SMART Farms- improving production and profitability (from the top down)

David Lamb

www.une.edu.au/parg

www.une.edu.au/smartfarm

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PRIMARY INDUSTRIES
STRIVING FOR CLIMATE RESILIENCE

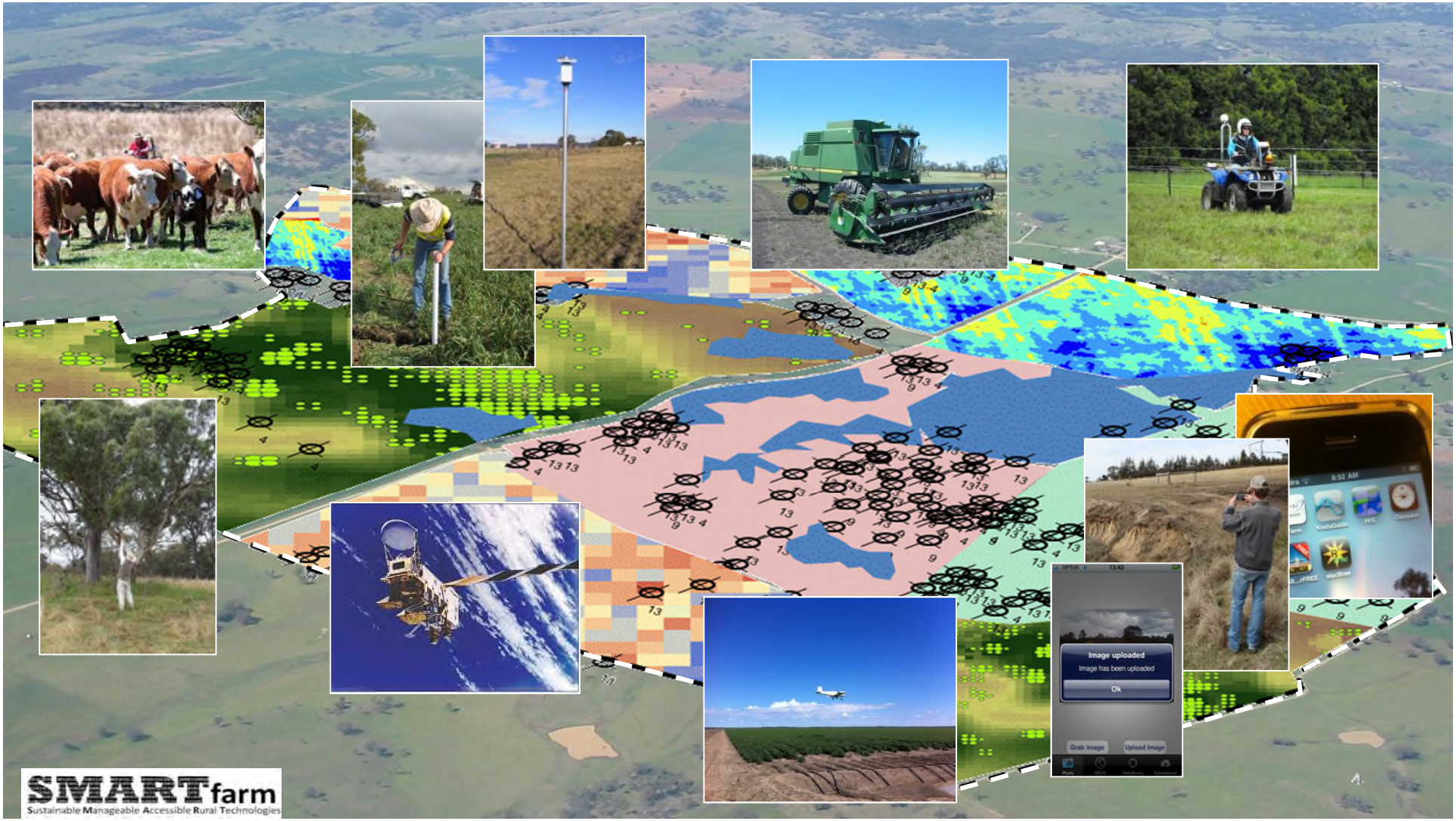
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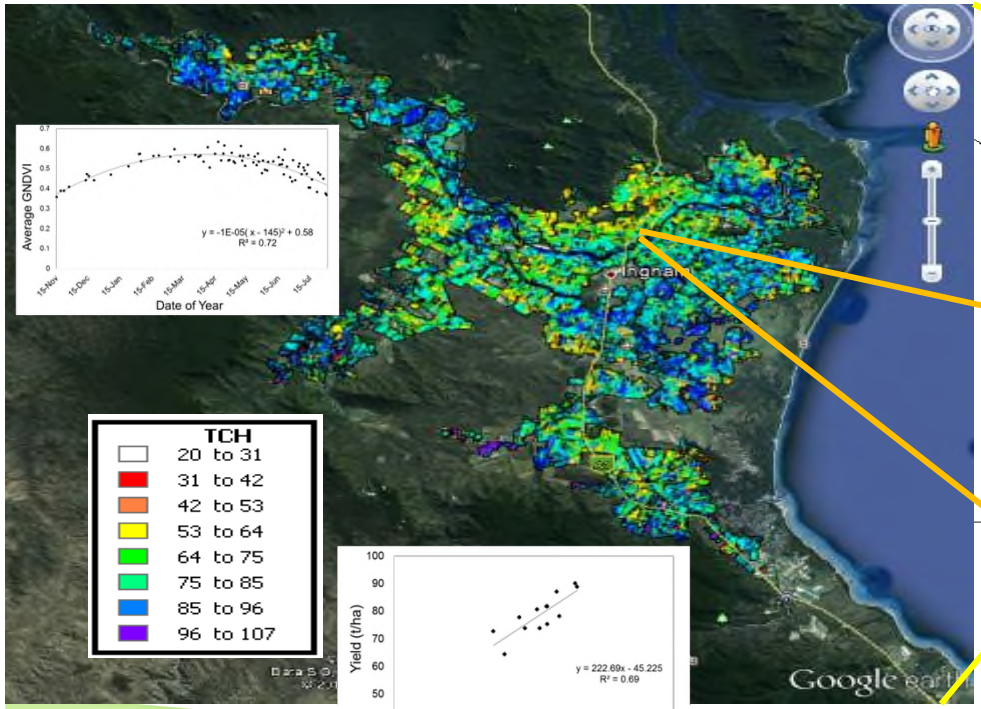
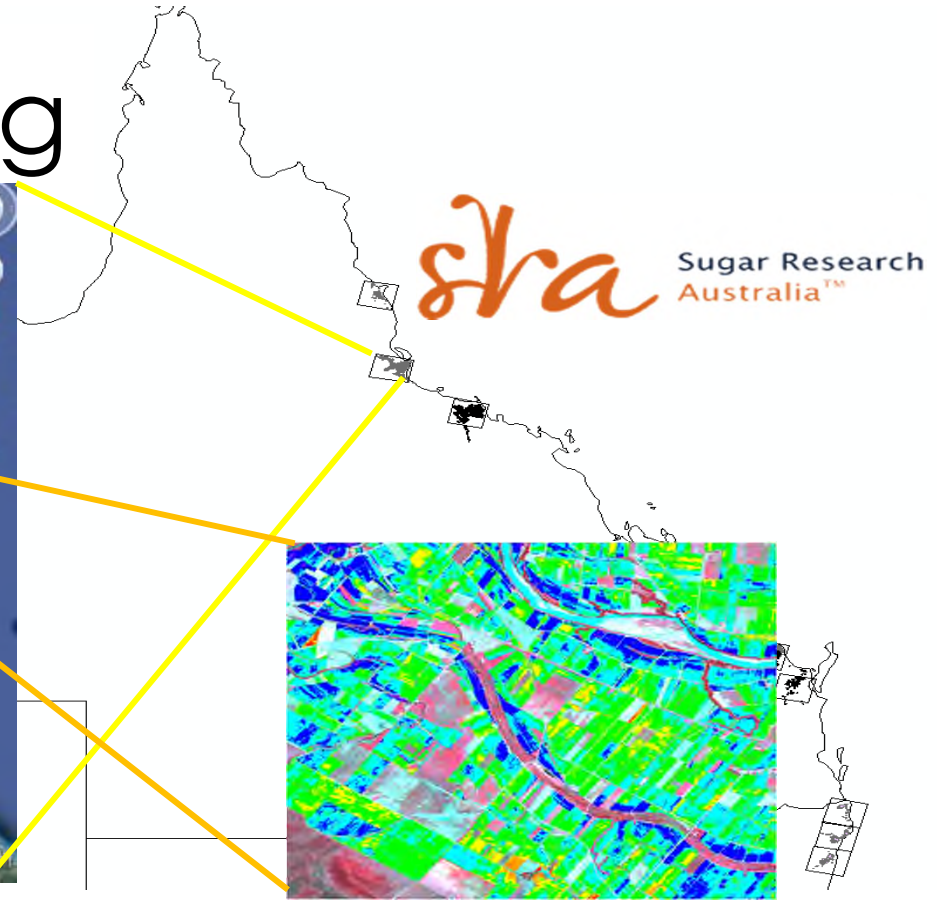
Image uploaded
Image has been uploaded
Ok
Grab Image
Upload Image

Crop forecasting





Sugar Research Australia™

Andrew Robson et al.

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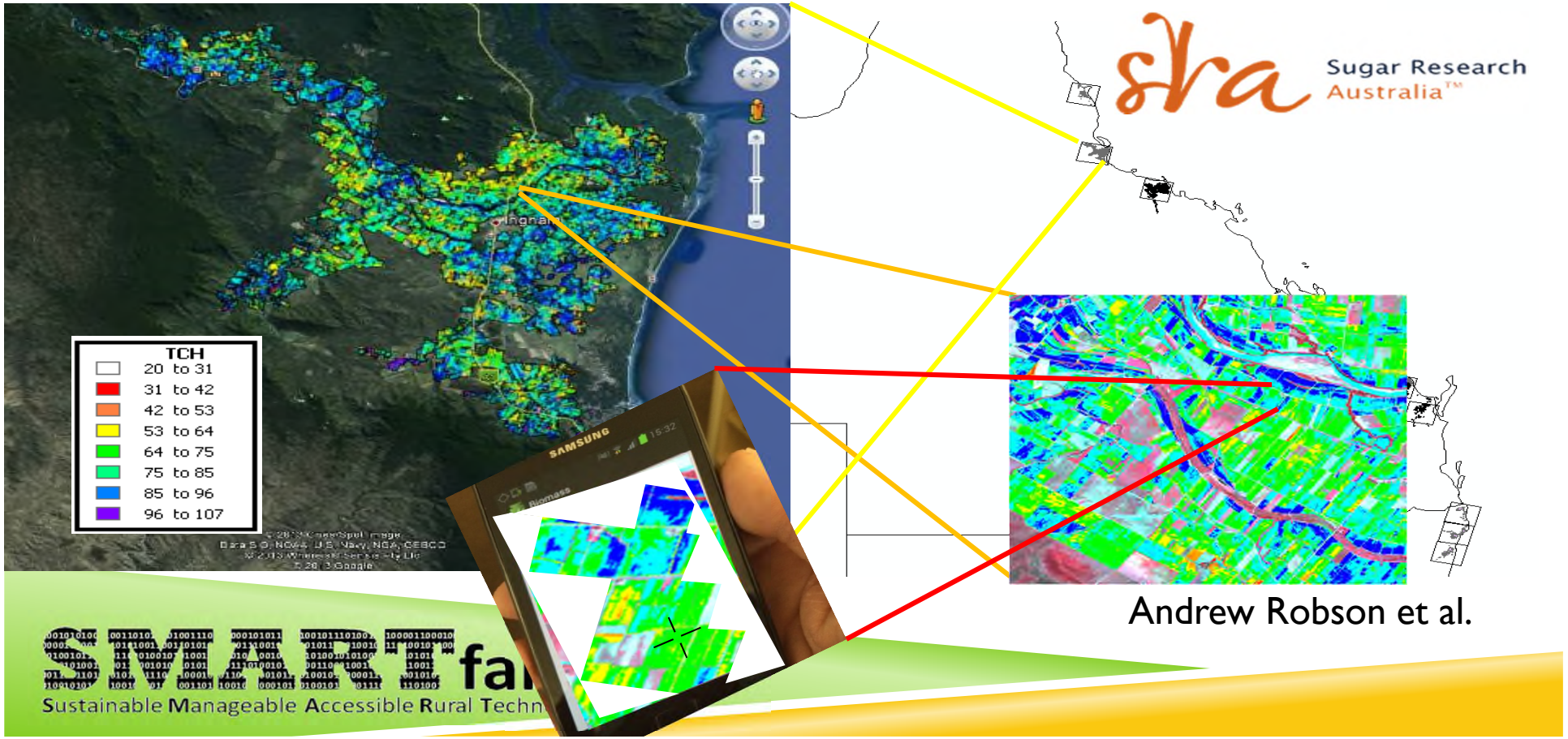
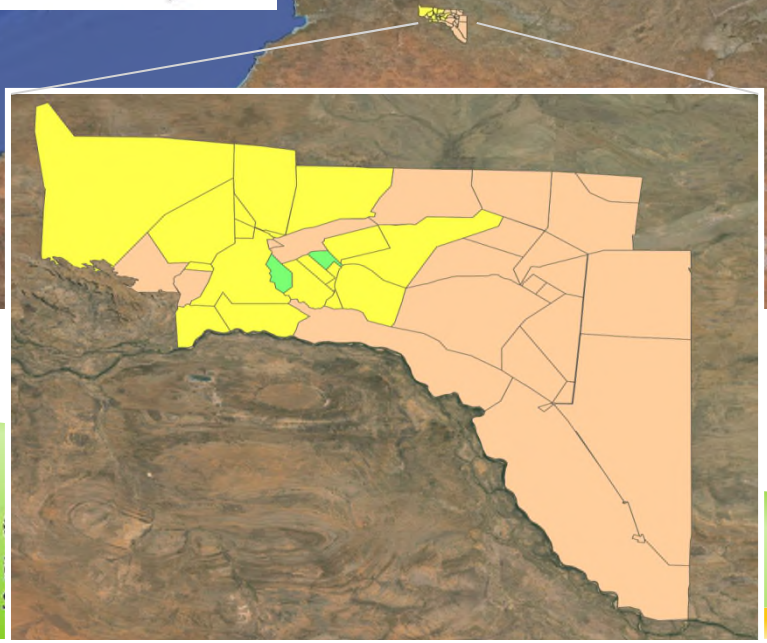
Crop forecasting- all scales

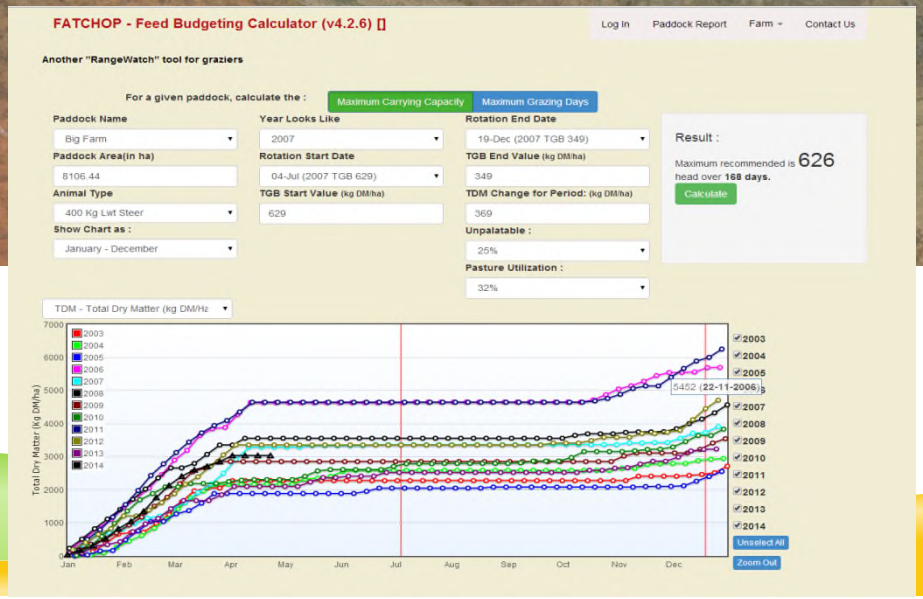


RangeWatch

Remote Sensing + plant growth + stocking rate calculator + delivery system

crc•si



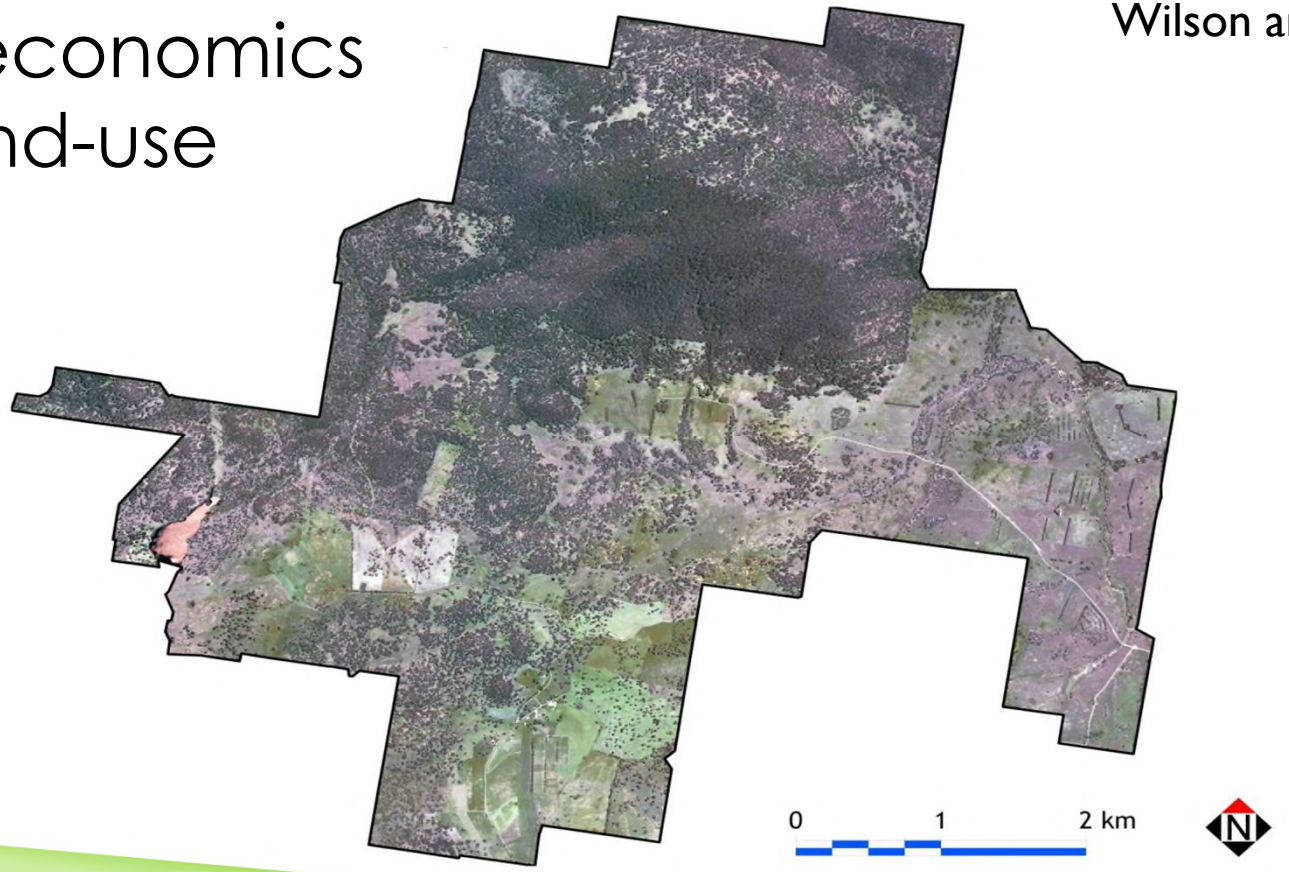


RangeWatch

Remote Sensing + plant growth + stocking rate calculator + delivery system

The economics of land-use

Wilson and Wilke, 2015



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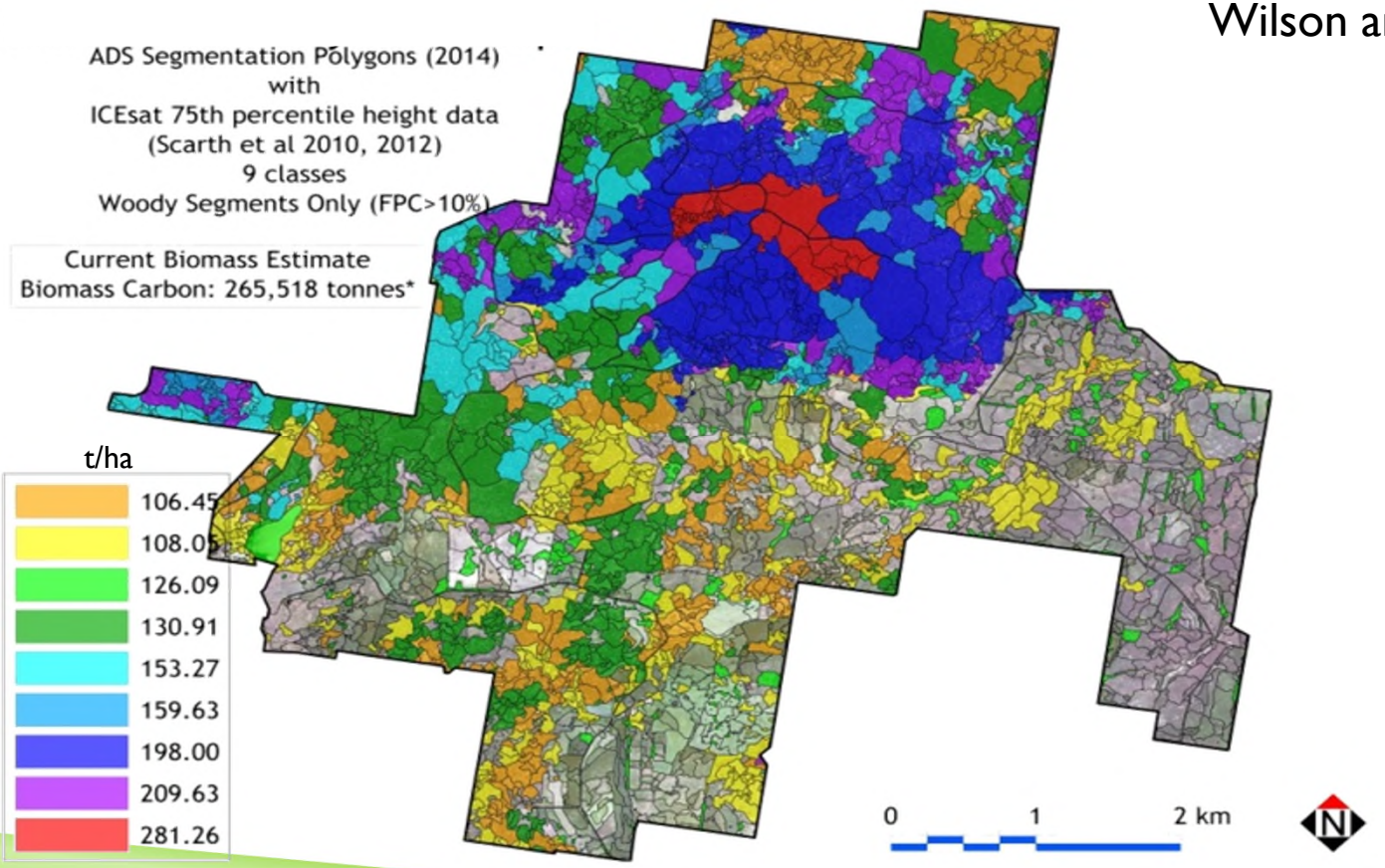
Wilson and Wilke, 2015



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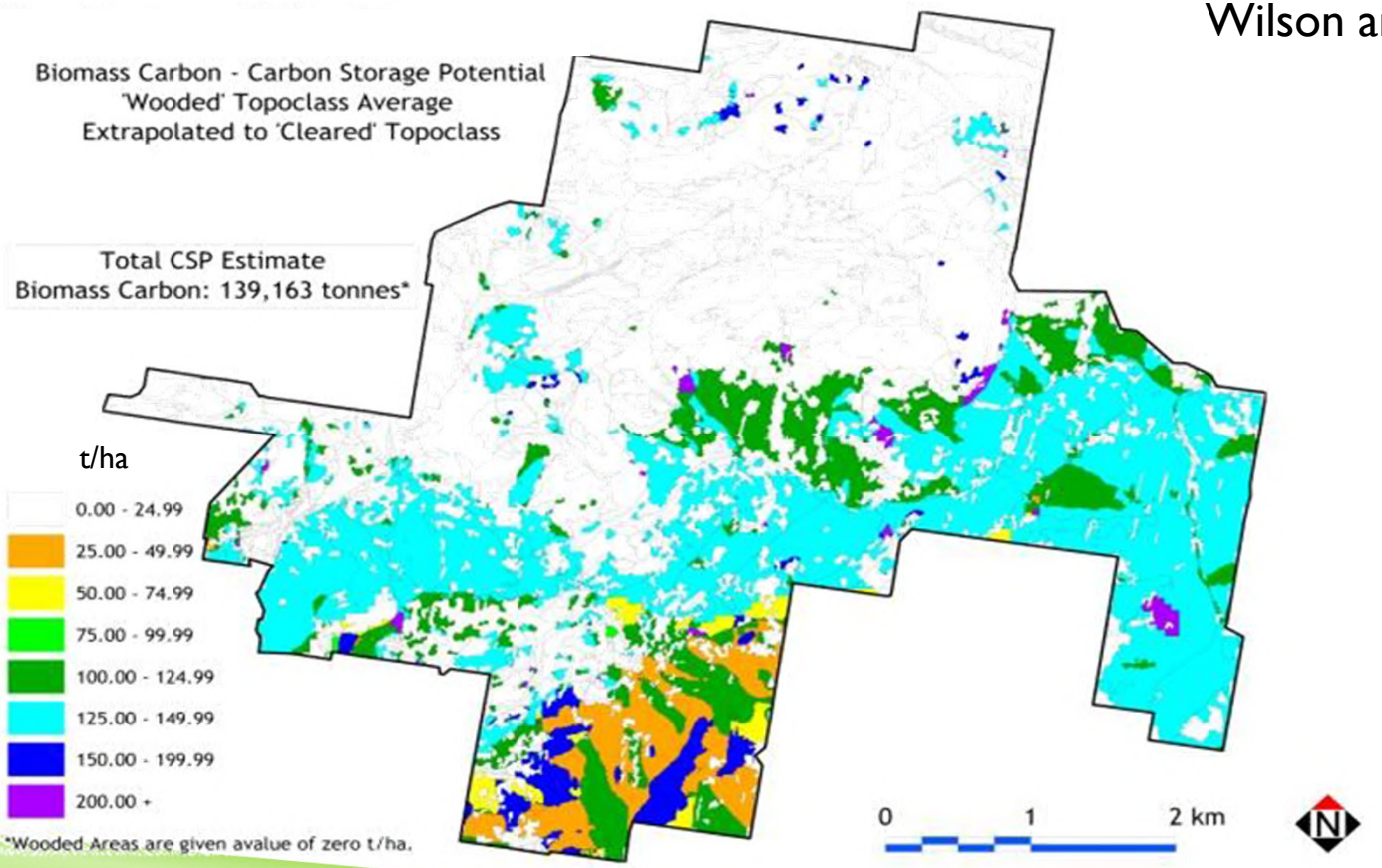
Wilson and Wilke, 2015



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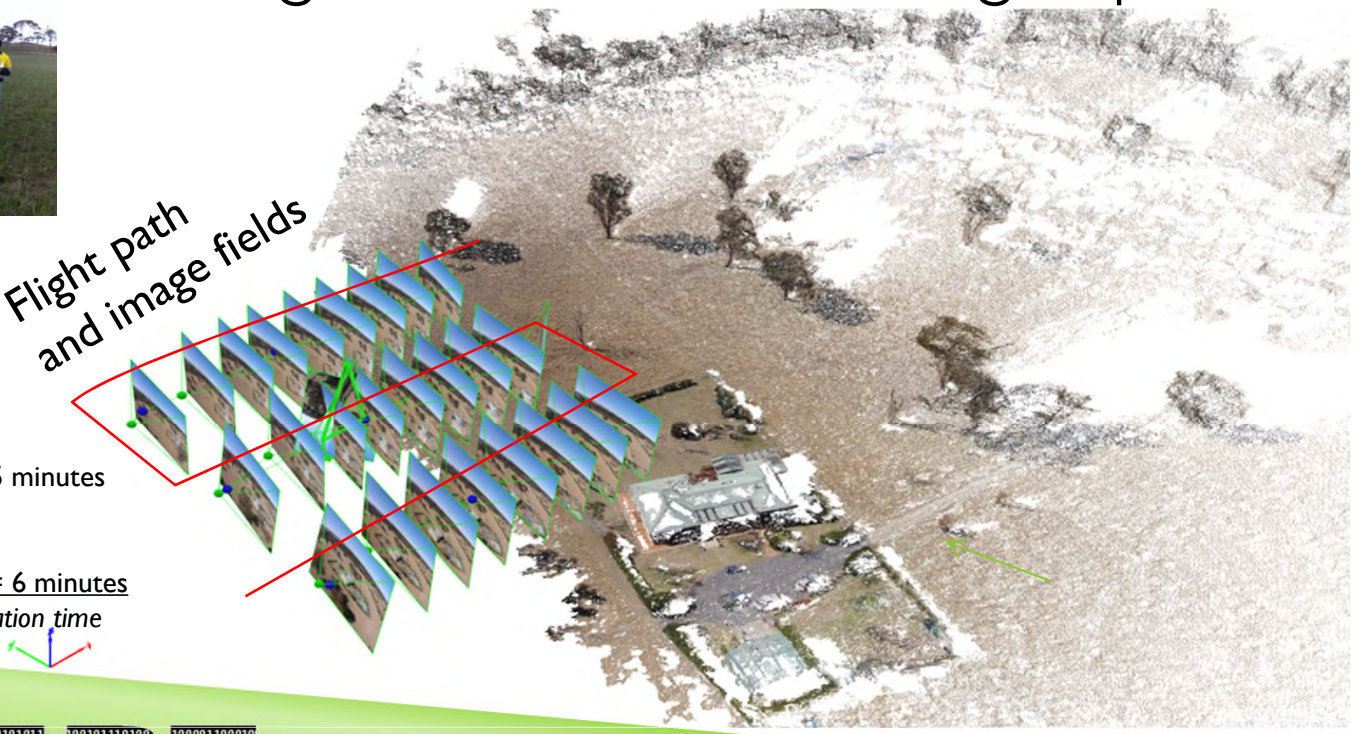
Drones!!

Putting serious science at fingertips….



Drone flying time = 4.5 minutes
Images collected = 25
Altitude = 40 m AGL
Data processing time = 6 minutes
Total mission/3-D generation time = 10.5 minutes

Reconstructed 3-D image of 'farmscape'

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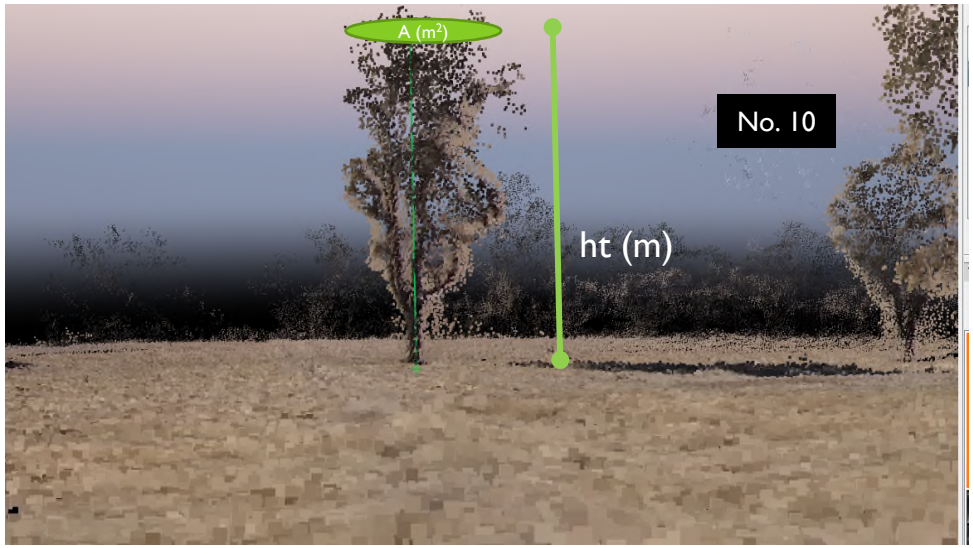
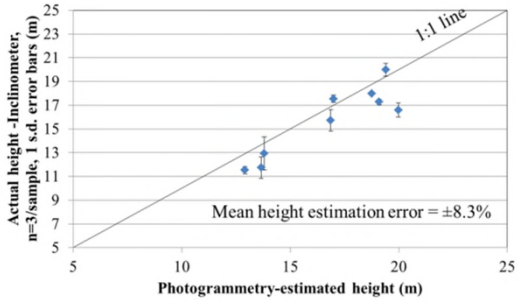
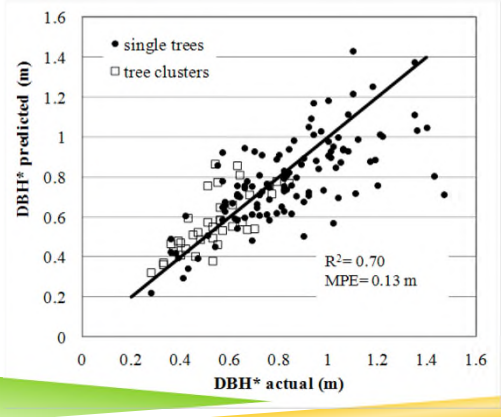
Rapid quantitative photogrammetry







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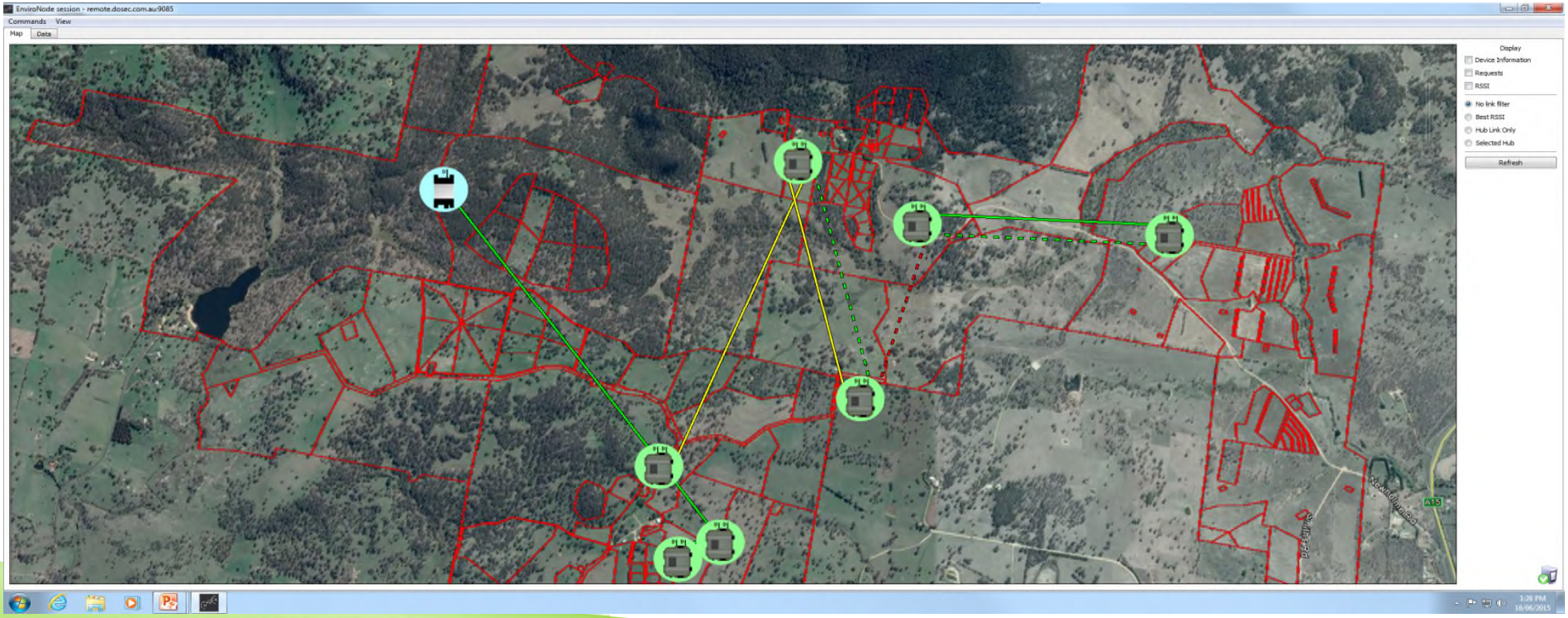
Sensor networks for plant growth



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SMART trees

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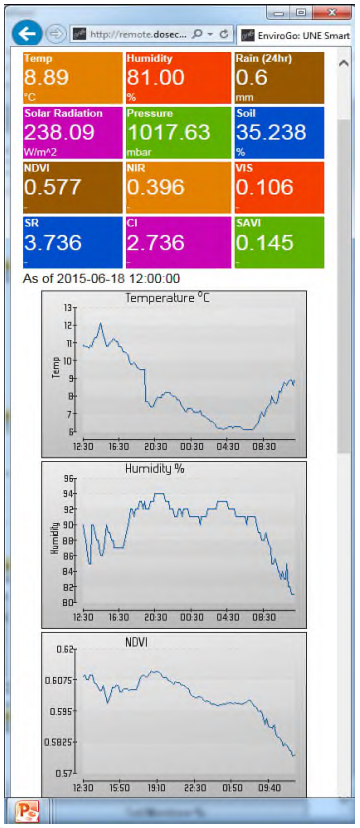
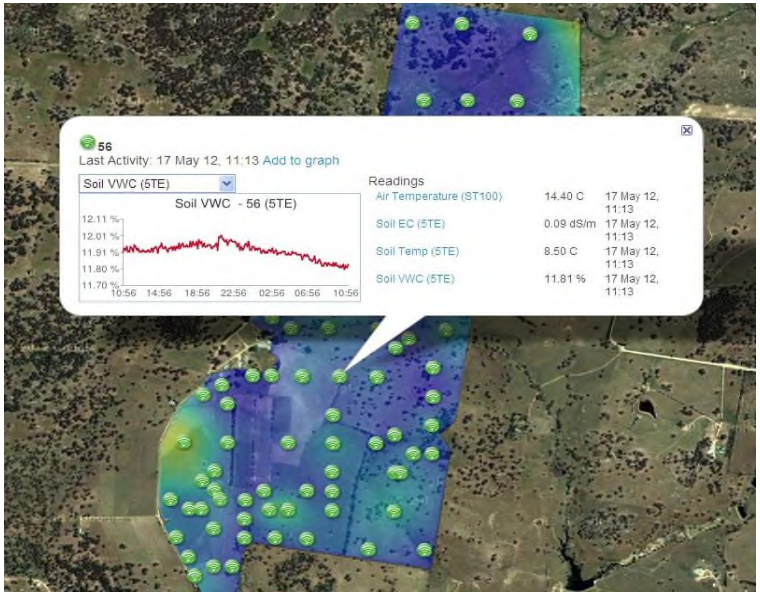
Soil moisture (%)

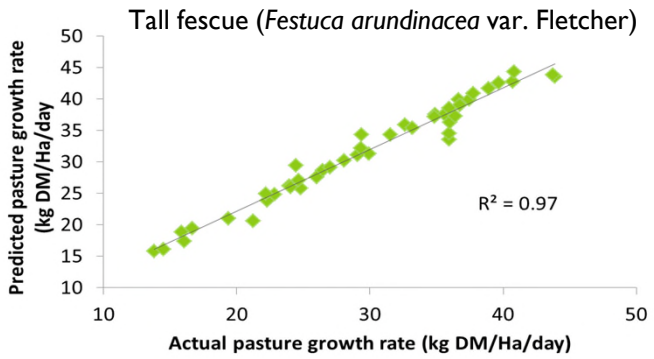
Outer sap flow rate (cm/hr)

Inner sap flow rate (cm/hr)

IoT = Plant growth and development







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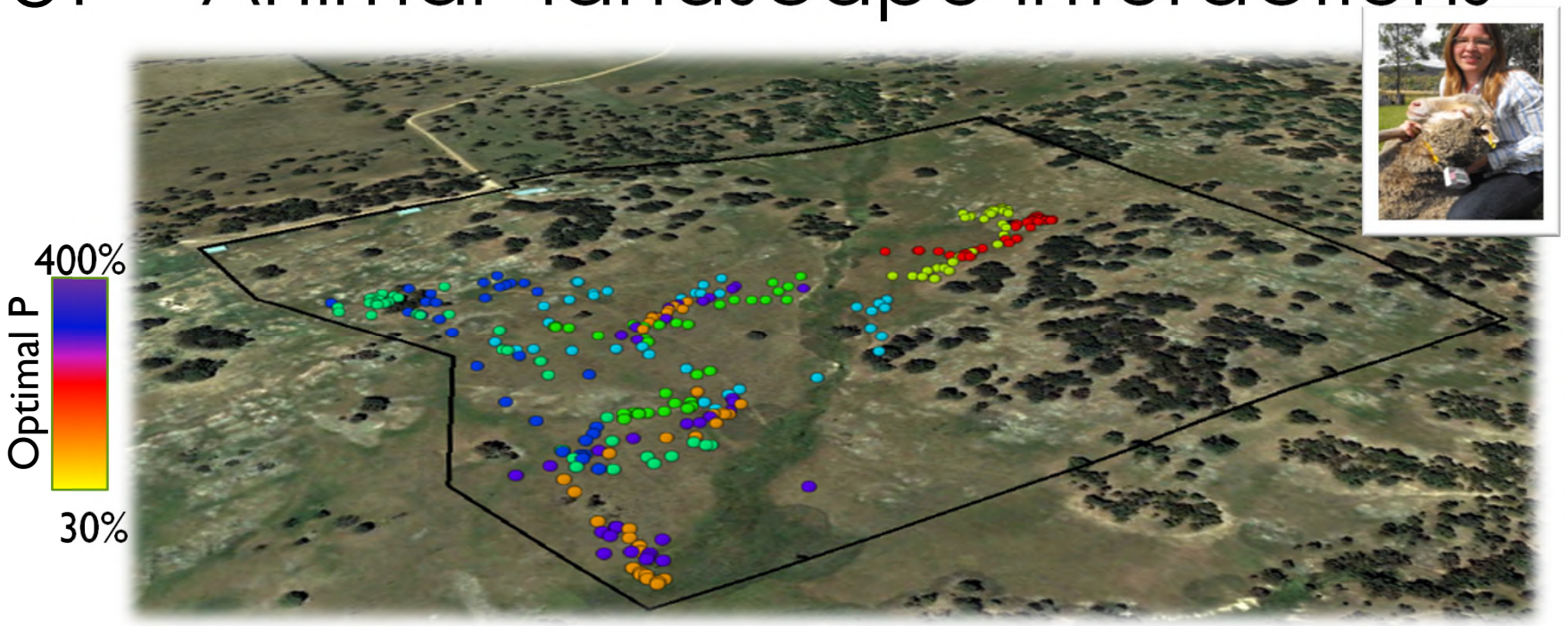
IoT = Animal- landscape interactions



GPS and RBT livestock tracking systems

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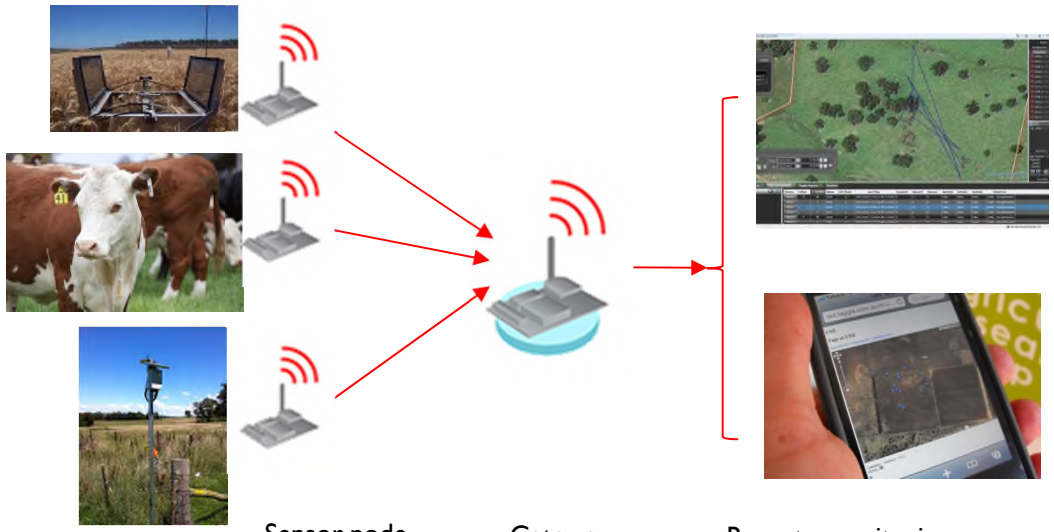
Getting connected…

Terrestrial: LoRa™ Long Range Spread Spectrum technology



- Bi-directional (900 MHz)
- Long range (3-4 km) (up to 16 km)
- Low power
- Single gateway can support ~10k sensors (nodes)
- Raspberry PI, Arduino…compatible
- Subscribed by the 'big ones'- IBM, Cisco…
- Data rate up to 300 kBps

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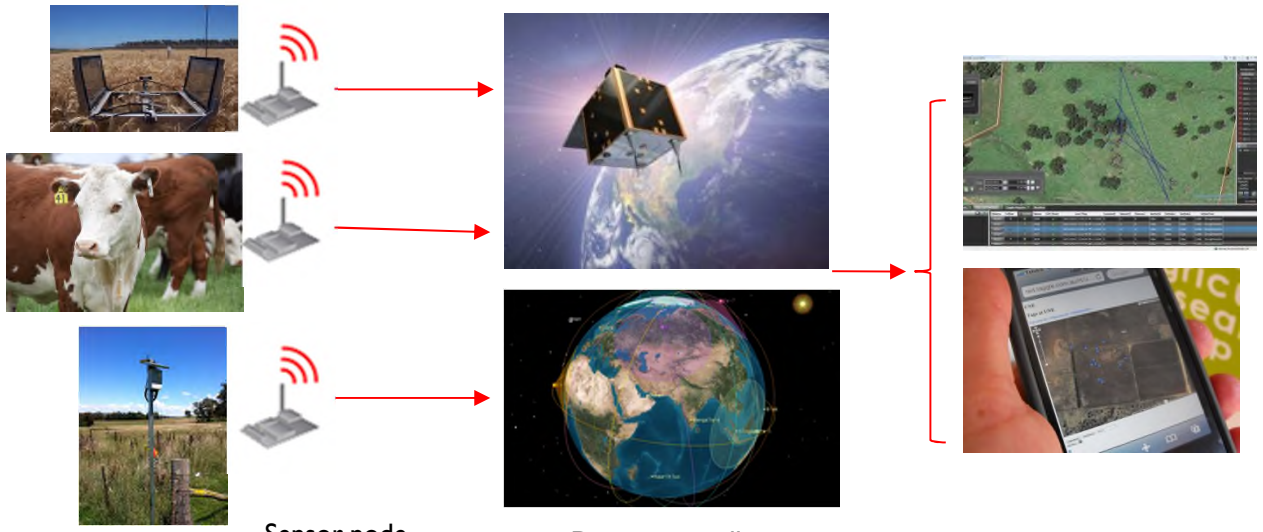
Getting connected…

‘Extra-Terrestrial’: eg Myriota



Sensor node

Direct to satellite

Remote monitoring

- 8 low earth orbit (~800 km) satellites
- 1st gen ‘credit card’-sized interfaces
- ~100k devices at any time
- Revisit intervals ~ 1-2 hours
- ~10-12 bits per device/sweep

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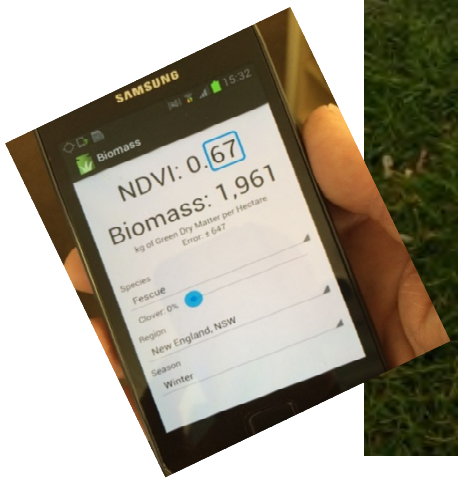
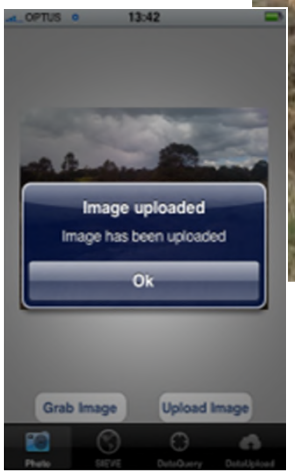
SMART Phones = citizen science





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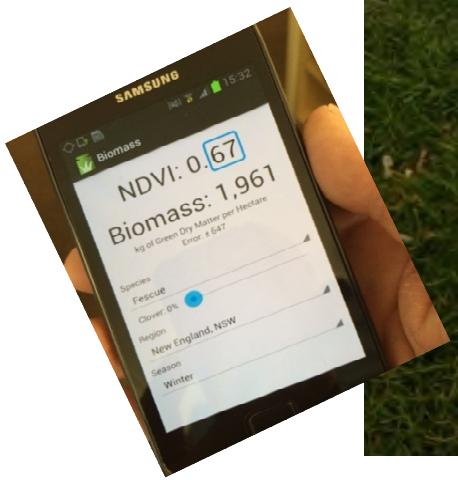

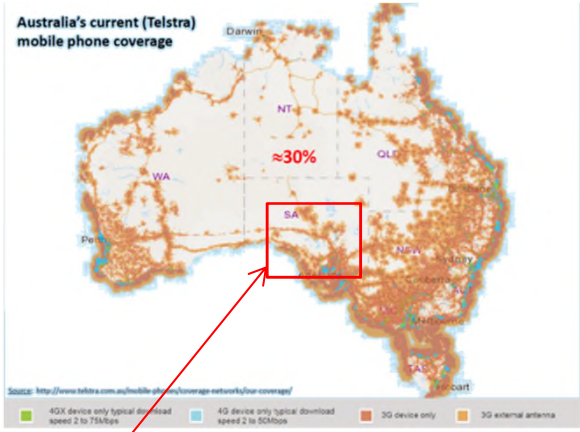

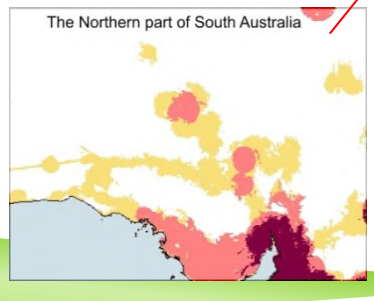

Zero coverage

100% (1 MNO)

200% (2 MNOs)

300% (3 MNOs)

Courtesy Robin Eckermann,
Robin Eckermann & Associates

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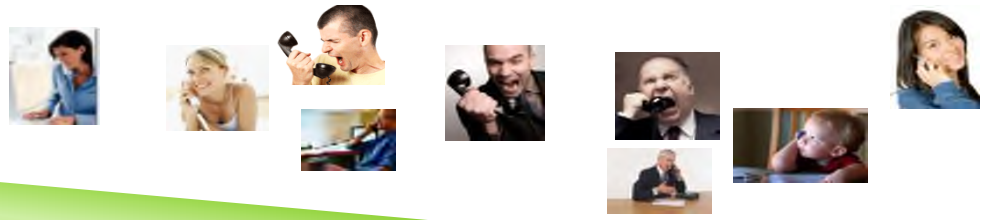
IoT is **NOT** IoP- RUOk?

(Virgin Media, 2014,=; n = 1000)

DESPITE significant growth in use of social media for communication

- 63% say it's easier to text instead of calling for a chat
- 43% prefer digital communications instead of phone



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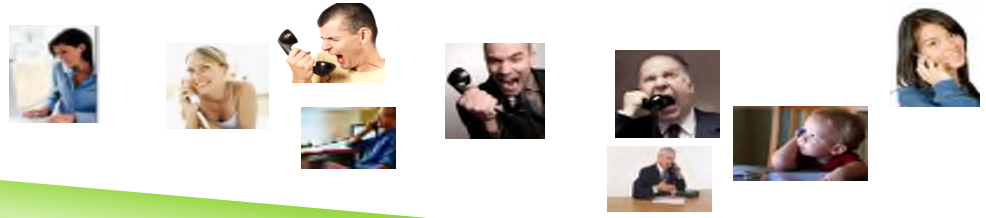
DESPITE significant growth in use of social media for communication

- 63% say it's easier to text instead of calling for a chat
- 43% prefer digital communications instead of phone
- **82% admit that speaking on the phone actually makes them feel more connected to people than social media interaction**



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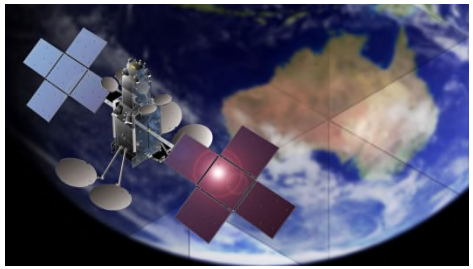
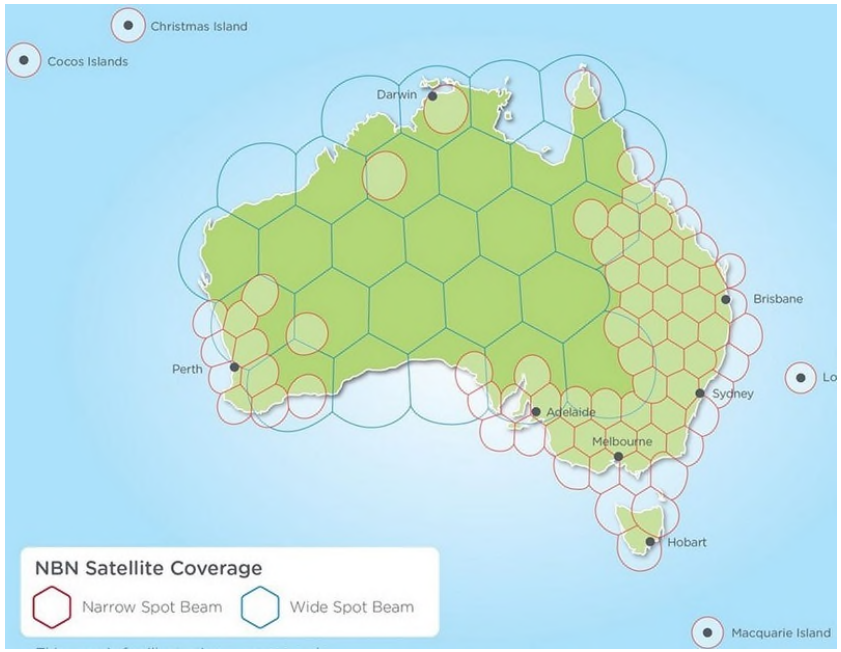
Connecting our farmers





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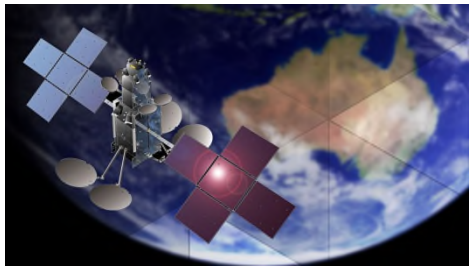
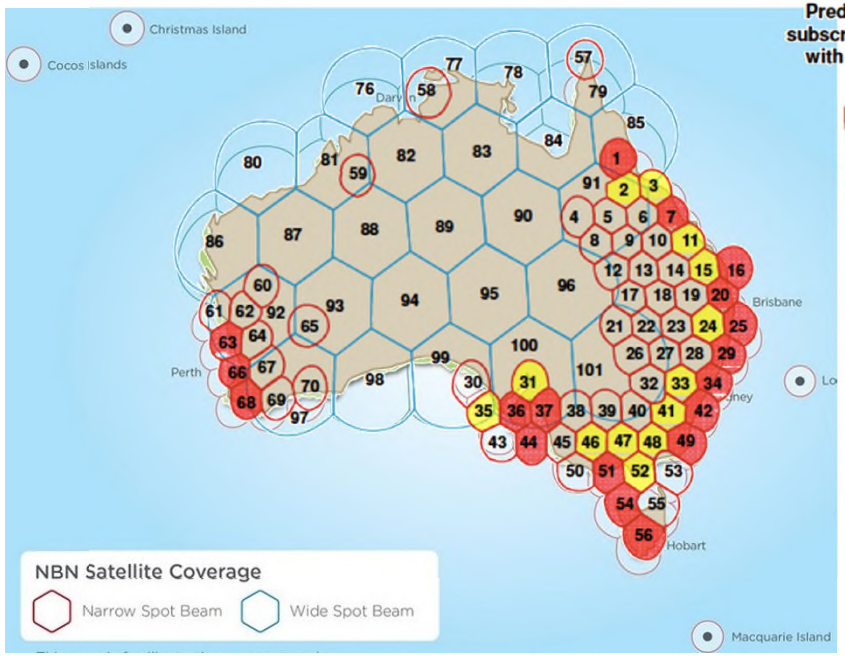
www.satcom.guru

Connecting our farmers





Predicted degree of over-subscription at ~65% take-up, with ~1,400 base stations

- Potentially 'severely over-subscribed'
- Potentially 'over-subscribed'

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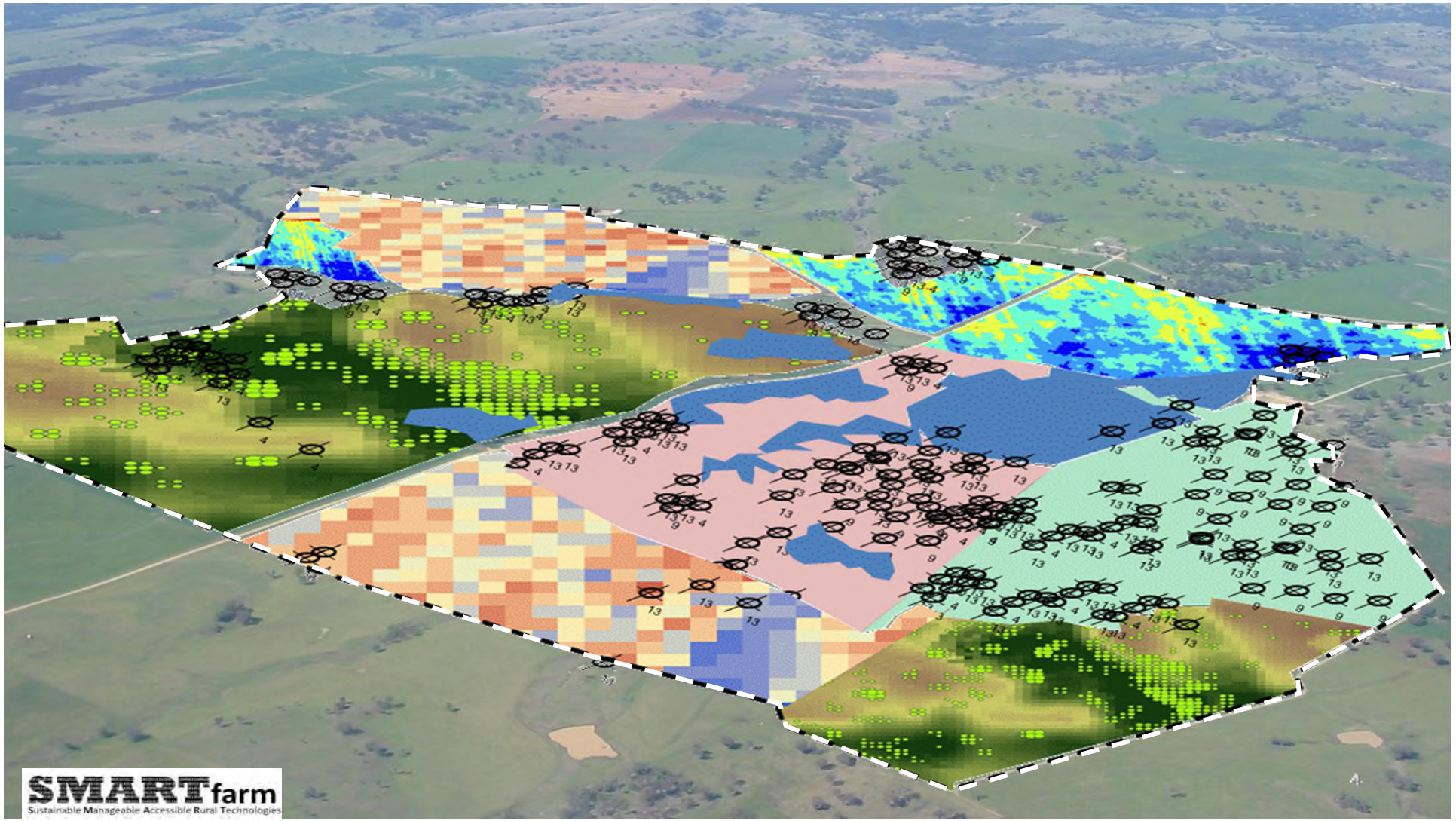
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