Using Airborne Sensing to Map Pools in Rivers

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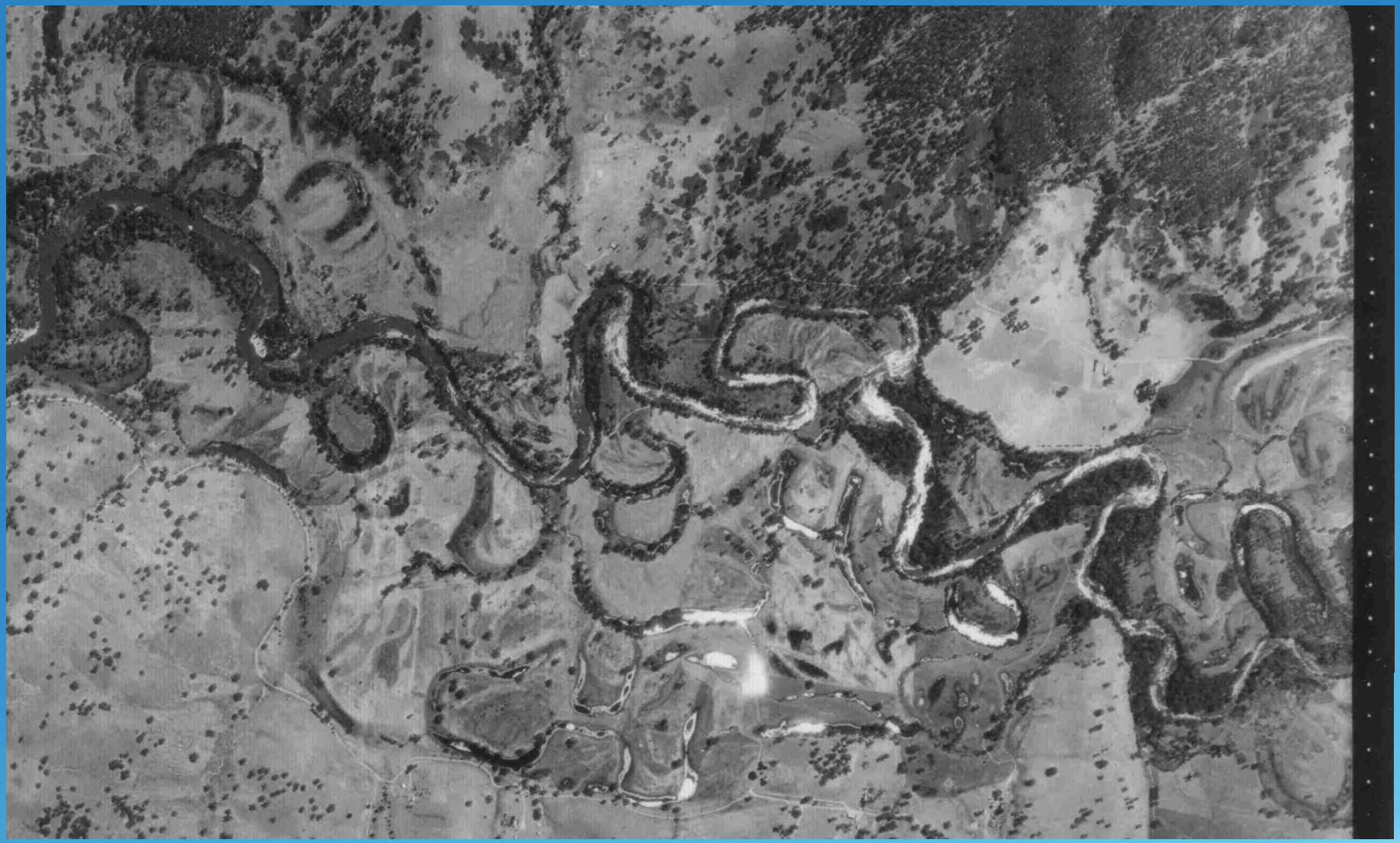

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Mapping methods

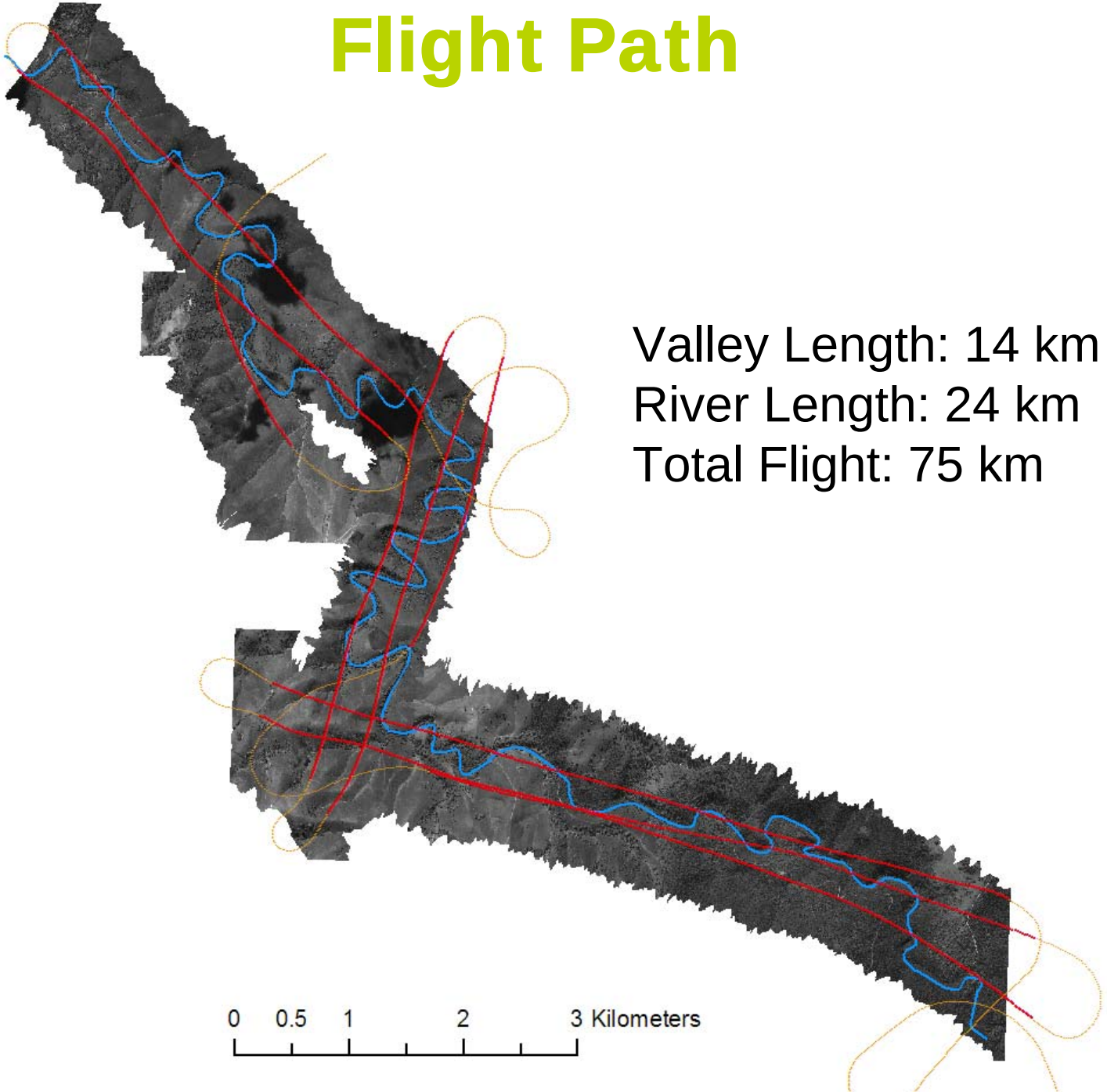
- Spaceborne Surveys
  - Advantages: Extensive coverages, low cost for existing products
  - Disadvantage: Low resolution, no control over timing and location, limited to available instrumentation
- Airborne Methods
  - Advantages: Can specify flight paths, low elevation and speed flights provides high resolution (<1 m), can select appropriate instrumentation
  - Disadvantages: Reliability uncertain, may need ground observation to calibrate mapping techniques

Pilot Study of Airborne Survey of Pools

- Plane mounted – combination of sensors
  - LIDAR, Infrared, multi-spectral scanning, digital stills
- Airborne Research Australia
- Simultaneous ground surveys of pool size and location

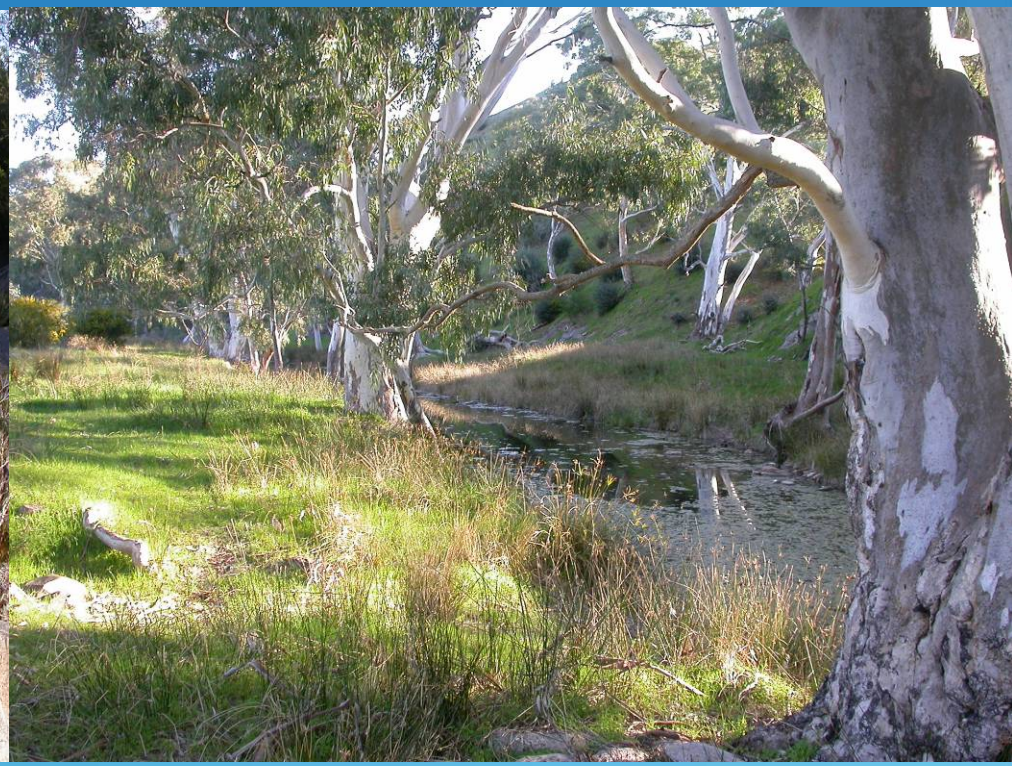
Instrumentation

Flight Path

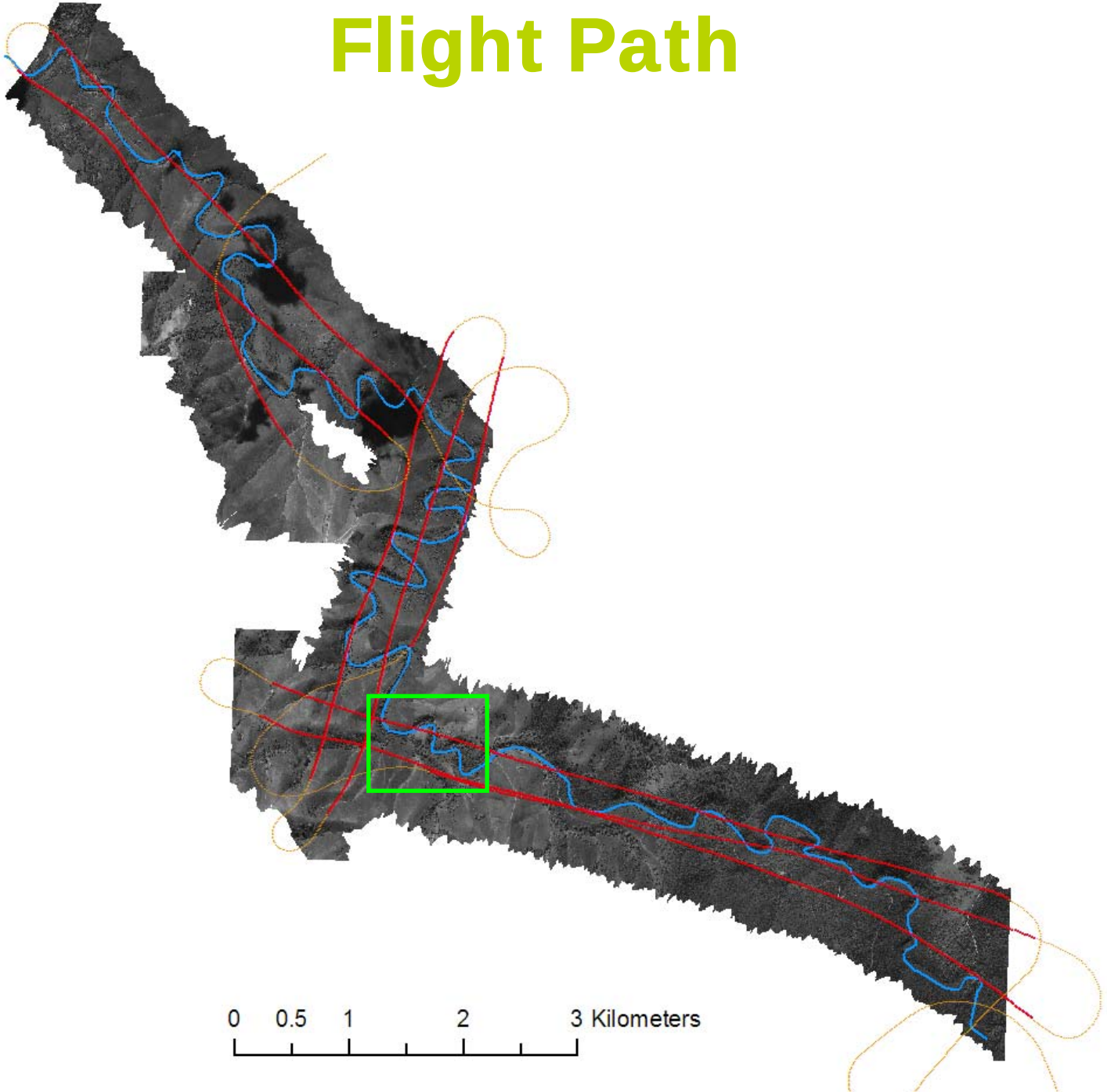


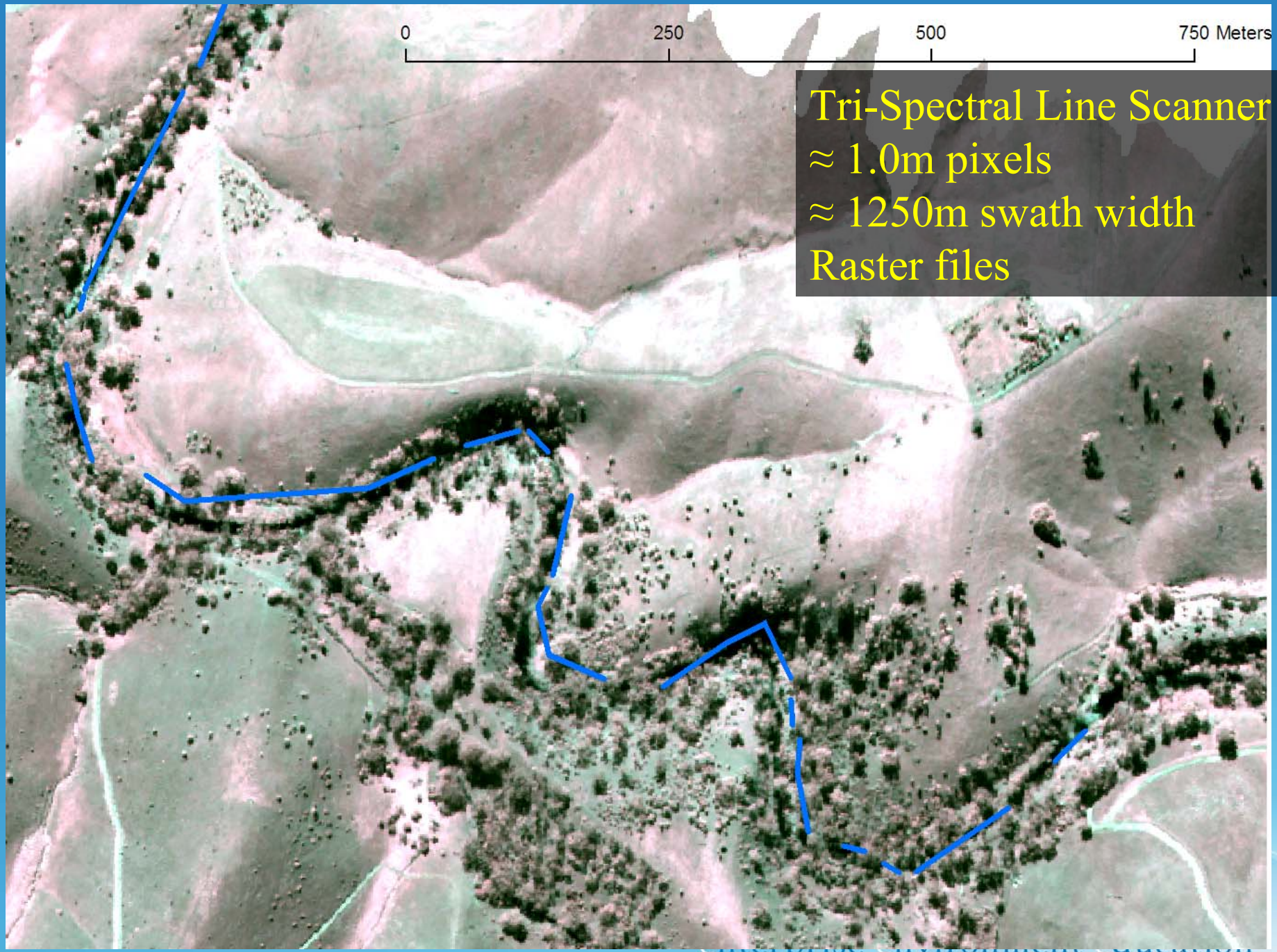
Valley Length: 14 km
River Length: 24 km
Total Flight: 75 km

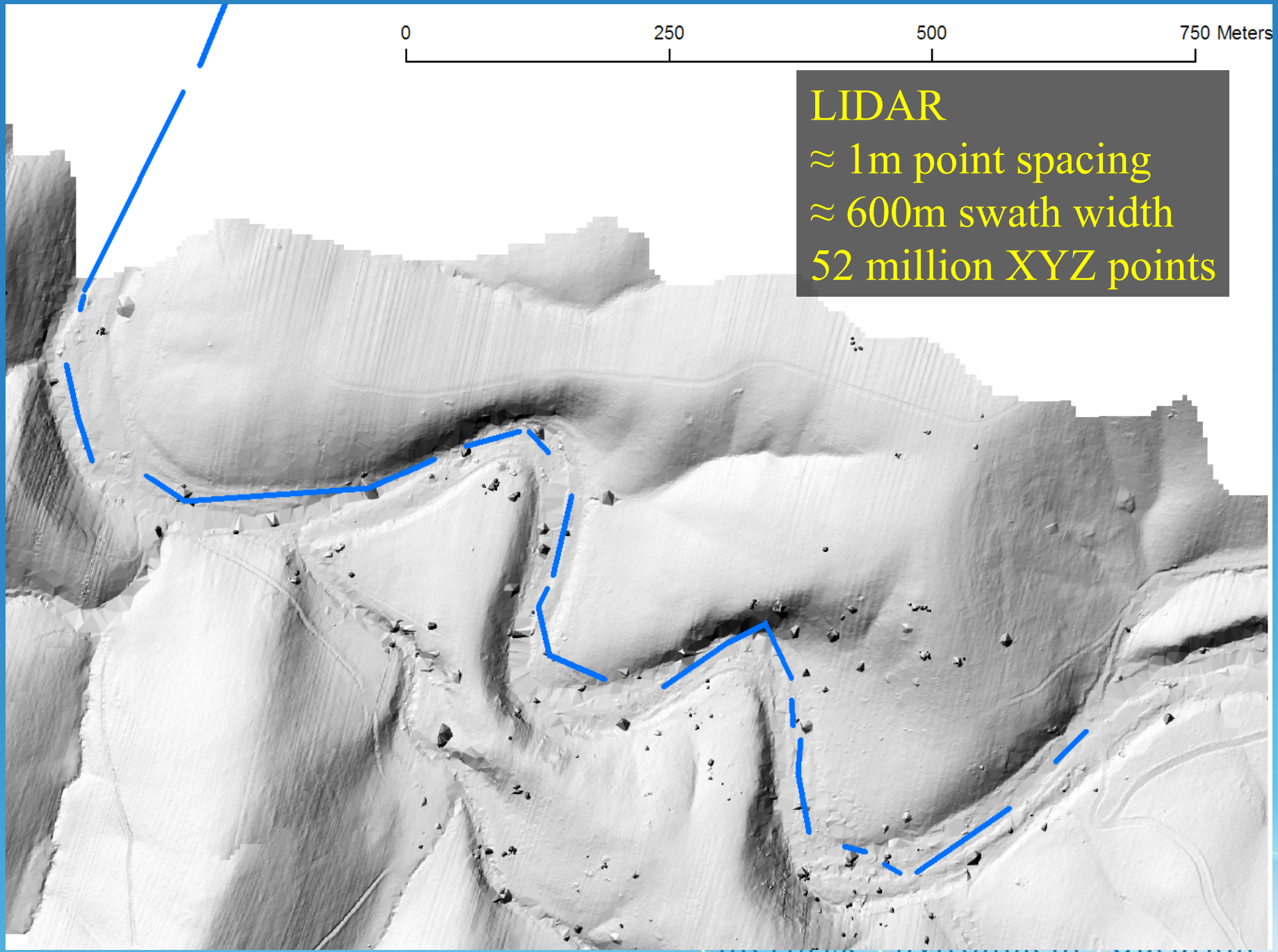
South Para River (upstream of Gawler)

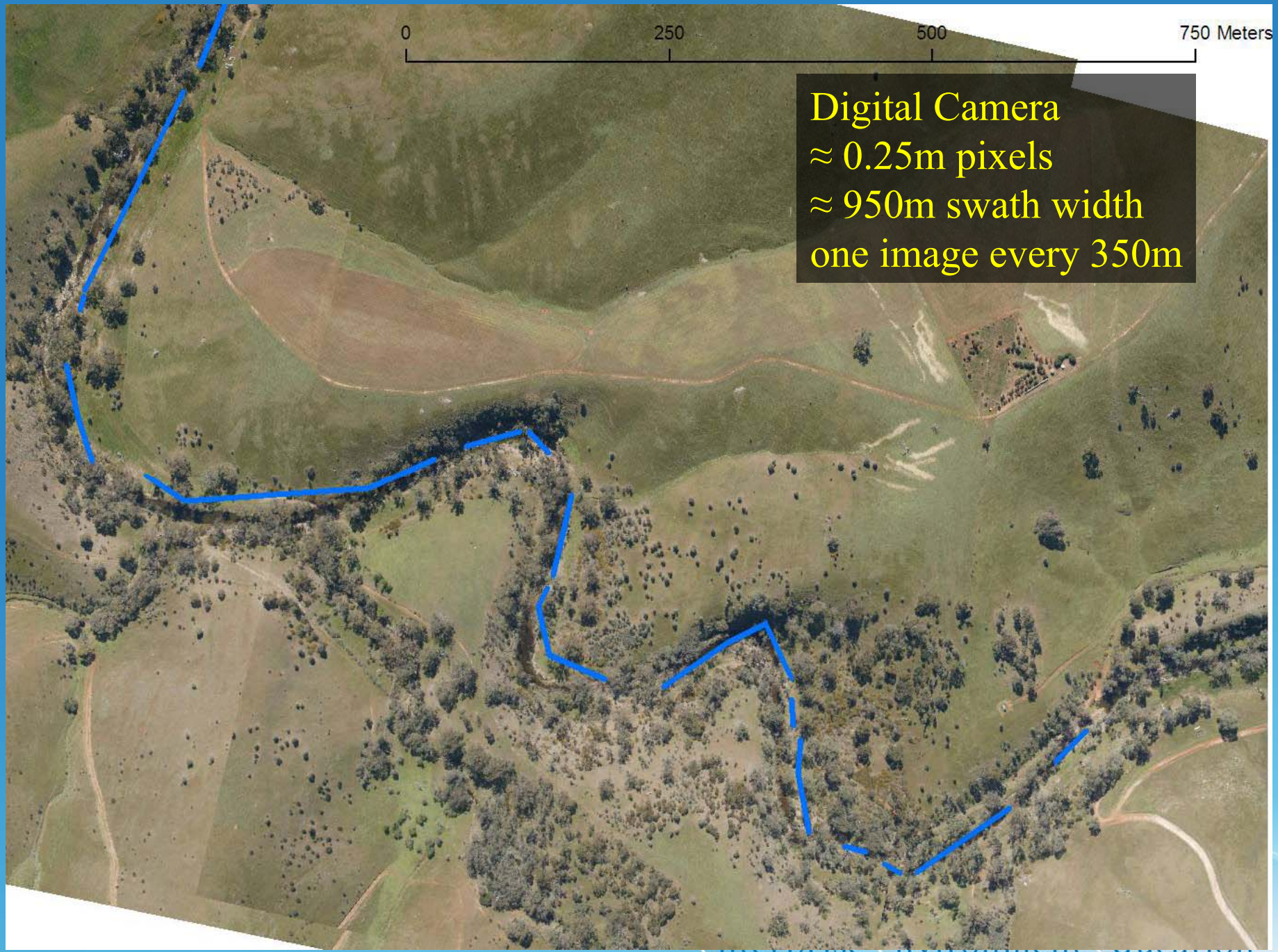


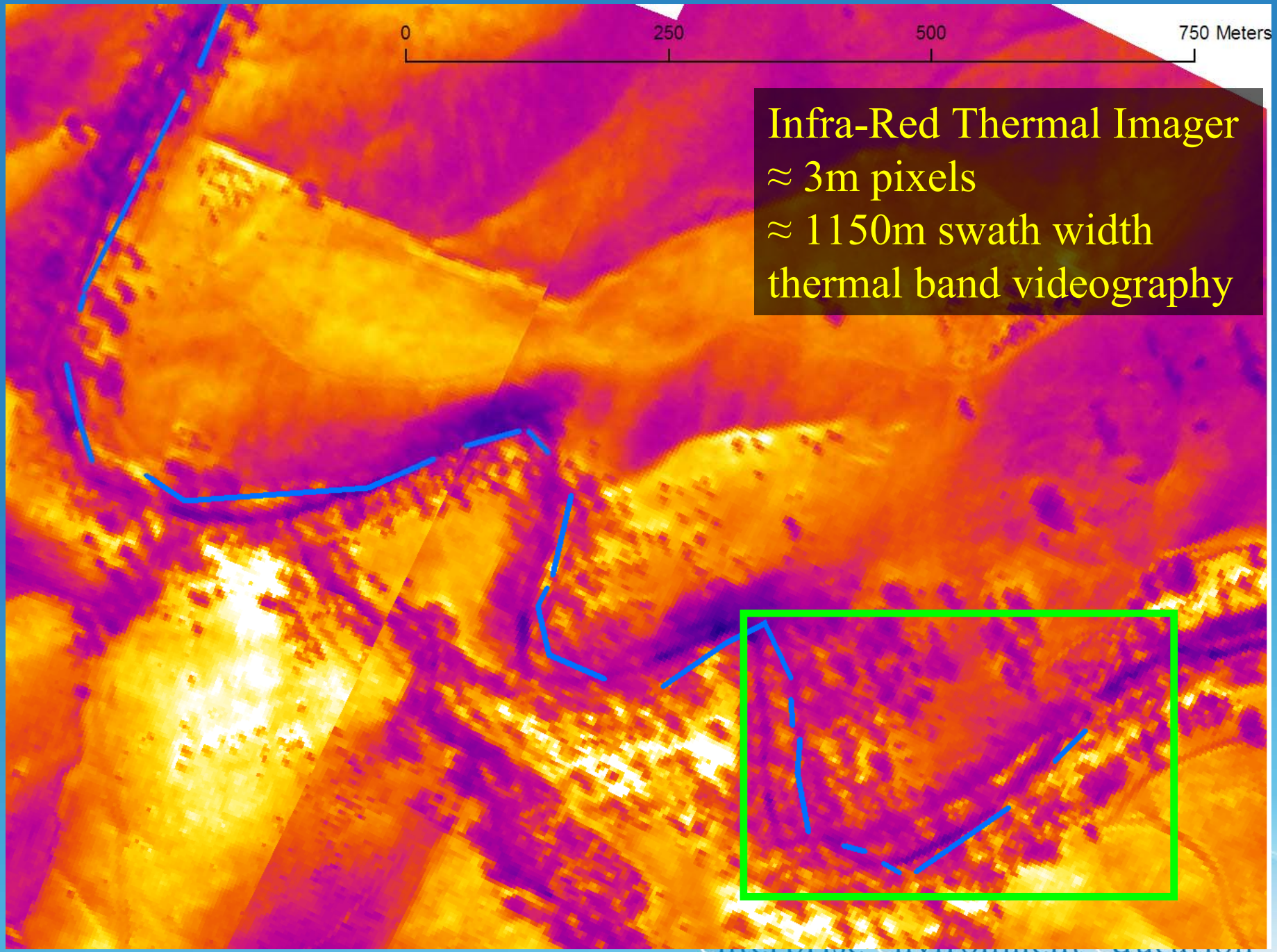
Flight Path



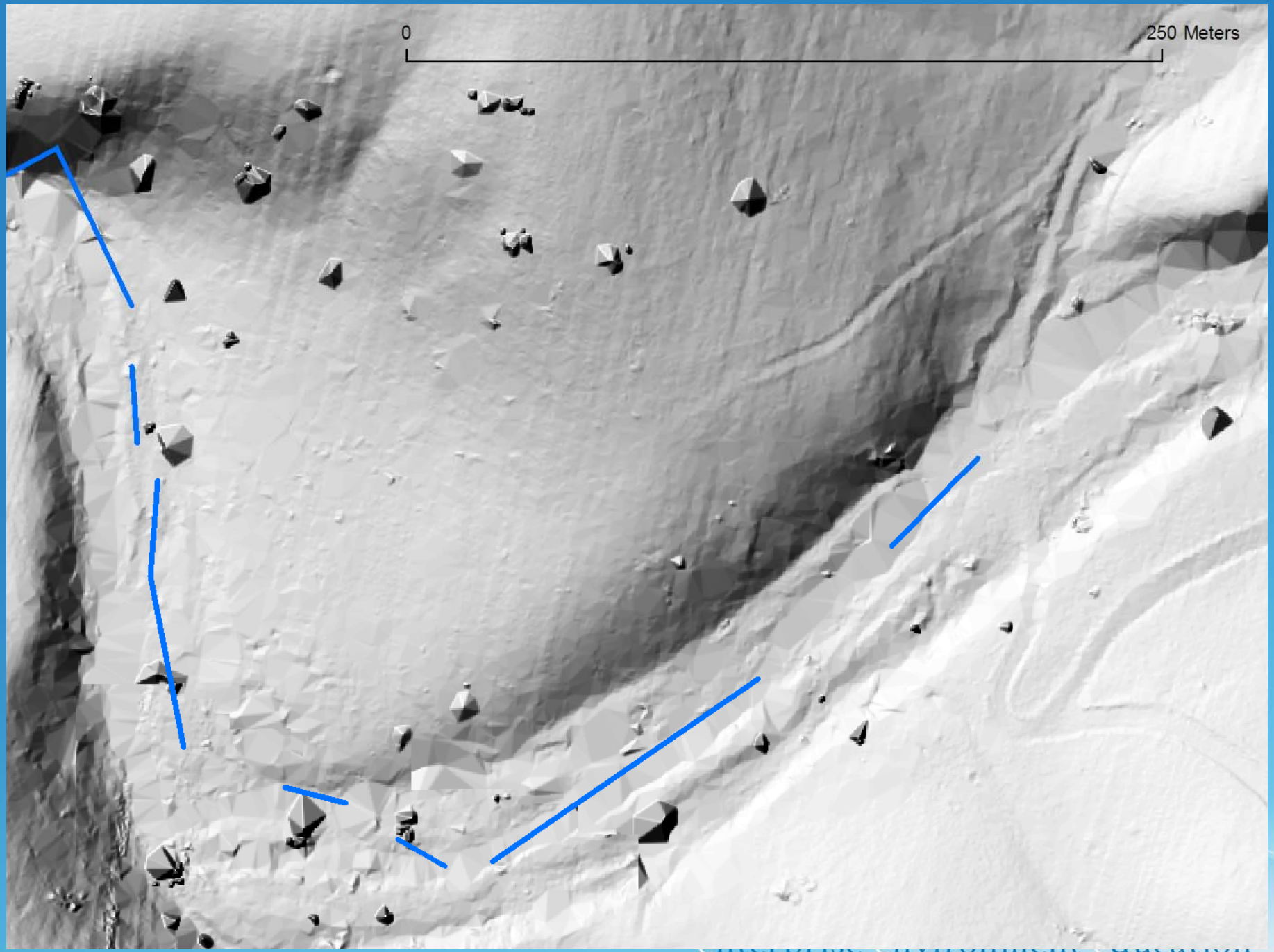

0
250
500
750 Meters
Tri-Spectral Line Scanner
≈ 1.0m pixels
≈ 1250m swath width
Raster files


0
250
500
750 Meters
LIDAR
≈ 1m point spacing
≈ 600m swath width
52 million XYZ points

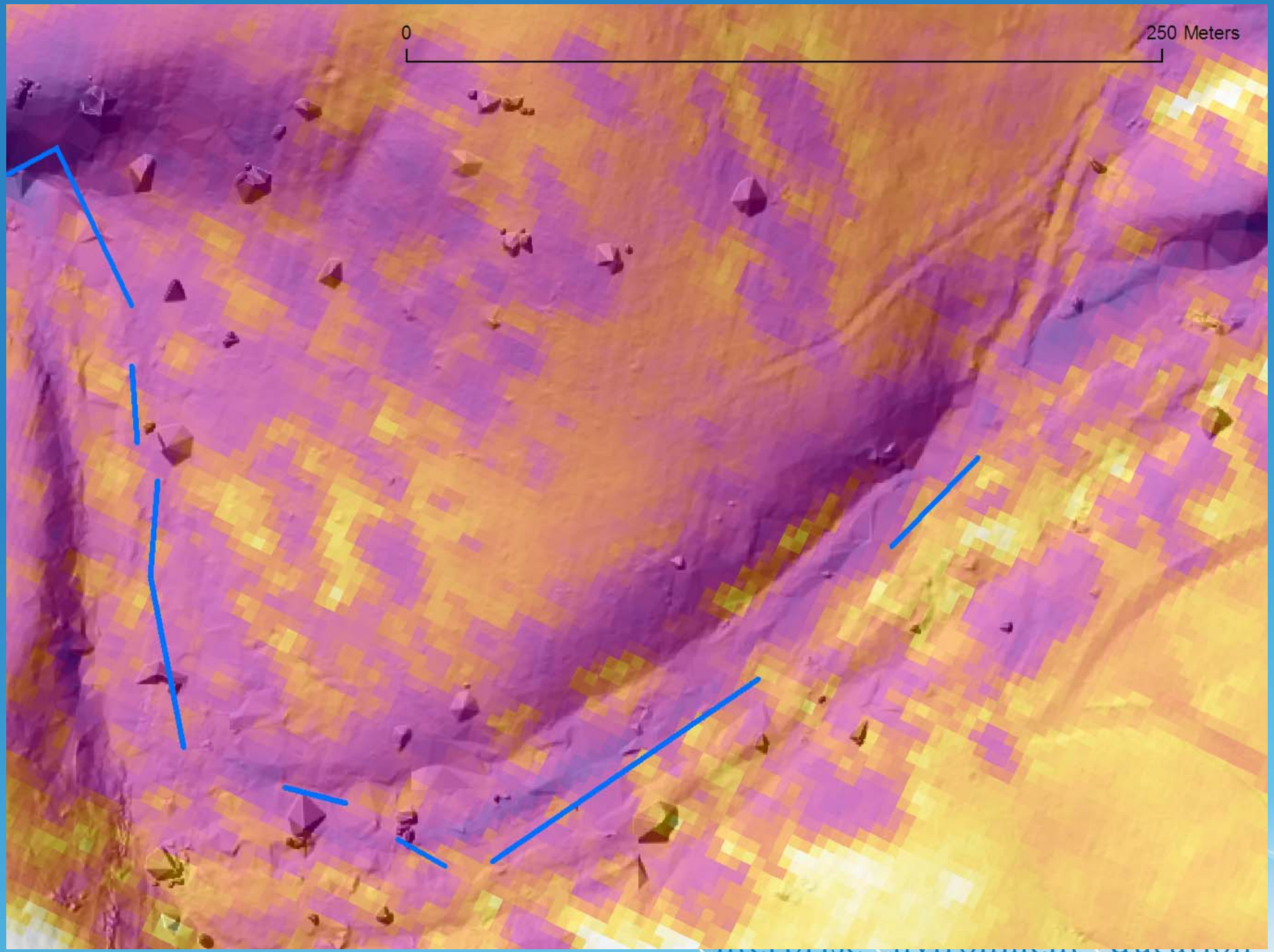

0
250
500
750 Meters
Digital Camera
≈ 0.25m pixels
≈ 950m swath width
one image every 350m


0
250
500
750 Meters
Infra-Red Thermal Imager
≈ 3m pixels
≈ 1150m swath width
thermal band videography


0
250 Meters


0
250 Meters


0
250 Meters


0
250 Meters

Tri-Spectral Scanner

Supervised Classification Accuracy

	1 Correct Location and Dimensions	2 Correct Location, Incorrect Dimensions	4 Pool not Identified in Supervised Classification
32 pools surveyed	10	21	1

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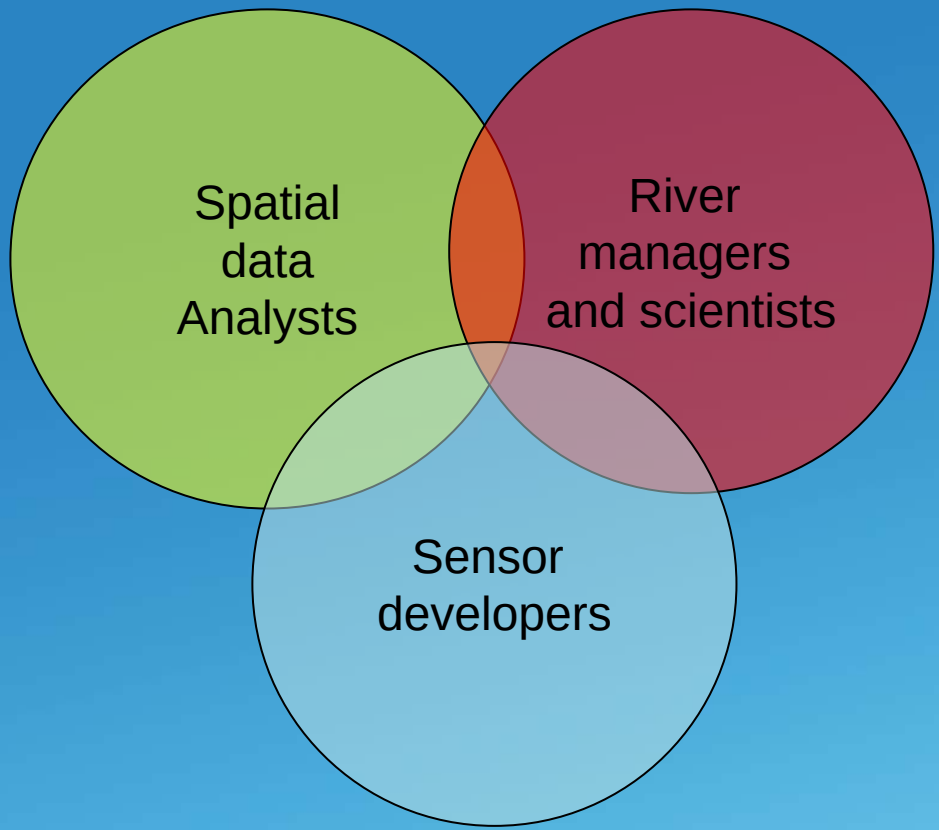
Cost Effectiveness

Method	Flight path	Costs $/km	Speed km/day	Interpretation of Data
Plane mounted sensors	Straight only	10-20	300-600	•Possibility of automation •Manual interpretation also possible ($<25/km) •Advantage of geo-referenced high resolution data
Helicopter videography	Follow river	45-70	360	•Manual interpretation only ($25/km) •Advantage of oblique view
Ground	Follow river where access possible	130	4	•Direct interpretation

Airborne Survey of Rivers

- Opportunity
  - cost effective
  - increased coverage and improved improved precision
  - reduced survey time and rapid response to events
  - environmental data for catchment modelling and visualisation
- Challenges
  - what is possible within limits to technology
    - data resolution and positional accuracy
    - penetration of tree canopy and water surface
  - instrument specifications for this application
  - procurement of instrumentation and aircraft
  - development of data processing procedures
  - optimum combination of ground, airborne and satellite data

Collaboration needed for Future Development



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