Digital Viticulture

Agrifutures - Viticulture Society of Canberra district

Agrifutures opportunity:

1. UAV Mapping of vineyard block boundaries

   "the entry point to precision viticulture"

2. Vineyard Sensing

   - Top Down: Satellite, fixed wing, UAV
   - Side on: "Greenseeker" NDVI & GoPro

About the project…

- It’s all about data collection!
- Representative, repeatable, traceable

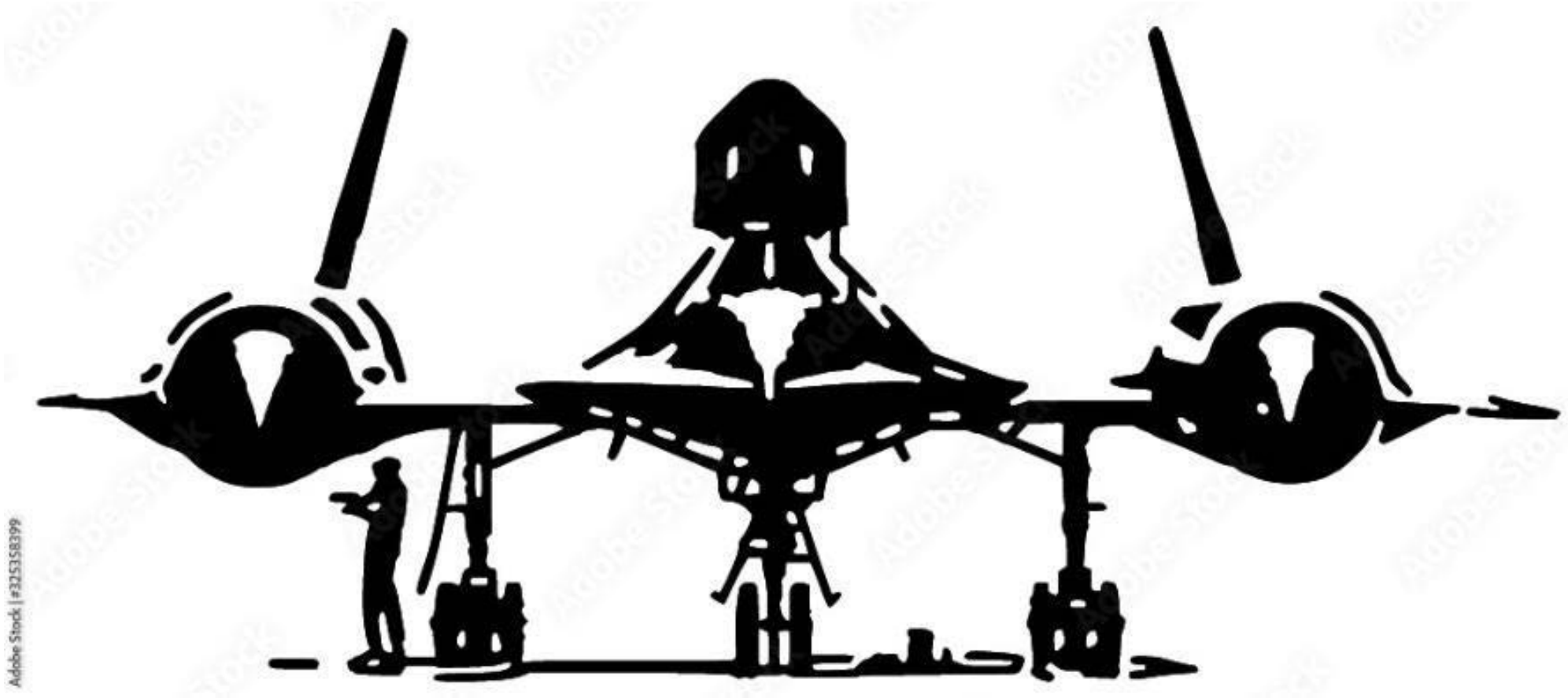
About me…

- Geologist:
  - Sample Collection
  - Database management
  - Geographic Information Systems (GIS)
- Viticulturist – Penley Coonawarra
  - Precision viticulture
  - Field data specialist
  - Wine Australia sponsored Nuffield Scholar:

    “here come the robots, but what do we do with the data?”

Types of Sensing

Top down: RGB, PCD, NDVI, point cloud & photogrammetry/orthomosaic etc.



Precision Viticulture

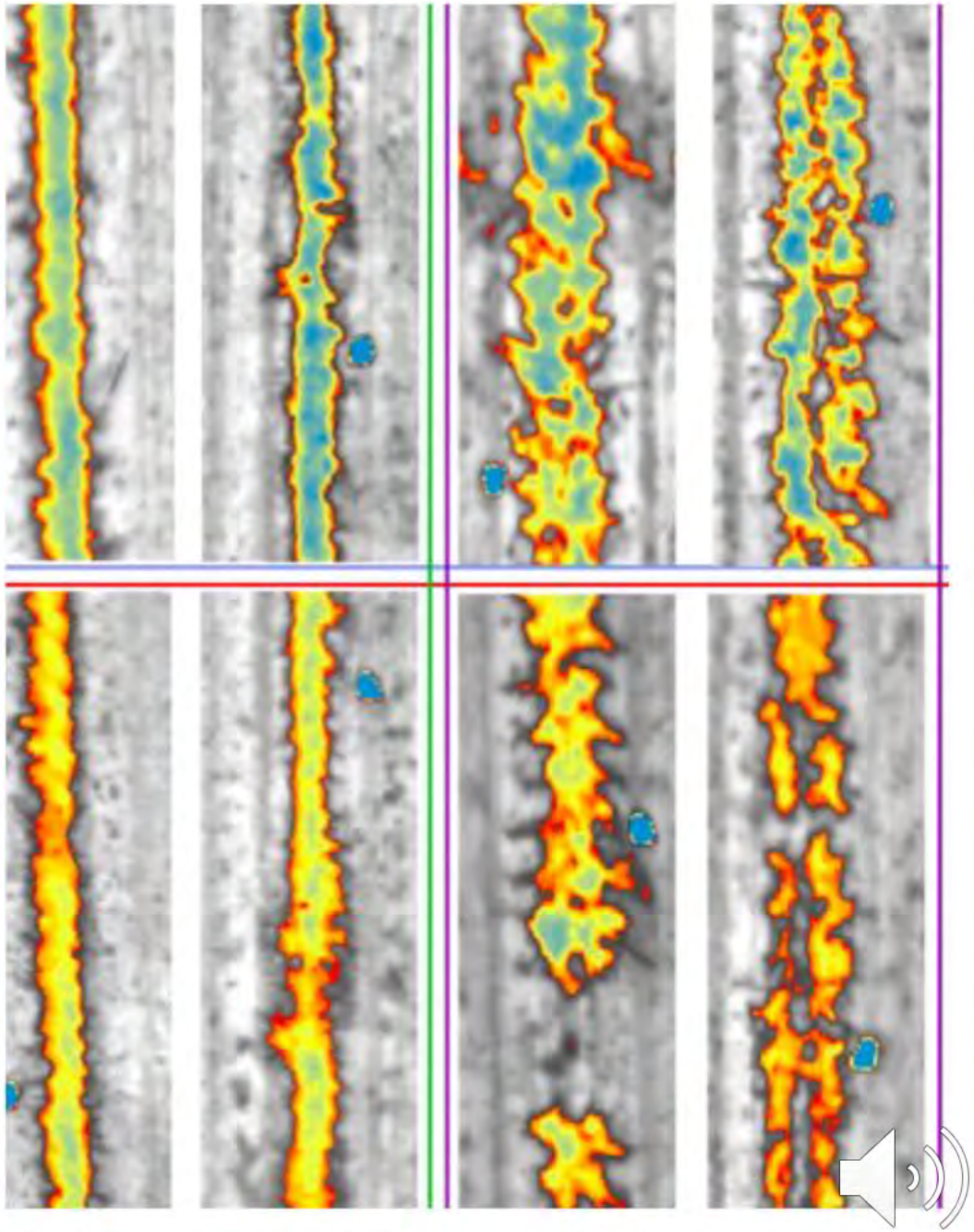
A new era in vineyard management and wine production

Tony Proffitt
Rob Bramley
David Lamb
Erika Winter

"the entry point to precision viticulture"

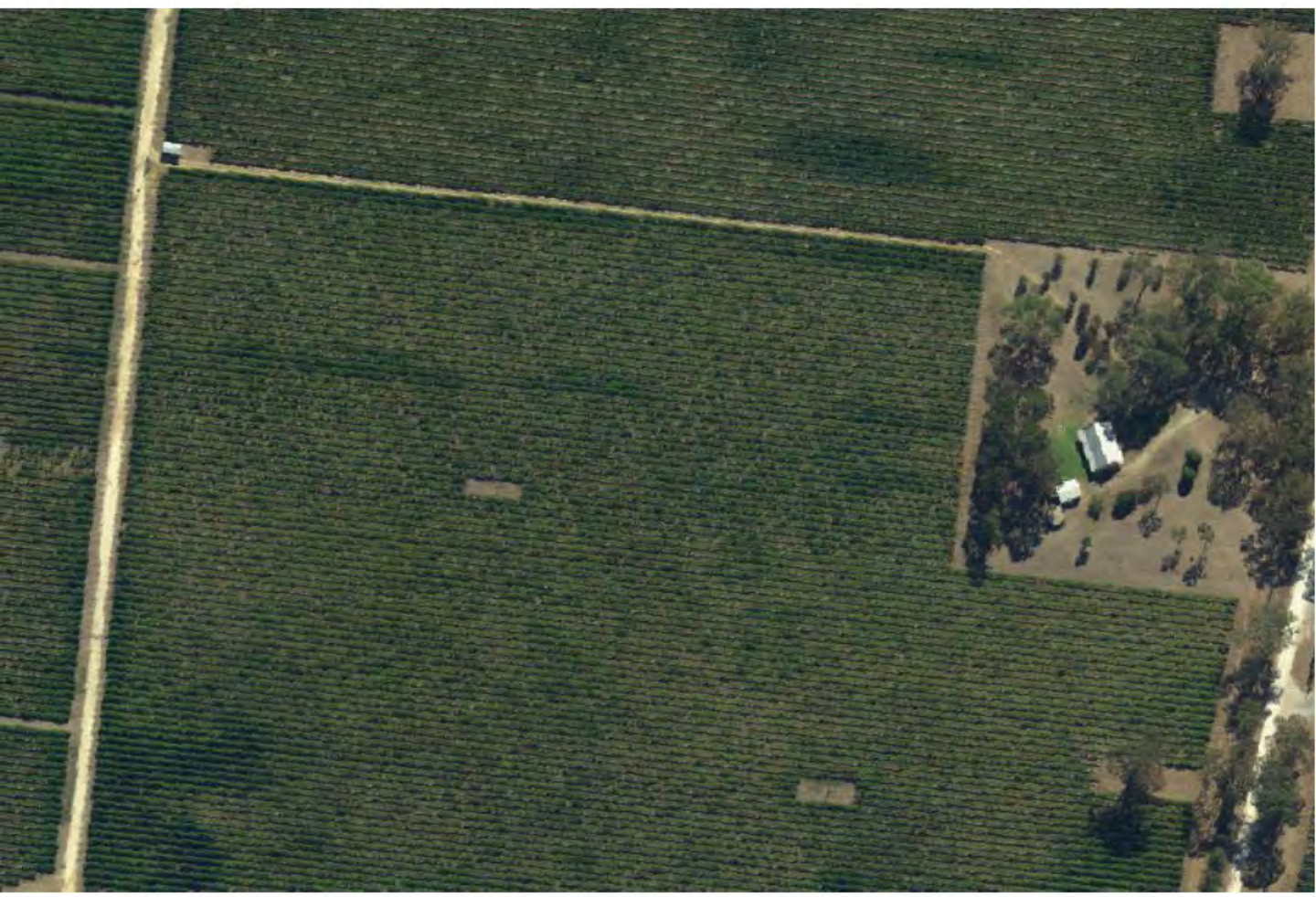
Collection & Processing

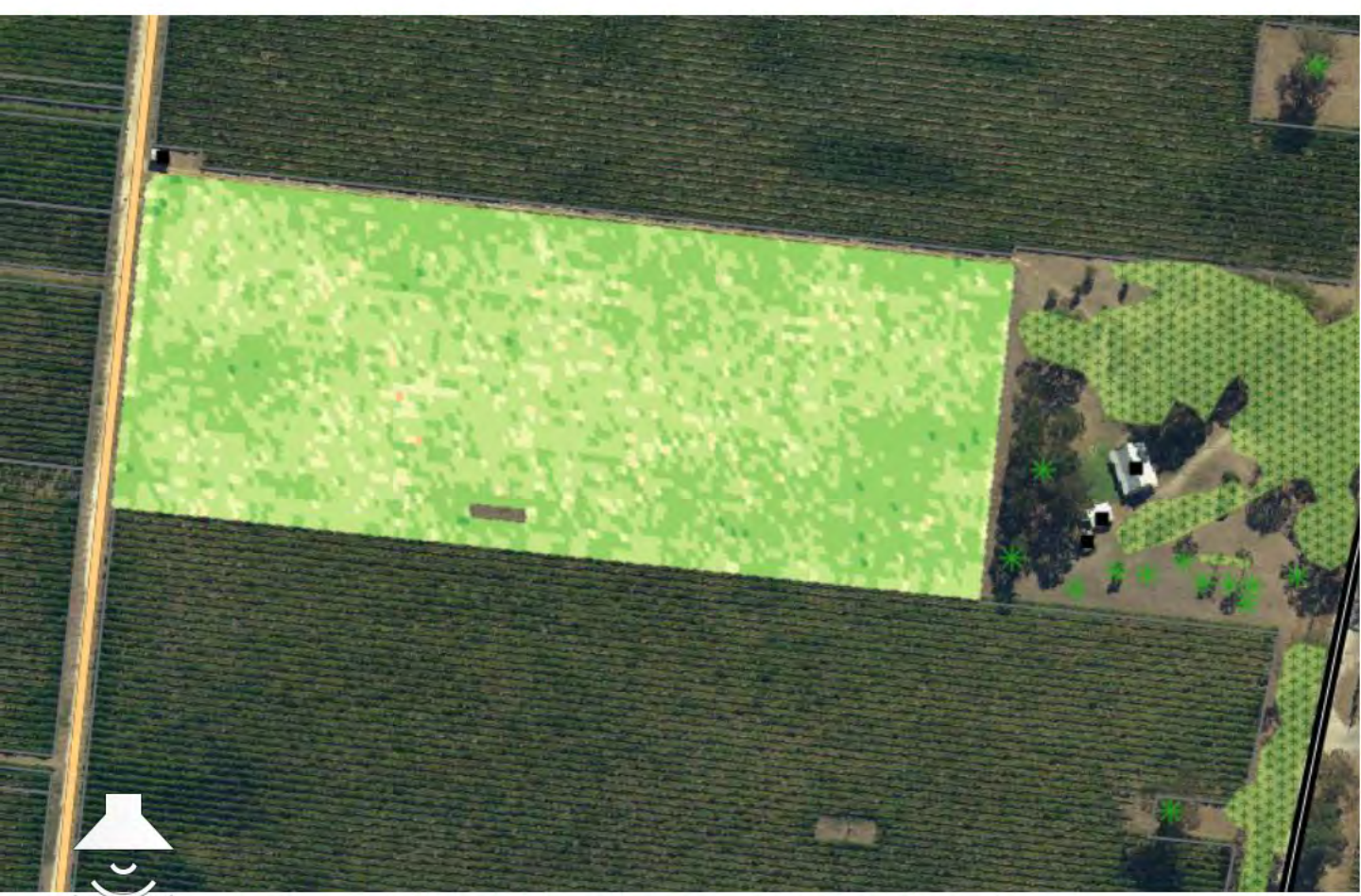
Image: Grant Yates – Southern Precision



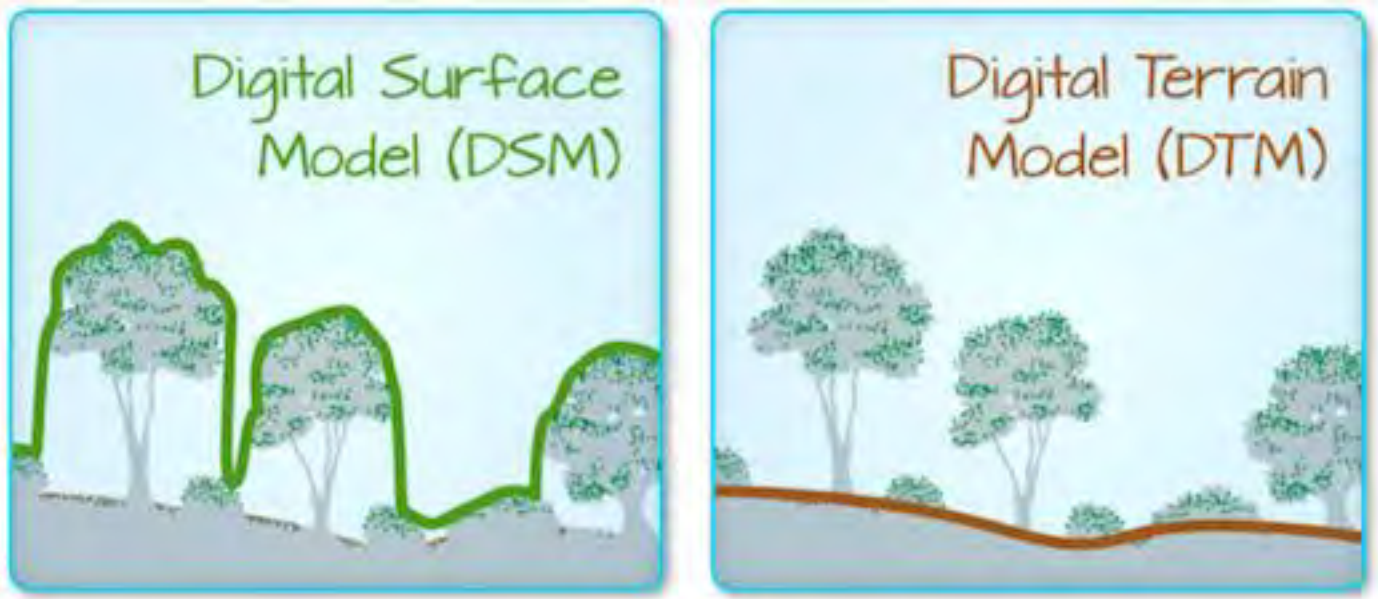
- Crop Water Stress Detection Image: Digital Falcon www.digitalfalcon.com.au

RGB & NDVI



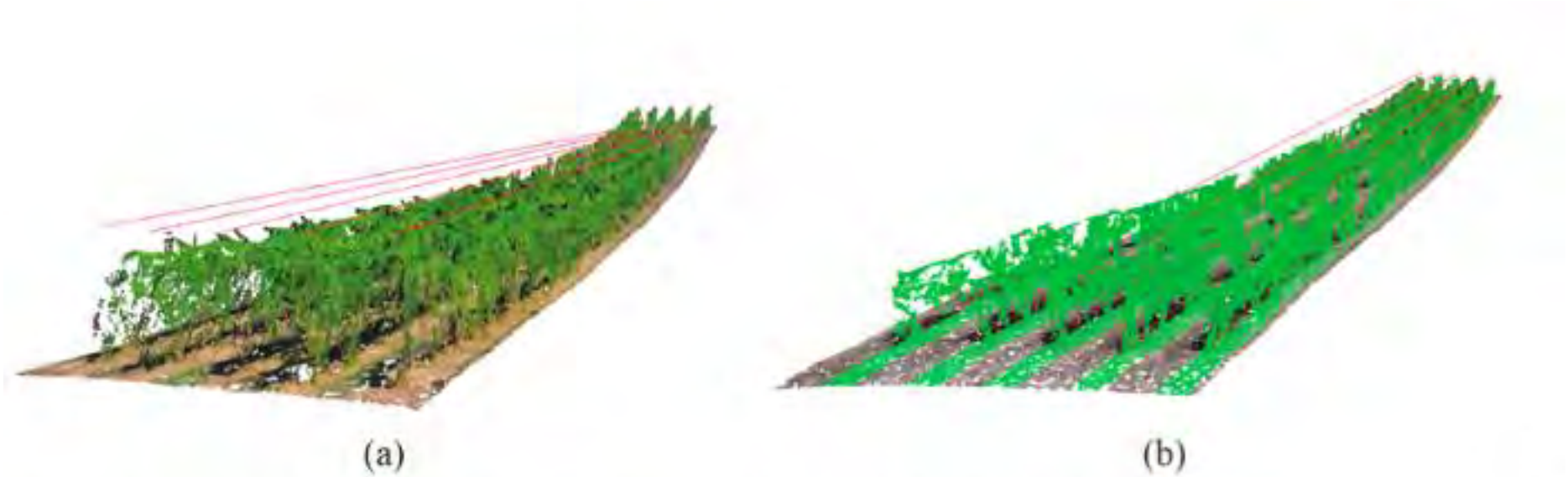


Photogrammetry & Orthomosaics



gis.stackexchange.com

Photogrammetry & Orthomosaics



Example of a segmentation of vine rows: (a) visualisation of the 3D vine rows generated as presented in Pádua et al. [14]; and (b) 3D points selection in the point cloud, using a 60 cm buffer.

Source: Jurado, J.M.,Padua, L., Feito, F.R., Sousa, J., 2020, Automatice Grapevine Trunk Detection on UAV-Based Point Cloud

Types of Sensing

- Side on: RGB, NDVI, thermal, LiDar


Image: courtesy of: Everard Edwards

Seasonal timing

- EL1 Dormancy
- EL4-9 First leaves
- EL12 Shoots 10cm
- EL Flowering
- EL33-38 Veraison

Crop Type	Phenological Stage	Net	GoPro Setting	Camera Angle	Example	Mounting	GoPro View
Wine Grapes	EL1 - EL3	nodes	Video Resolution: **4K 4:3** Frames per second: **30** Field of View: **Linear + HL (Horizon Leveling)** HyperSmooth: **On**	**Camera Bottom and Facing Up** (35 to 45 degree)			
	EL4 - EL12	shoots	Video Resolution: **4K 4:3** Frames per second: **30** Field of View: **Linear + HL (Horizon Leveling)** HyperSmooth: **On**	**Camera Bottom and Facing Up** (35 to 45 degree)			
	EL12 - EL15	inflorescence	Video Resolution: **4K 4:3** Frames per second: **30** Field of View: **Linear + HL (Horizon Leveling)** HyperSmooth: **On**	**Camera Side On** (Flowering Area in the Frame)			
	EL15 - EL20	canopy height	Video Resolution: **4K 4:3** Frames per second: **30** Field of View: **Portrait Mode** HyperSmooth: **On**	**Camera Side On** (Whole Post in the Frame - Tips of the Shoots in the Frame)			
	EL32 - EL38	bunches	Video Resolution: **4K 4:3** Frames per second: **30** Field of View: **Linear + HL (Horizon Leveling)** HyperSmooth: **On**	**Camera Side On** (Fruiting Area in the Frame)			

Practical Considerations…

Image by pch.vector on Freepik