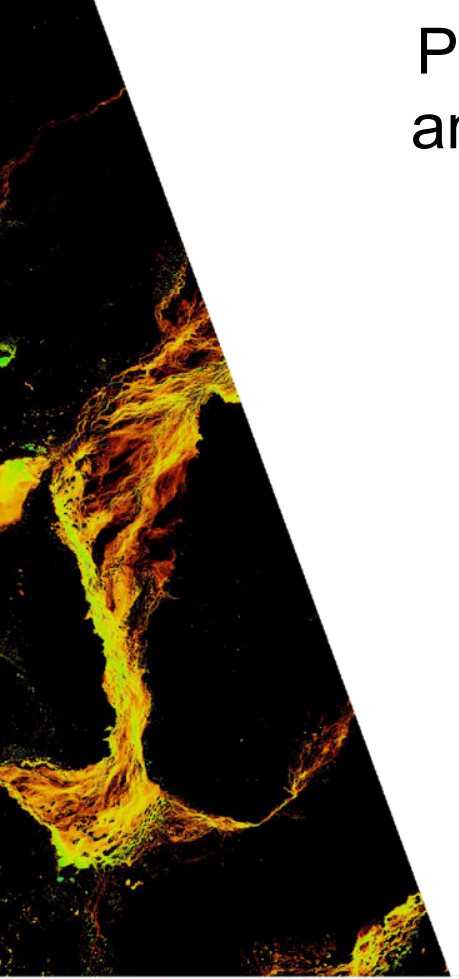
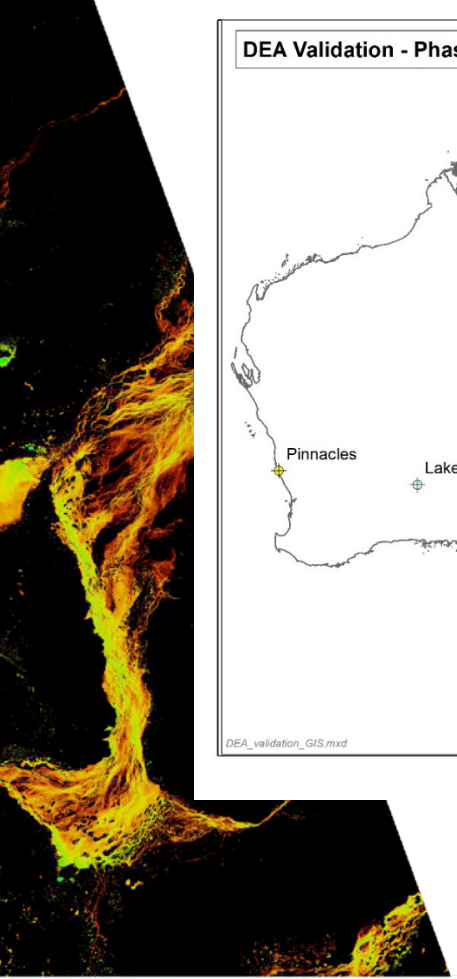


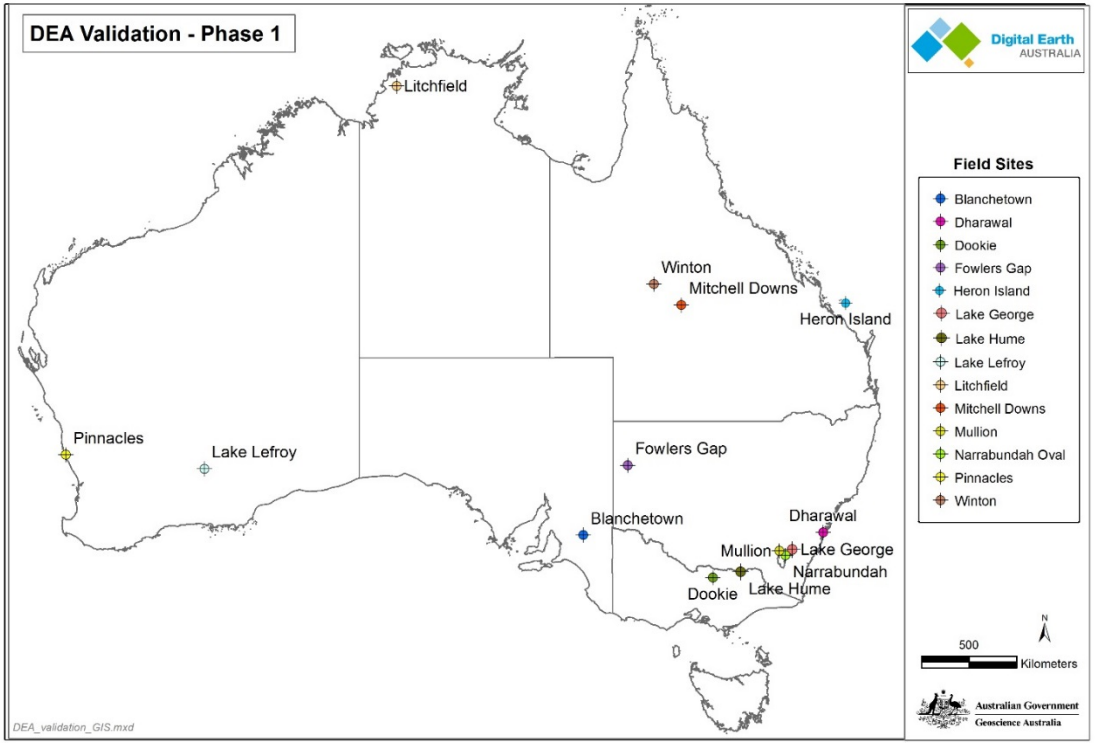
Past and Future Validation of Landsat 8 and Sentinel 2 Products, using a Drone-Based Approach

Dr Andrew Walsh
Mr Guy Byrne
Dr Mark Broomhall
Mr Medhavy Thankappan

Geoscience Australia

With thanks to Dr Stefan Maier (Maitec)





Digital Earth AUSTRALIA

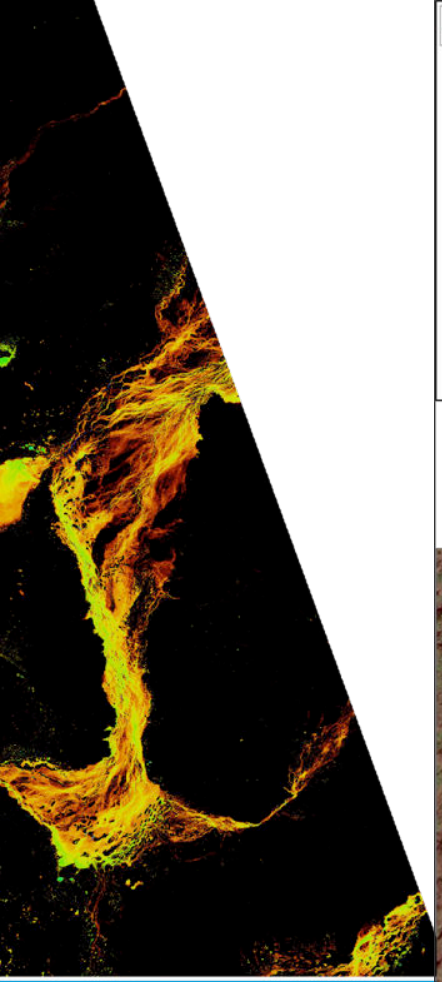
Field Sites

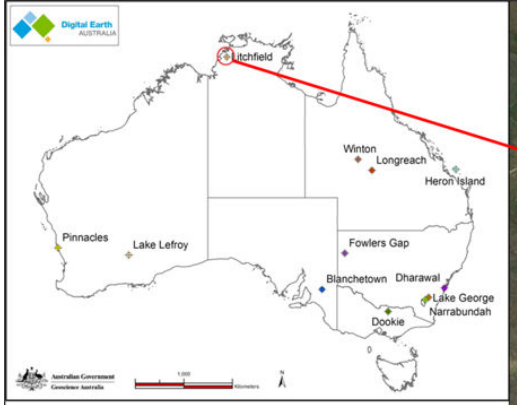
- Blanchetown
- Dharawal
- Dookie
- Fowlers Gap
- Heron Island
- Lake George
- Lake Hume
- Lake Lefroy
- Litchfield
- Mitchell Downs
- Mullion
- Narrabundah Oval
- Pinnacles
- Winton

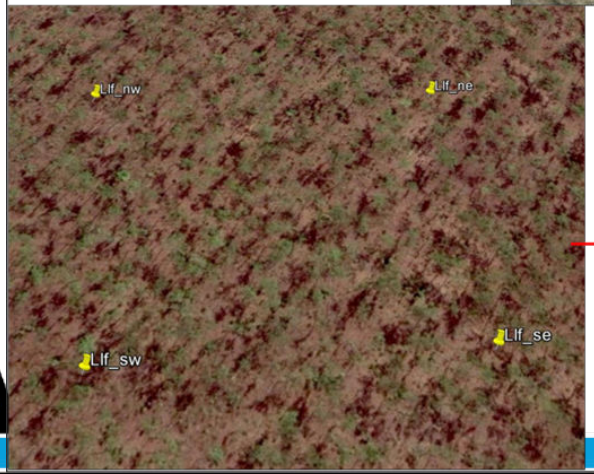
N

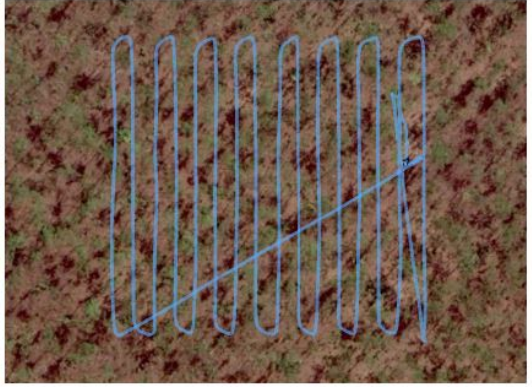
500 Kilometers

Australian Government
Geoscience Australia







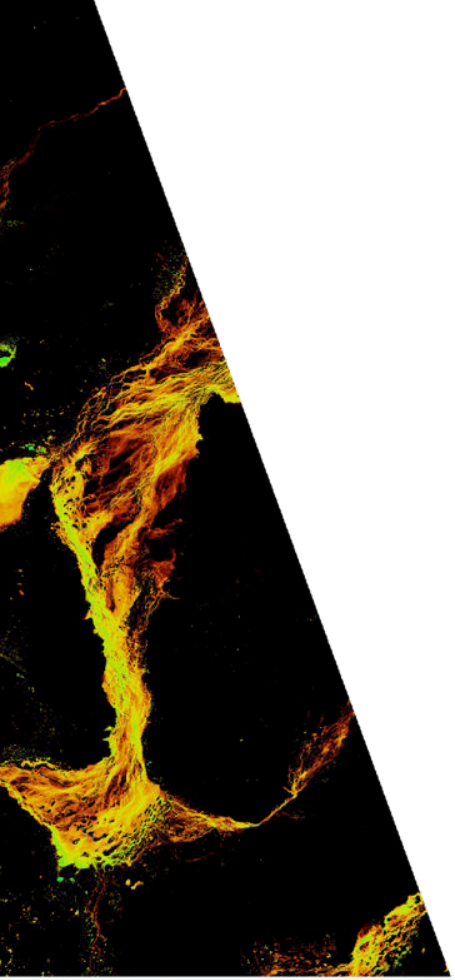


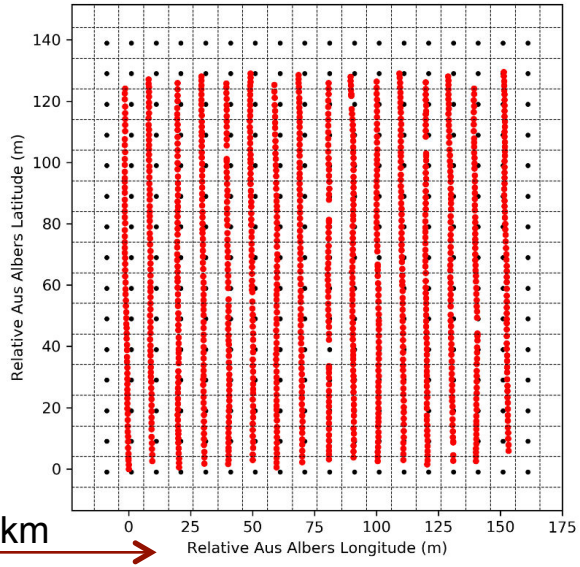
Spectroradiometer:

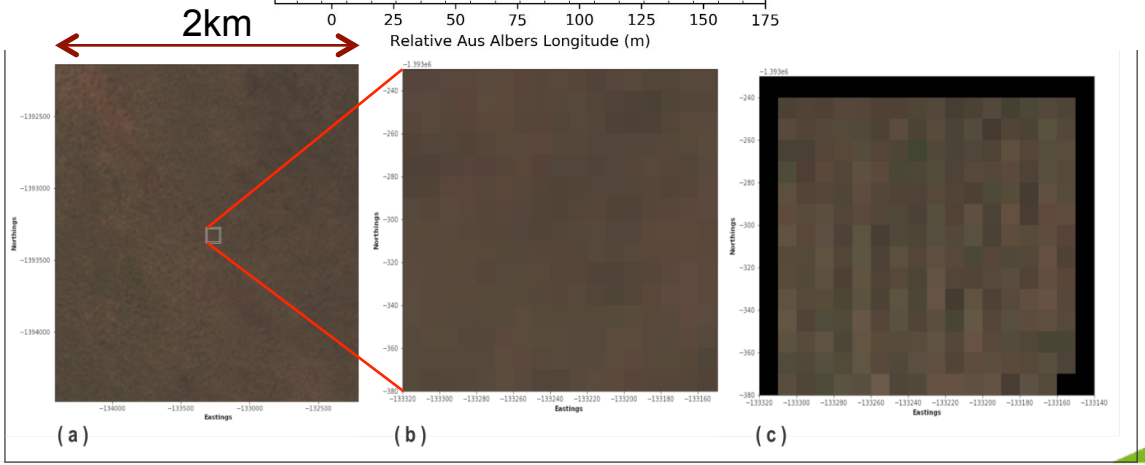
- STS-VIS from Ocean Optics mounted on a Solo UAV from 3D Robotics
- Captures spectra in 1024 channels from 337 nm to 823 nm
- 15° field-of-view

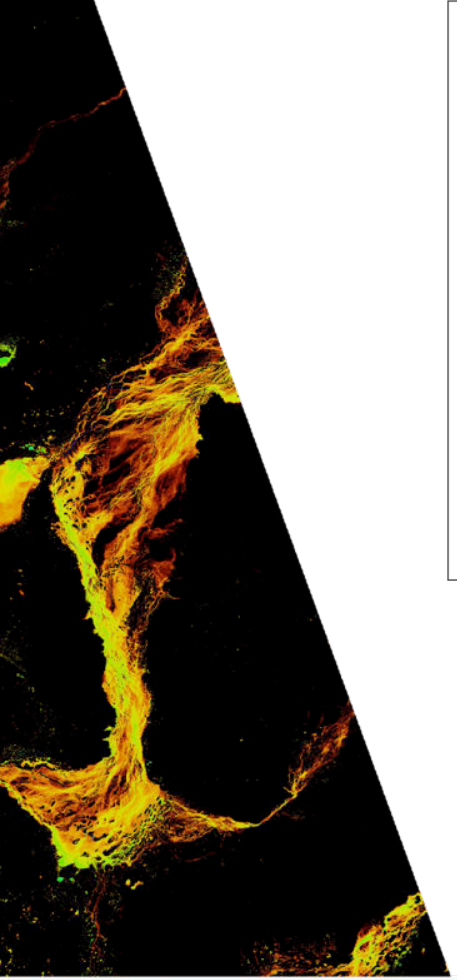
Flight Pattern:

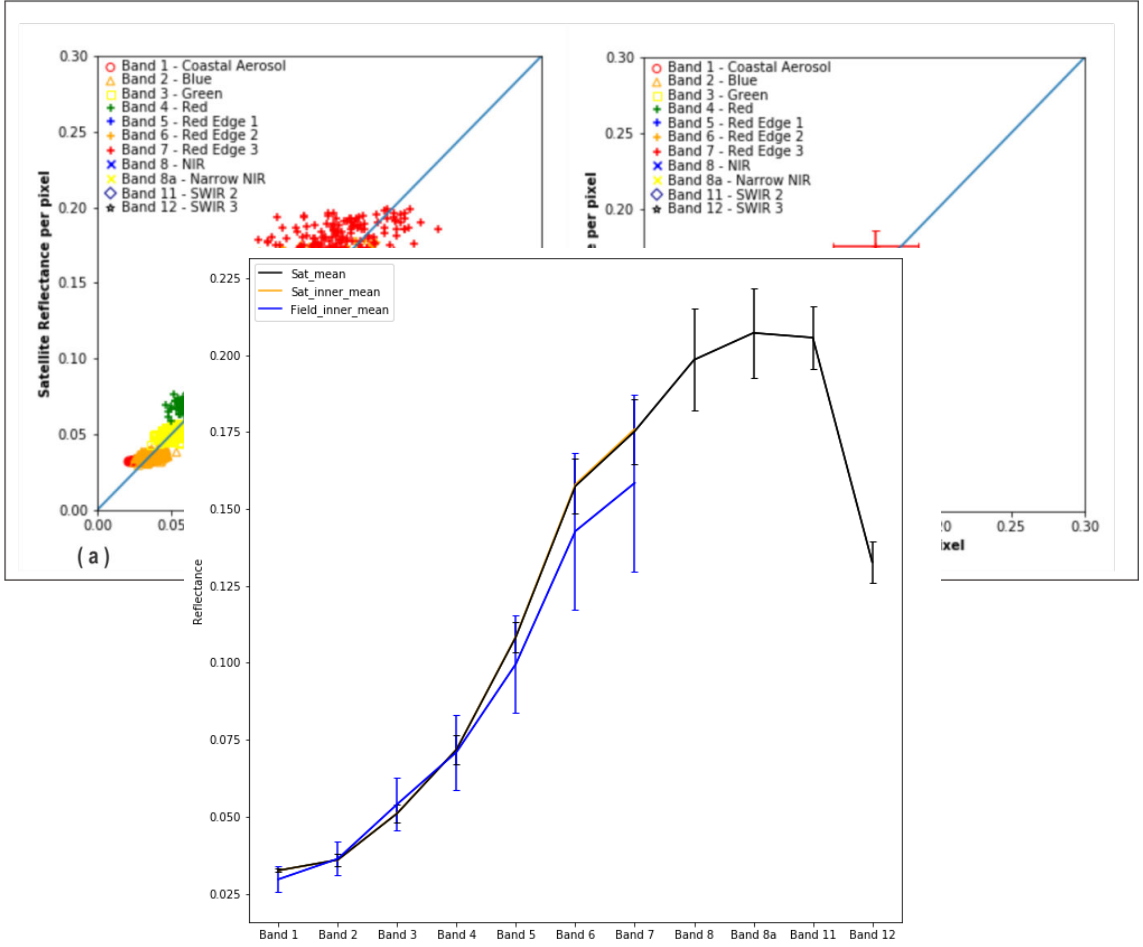
- 16 transects of 150m length with a spacing of 10m
- Nominal height of 50m
- 13m ground footprint
- Duration 7m 40s

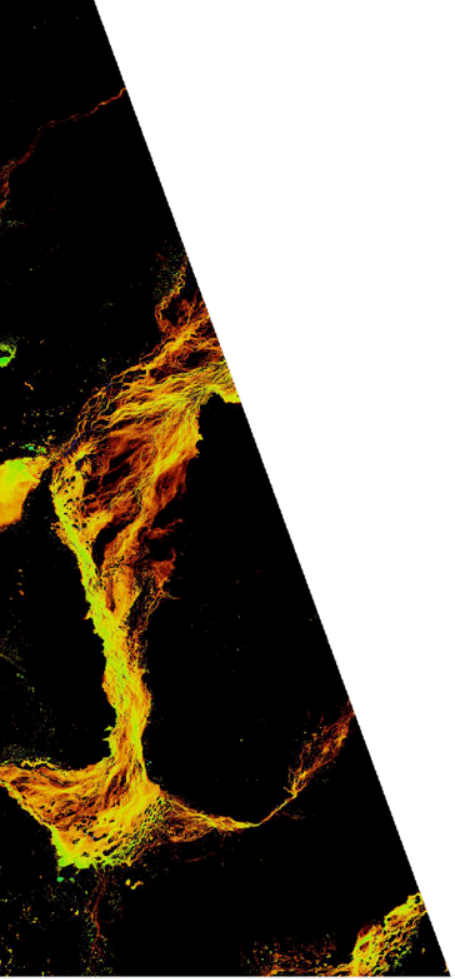










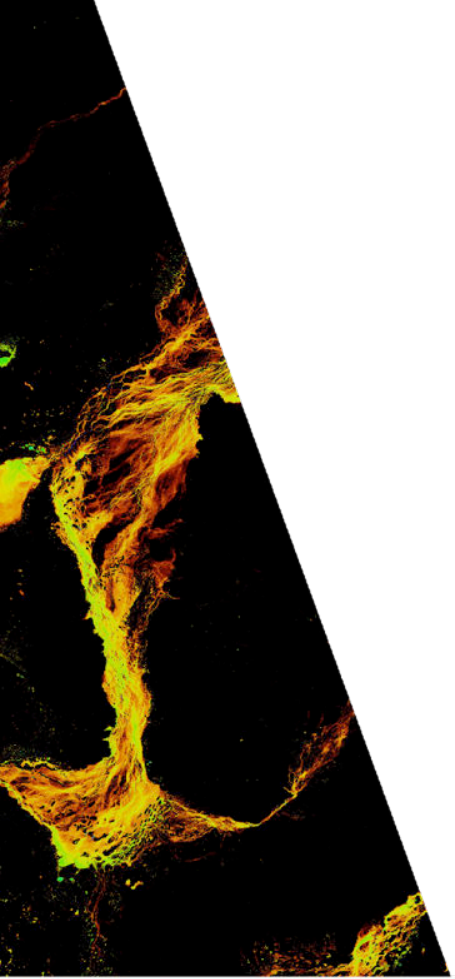


Advantages of drone over manual validation

- Quicker
- Cheaper
- Larger area
- More data
- Above canopy view

Advantages of manual over drone validation

- Full spectral range 350-2500nm
- Established procedures and equipment



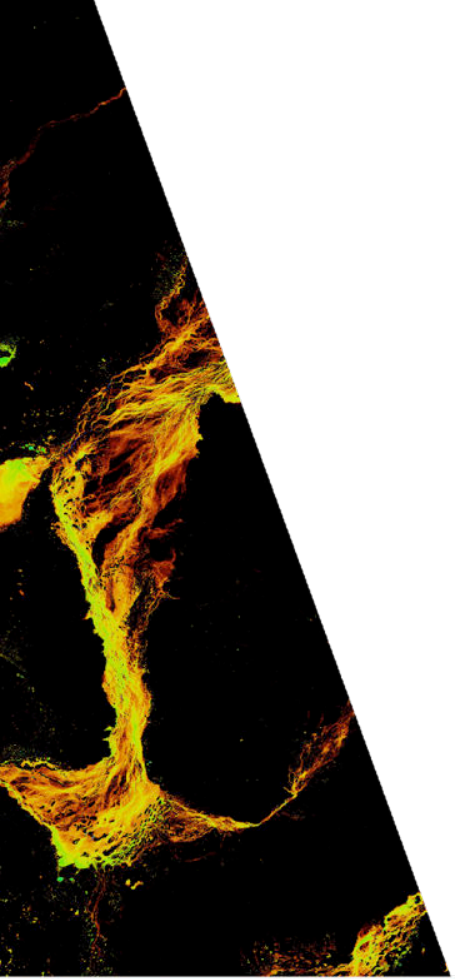
Phase 2 Validation with drones

Equipment

- Matrice 600 Pro as platform (The Skyhook)
- Ocean Optics Flame spectrometer (350-1000nm)
- Ronin MX Gimbal
- Gershun tube (change field-of-view)

Training

- Remote Pilot Licence (RPL 25kg class)
- Remote Operator Certificate (ReOC)



Phase 2 Validation with drones

Motivation

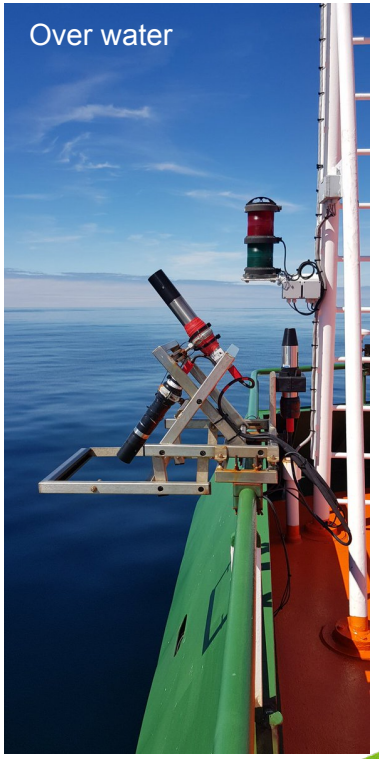
Terrain and targets

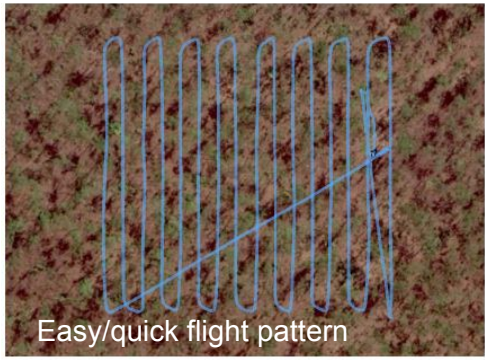
- Can fly over anything that is less than 120 m above the surface
- Anything with a steep slope (hill)
- Over water without the need for a boat

Methodology

- Quick deployment and flight pattern
- Sample entire surface

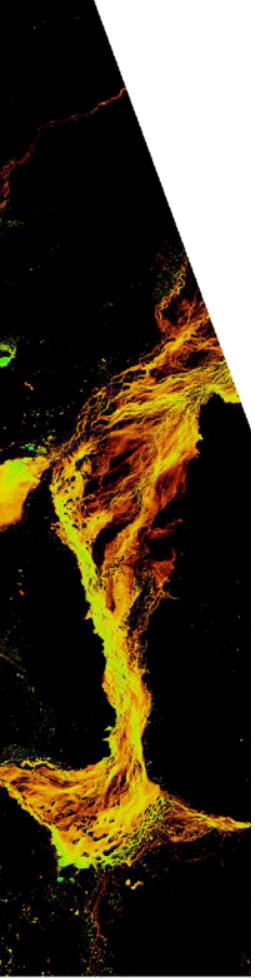
Phase 2 Validation with drones

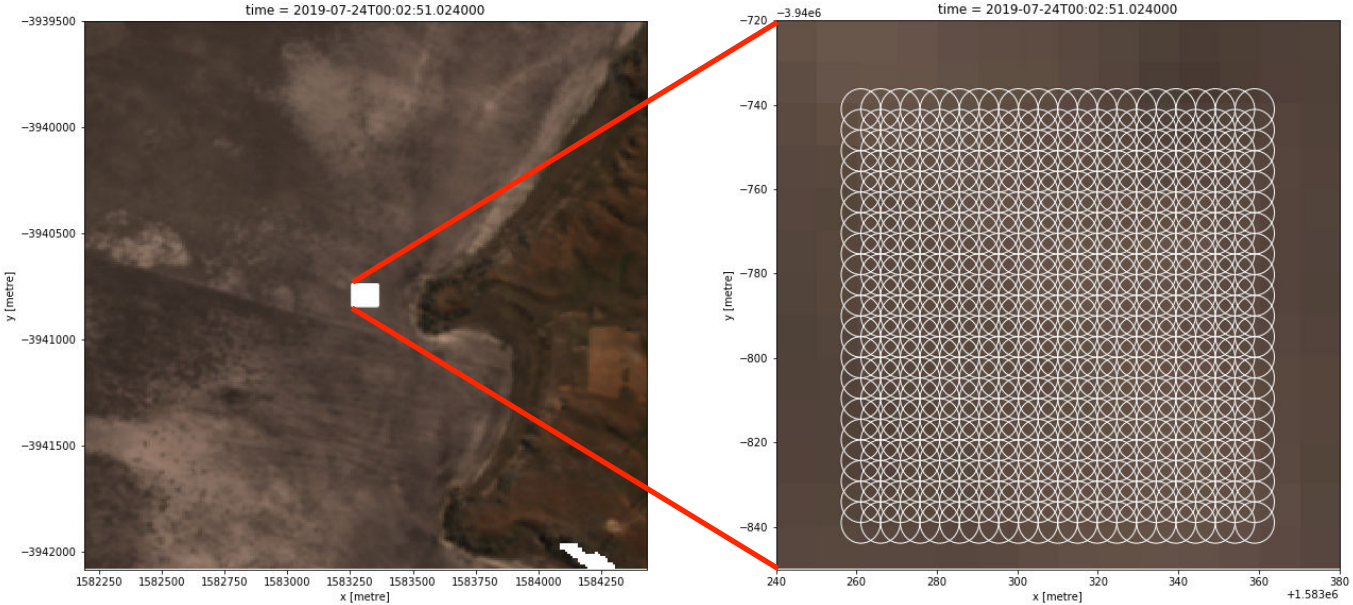




Phase 2 Validation with drones

Sample the entire surface

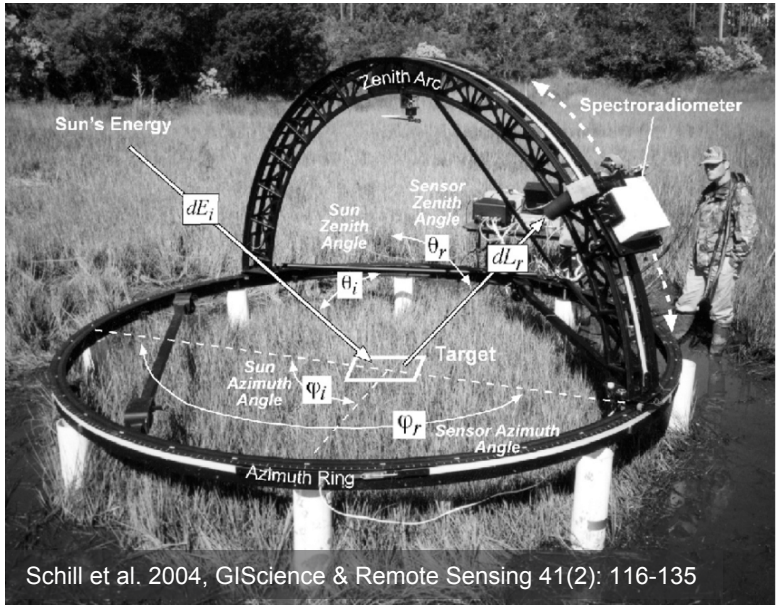




Bidirectional Reflectance Distribution Function (BRDF)

Bidirectional Reflectance Distribution Function (BRDF)

- Complex measurements – The Bidirectional Reflectance Distribution function (BRDF) can only be determined by viewing at numerous Solar, view and azimuth angles. A drone platform with a gimbal is ideal for this.



Schill et al. 2004, GIScience & Remote Sensing 41(2): 116-135

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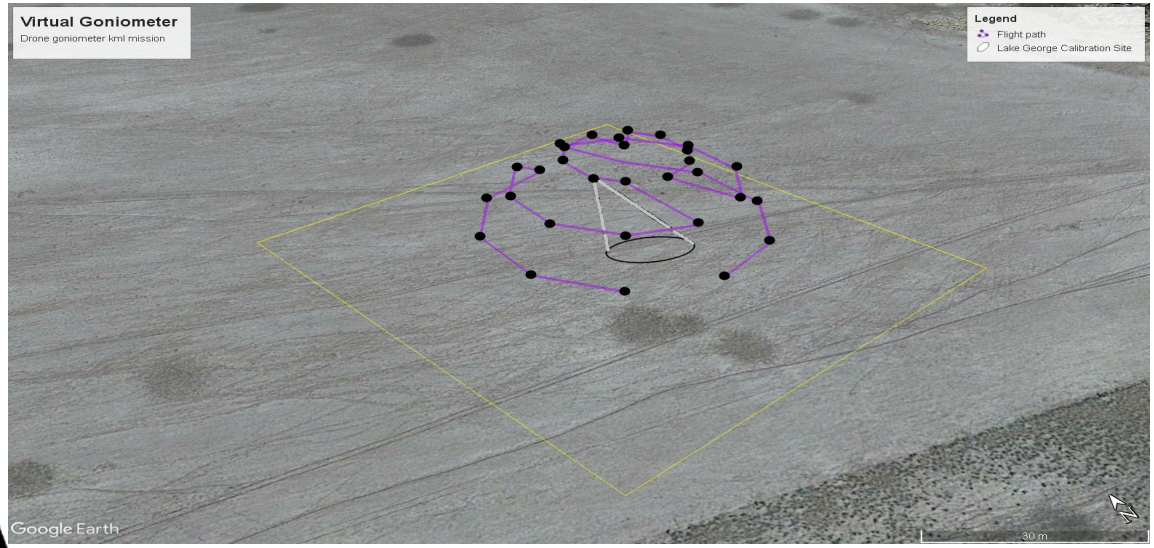

Summary

Phase 1: Litchfield site validated successfully
→ quick, cheap, but only shorter wavelengths

Phase 2: Acquiring new equipment, developing new methods
→ Greatly increase capability to validate more sites