

Scaling Carbon Stock Assessment by Leveraging High-Resolution Satellite Imagery



OVERVIEW

The scale of carbon stock assessment has evolved from local projects to large regional territories. As organisations face increasing pressure to deliver accurate carbon measurements across large areas, they seek efficient solutions to support this.

Remotely sensed datasets play a significant role in the assessment over large project areas.

The challenge of picking a dataset for accurate carbon stock assessment at regional scales involves balancing multiple factors: measurement accuracy, cost efficiency, and timely data acquisition.

Satellite imagery like Sentinel and Landsat have long been used as an accessible and reliable tool to extrapolate ground sampled assessments across these large territories.

Commercial grade, sub-meter resolution satellite imagery enables further detection of smaller vegetation features that might otherwise be missed with traditional datasets, while remaining affordable and accessible for large area assessments.

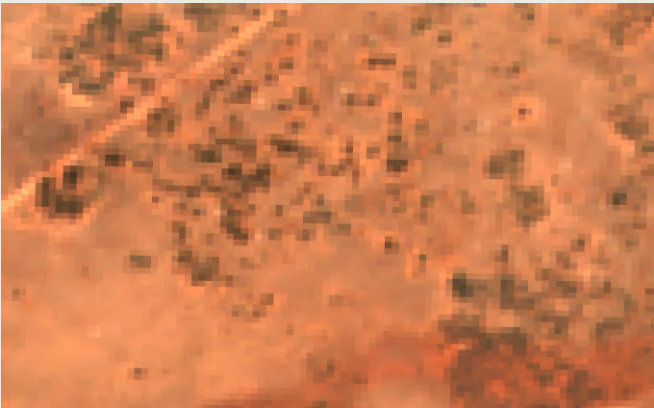
This document evaluates the potential benefits of implementing high-resolution satellite imagery in comparison to other remote sensing datasets that are typically used for carbon stock monitoring in Australian landscapes.

CURRENT REMOTE SENSING APPROACHES

Remote sensing datasets are commonly utilised to extrapolate ground sampled data across vast areas.

The two most widely adopted approaches each present distinct trade-offs: Aerial and drone surveys offer very high resolution but face practical limitations in large-scale deployment.

Freely available satellite programs like Sentinel and Landsat provide readily available data, but at a coarse resolution that limits the detection of smaller vegetation features.



Commercial satellite imagery bridges this gap by providing high-resolution data over large areas at a cost-effective price.

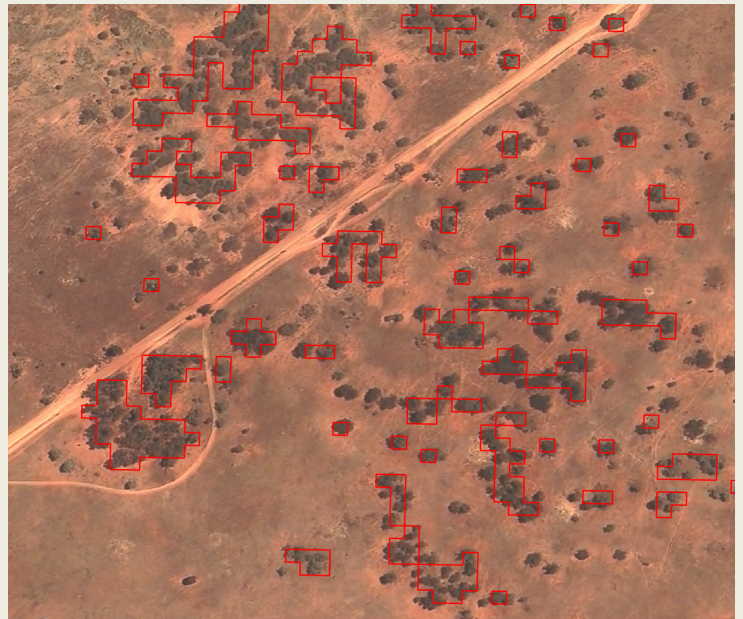
To showcase the capabilities of commercial satellite data, the following comparison evaluates Jilin-1 50cm imagery, selected for its low cost and archive availability, against Sentinel-2 imagery for large-scale carbon stock assessments.

Feature	Jilin-1 (50cm)	Sentinel-2 (10m)
Spatial Resolution	50cm PAN 2m MS	10m MS
Revisit Frequency	Daily	5 days at the equator
Tree Crown Detection	Detects individual tree crowns	Limited to clusters of vegetation
Cost per Hectare	\$0.12 AUD	Free

COMPARISON



Jilin-1 50cm Imagery with NDVI-derived vegetation detection (50cm resolution)

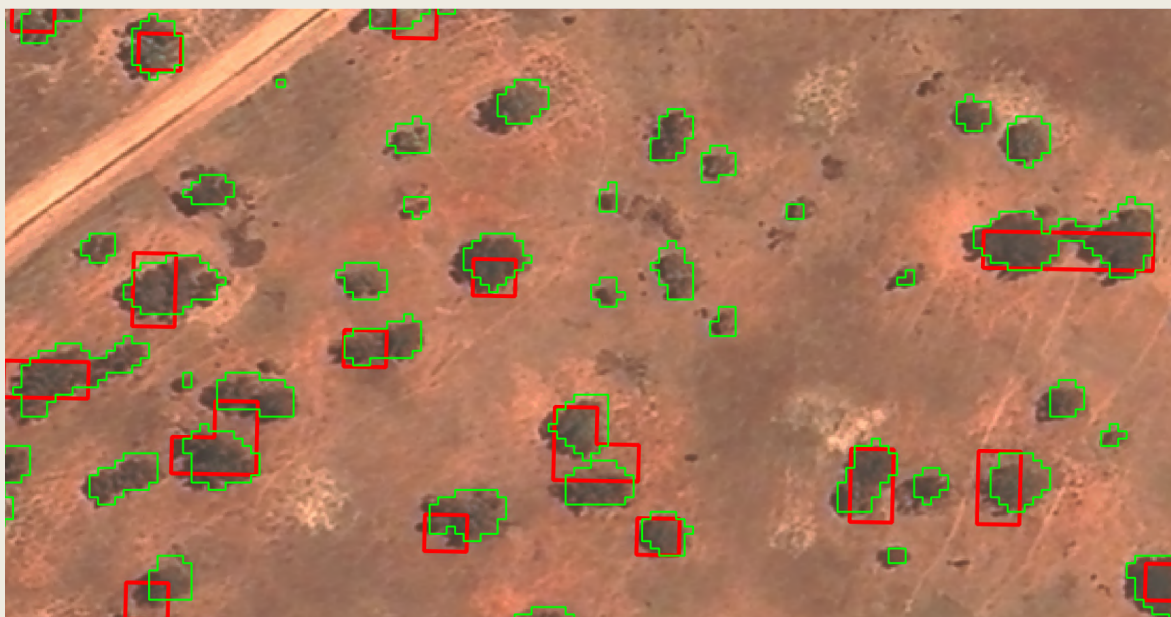


Jilin-1 50cm Imagery with NDVI-derived vegetation detection from Sentinel-2 (10m resolution)

To evaluate the advantages of high-resolution commercial satellite imagery, we performed a simple NDVI based vegetation analysis on Jilin-1 50cm and Sentinel-2 10m imagery.

Both datasets were captured two days apart, allowing for comparable environmental conditions. An NDVI analysis was performed on each image, with a threshold applied across both images to classify vegetation.

The results demonstrate a **28% increase in vegetation area classified** using Jilin-1 imagery compared to Sentinel-2. This difference is attributed to the Jilin data's higher resolution, which enables the detection of individual trees and finer vegetation structures that Sentinel-2 cannot resolve.



Jilin-1 NDVI results (green) overlaid with Sentinel-2 NDVI results (red), showcasing increased vegetation detection and improved boundary accuracy with Jilin-1's higher resolution.

CONCLUSION

At a cost of \$0.12 AUD per hectare, Jilin-1 imagery offers a cost-effective alternative that is 5–10 times cheaper than aerial or drone surveys while still enabling the detection of individual trees and smaller vegetation features.

This allows for a more precise tree count compared to freely available satellite data, enhancing the accuracy of vegetation classification and carbon stock assessments.

For organisations involved in carbon stock assessments, forestry, and land management, this provides:

- More accurate carbon stock estimates, with improved vegetation detection.
- Greater confidence in results, through precise vegetation footprints.
- Significant cost savings, delivering high-resolution insights at a fraction of the cost of traditional aerial or drone imagery.

Interested in getting started with high resolution satellite data?

Geopera makes accessing satellite imagery easy. Search your project areas for historic data, task new captures, and get instant pricing across a wide range of sensor options.

