



UNMANNED AERIAL SYSTEMS (UAS): REDEFINING VEGETATION ANALYSIS

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The Game Plan

- Redefinition - What Changed?
Why UAS?
- The Technology
- The Data
- Case Studies – UAS in action
- Questions



Redefinition
What Changed?
Why UAS?



What Changed?



Landsat



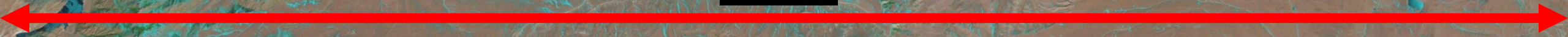
Manned Aircraft

LANDSAT

30M PIXEL RESOLUTION



150 KM



NAIP

1M PIXEL RESOLUTION



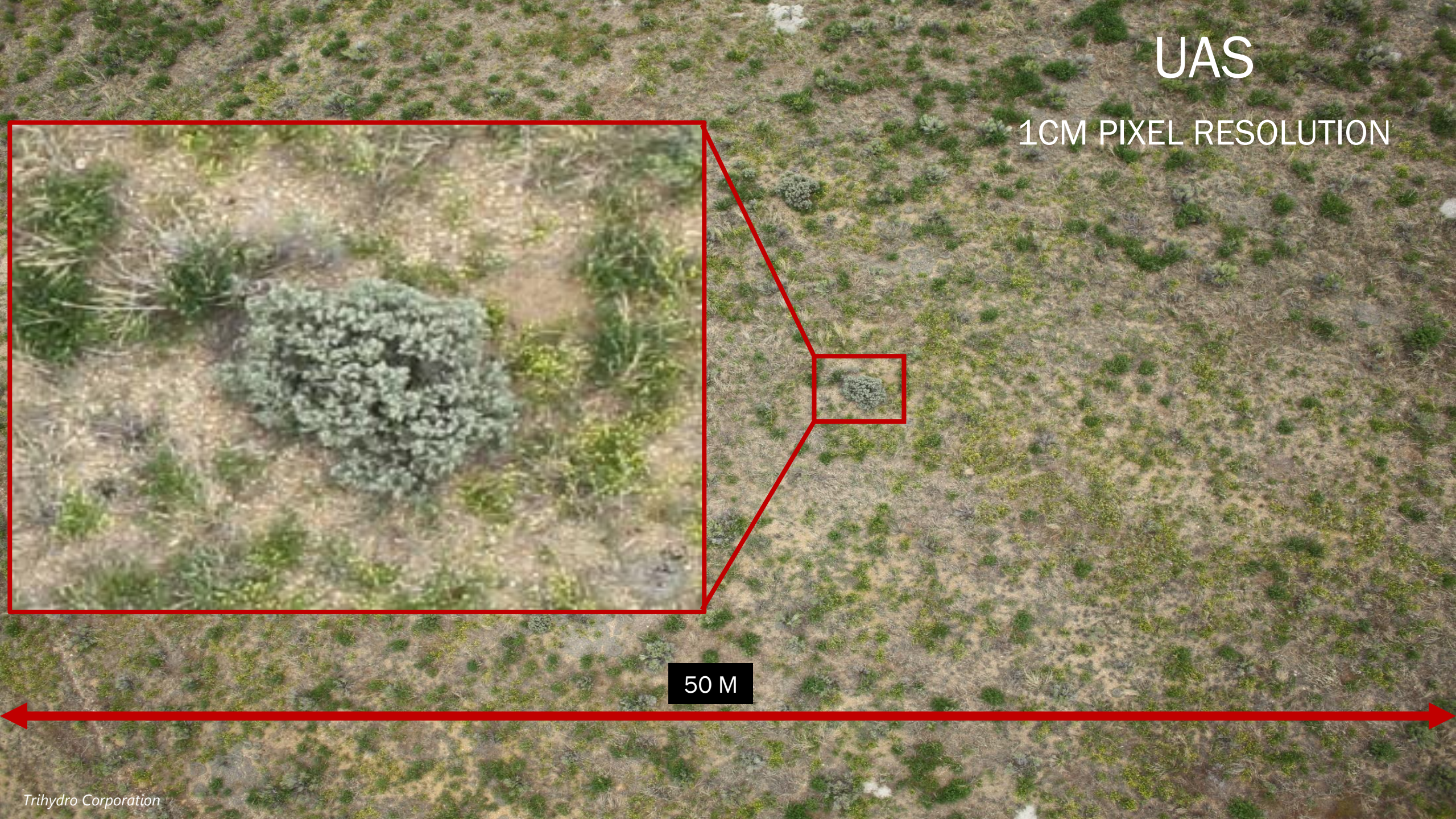
1.5 KM



UAS

1CM PIXEL RESOLUTION

50 M



Why UAS?



UAS – Multiple Sensors

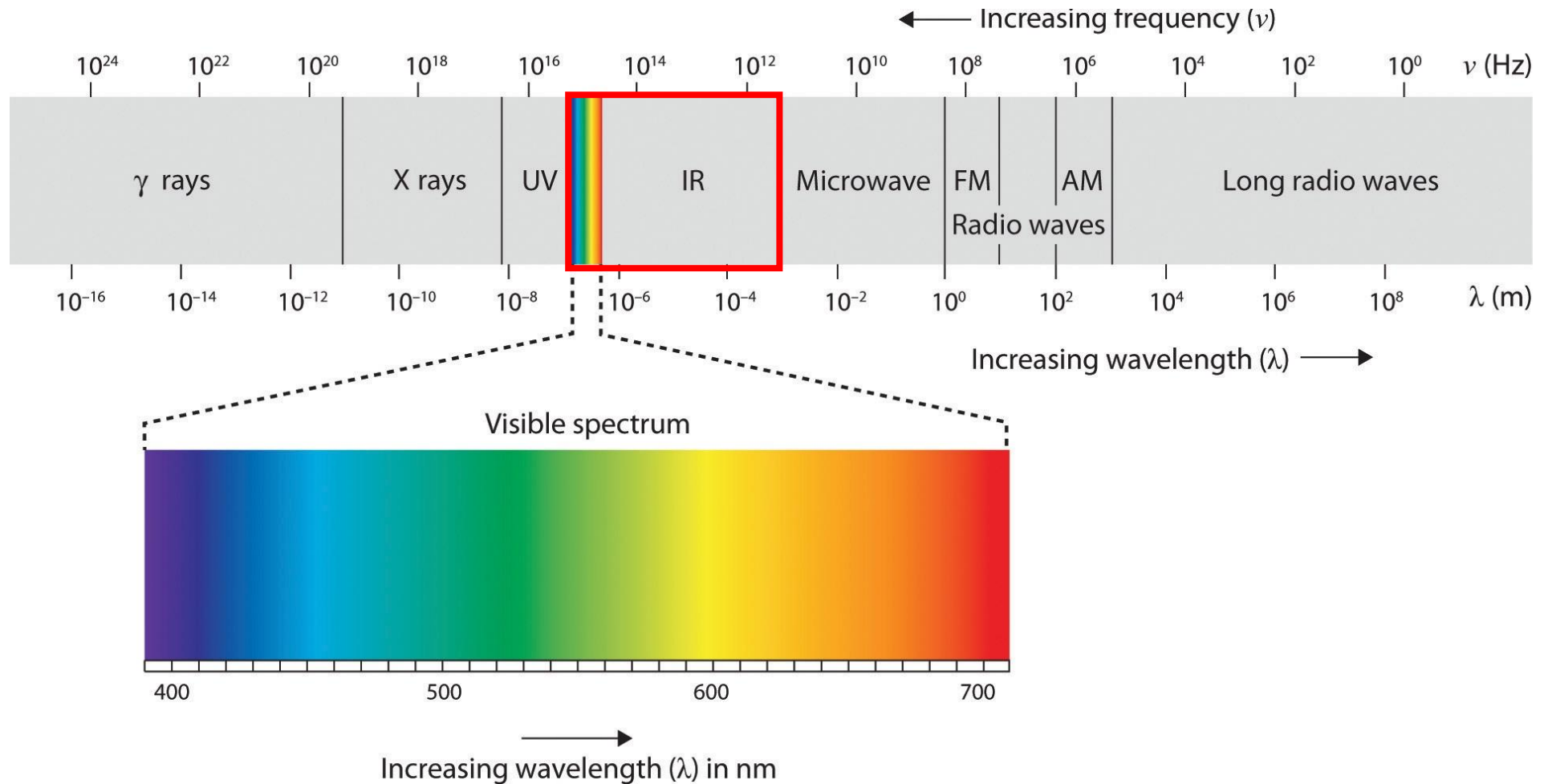
- Safety
- Spatial Resolution
- Rapid Deployment
- Real-Time Data
- Repeatability
- Efficiency

CAUTION! – Make sure it is the right tool for the job!!!

The Technology



Electromagnetic Spectrum

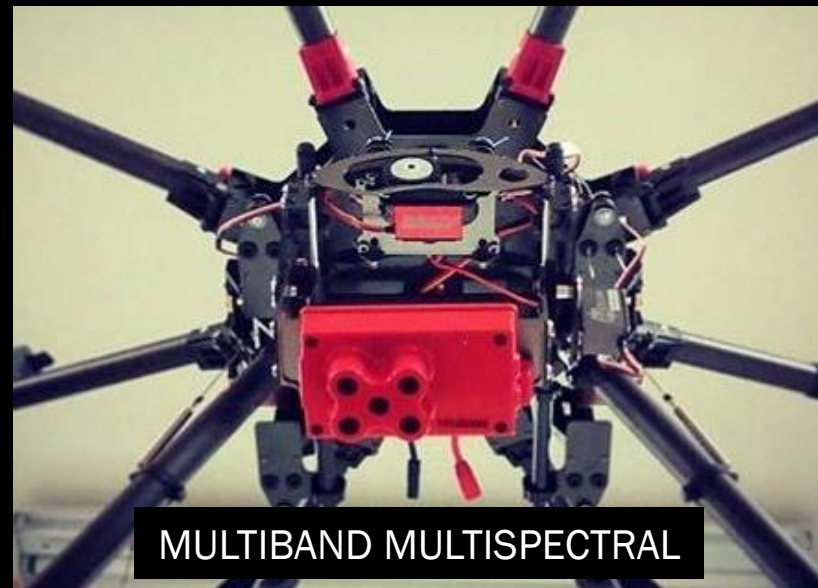




RGB



MODIFIED MULTISPECTRAL



MULTIBAND MULTISPECTRAL



MULTICAMERA MULTISPECTRAL



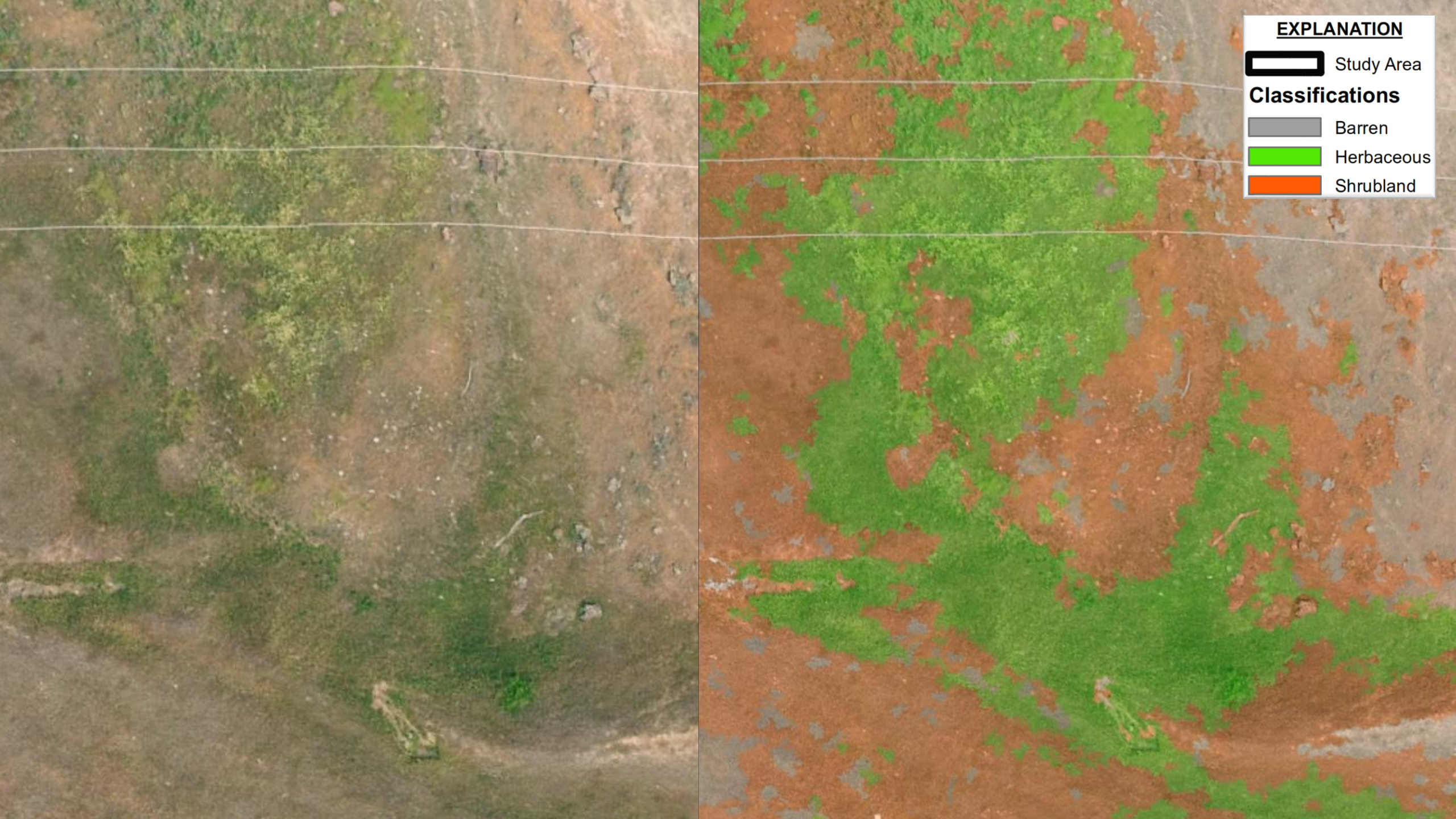
HYPERSPECTRAL



THERMAL-INFRARED

The Data





EXPLANATION

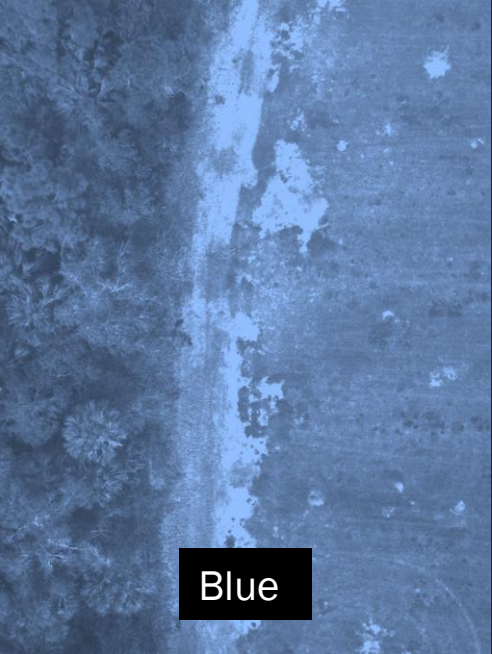
 Study Area

Classifications

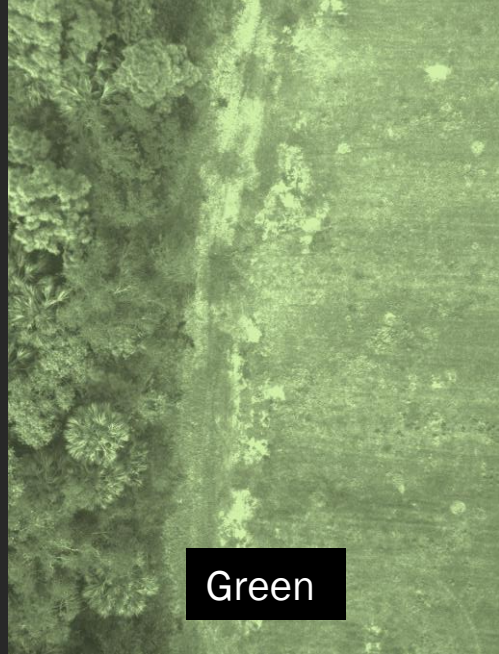
 Barren

 Herbaceous

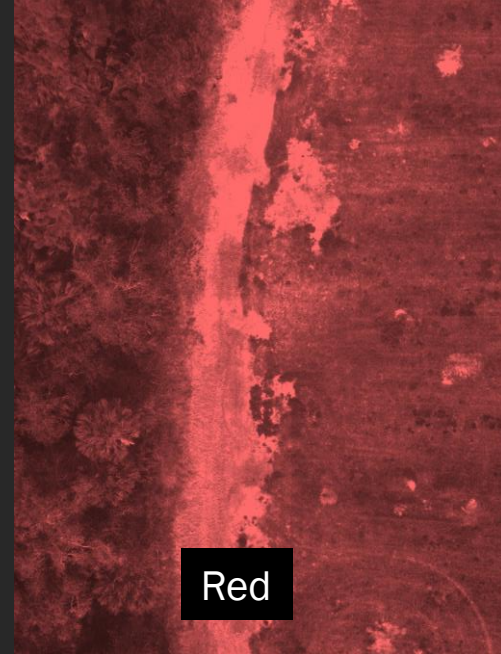
 Shrubland



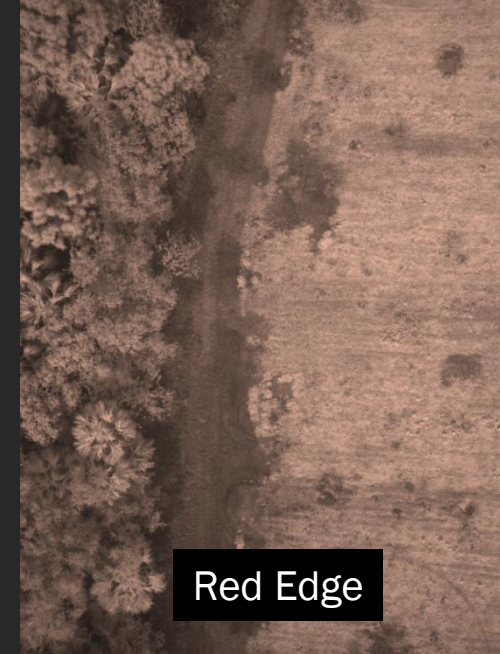
Blue



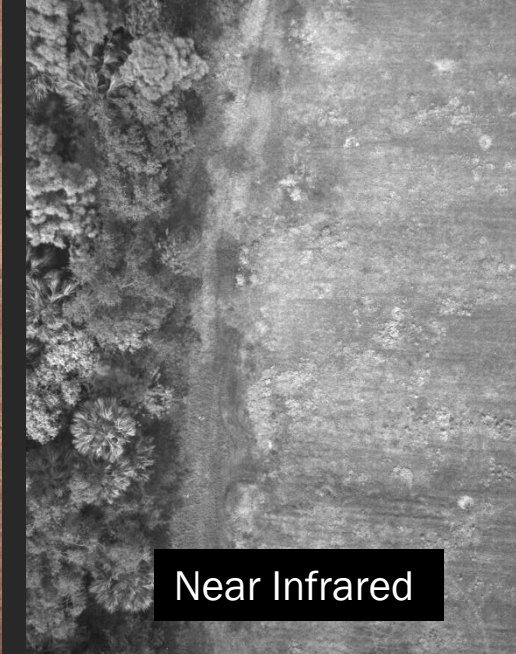
Green



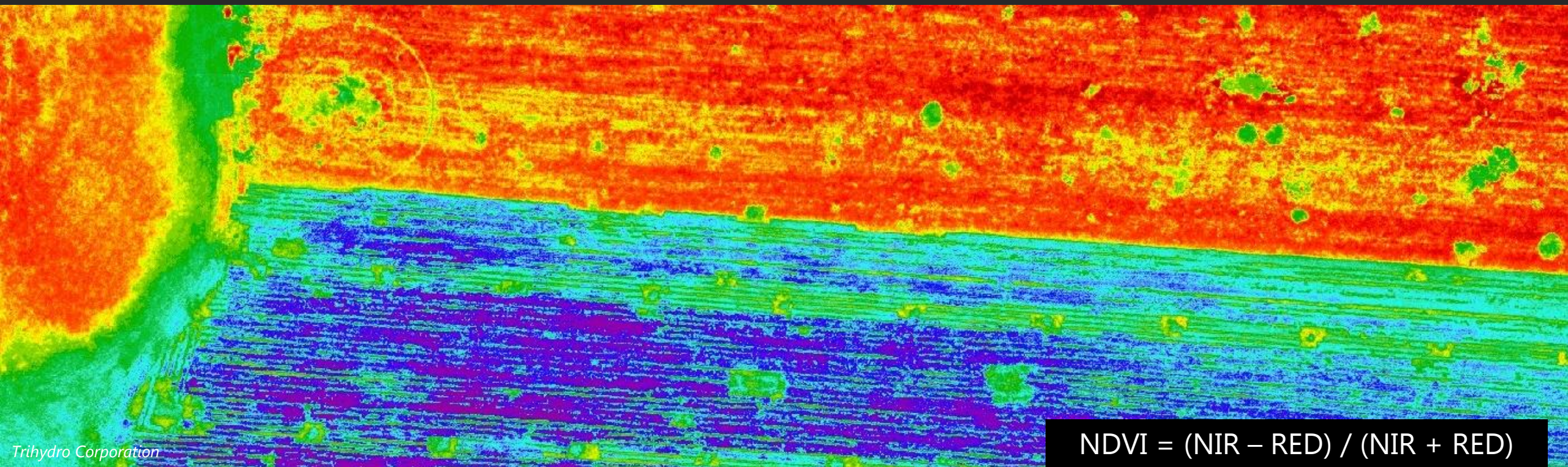
Red



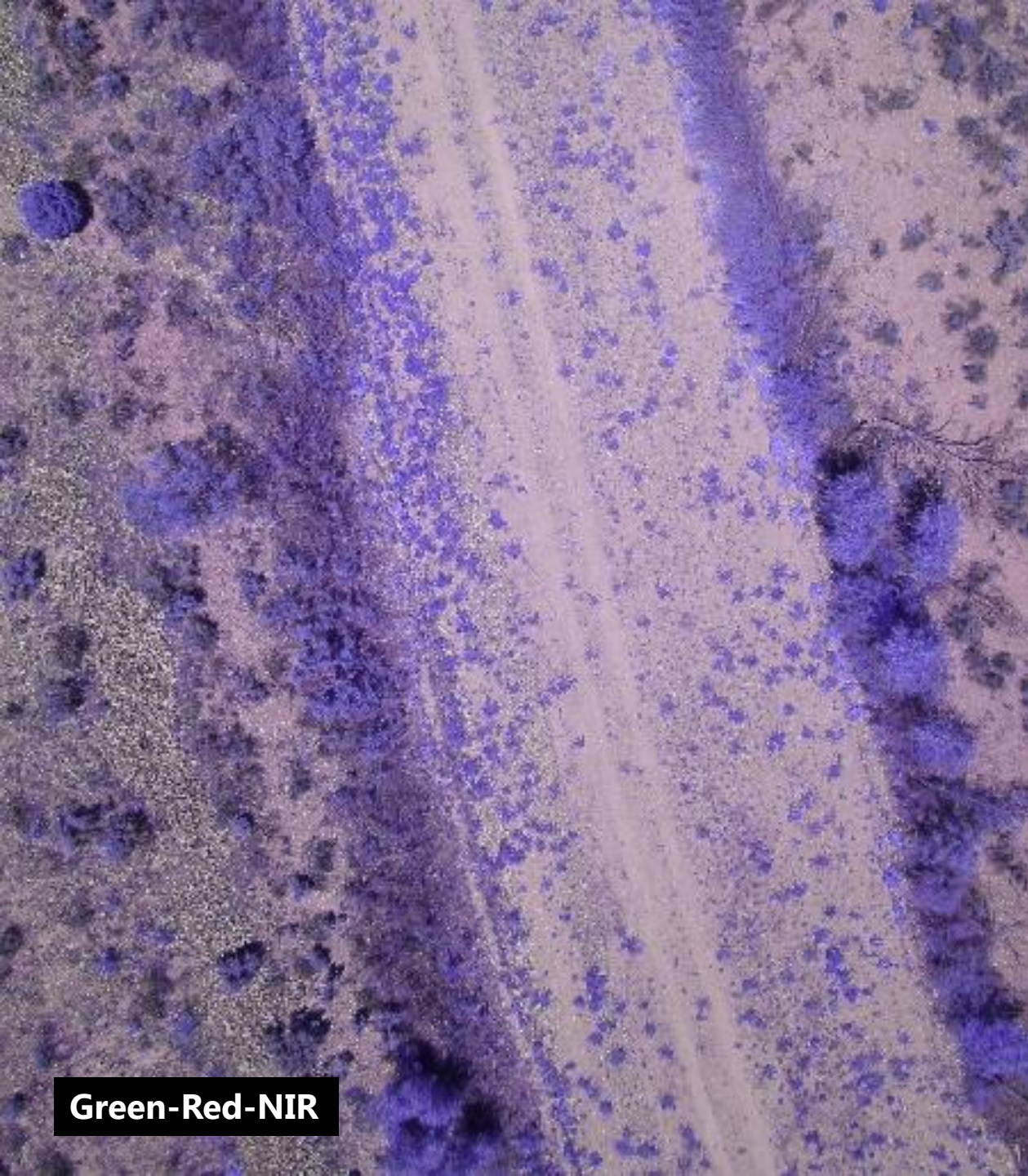
Red Edge



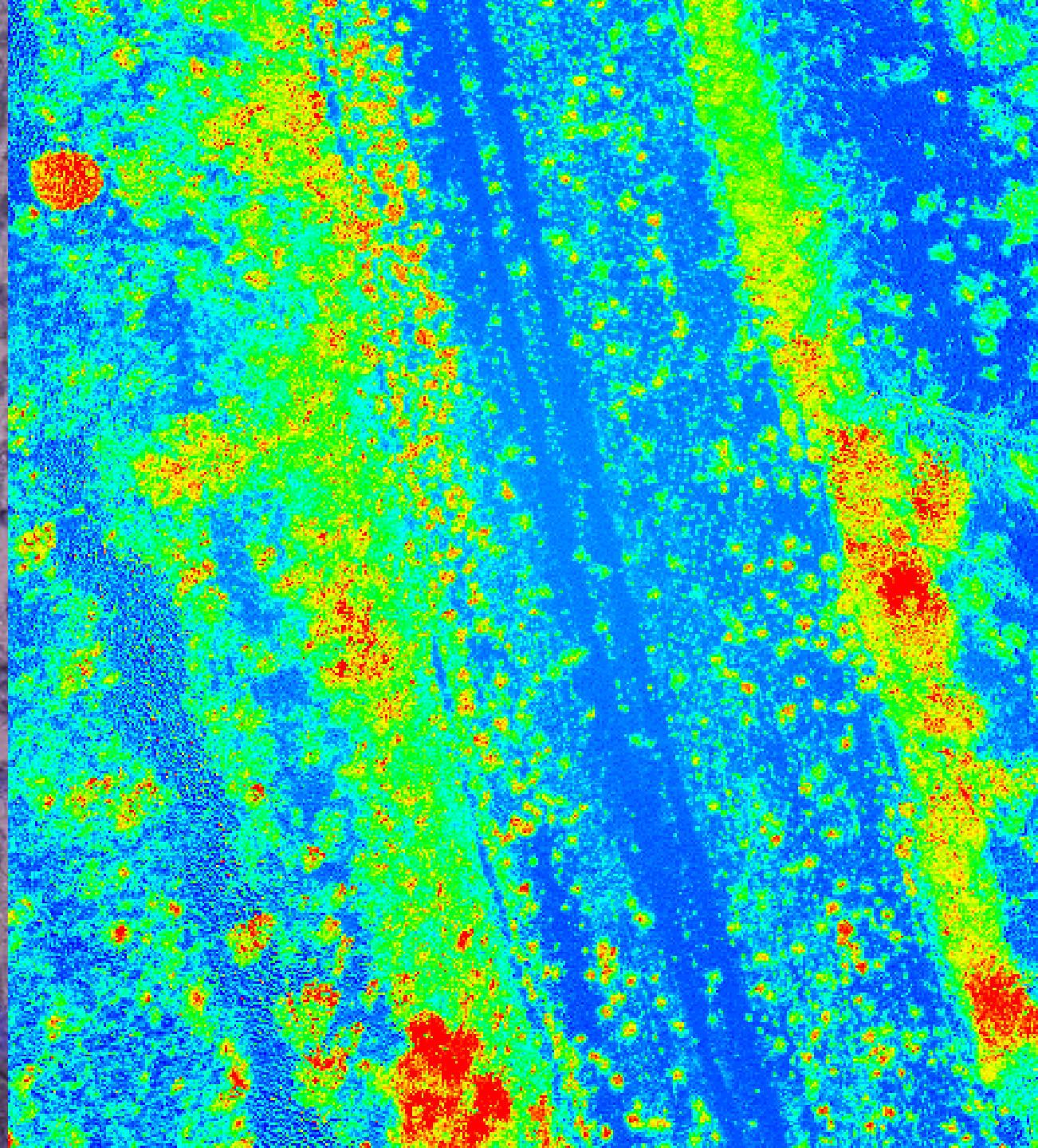
Near Infrared

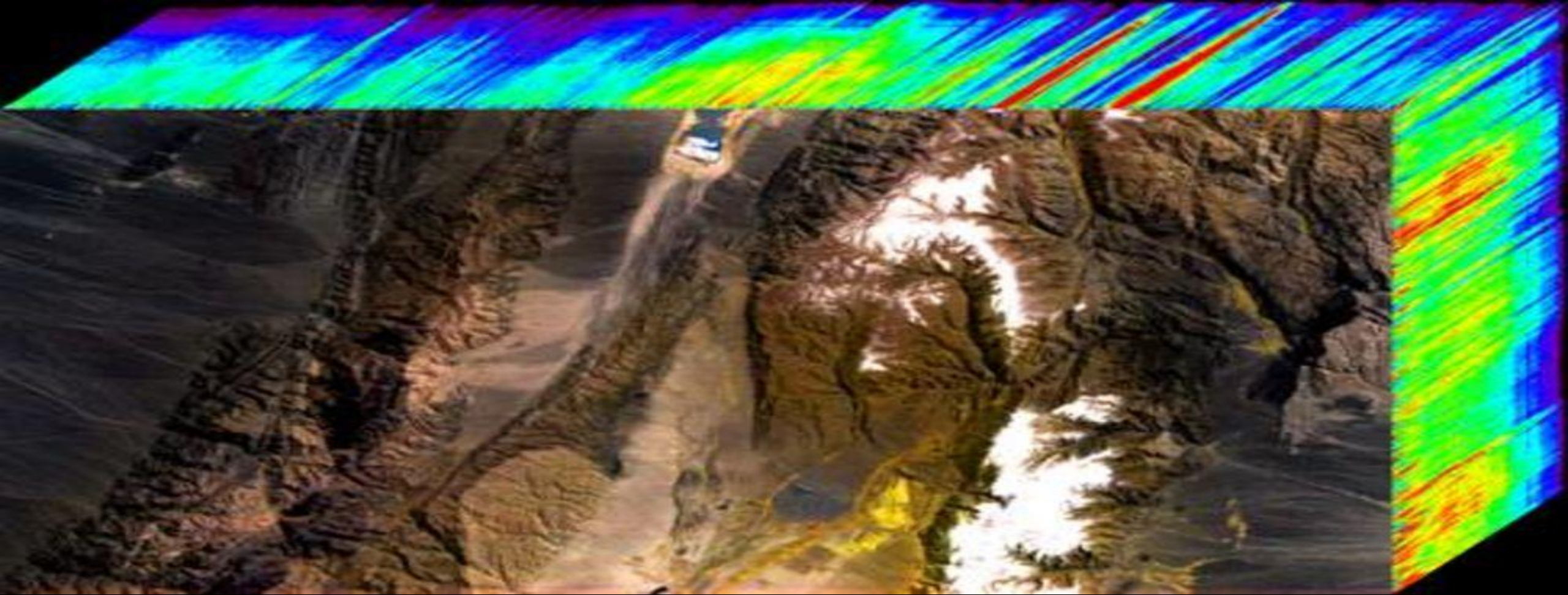


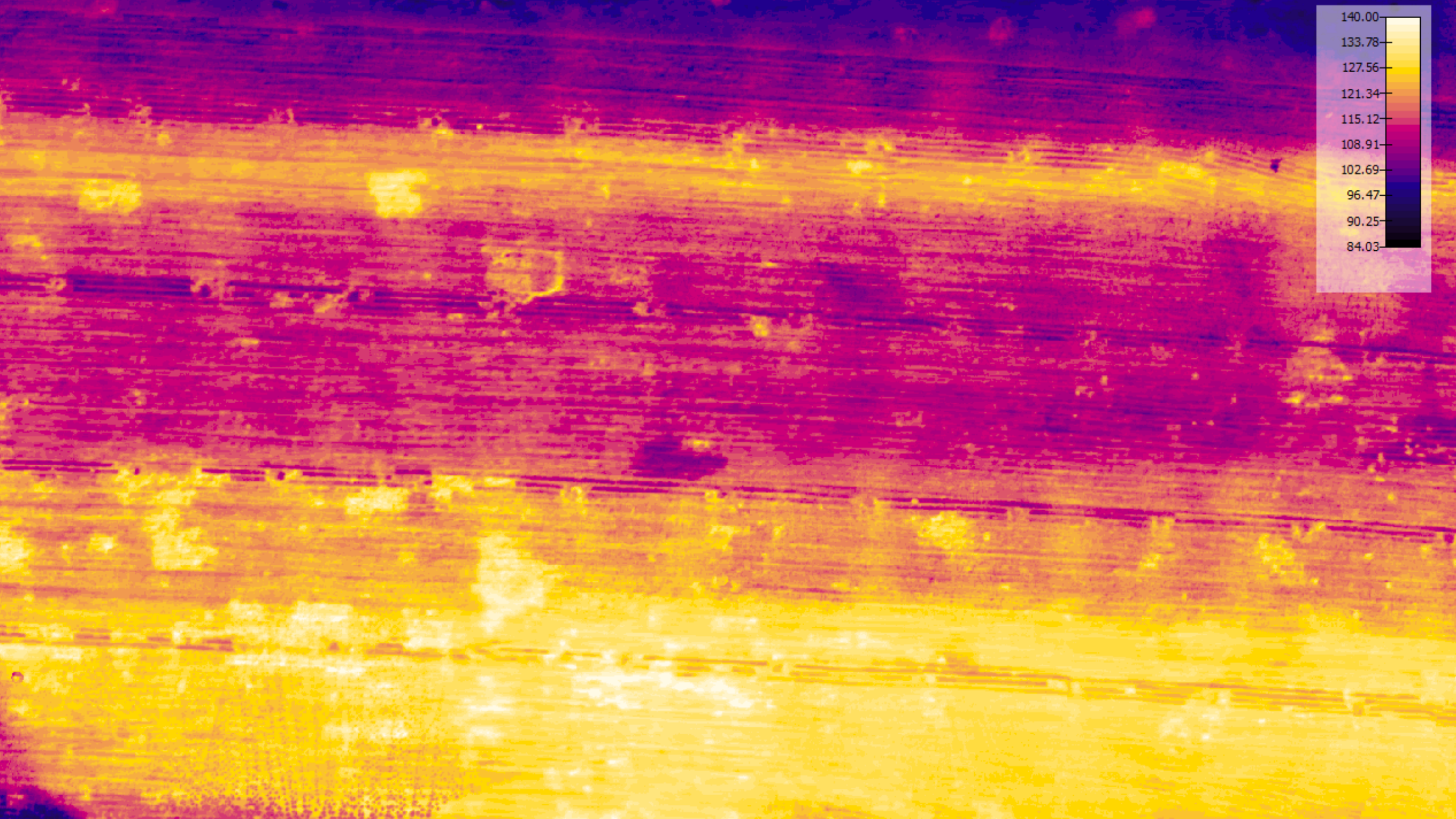
$$\text{NDVI} = (\text{NIR} - \text{RED}) / (\text{NIR} + \text{RED})$$



Green-Red-NIR







Case Studies – UAS in action

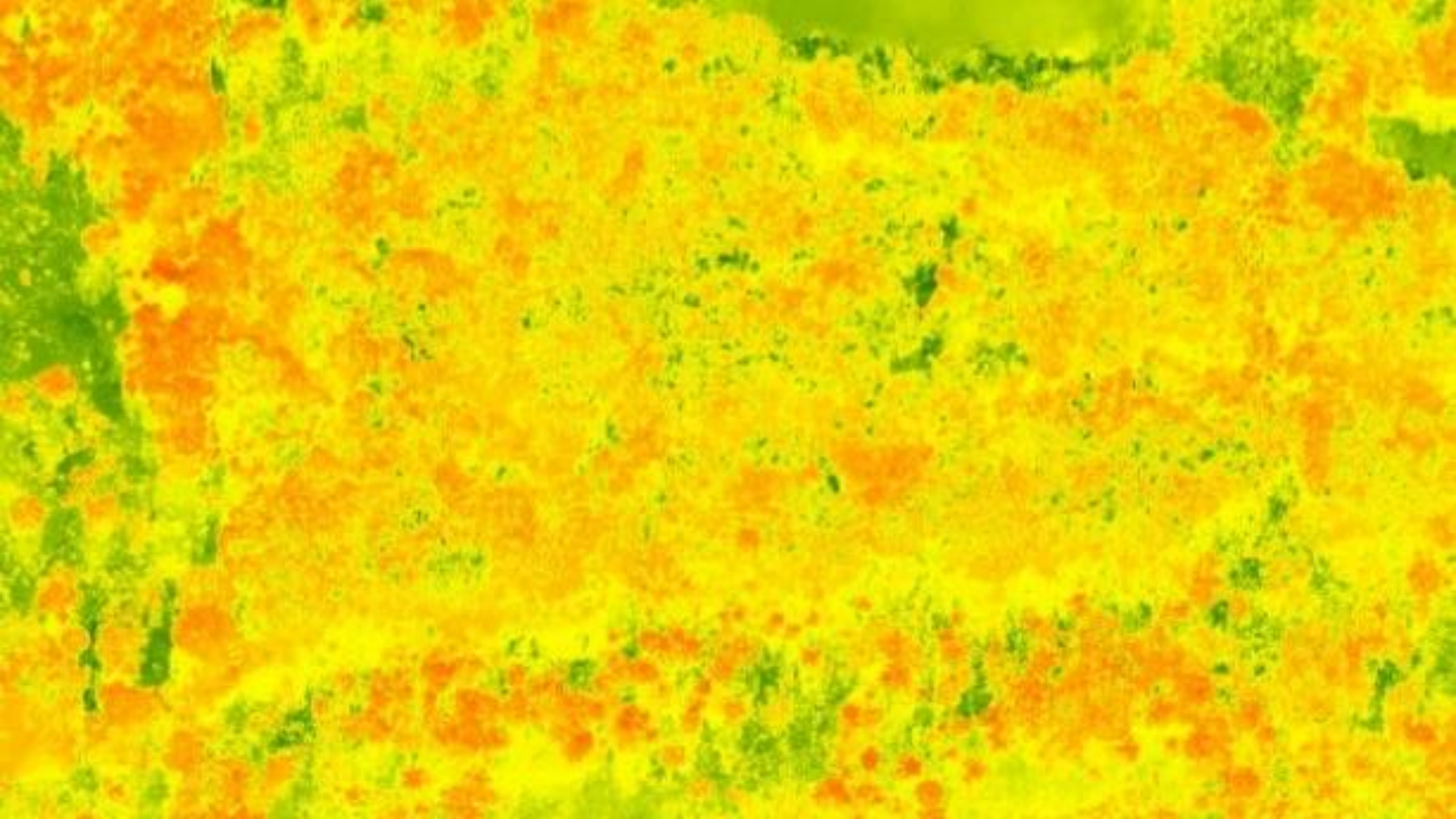


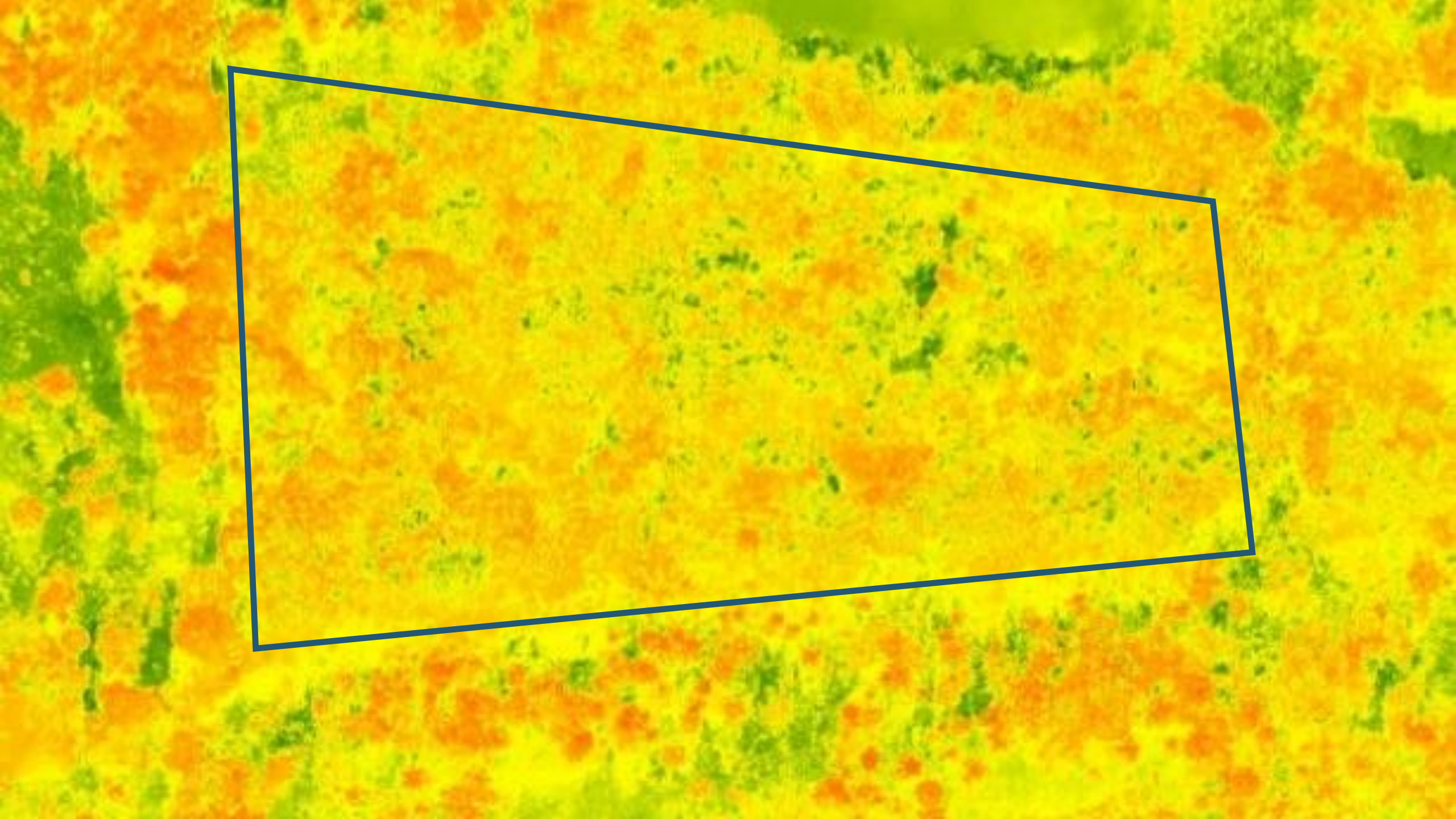




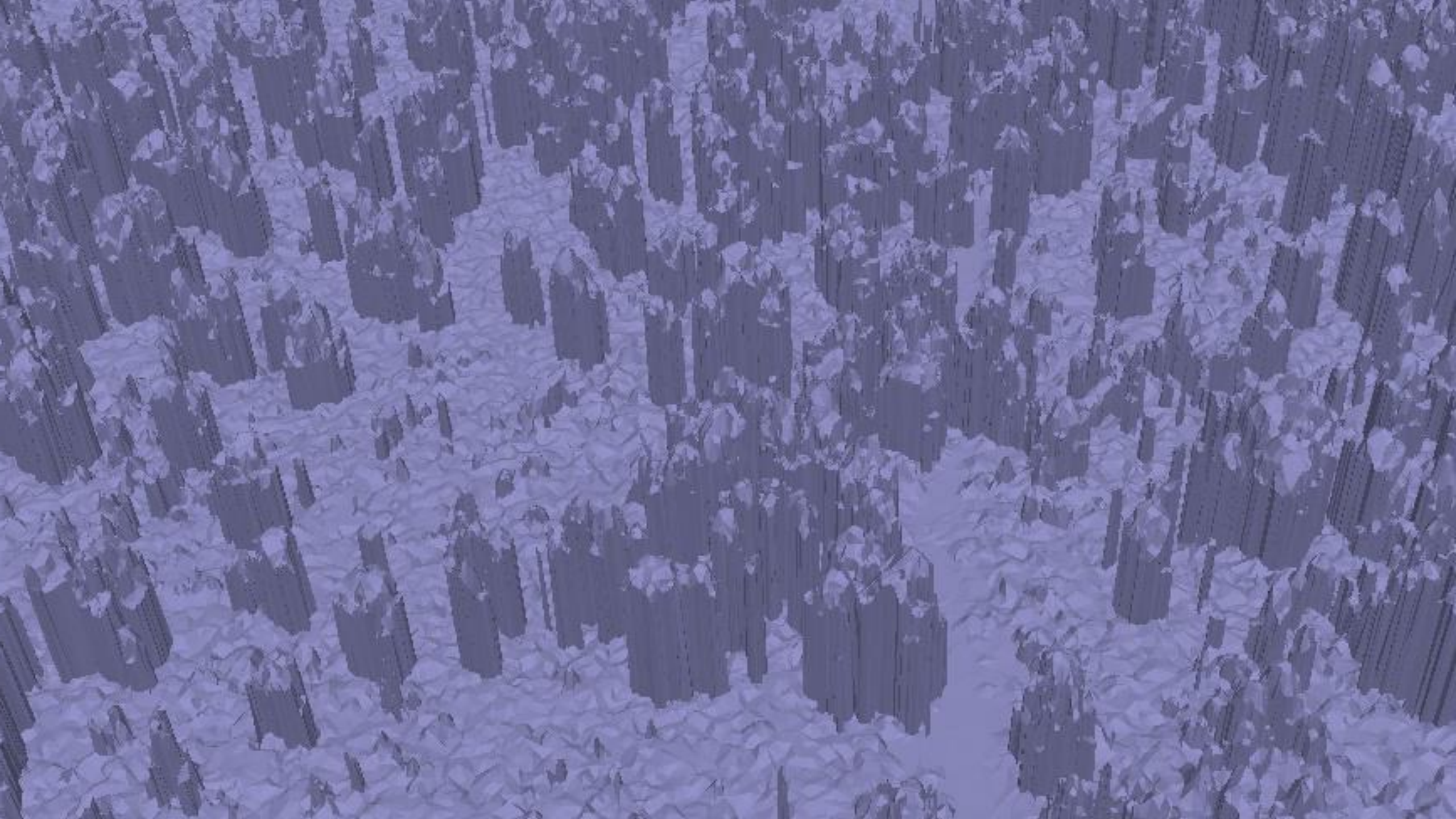
SAMPLE
POINT











An aerial photograph of a forest canopy. The image is overlaid with a color-coded map showing canopy height. The colors are yellow, orange, and magenta. The magenta areas are the most extensive, covering most of the canopy. The orange areas are scattered throughout, and the yellow areas are the least extensive, appearing as small patches. The background is a dark, textured aerial photograph of the forest.

EXPLANATION

Canopy Height

	5-10 ft.
	10-20 ft.
	Greater than 20 ft.



What to Consider?

- Project size
- Collection frequency
- Seasonal vegetation growth
- Local weather
- Data spatial resolution
- Ability to manage big data

Questions?

WHAT

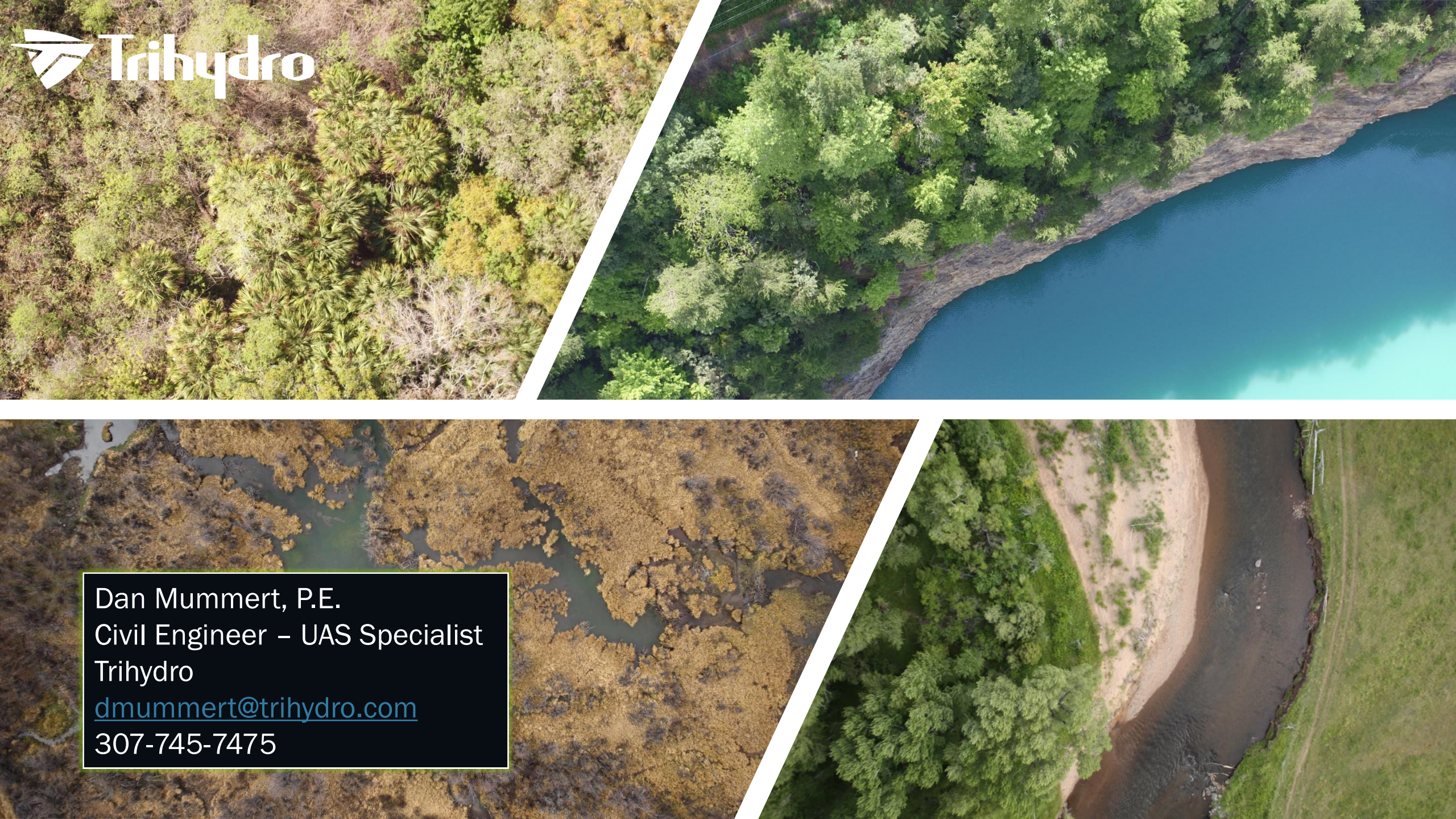
WHY

WHERE

WHEN

WHO

HOW



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