CRCLEME
Cooperative Research Centre for
Landscape Environments
and Mineral Exploration

THE UNIVERSITY OF ADELAIDE
AUSTRALIA
SUB CRUCE LUMEN

Improving the reliability of Au-in-Calcrete anomalies: evidence from Tunkillia, SA

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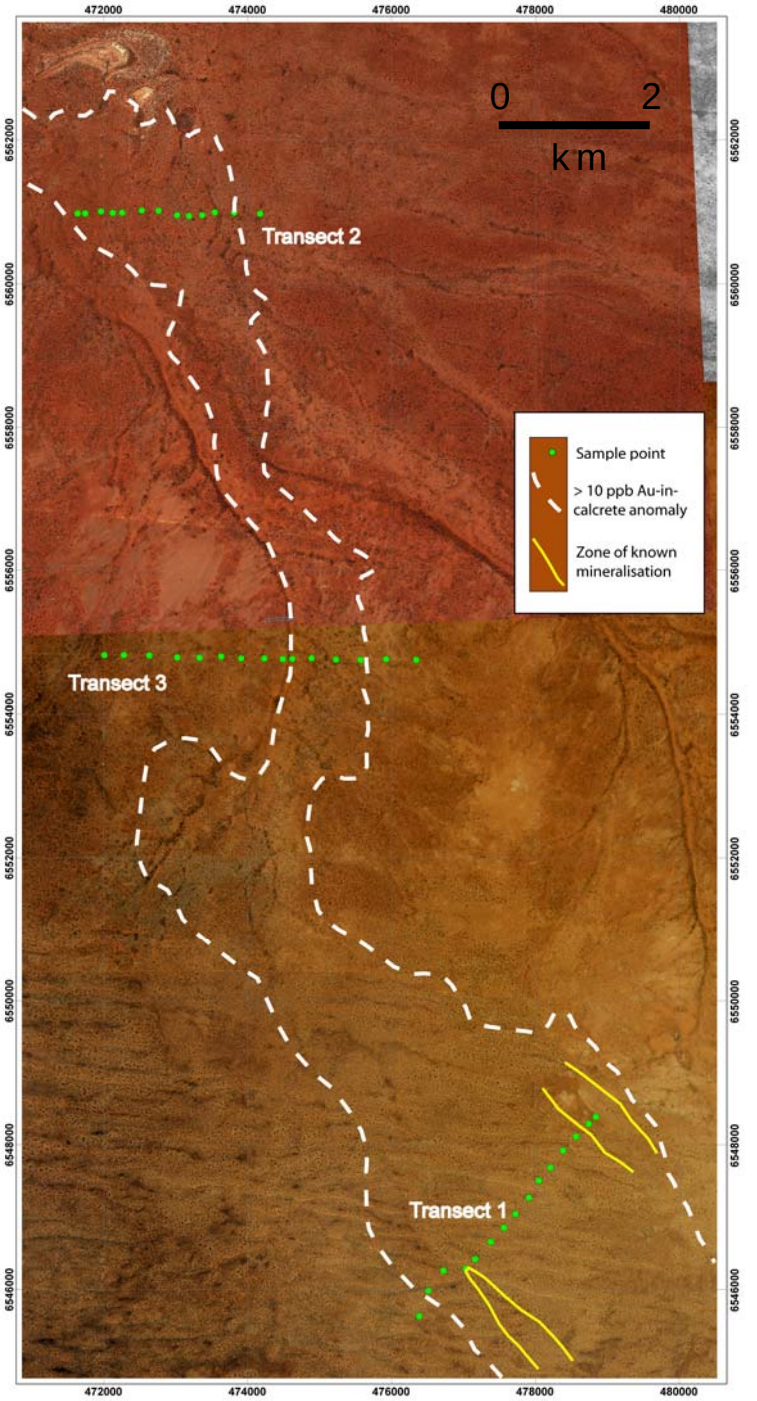
Introduction

- Companies seem to have no problem producing Au-in-calcrete anomalies
- BUT
- The **BIG** question:
  - Can we rank these and make them more effective???

Tunkillia

- ENORMOUS Au-in-calcrete anomaly
  - ~ 20 km at > 10 ppb Au
- Extensive drilling $$$ (>$15 million)
  - defined small discrete zones of mineralisation



Introduction

- What can we learn from the Tunkillia experience?
- Can we use this knowledge to improve the success rate of other Au-in-calcrete anomalies in the area?

What did we do?

- Regolith-Landform mapping
- Sampled 3 transects across:
  - 1. Au-in-calcrete anomaly over mineralisation
  - 2. Au-in-calcrete anomaly over barren bedrock
  - 3. background
- Samples assayed for 53 element suite

REGOLITH-LANDFORM MAPPING

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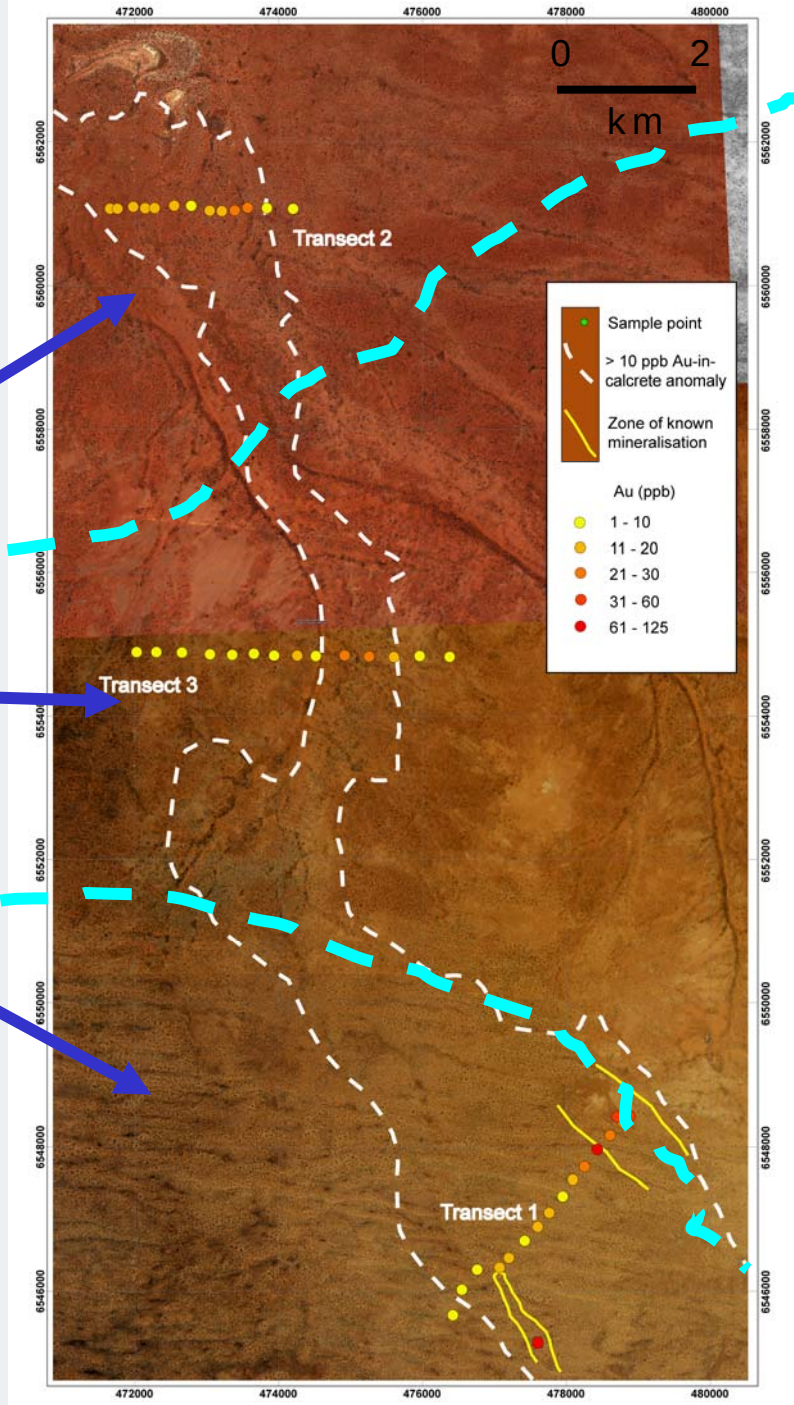
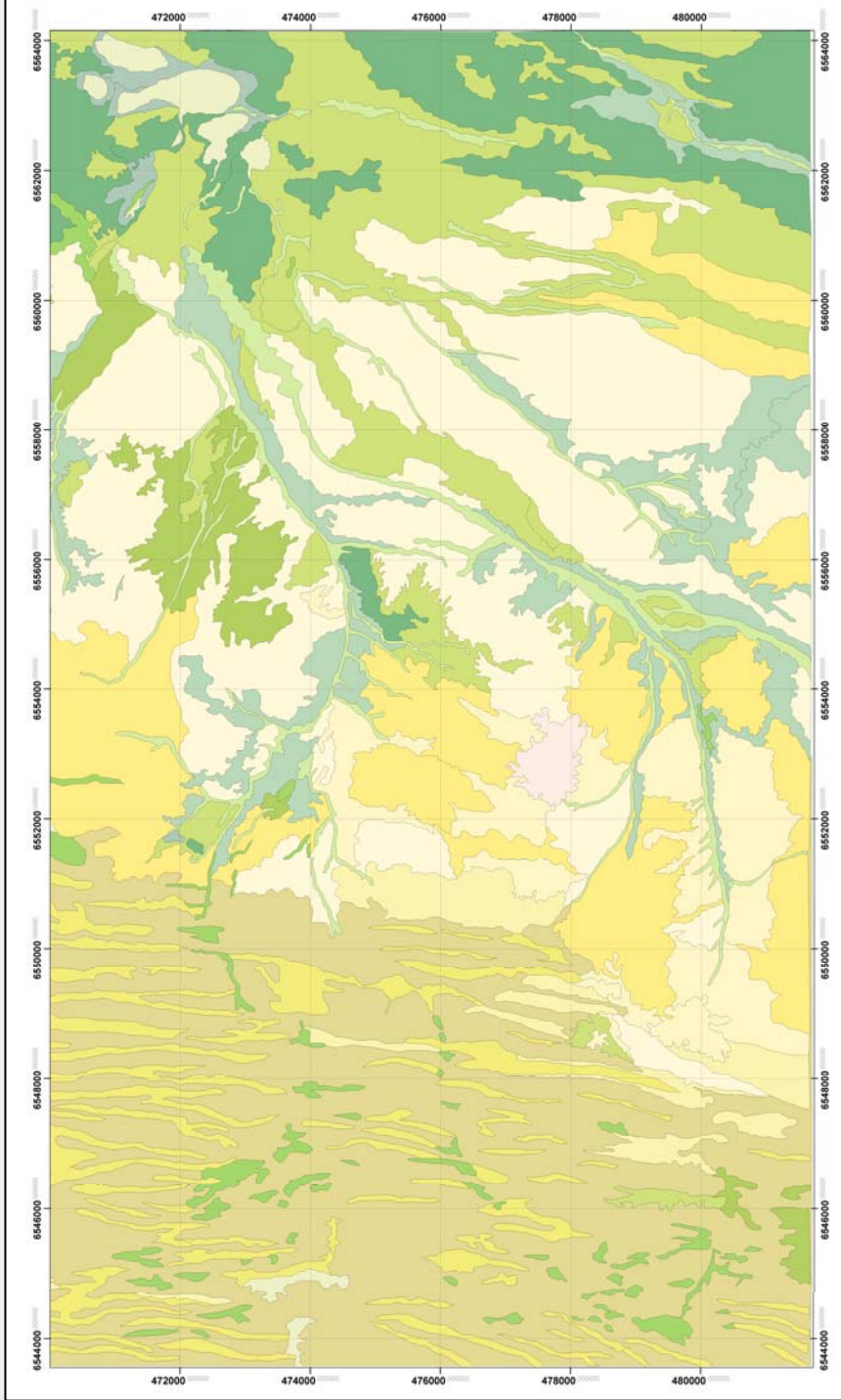
Regolith-Landform mapping

- Main landform zones
  - Depositional
  - Erosional
  - Dunefield



What the completed regolith-landform map looks like



Southern transect

- Dunefield

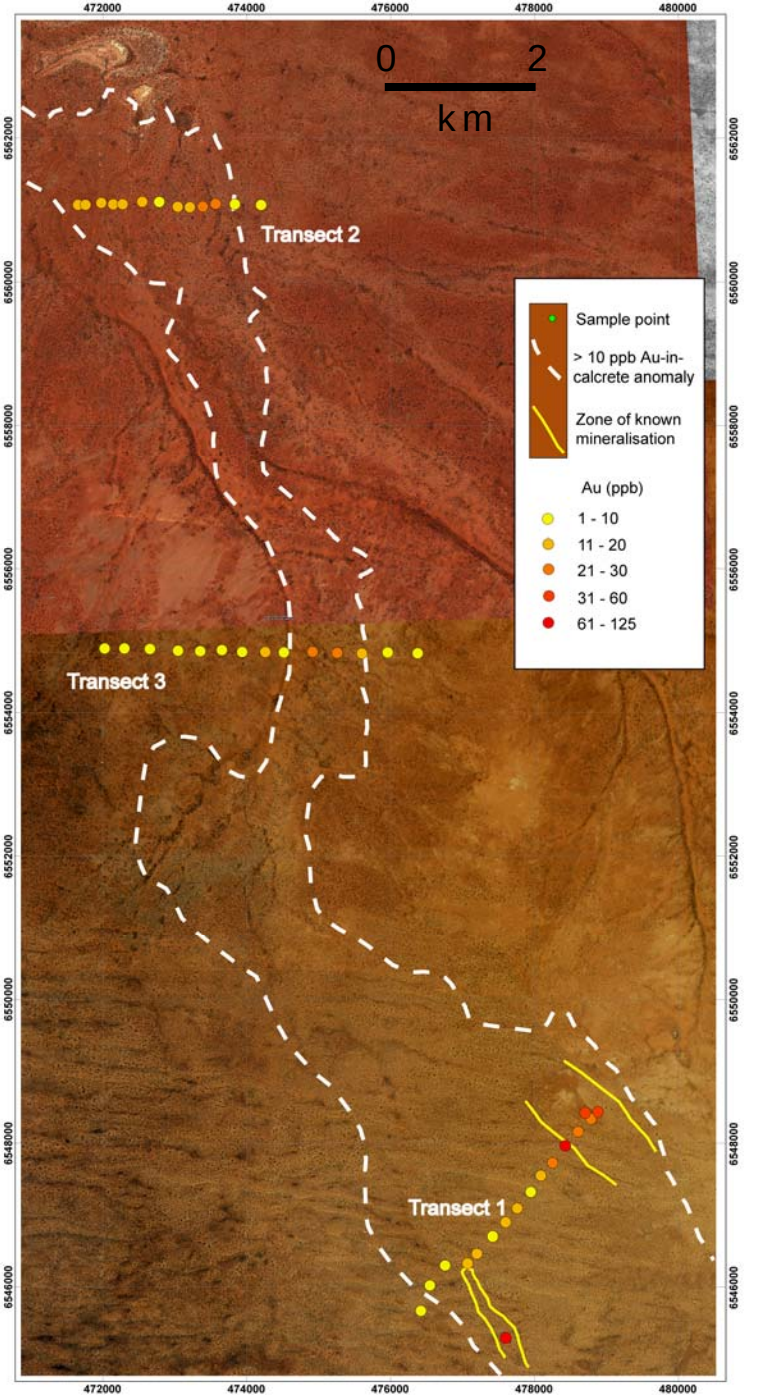
Central transect

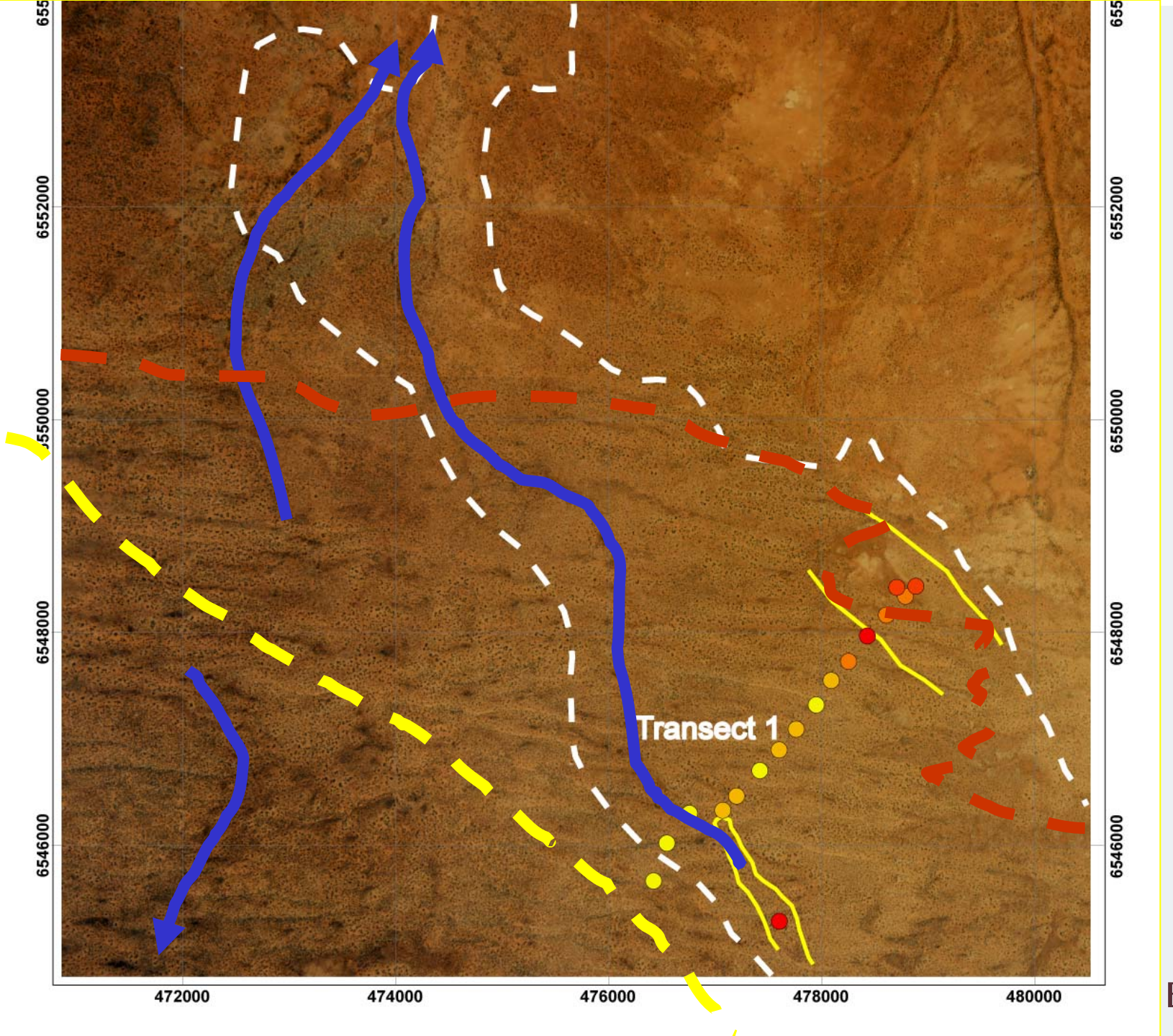
- Erosional plains

Northern transect

- Depositional plains & ephemeral lakes

What regolith-mapping revealed




6552000
6550000
6548000
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472000
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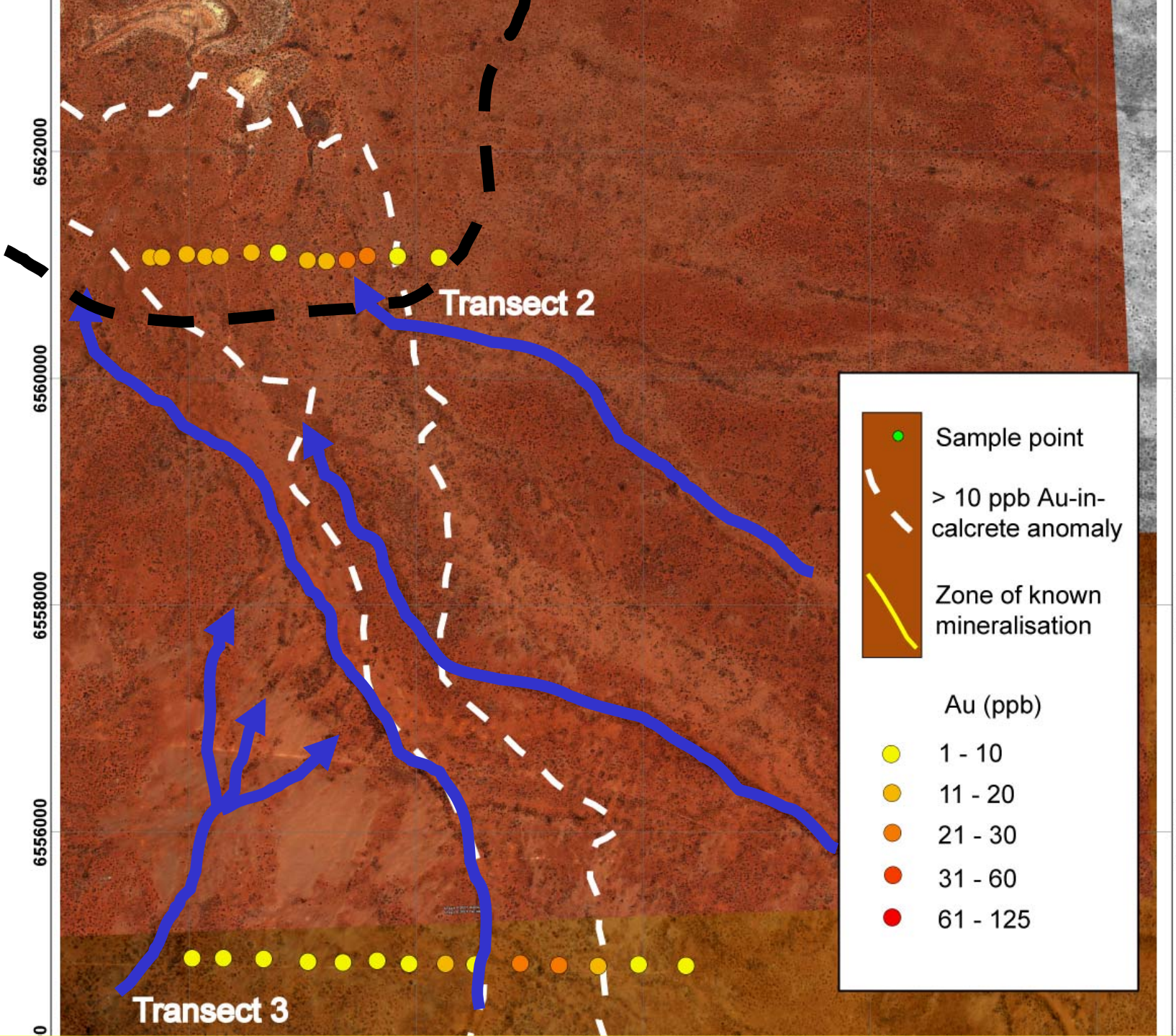
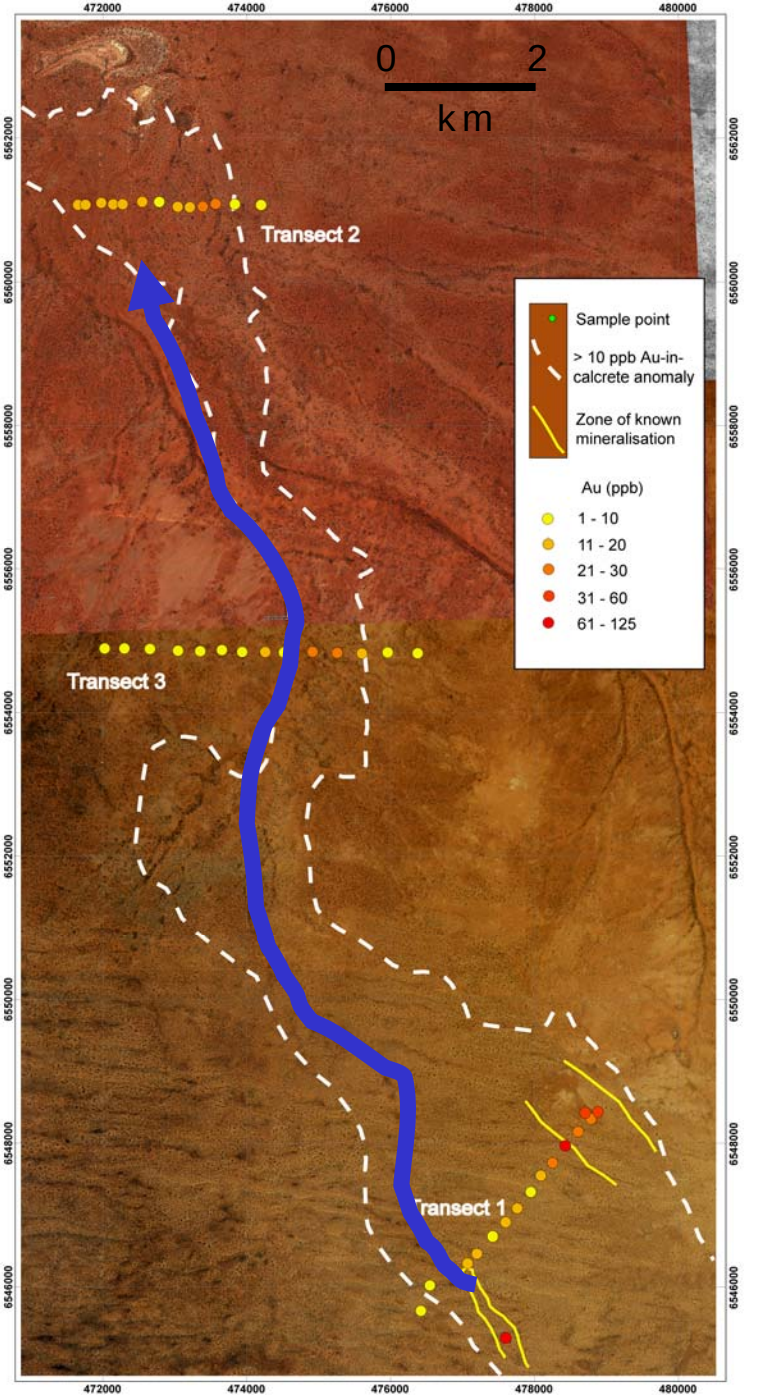
476000
478000
480000
Transect 1

E


6562000
6560000
6558000
6556000
Transect 2
Transect 3
Sample point
> 10 ppb Au-in-calcrete anomaly
Zone of known mineralisation
Au (ppb)
1 - 10
11 - 20
21 - 30
31 - 60
61 - 125

Points to note

- Palaeodrainage extends beneath sand dunes
- Au-in-calcrete anomaly shape follows palaeo- and contemporary drainage system



REGOLITH CARBONATES AND ASSAY RESULTS

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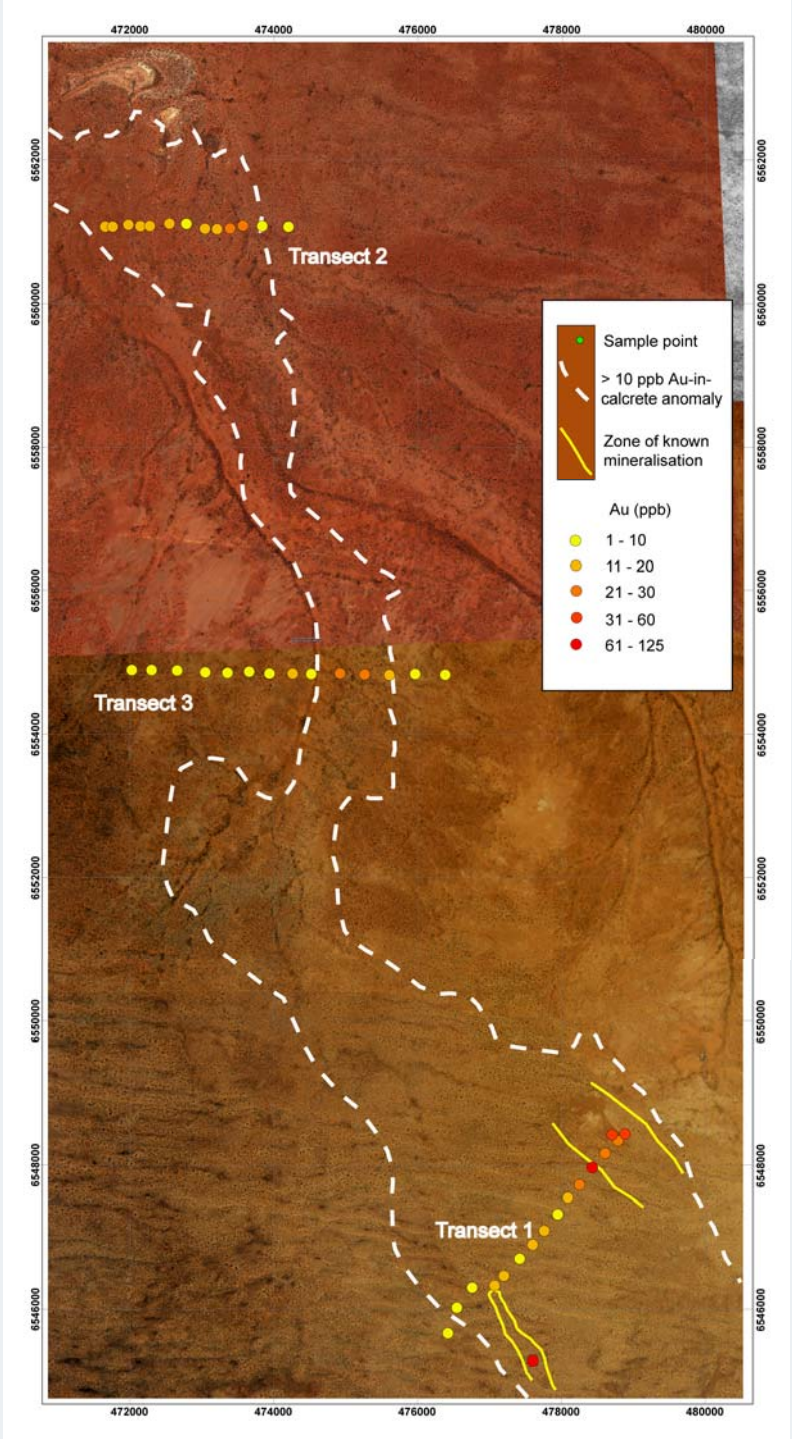
When is a calcrete a calcrete?

- Southern transect
  - Calcareous red sand
    - 0.74 – 9.7% CaO, ~0.8 m deep
  - Nodules with hardpan
    - 8.5 – 39.4% CaO, ~0.5 m deep
- Central transect
  - Predominantly hardpan
    - 20.7 – 42.9% CaO, ~0.2 m deep
- Northern transect
  - Calcareous sand and nodules
    - 4.0 – 9.1% CaO, ~0.6 m deep

Transect Au assays

- New results indicate
  - Repeatability of company work
  - Au finely dispersed



0 2
km

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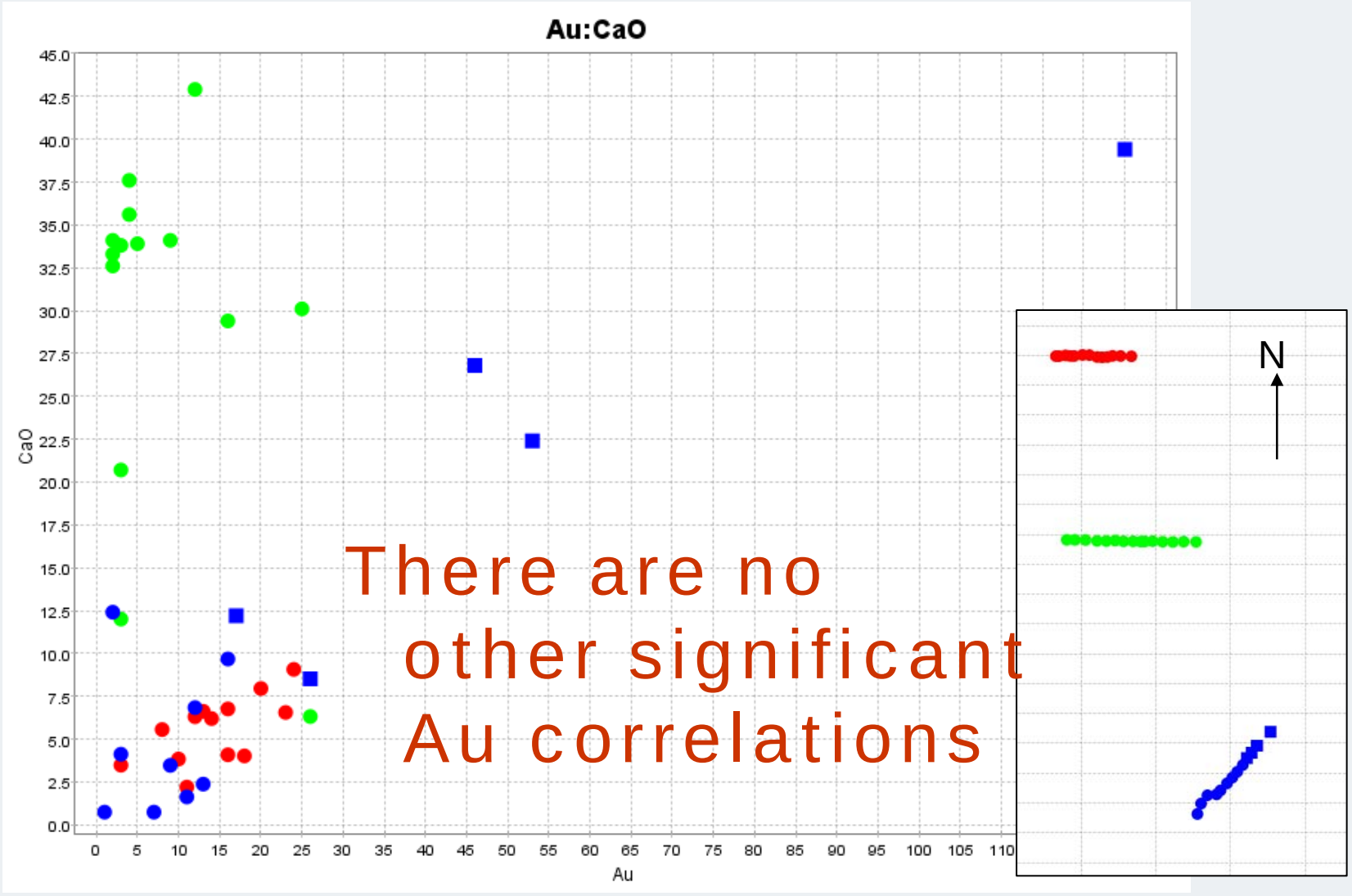
Assay results

- Ca & Au correlation



There are no other significant Au correlations

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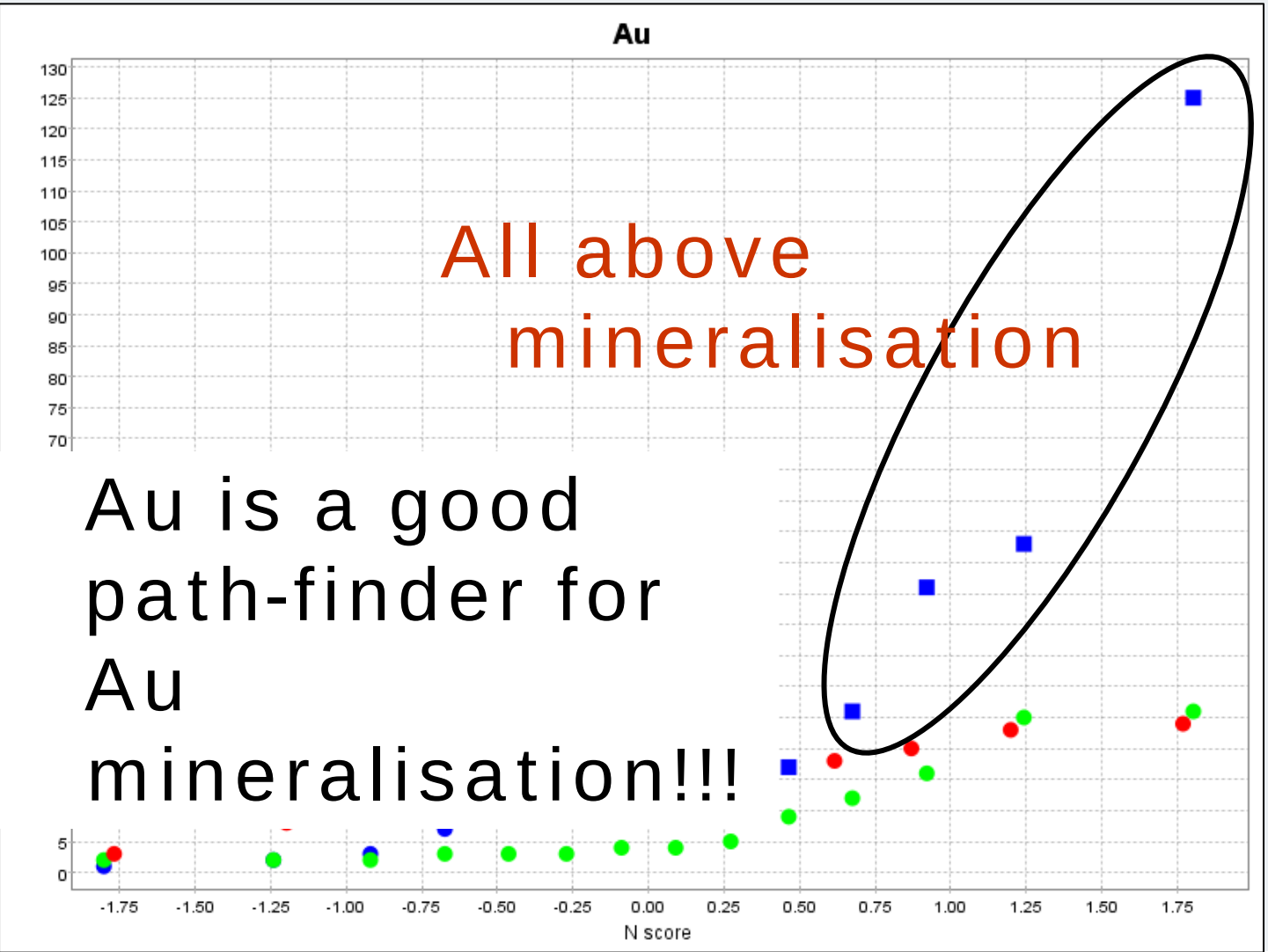
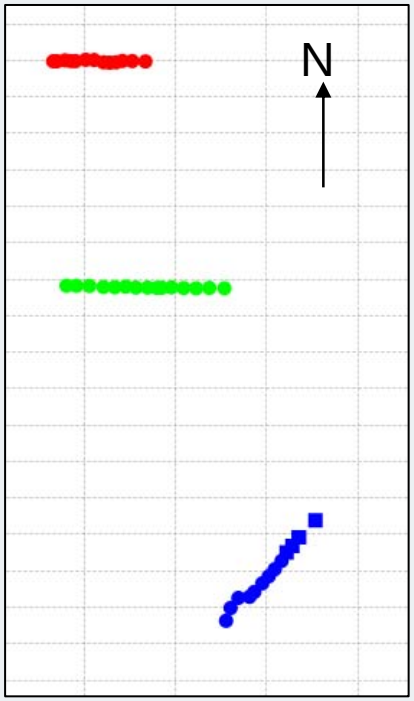
Assay results

- Au distribution



Au is a good path-finder for Au mineralisation!!!



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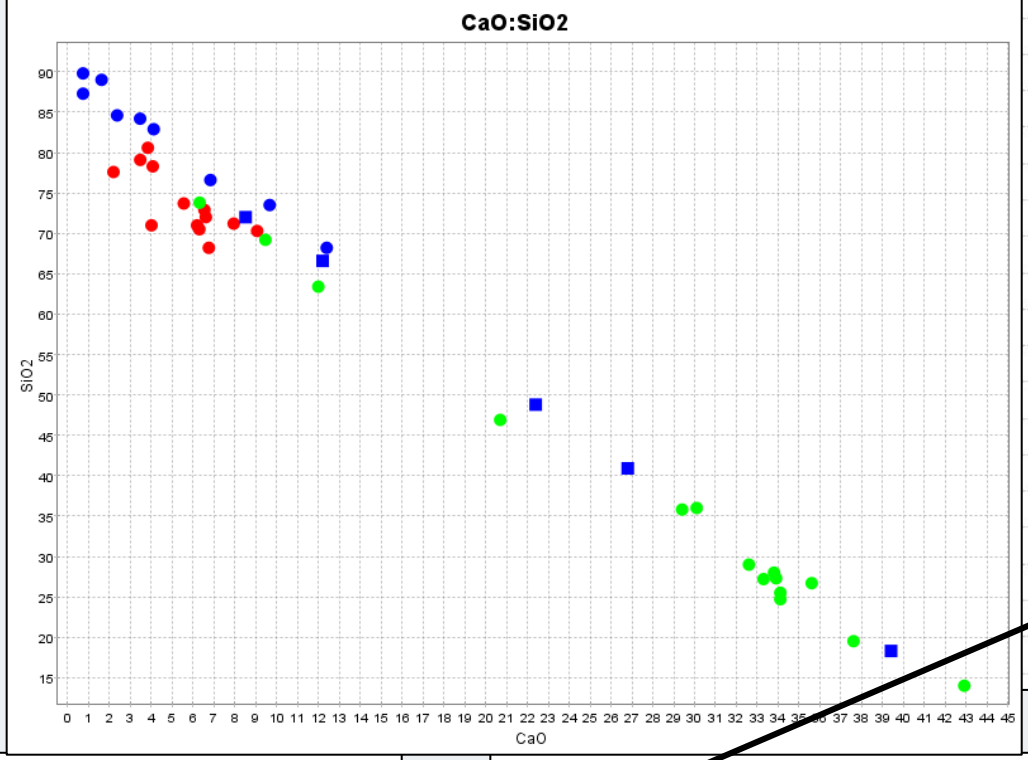
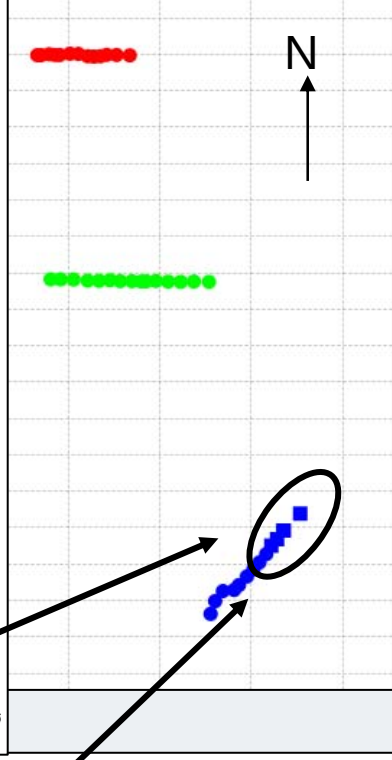
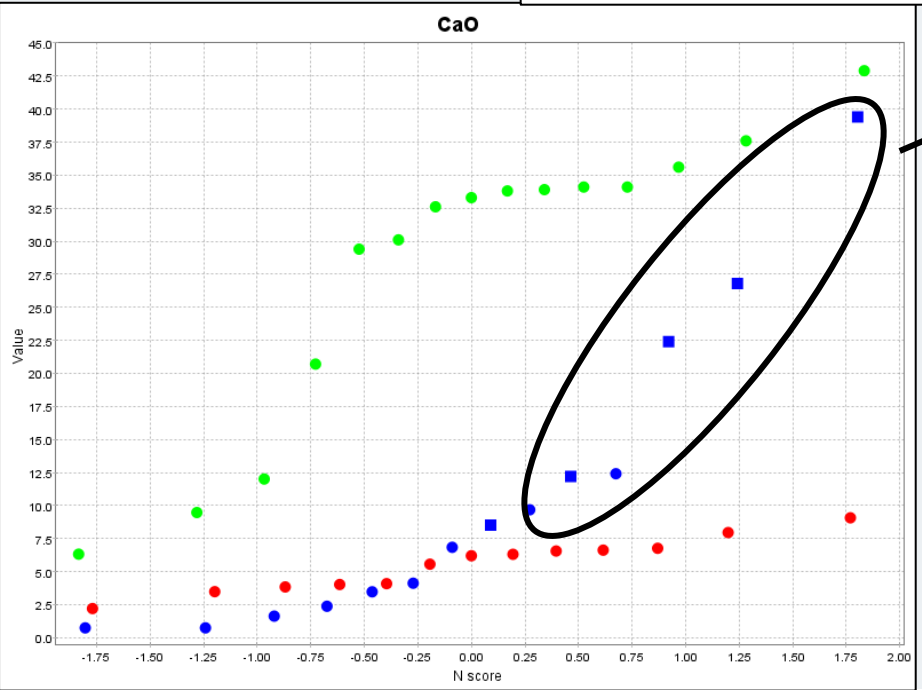
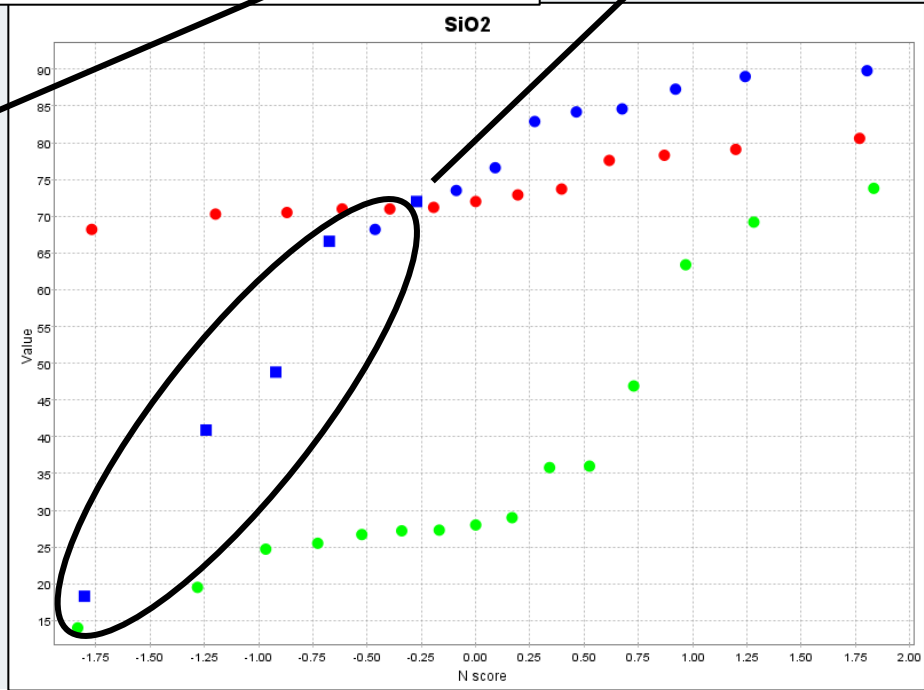
Assay results

Si and Ca





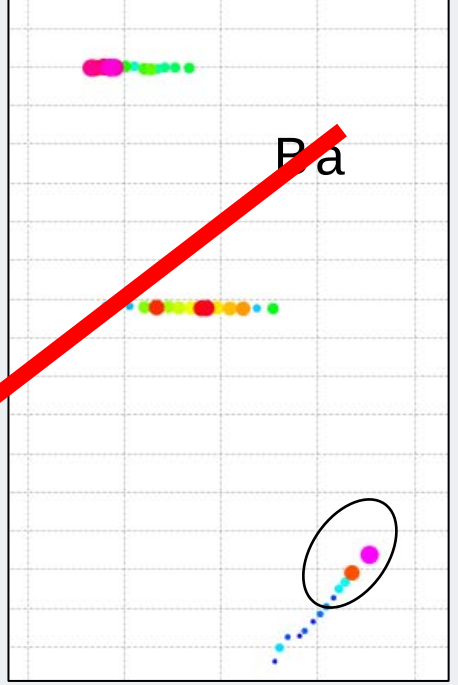


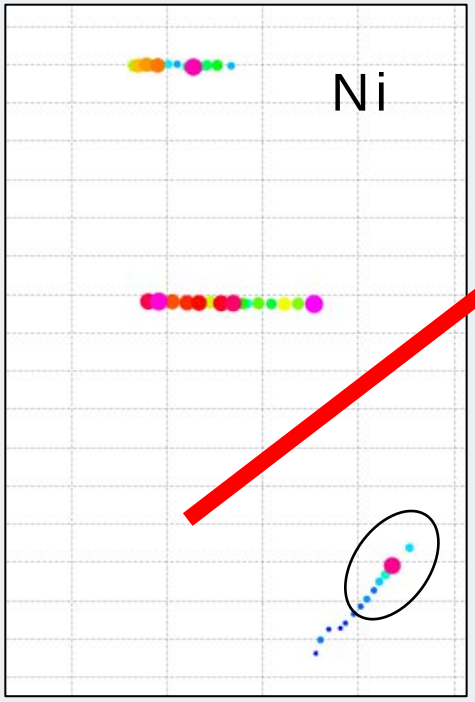


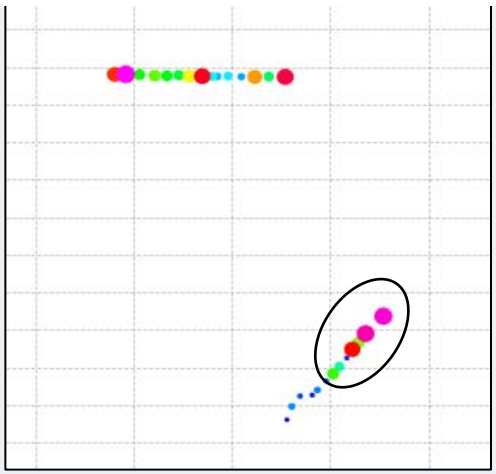
A Warning!

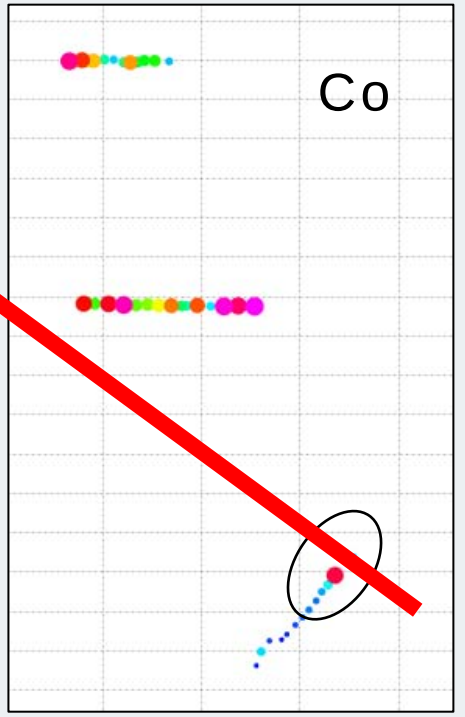
"Apparent" highs over mineralisation for several ele

Due to low values along southern end of transect



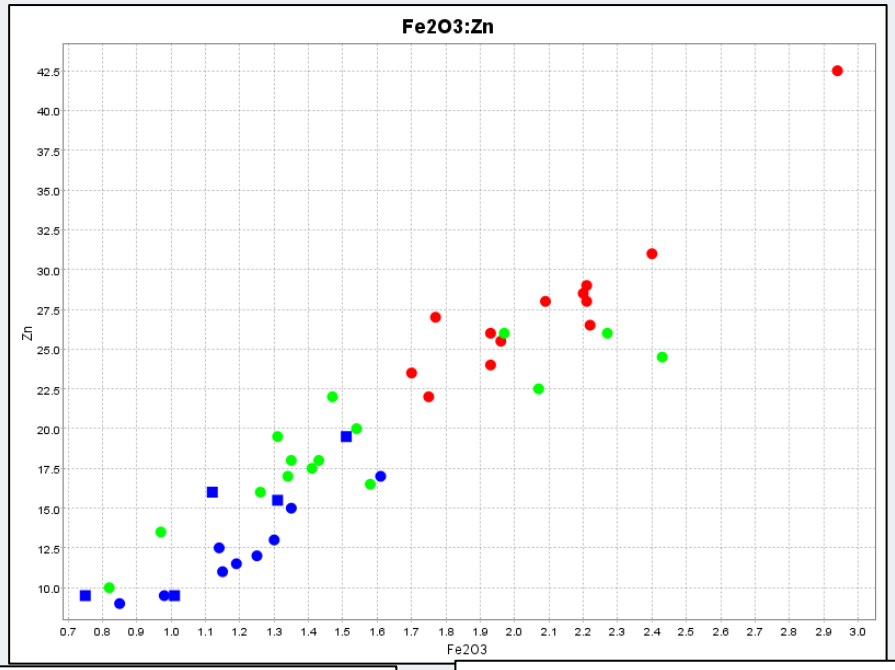


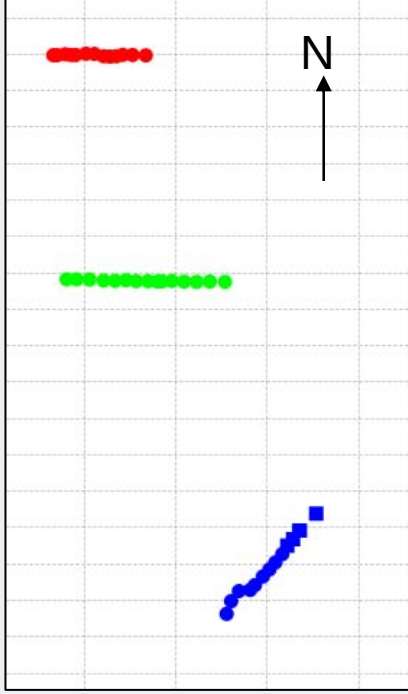


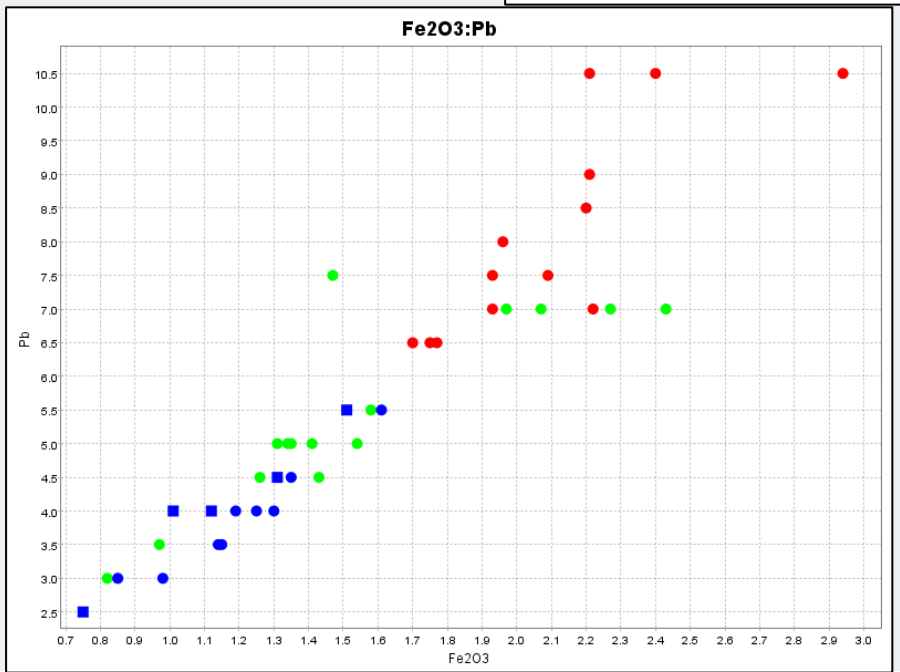


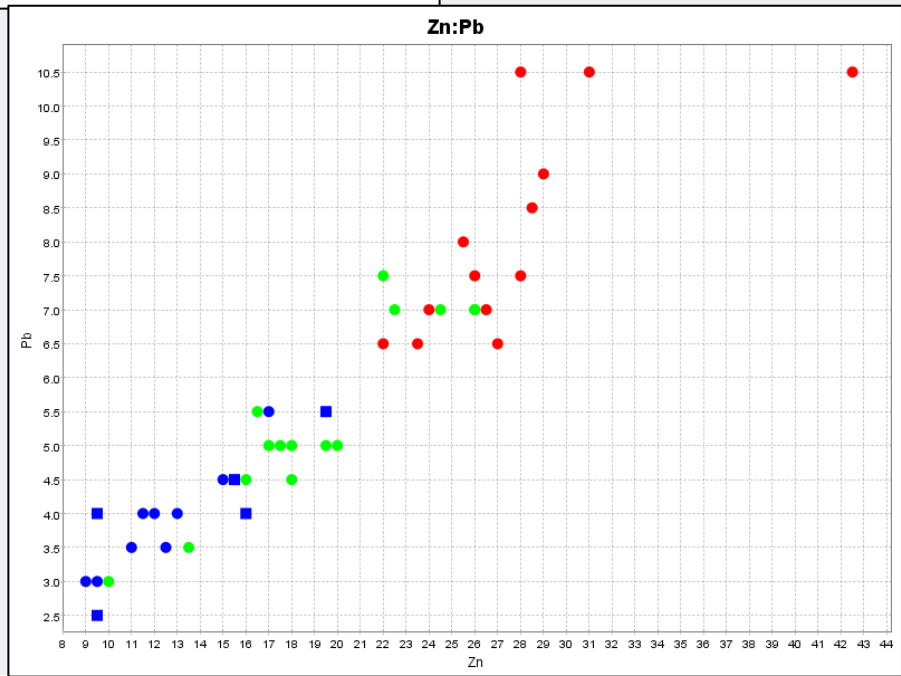
Assay results

Correlations between Fe, Pb and Zn



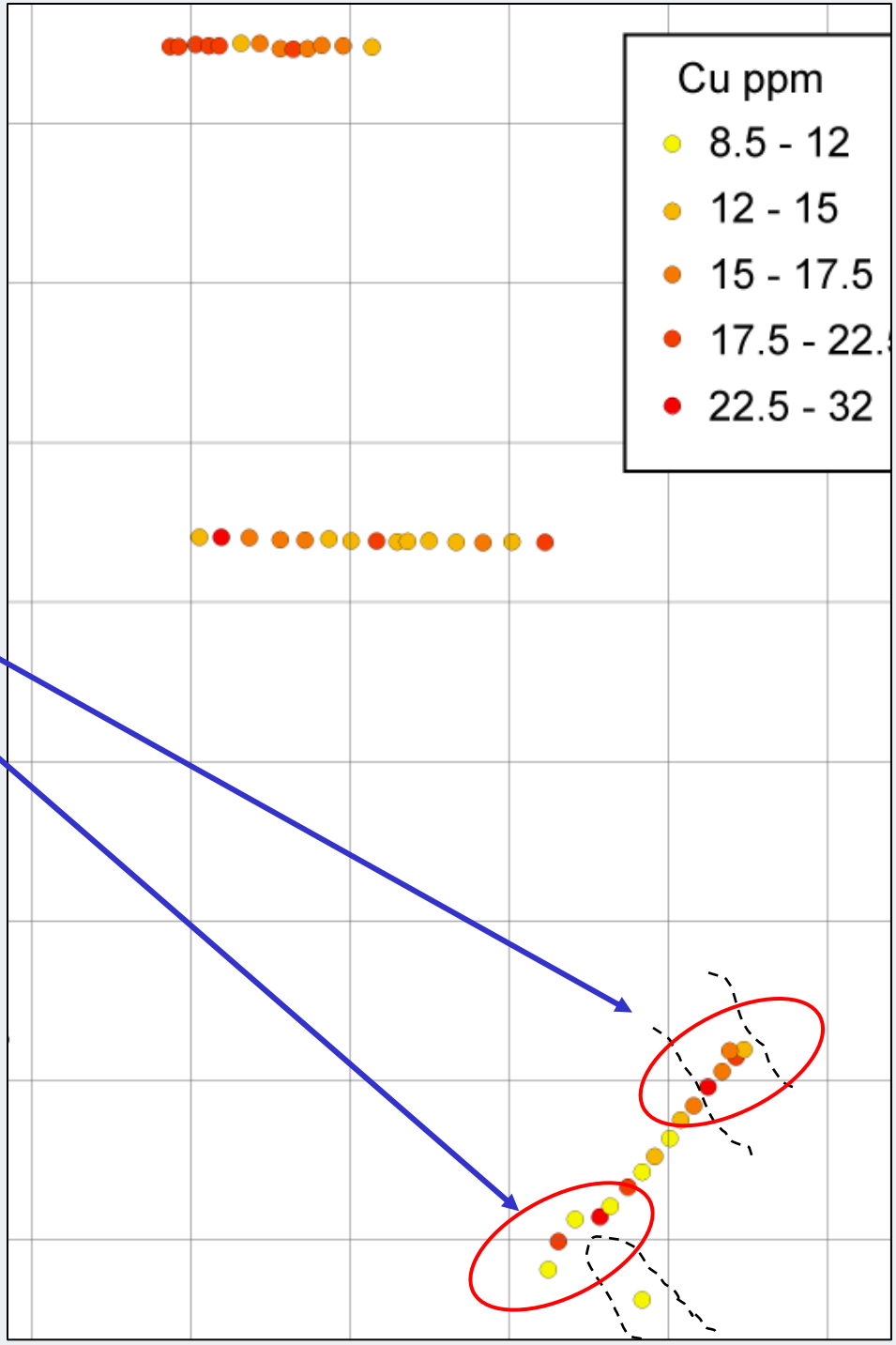






Assay results

Cu is the only element that is high over both zones of mineralisation



Assay results

- REE
  - Strongly correlated
  - Low along southern transect
- No single element high over mineralisation alone
- Analysis is ongoing.....

WHAT DOES ALL THIS MEAN SUGGESTED MODEL

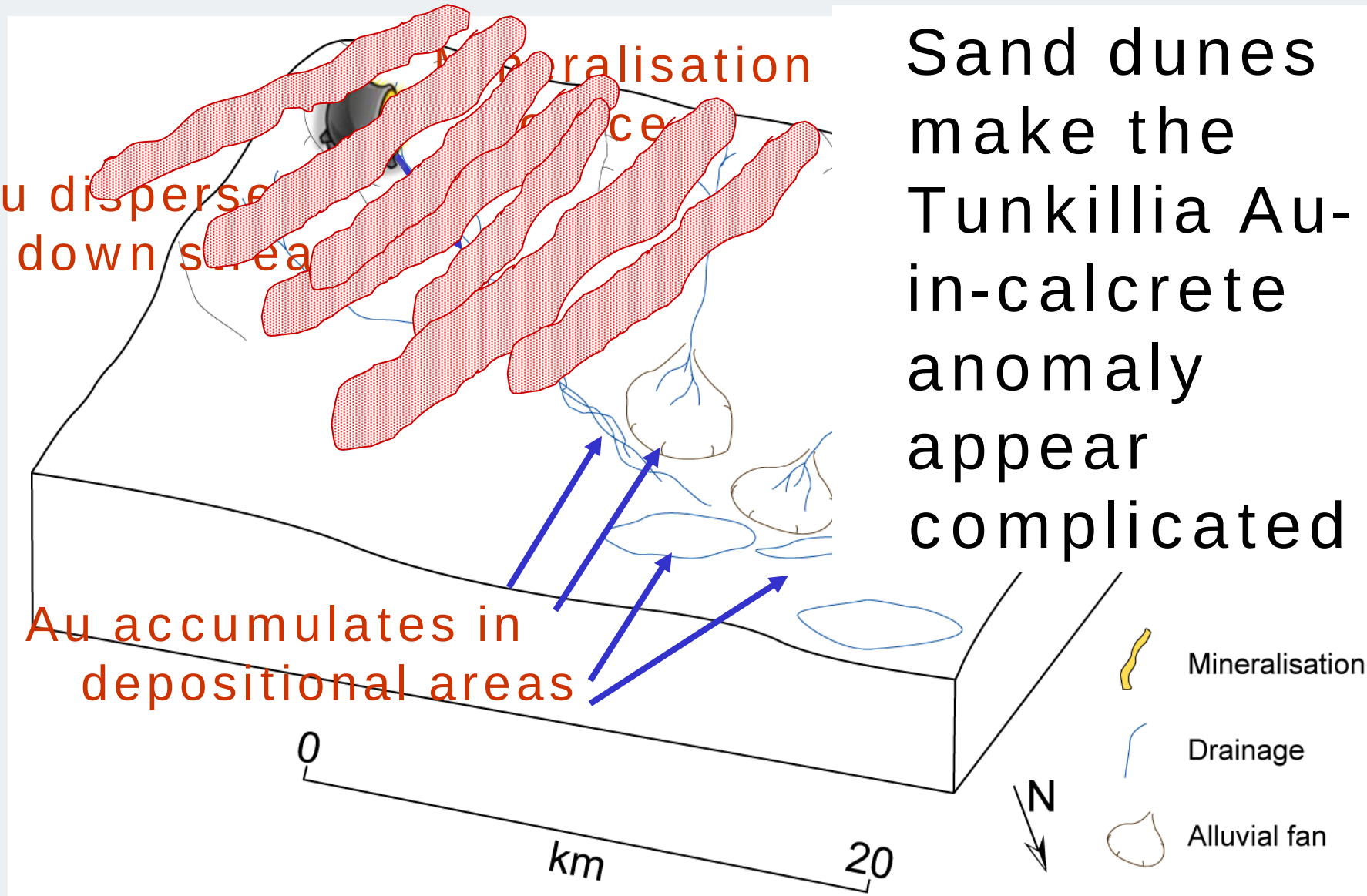
Things to think about

- Not all calcretes are calcrete!
  - Samples range from <1% to >40% CaO
- Highs may be due to anomalous lows
- Higher Si content along transect 1 masks other element concentrations and confuses the analysis

Things to think about

- Majority of elements are abundant in the north
  - reflects dispersion and deposition
- What is an anomalous Au value
  - Should we consider raising the threshold?
  - Probability plot shows >30 ppb for Tunkillia
- Finally… It is not difficult to explain the large Au-in-calcrete…..

Proposed model



Sand dunes make the Tunkillia Au-in-calcrete anomaly appear complicated

Take home point

- Understanding landscape processes can reveal more than you would expect

Acknowledgements

- Tony Belperio, Richard Flint & Barry van der Stelt from Minotaur
- CRC LEME & The University of Adelaide
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