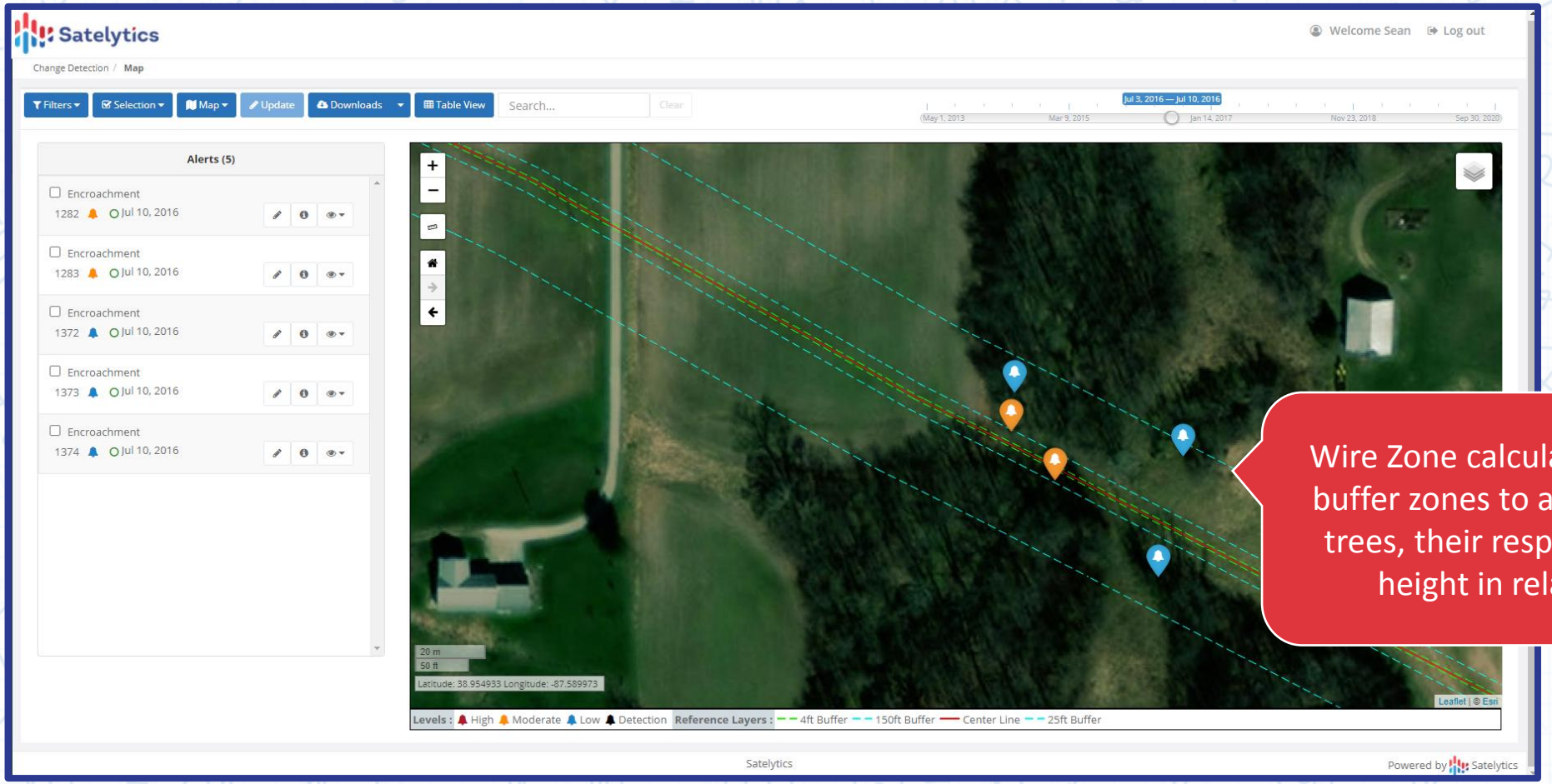
Alerts and alarms may be set on any user criteria, time based, measurements, and or location risks.

Shown is an alert of moderate risk, based on tree speciation, health, height, and proximity to asset.

Alert details are customer-selected, with specificity to illustrate individual trees that require evaluation and attention.

Satelytics

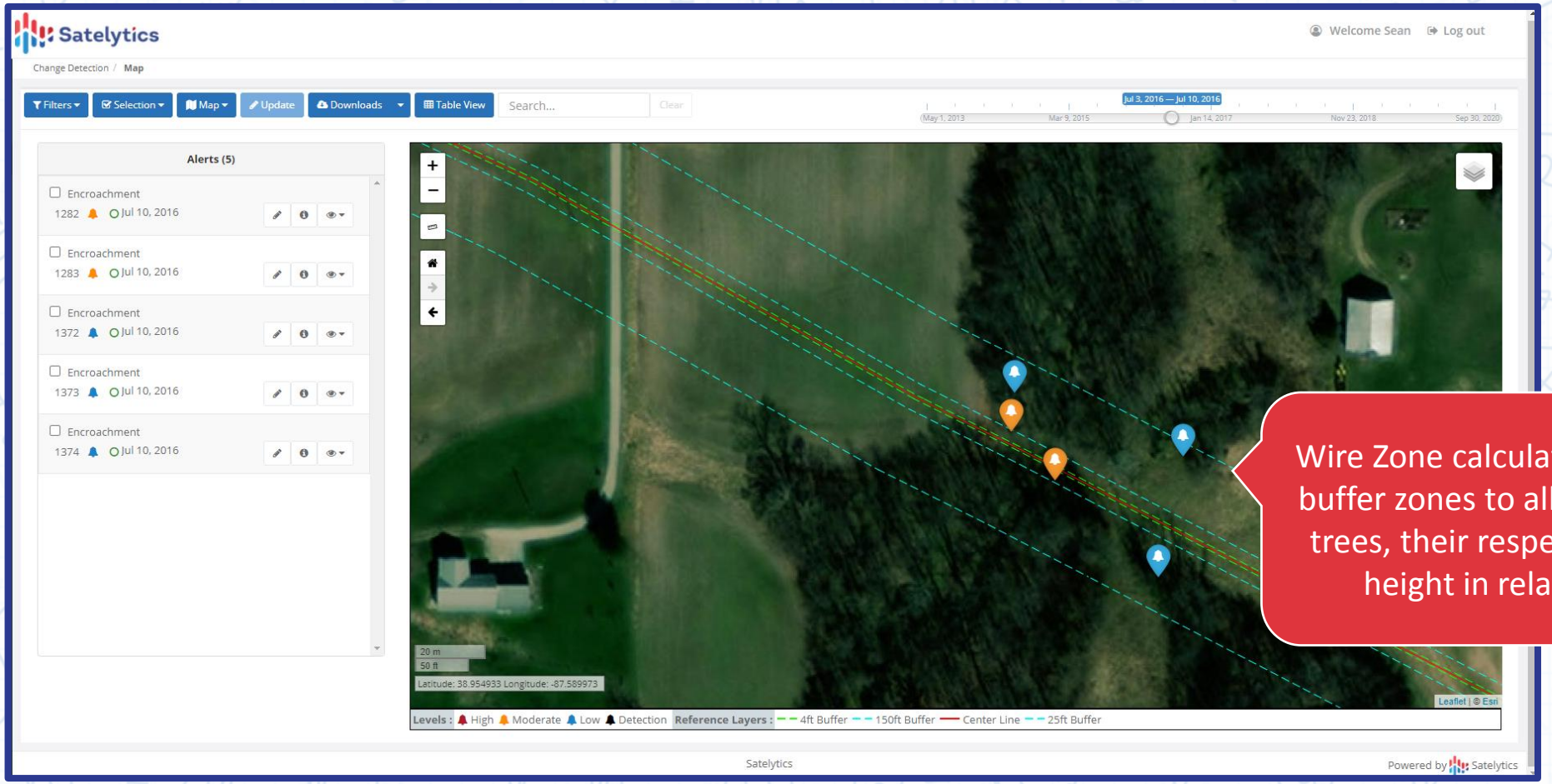
Understanding the “Wire Zone” for Transmission and Distribution Corridors, Using Analytics to Alert on Vegetation Proximity, Health, Height, and Speciation



Wire Zone calculated by Satelytics. Multiple buffer zones to allow for alerts to species of trees, their respective health, density, and height in relation to infrastructure.

Satelytics

Understanding the “Wire Zone” for Transmission and Distribution Corridors, Using Analytics to Alert on Vegetation Proximity, Health, Height, and Speciation



Wire Zone calculated by Satelytics. Multiple buffer zones to allow for alerts to species of trees, their respective health, density, and height in relation to infrastructure.

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Speciation Identification in Right-of-Way

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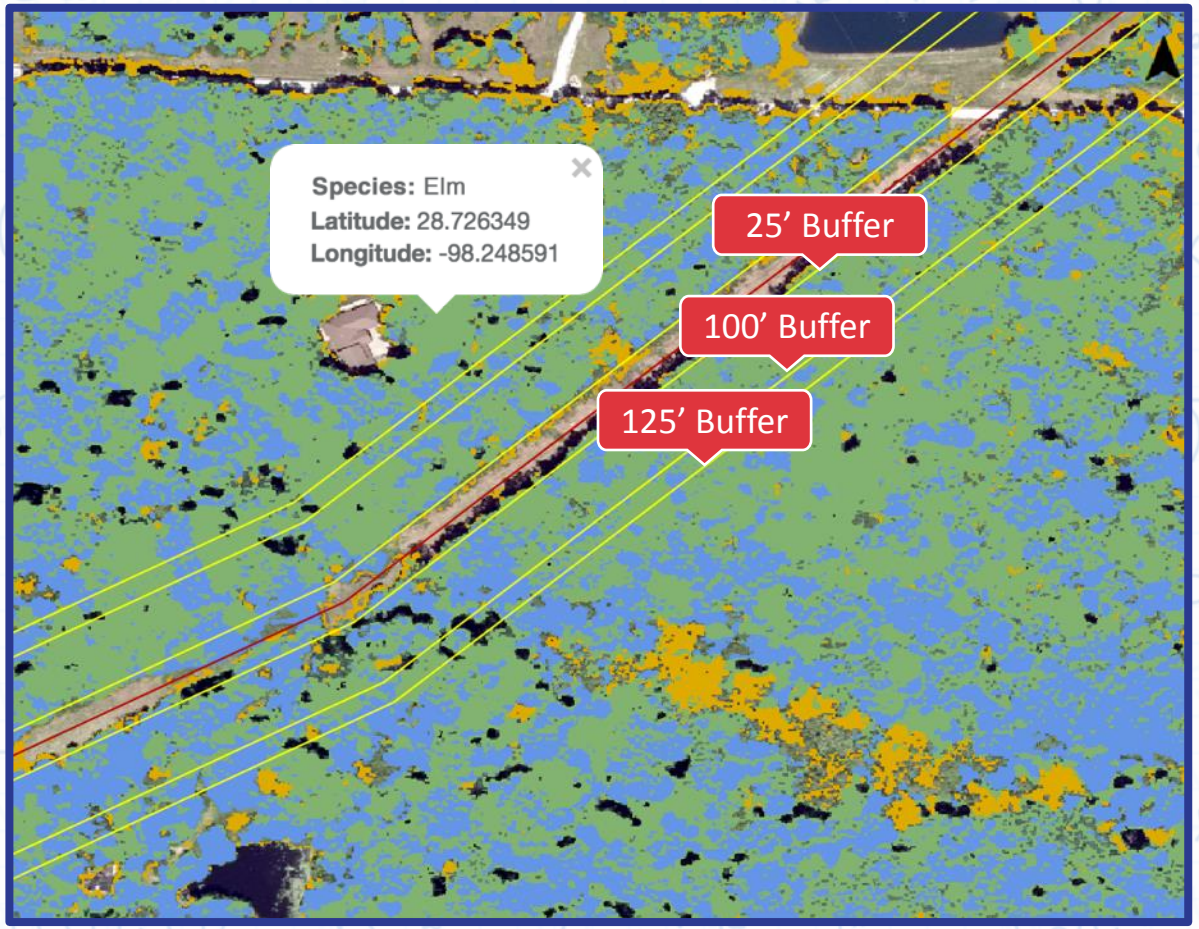
Vegetation Analysis: Post-Analysis & Natural Color

Natural color image, Montgomery County, Illinois



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Re-Vegetation Analysis – Growth or Decline

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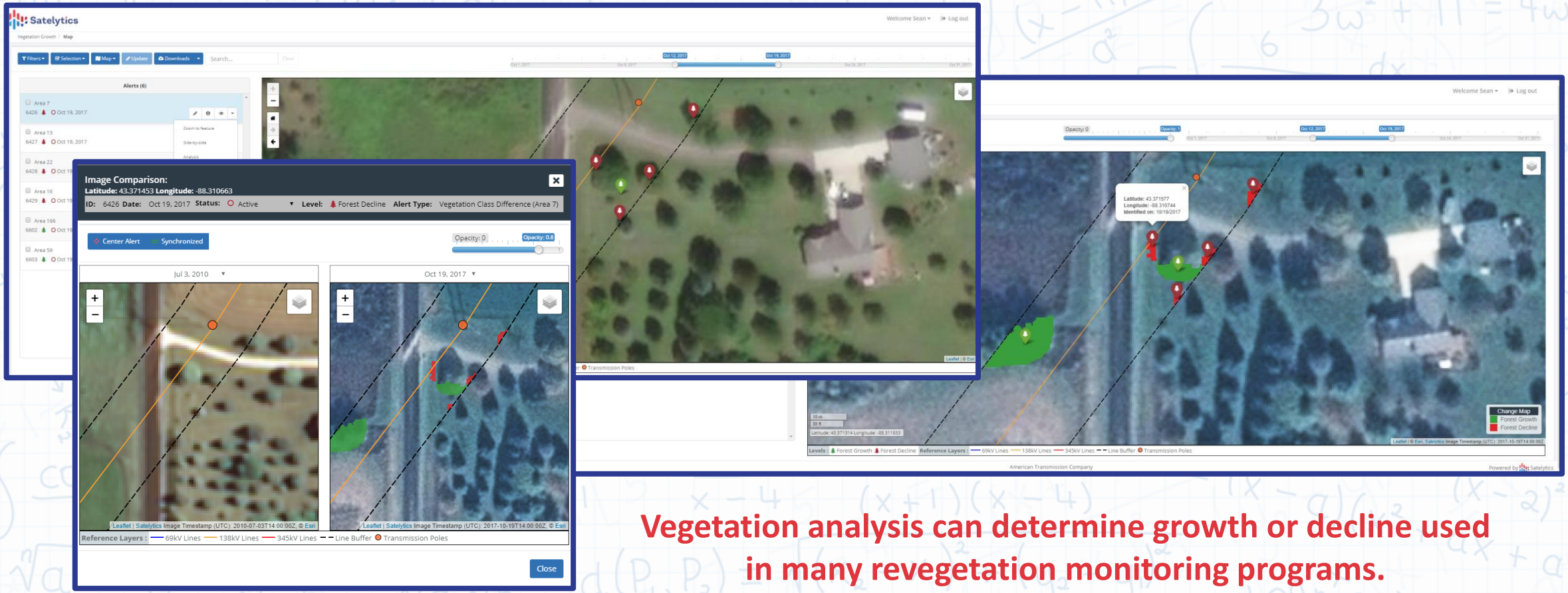
Vegetation Analysis: Growth or Decline…or Both



Vegetation analysis can determine growth or decline used in many revegetation monitoring programs.

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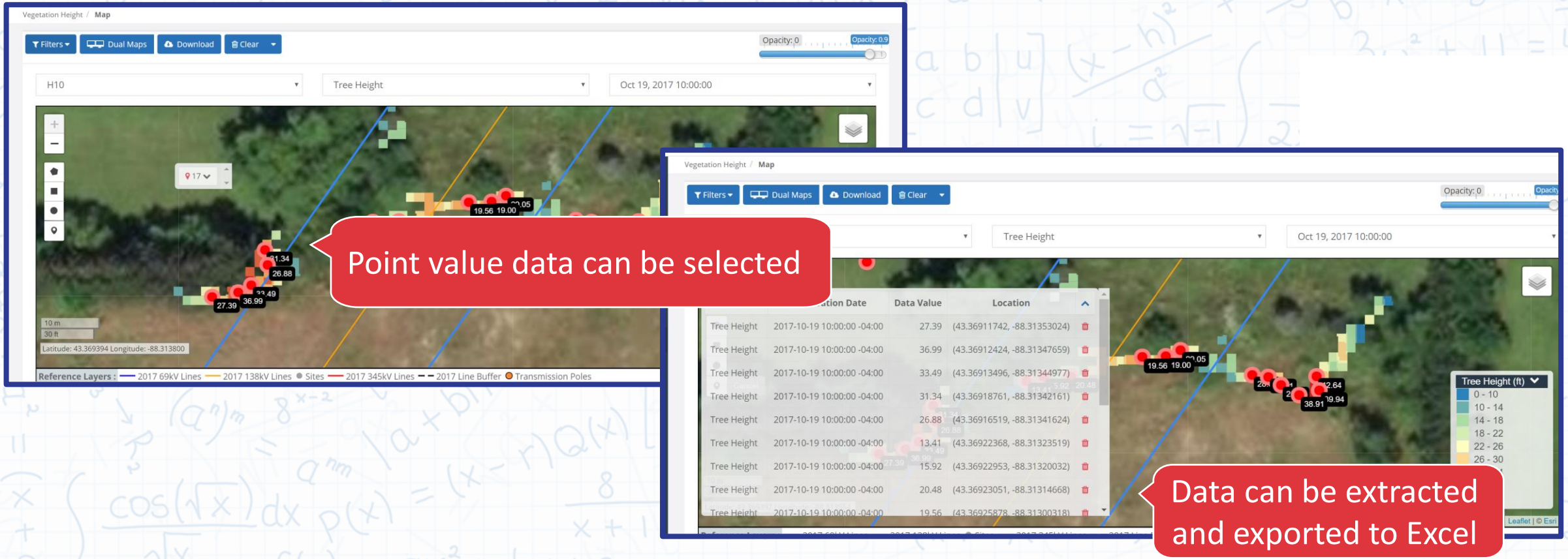
Data Can Be Selected and Exported to a.csv File or Using API's



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Land & Water: Analysis for Constituents

Applying our patented algorithms and techniques to the world's land and water resources using satellite or nano-satellite data

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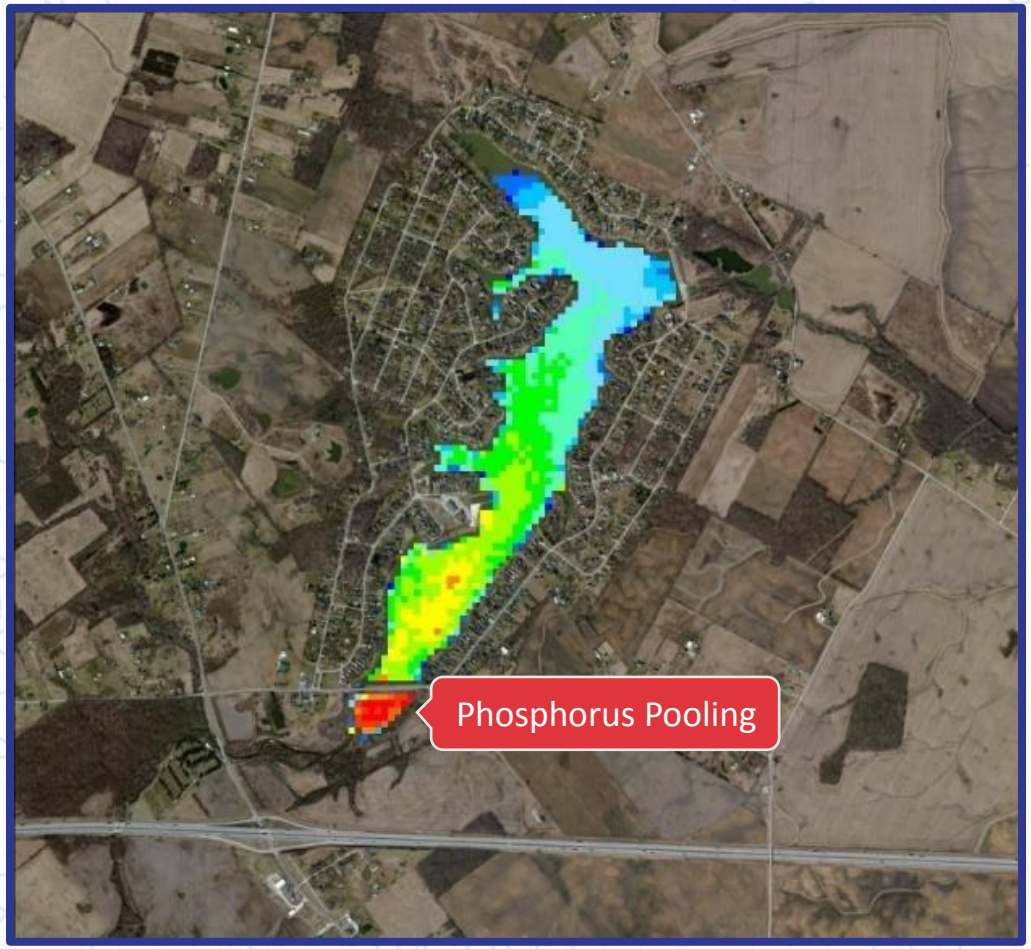
Phosphorus in Water



Lake Choctaw, Ohio, on August 26, 2014

Total Phosphorus in Water (parts per billion)

- 0 - 30
- 30.1 - 60
- 60.1 - 90
- 90.1 - 120
- 120.1 - 150
- 150.1 - 180
- 180.1 - 210
- 210.1 - 240
- 240.1 - 270
- 270.1 - 300
- 200.1 - 330
- > 330.1

- Use satellite imagery to identify sources of phosphorus in water.
- Identify factors that influence phosphorus formation.
- Use satellite imagery to correlate with sources of phosphorus on land.

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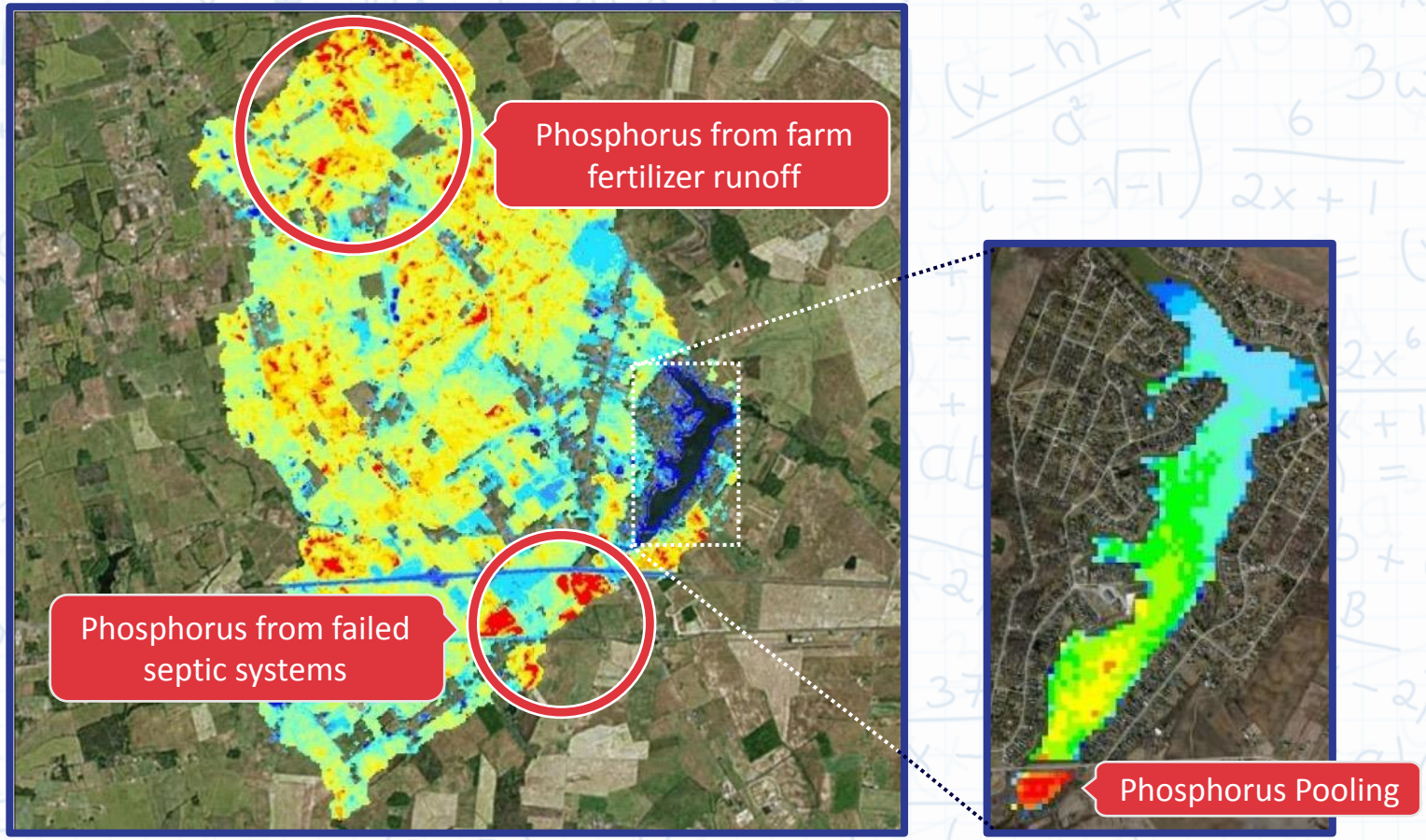
Phosphorus on Land

Total Phosphorus on Land
(parts per billion)

- 0 - 30
- 30.1 - 60
- 60.1 - 90
- 90.1 - 120
- 120.1 - 150
- 150.1 - 180
- 180.1 - 210
- 210.1 - 240
- 240.1 - 270
- 270.1 - 300
- 200.1 - 330
- > 330.1



Lake Choctaw, Ohio Watershed, August 26, 2015

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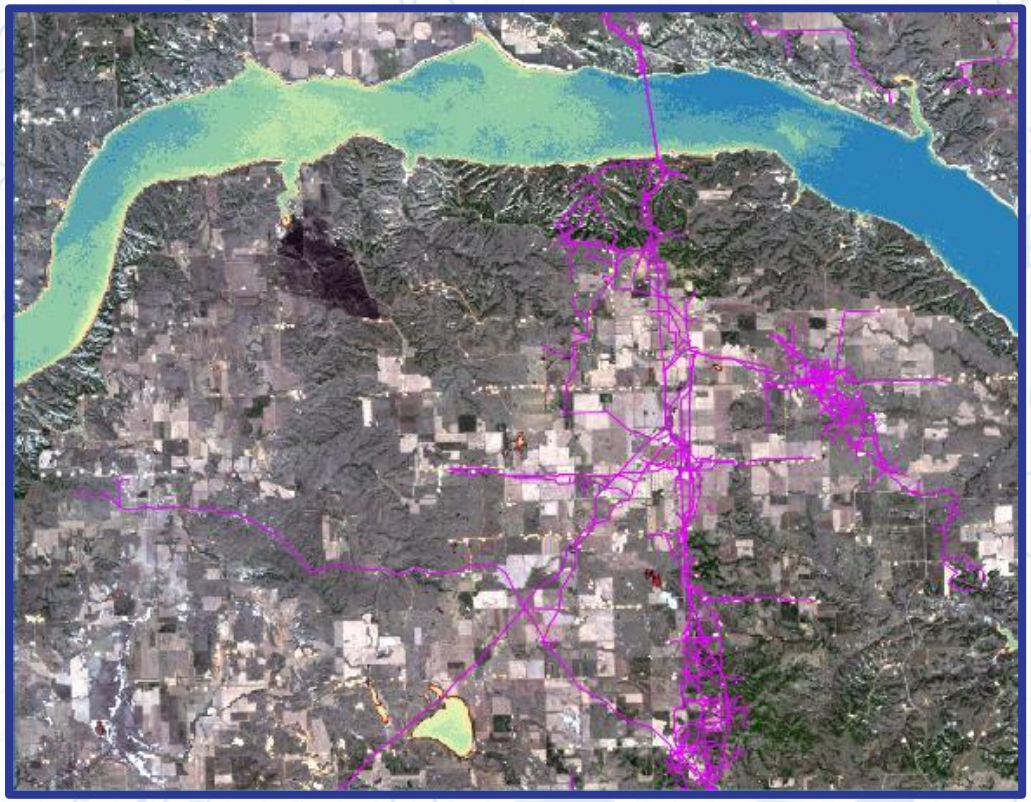
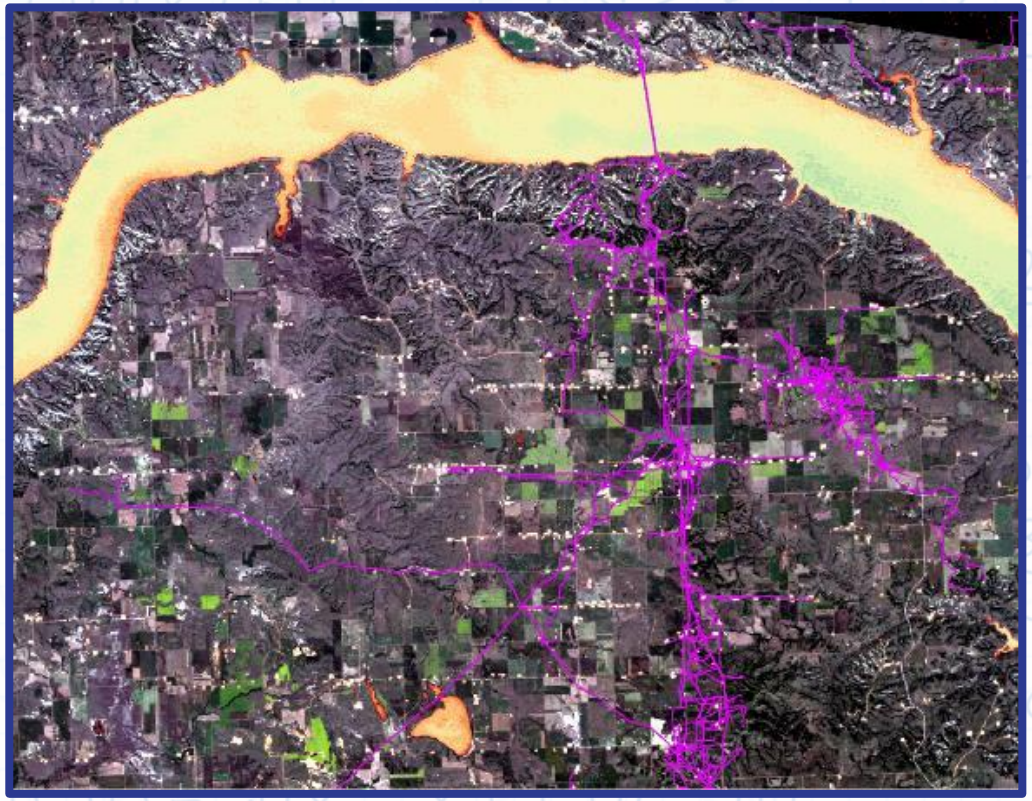
Thermal Imagery: Surface Water Temperature



May 16, 2015



June 27, 2015

Pipeline

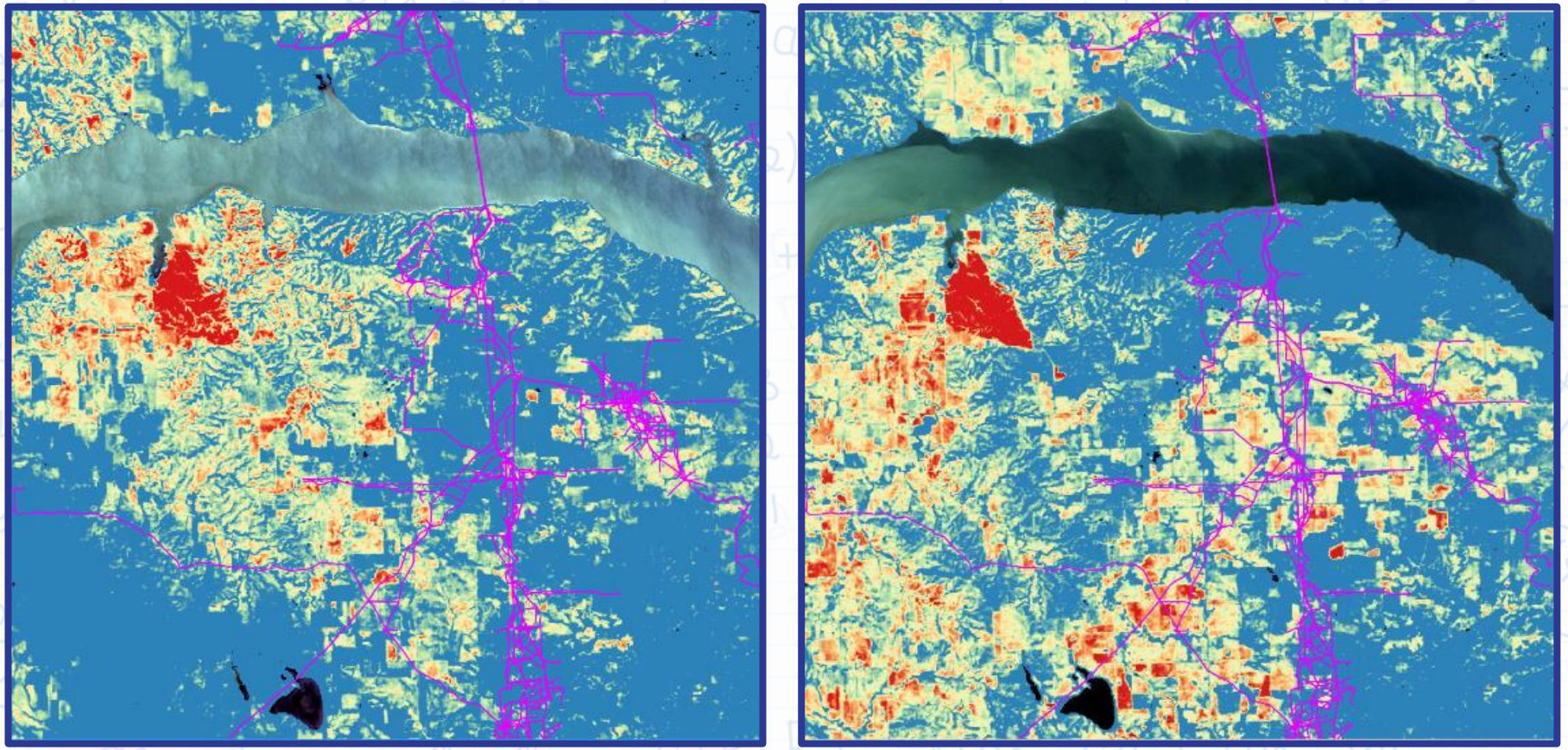
Water Temperature

Low

High

Satelytics

Thermal Imagery: Land Surface Temperature



May 16, 2015

June 27, 2015

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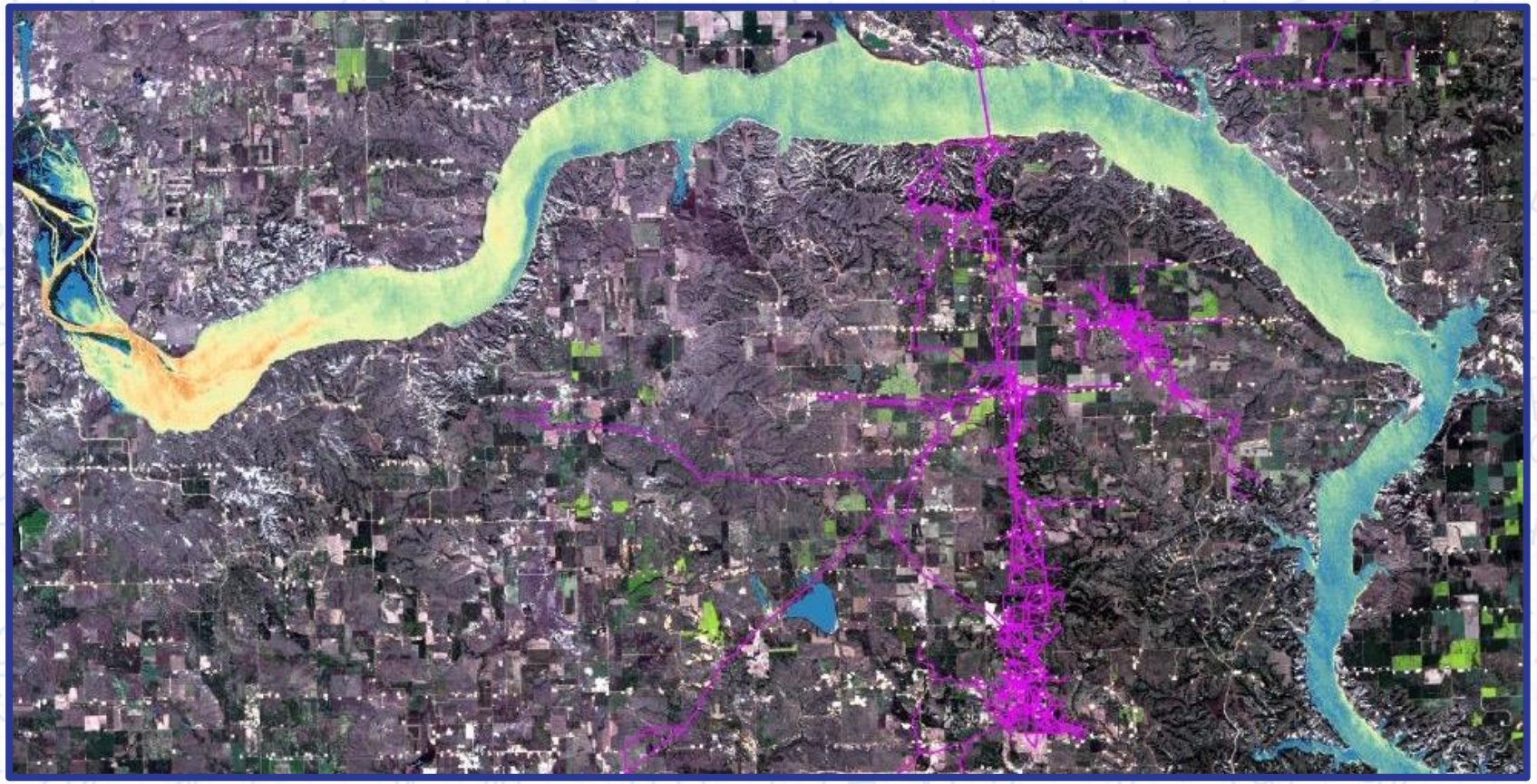
Water Quality: Relative Sediment



June 27, 2015

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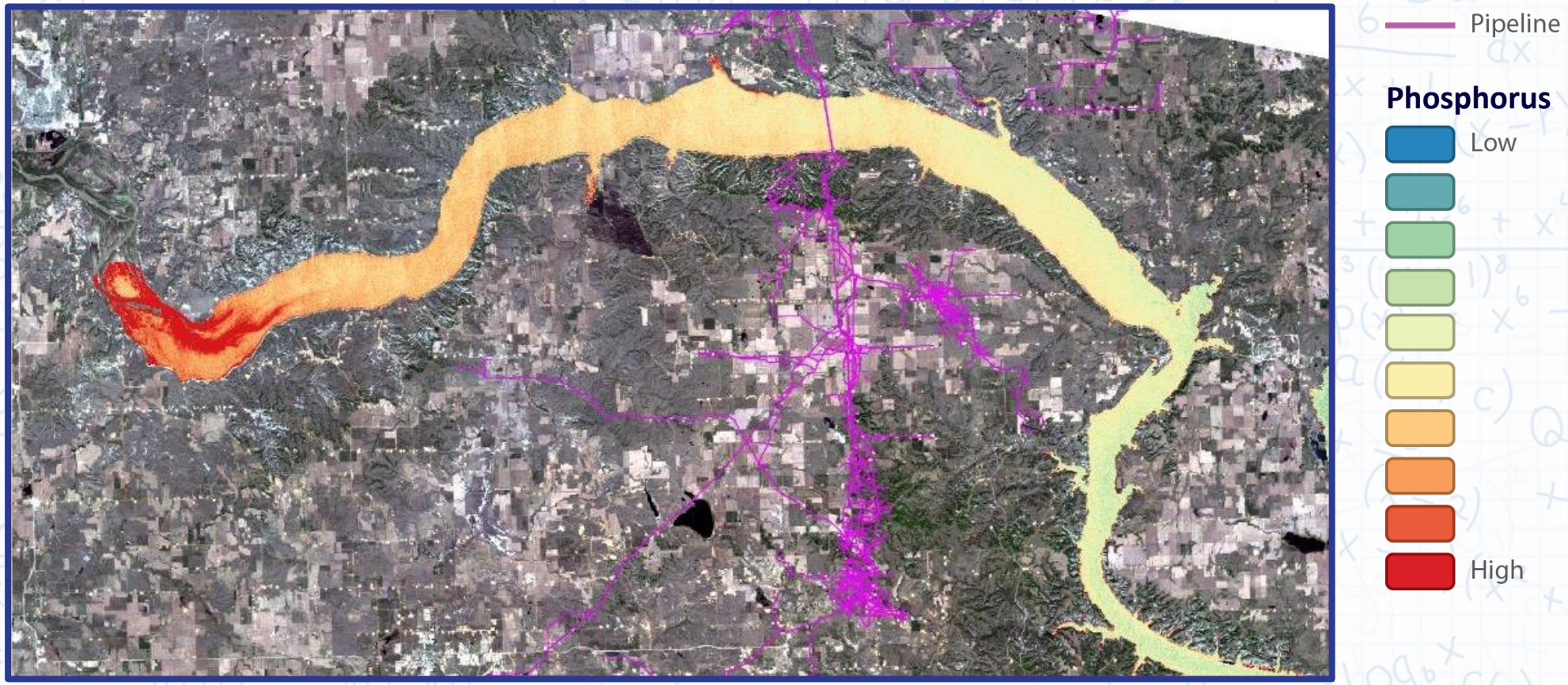
Water Quality: Phosphorus in Water



June 27, 2015

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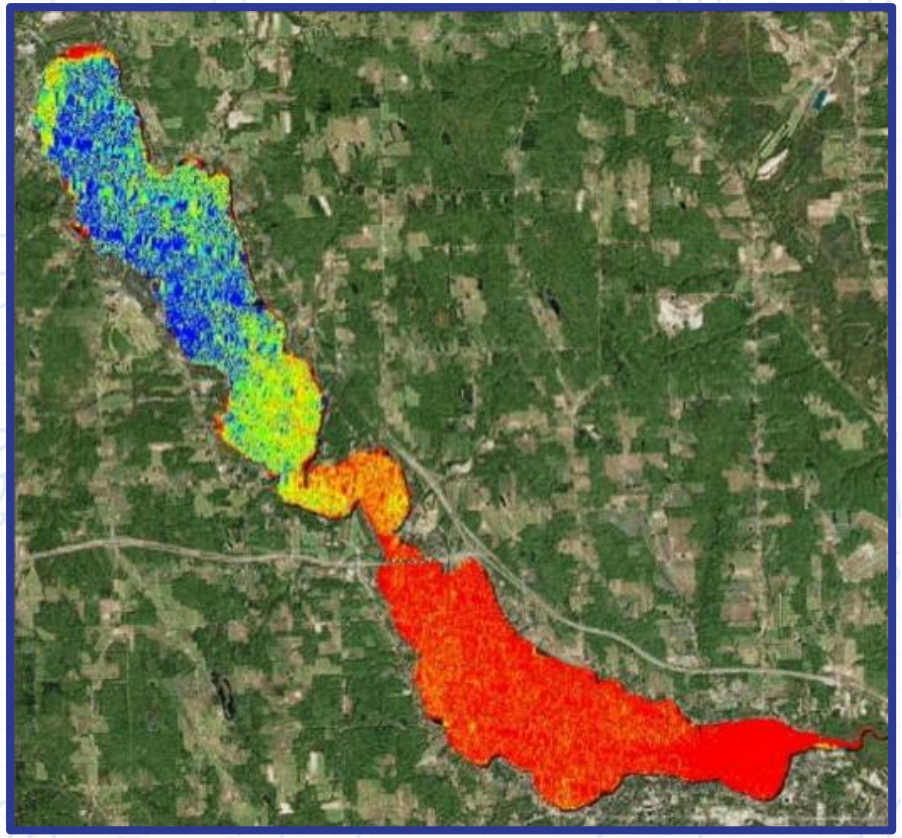
Lake Chautauqua: Natural Color

August 30, 2012

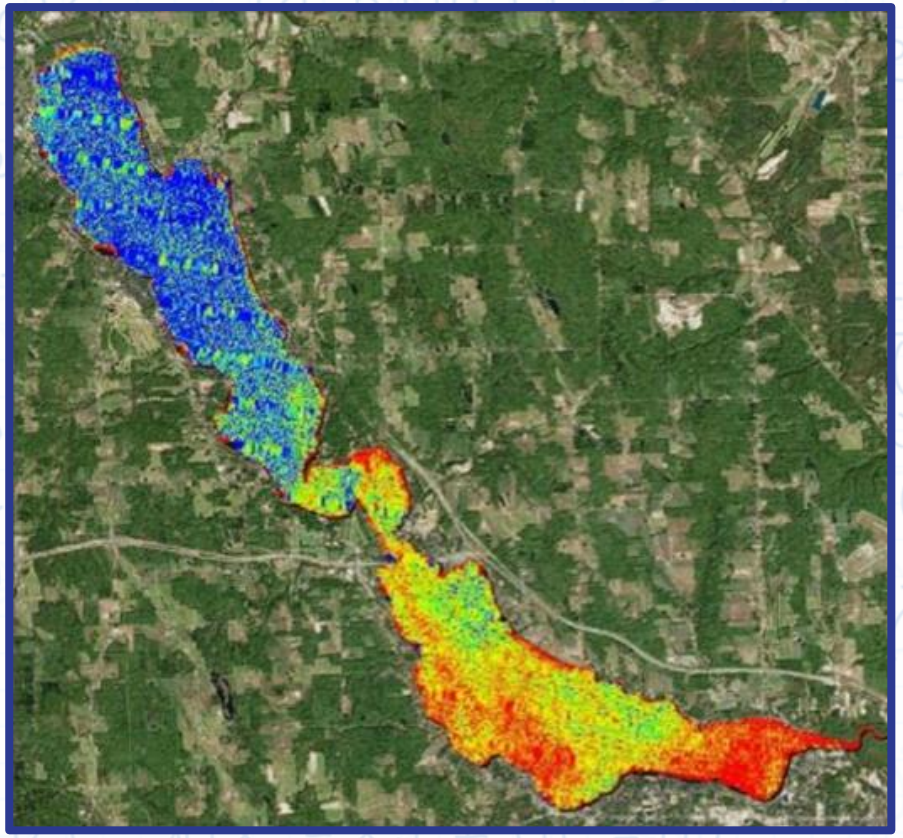
September 18, 2013

Satelytics

Lake Chautauqua: Total Phosphorus in Water



August 30, 2012



September 18, 2013

Total Phosphorus
(parts per billion)

- 0
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- > 60

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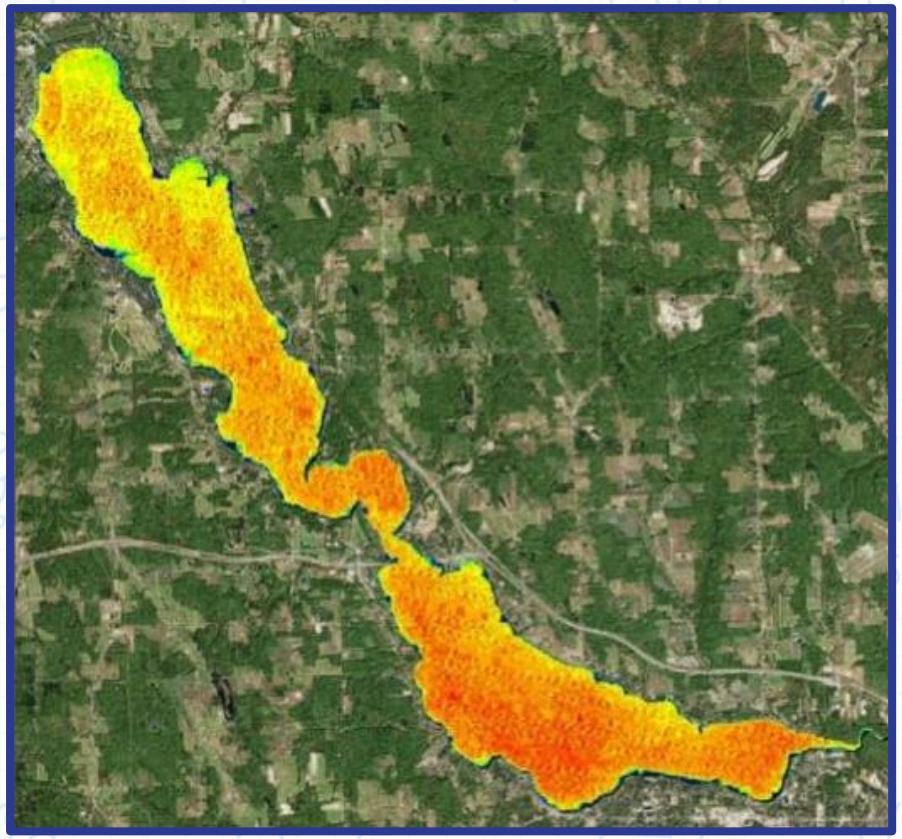
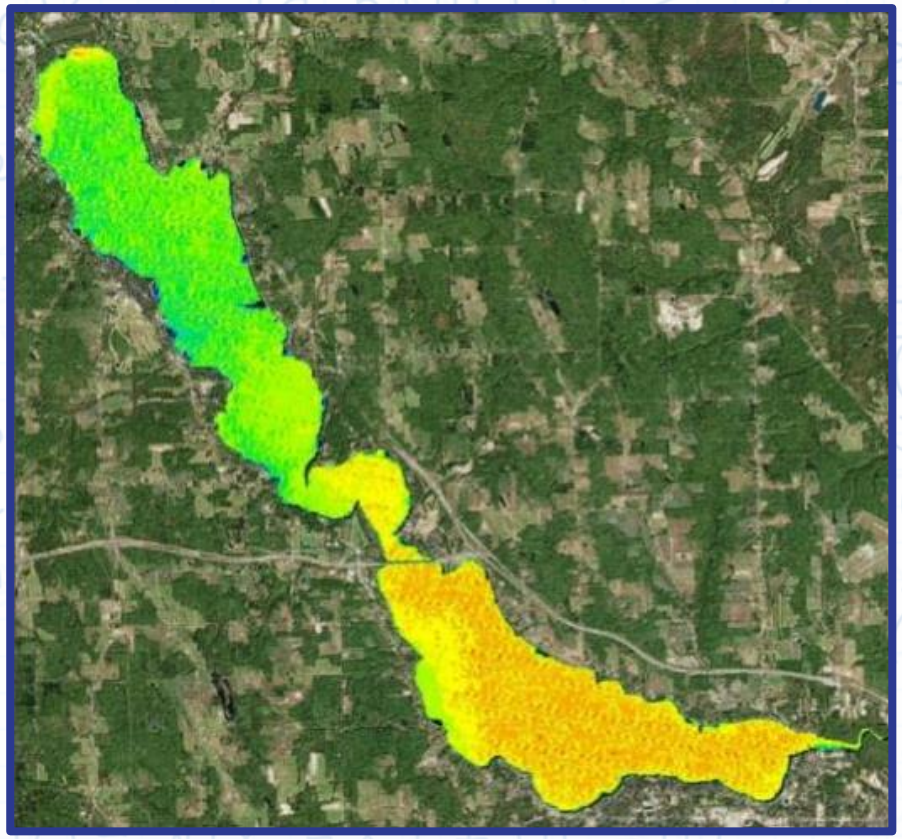
Lake Chautauqua: Chlorophyll-a



August 30, 2012



September 18, 2013

Chlorophyll-a
(parts per billion)

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 75
- 76 - 100
- 101 - 125
- 126 - 150
- > 150

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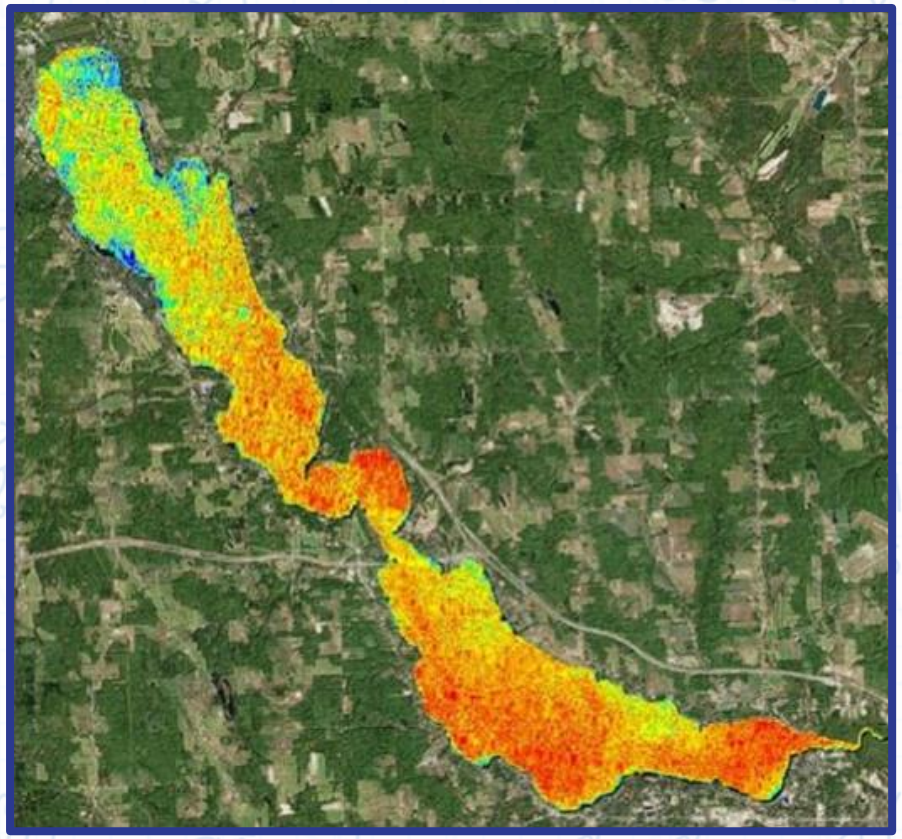
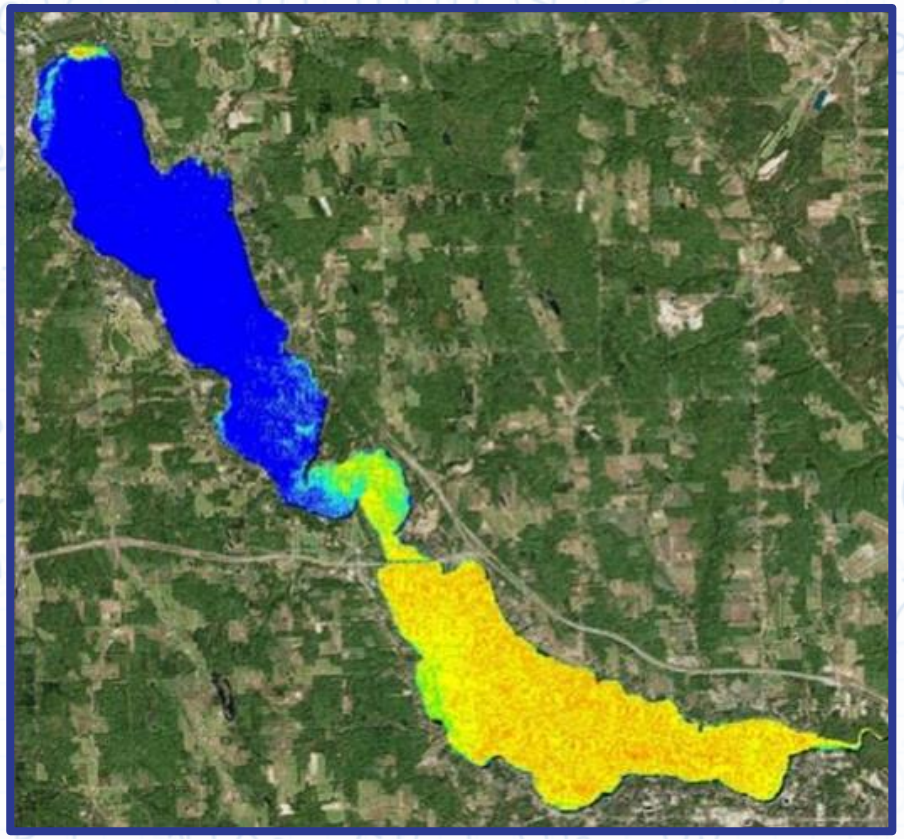
Lake Chautauqua: Phycocyanin



August 30, 2012



September 18, 2013

Phycocyanin
(parts per billion)

- 0 - 1
- 2 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- > 50

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Erosion and Land Movement

Continuously monitoring for movements and erosion both on land and water.

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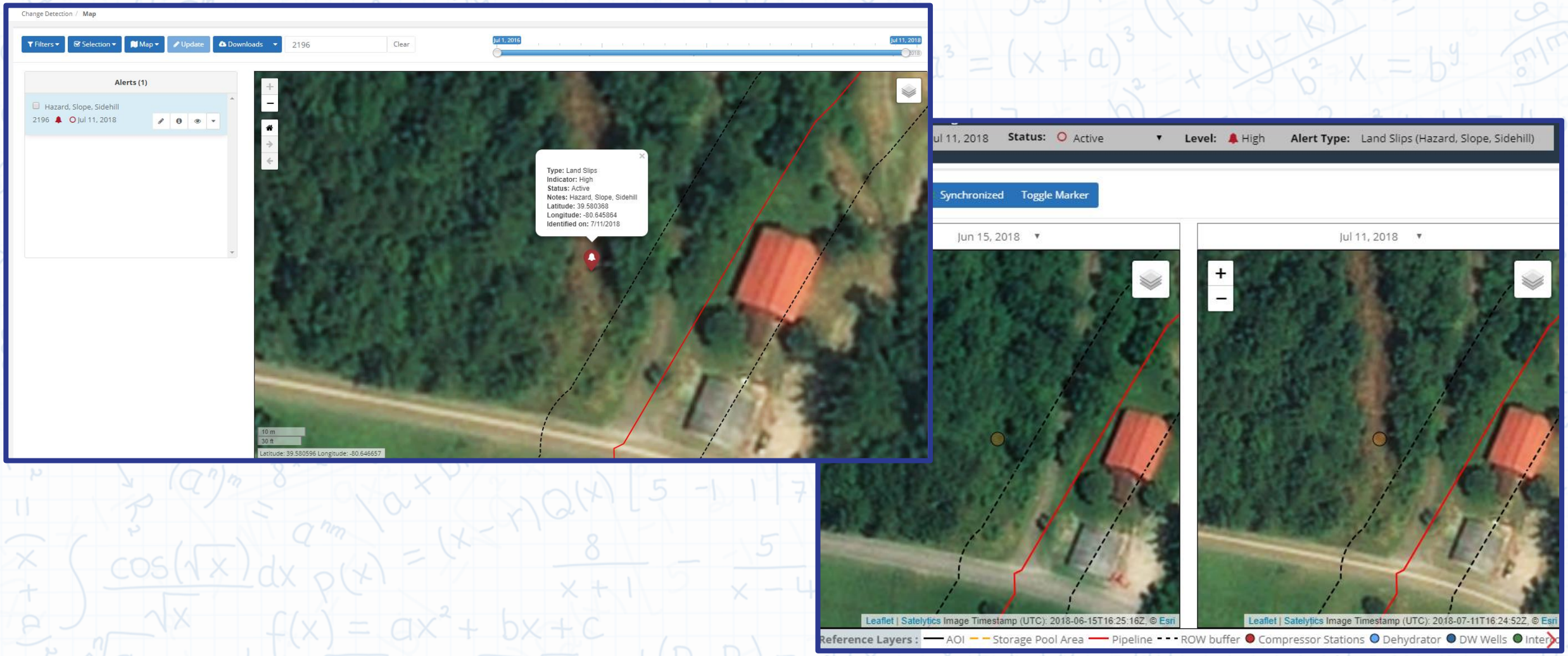

West Virginia During the Spring Rains

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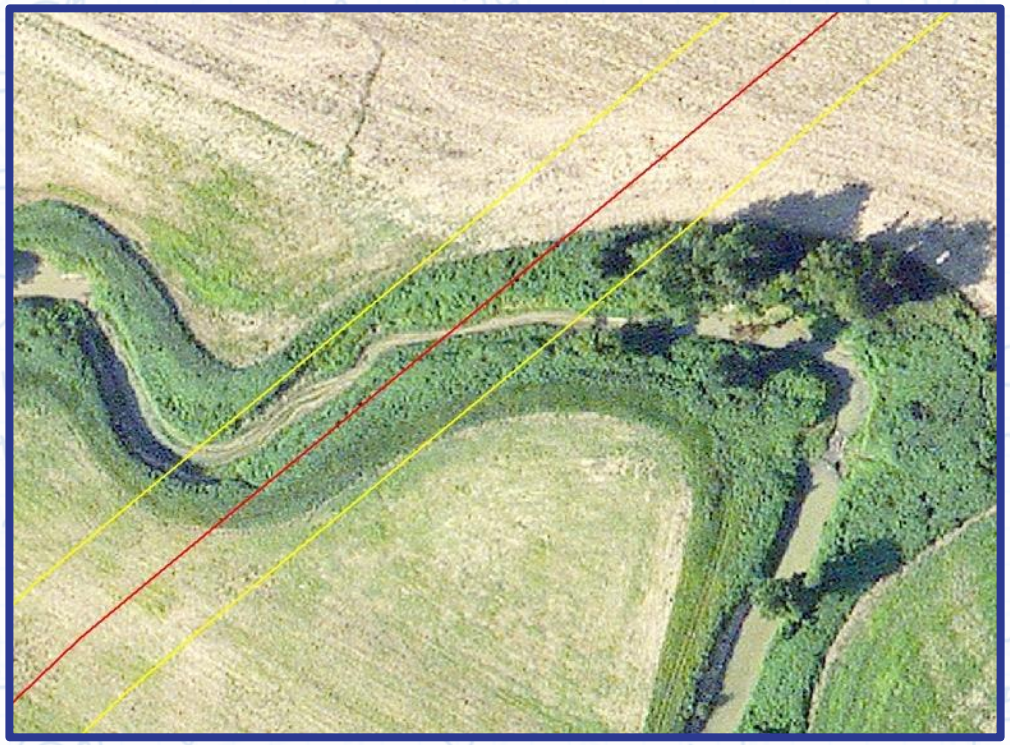

Red: The center line represents the pipeline.

Orange: The lines on either side of center represent the right of way (ROW).

Blue: Outlined areas which represent an erosion event widening of the water area. Widening has caused the loss of overburden and could potentially expose the pipeline.

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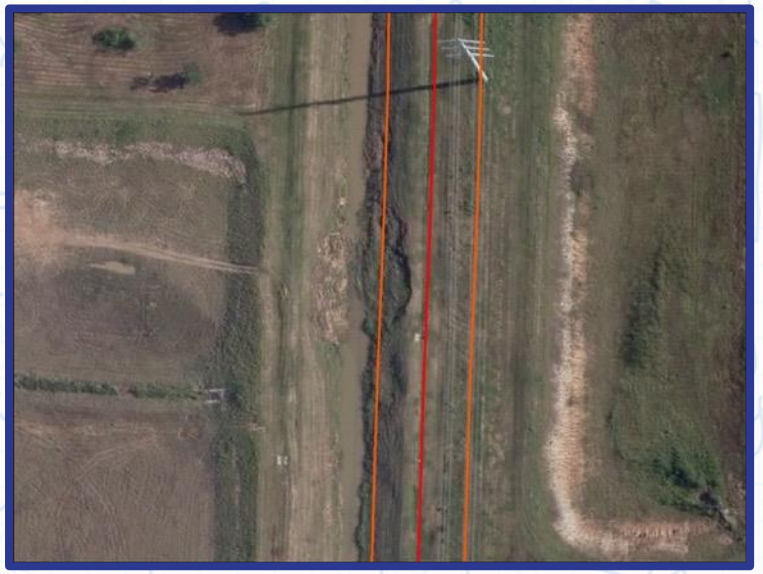

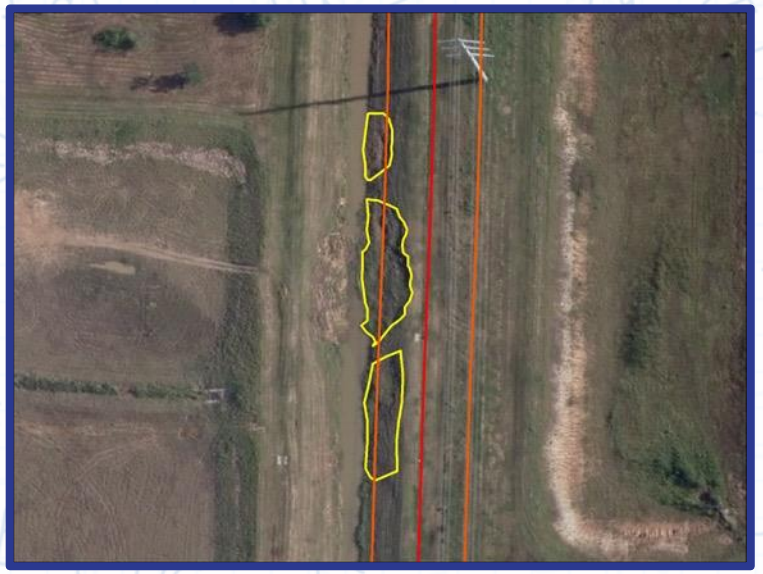

Red: The center line represents the pipeline.

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Yellow: Outlined areas which represent an erosion event widening of the water area. Widening has caused the loss of overburden and could potentially expose the pipeline.

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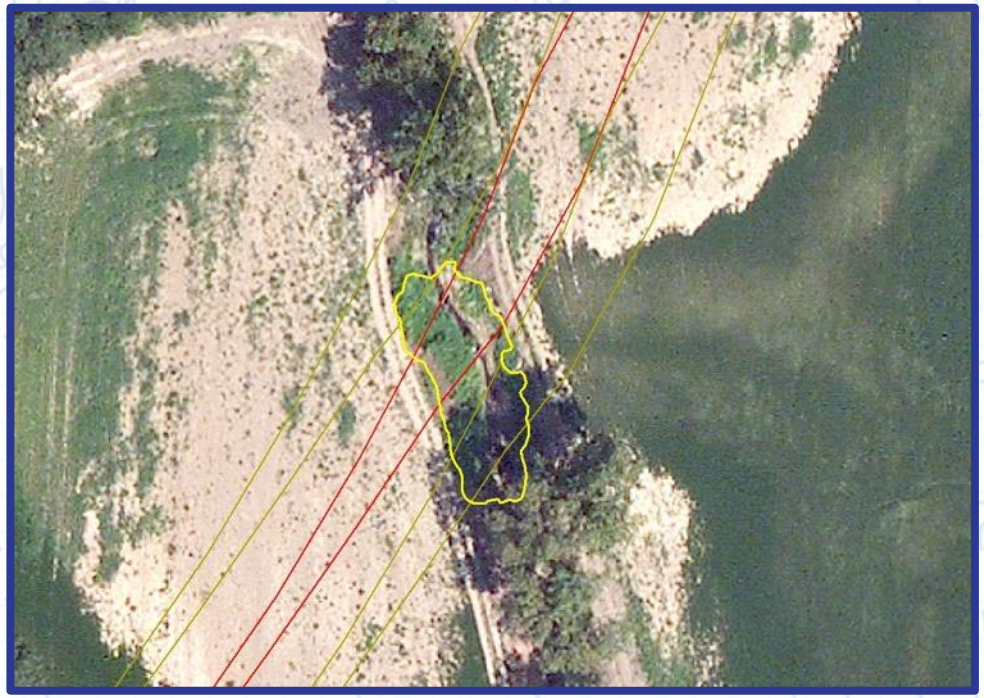

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419-728-0060