

# Vegetation Management Algorithms Keep Utility Infrastructure Safe

## by Analyzing Wire Zone Encroachment and Strike Potential with Pléiades Stereo Images

### Tree Health Assessment

Two companies with expertise in utility vegetation management teamed in a pilot project to validate the analysis of high-resolution 50cm resolution Pléiades 1A/1B satellite imagery to identify individual trees at risk of striking electric transmission and distribution lines. Field work confirmed the AI-based processes pinpointed trees that exhibited potential to strike to the lines. Using stereo pair imagery at the optimal time and angle of collection resulted in up to 90 percent accuracy in these alerts.

*“The primary advantage of using satellite imagery in this analysis is immediacy,” said Brian Joiner, President of ACRT Pacific, a utility vegetation management company that provides comprehensive utility solutions in California. “This provides actionable intelligence quicker than traditional field crews or airborne LiDAR. By prioritizing trees with condition changes, it alerts pre-inspectors, allowing workers to promptly verify trees requiring attention on the ground.”*

Joiner added that field crews won't be replaced by this method. It will make them more efficient during their site visits. This is especially true in between scheduled inspections or to compliment the ground patrol by pinpointing trees requiring further evaluation that may not be easily identified from a ground inspection alone. The crews will go straight to the trees that have been identified by the algorithms as a concern to confirm that trimming or removal is warranted, reducing risk.

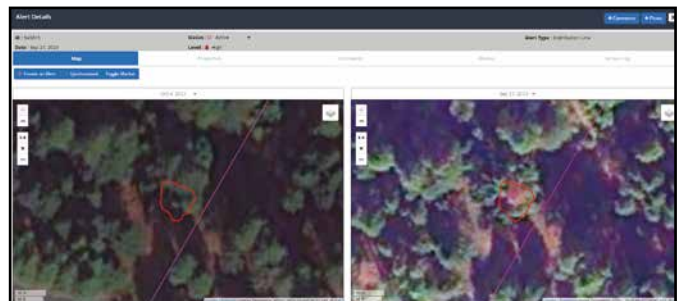
For the pilot, ACRT Pacific partnered with Ohio-based Satelytics, a leader in automated cloud-based AI geospatial analytics for diverse applications worldwide. ACRT Pacific leveraged Satelytics' vegetation encroachment algorithms to identify a staggering 57,000 trees that presented a strike risk to electric lines in an area covering only 10 square kilometers. ACRT Pacific validated the accuracy of the results with its teams of experienced utility vegetation arborist inspectors.

The pilot was funded by ACRT Pacific with the objective of increasing the safety of its electric utility customer's service territory and reducing the risk of tree line conflicts on transmission and distribution assets. The stakes in safeguarding utility infrastructure cannot be overstated. The potential liability associated with a vegetation related wildfire - whether the loss of life or damage to assets - is measured in billions of dollars.

### Determining Line Sag, Sway, and Tree Health

ACRT Pacific worked with Satelytics in developing and refining vegetation management algorithms to a level of sophistication unmatched in the market today. Remotely sensed data, often imagery or LiDAR point clouds, has commonly been used to find tree branches that have extended into the buffer zone around electric lines. These data sets also help to identify trees that have grown tall enough to strike a line if they were to fall, and identify trees that will encroach the compliance zone if not mitigated.

These AI algorithms can identify dangers down to the individual tree level through analysis of 50 cm resolution stereo pairs captured by the Pléiades 1A/1B satellites. Satelytics has also made a huge leap forward with its algorithm to predict more nuanced potential dangers with change detection and changes in tree health.



*In this image, an unhealthy tree is identified by Satelytics, using Airbus 50cm imagery*

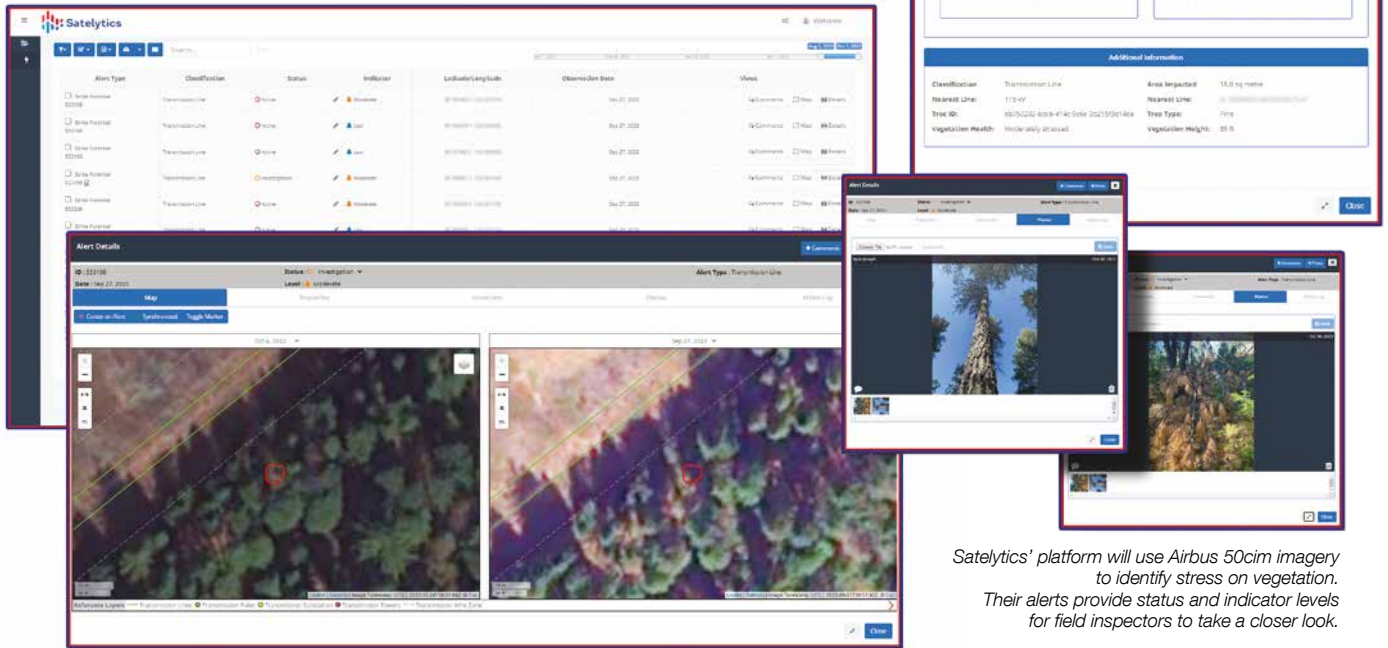
*“The algorithms now calculate the sag and sway of electric lines under hot and windy conditions,” said ACRT Pacific's Joiner. “By taking into account the height of the nearby trees and the transmission lines, we can determine if they have the potential to intersect during a storm event.”*

Joiner explained that summer storms are a significant threat to transmission operations. During hot days when electricity demand is high, the combination of outside temperature and power load makes the lines sag out of their normal orientation. Add in high winds, and the lines start to sway, potentially contacting vegetation that otherwise might be out of their safe buffer proximity. The calculations also take into account the swaying of the trees in windy conditions.

Satellytics has built analytics into its algorithms that assess the condition of individual trees. The analysis focuses on the multispectral infrared bands (blue, green, red, near-infrared) collected by Airbus' Pleiades stereo pairs to determine the tree species, height, and health.

This information can be important for pre-inspection teams for two reasons. First, specific tree species in certain geographic areas are more susceptible to drought or pest infestation. Secondly, dying trees can often be spotted in near-infrared imagery before they display stress visible to the human eye. If identified in the imagery, unhealthy trees or trees of a certain species will deserve a closer look by the field inspectors onsite.

*"We recommend applying the satellite-based analysis to utility service territories every quarter," said Jay Almlie, Satellytics chief marketing officer. "This can help guide the field crews in ground truthing and prescribing trees for remediation. After the trimming or removal has been completed, it lets the utility verify that all the potential problems have been addressed."*



*Satellytics' platform will use Airbus 50cm imagery to identify stress on vegetation. Their alerts provide status and indicator levels for field inspectors to take a closer look.*

## Immediacy is Critical

The unique tree sag, sway, and health analytics that ACRT Pacific and Satellytics have developed will disrupt the utility vegetation management market, Almlie predicts, but the speed with which information is delivered will be just as impressive. This is why Satellytics relies on Airbus satellite imagery for asset monitoring services in numerous industries.

Additionally, OneAtlas is utilised to schedule tasked image acquisitions as little as 25 minutes before the satellite passes over. A few hours after the collection, Satellytics

receives the data from the platform and begins applying its algorithms. Depending on the processing level, the analysis is completed in two to three hours and ready for delivery to clients via website, mobile app, or email/text alert.

*"Instead of waiting months for the next inspection by field crews or processing of LIDAR data, utilities will have actionable results within hours," said Almlie. "This enables them to take action today to fix the problems they see and avoid billion-dollar lawsuits."*

## About Satellytics

Satellytics is a software company, producing geospatial analytics for early detection, location, and — in many instances — quantification of our customers' most pressing challenges. The Ohio-based company uses science, software and technology to deliver valuable services to customers to identify problems before they become disasters — environmentally, financially, or otherwise. Learn more about Satellytics here.

## About ACRT Pacific

ACRT Pacific helps California utilities and cooperatives proactively manage vegetation across rights of way, with dedicated service for the state's unique and diverse landscape. We plan, customize, and deploy effective, comprehensive vegetation programs — all with total independence. Learn more about ACRT Pacific here.

## About Airbus

Airbus provides users with proprietary access to the world's most comprehensive commercial satellite constellation combining optical imagery from Pléiades Neo, Pléiades, SPOT, Vision-1 as well as radar data from TerraSAR-X, TanDEM-X and PAZ).