Local Scale Variation

Lag sampling in the Cobar Area NSW, Australia

Rex Berthelsen
Wheaton River (Australasia) Pty Ltd

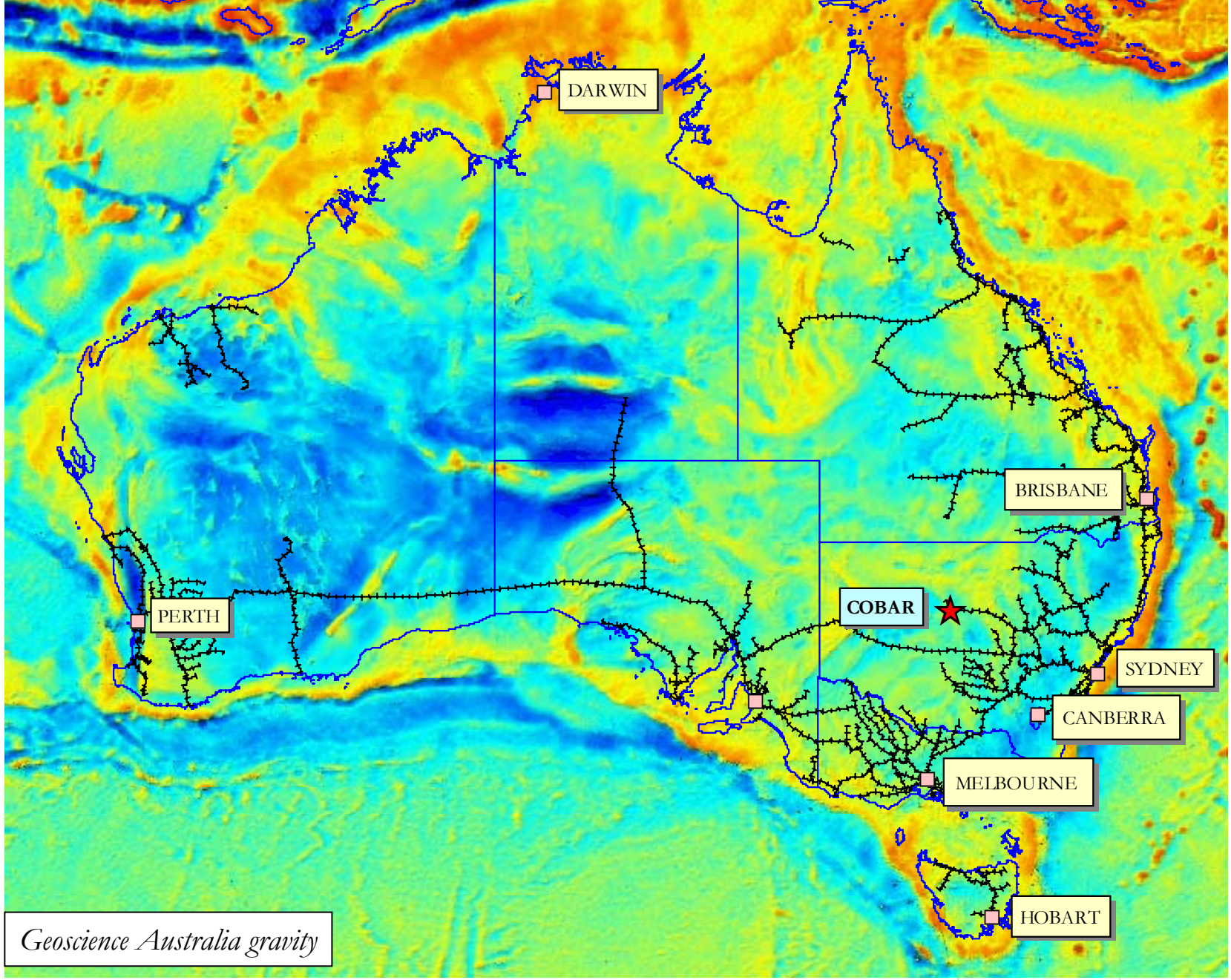
Mark Arundell
Arundell Geoscience

Local Scale Variations

- Structural Geology (D. Thomas, CAMECO)
  - Scale independence
  - Micro = Macro
- Does geochemical data behave like this?
- An orebody is a ***local scale variation*** in geochemical data
- Are regional interpretations appropriate?

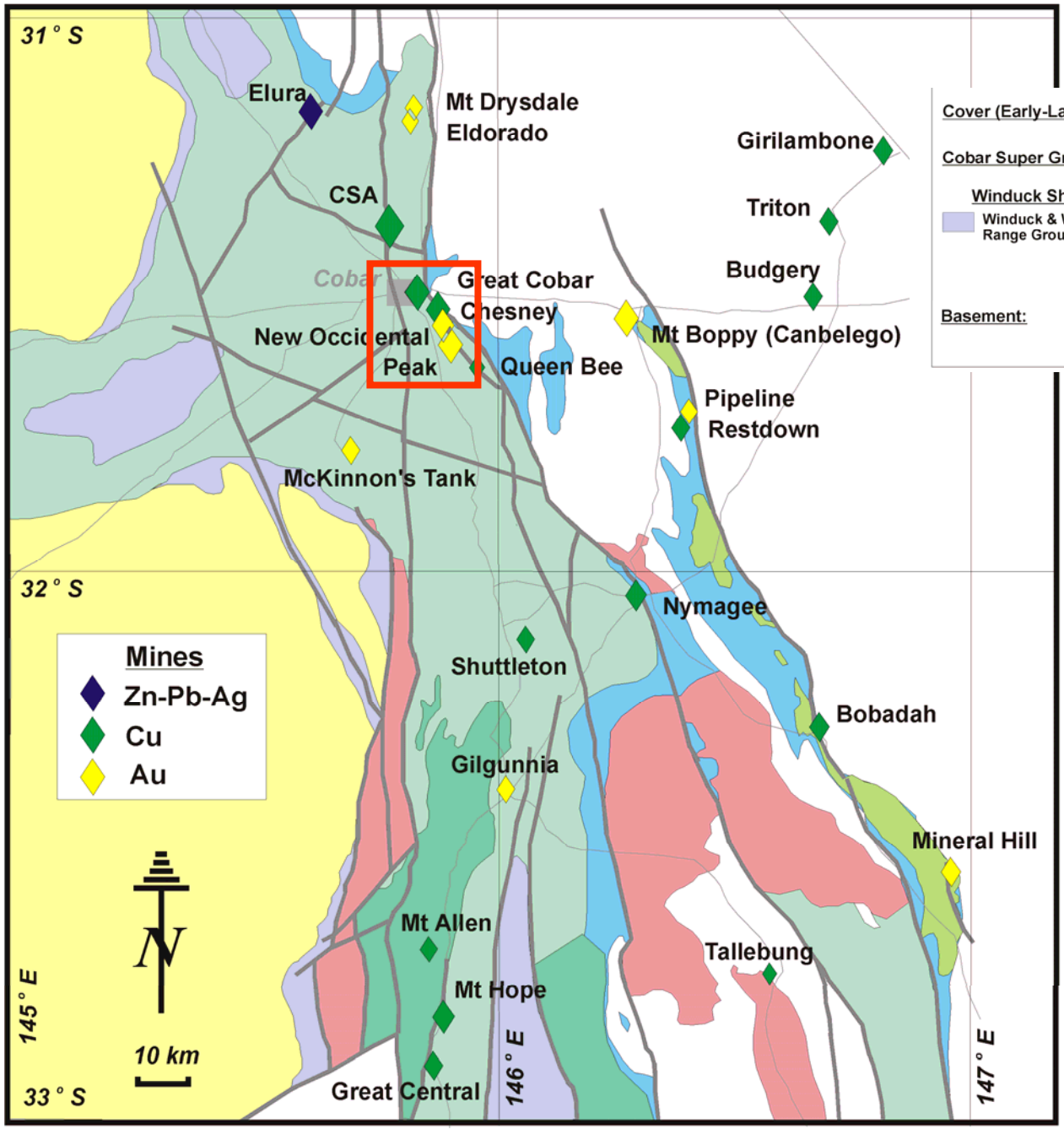
Local Scale Variation

- Intro. to Cobar Geology
- Cobar Lag
- Cobar RAB
- Deeper Drilling - RC percussion
- Lessons
- Conclusions


DARWIN
BRISBANE
PERTH
COBAR
SYDNEY
CANBERRA
MELBOURNE
HOBART
Geoscience Australia gravity

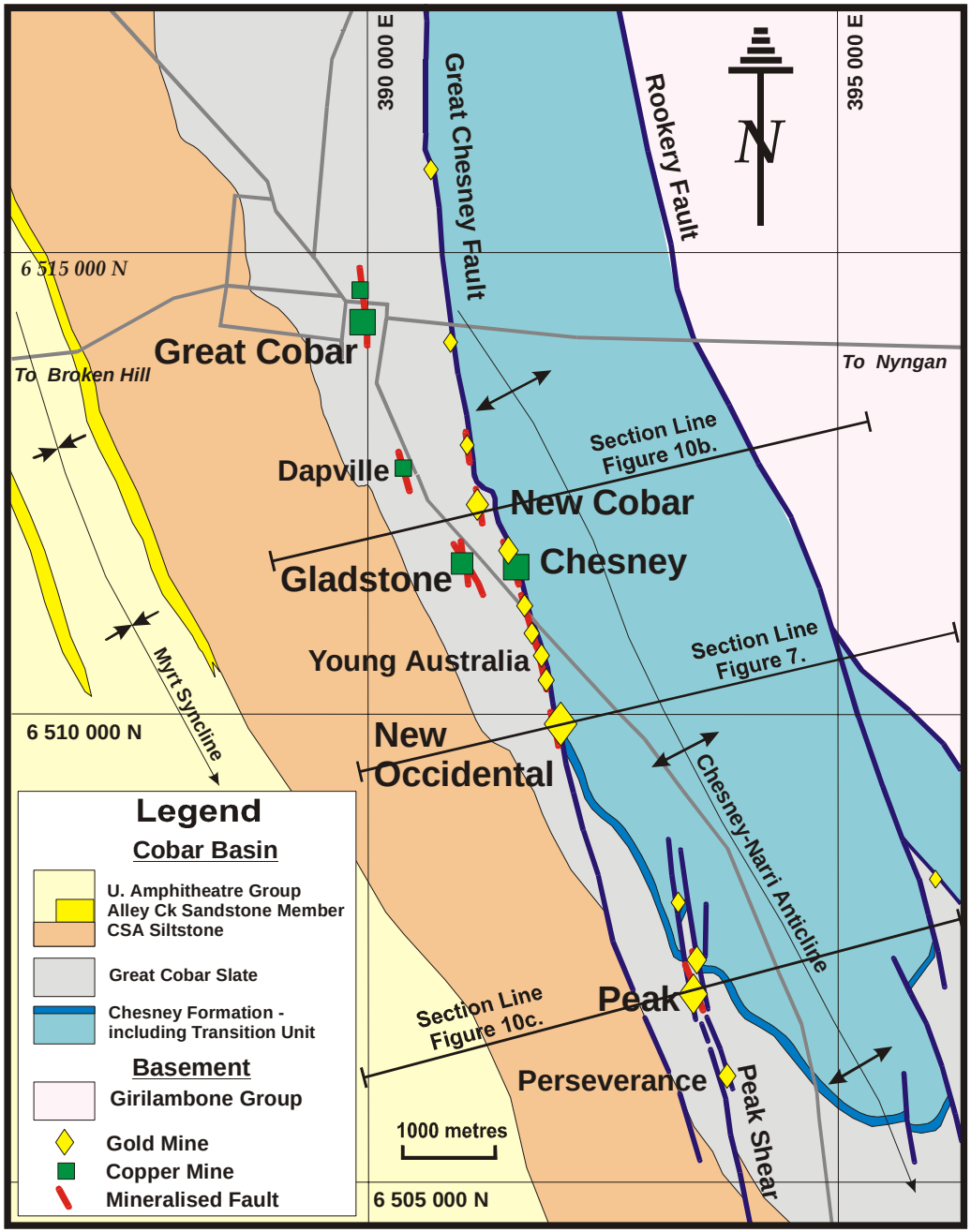
Cobar Mineral Field

- Au : 3.5Moz *(prr)*
- Cu : >0.6Mt *(p)*
- Pb & Zn : 2.5Mt & 4.2Mt *(prr)*
- Major deposits *(pre-mining resources)*
  - Peak : 5.2Mt @ 9.1g/t Au
  - CSA : 48Mt @ 3.1%Cu, 0.3%Pb, 1.1%Zn, 18g/t Ag
  - Elura : 42Mt @ 5.4%Pb, 8.6%Zn, 18g/t Ag



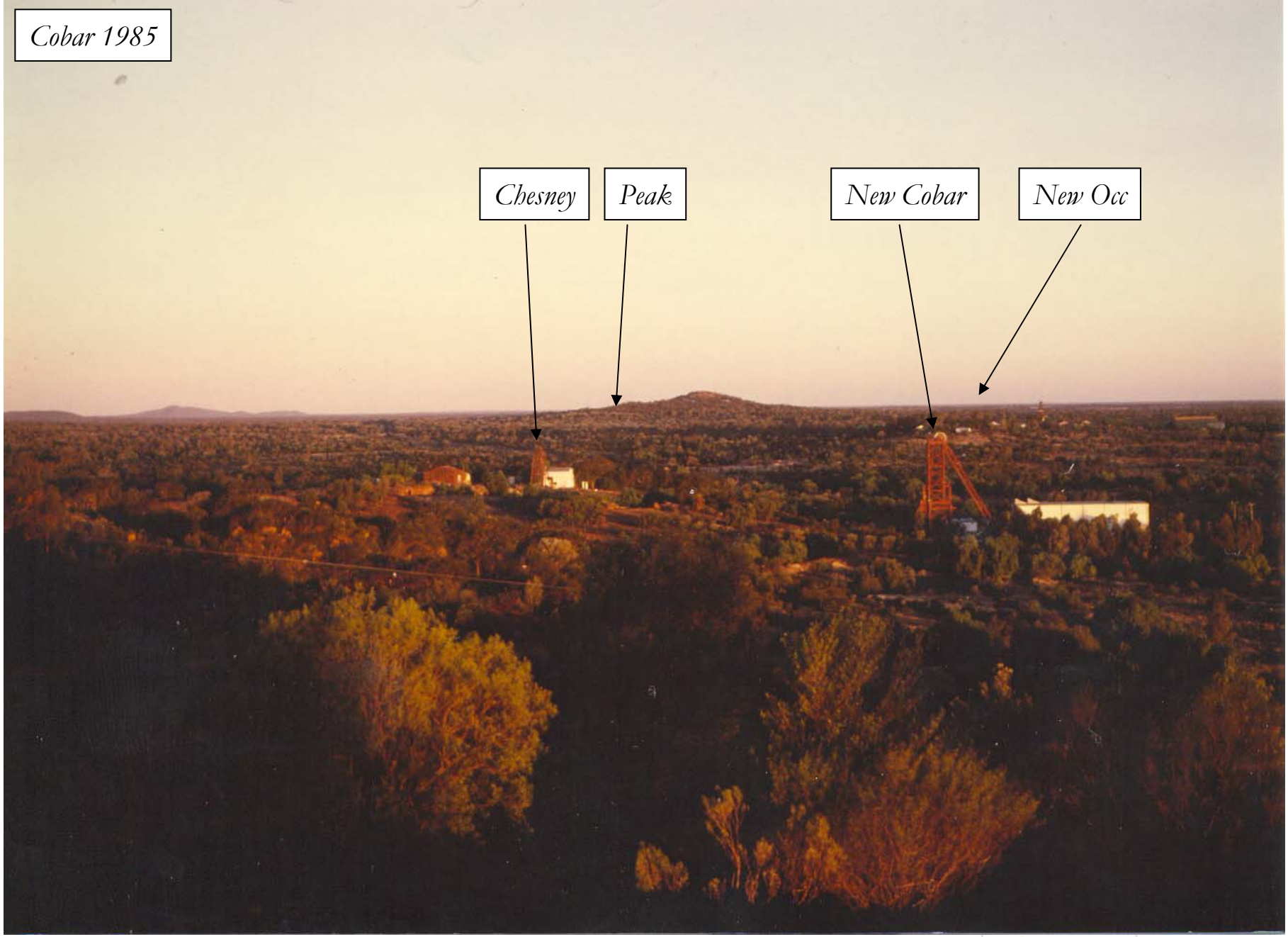
after Glen, 1987; 1994

Cobar Regional Geology



after Stegman & Pocock, 1995

Cobar Goldfield Geology


Cobar 1985
Chesney
Peak
New Cobar
New Occ

Oxidised zone of the New Cobar deposit, NSW

A quartz lag

B lithic lag

D ferruginous mag. lag

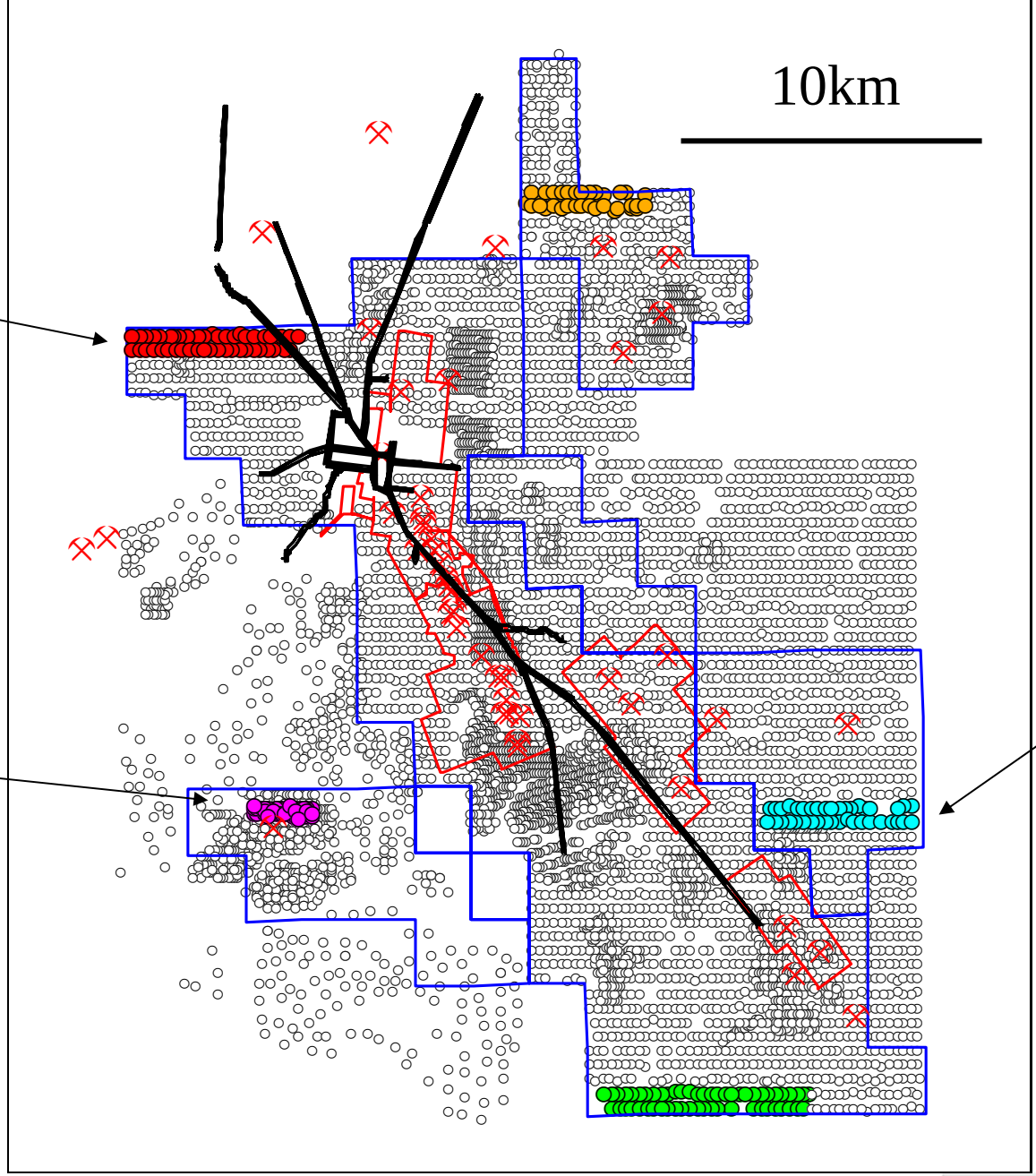
C ferruginous non mag lag

After McQueen, 2005

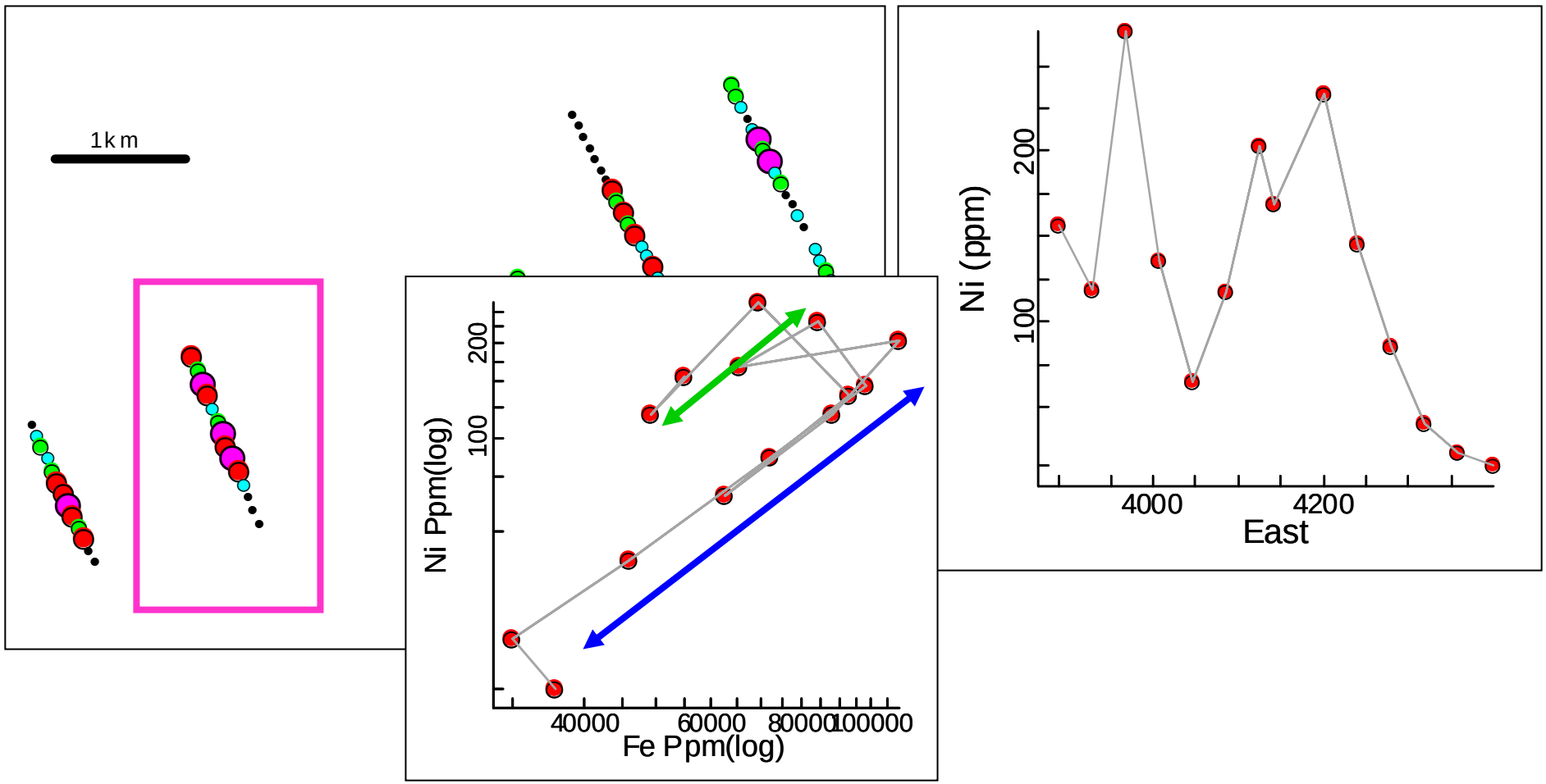
Example of lag types from the Cobar region

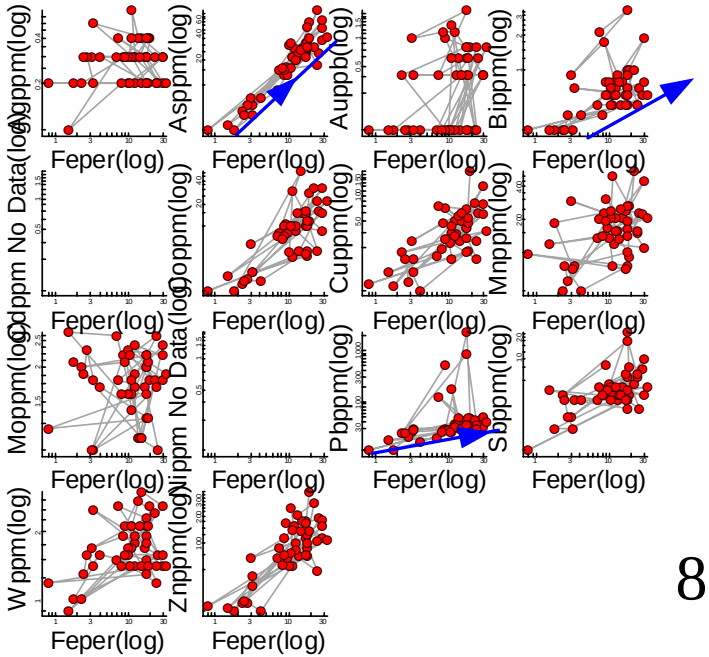
Cobar - Eastern Australia

- Rock lag ("deflationary") sampling completed over entire tenement package - ~7,000 samples
- Depositional areas avoided
- Initial analysis of background

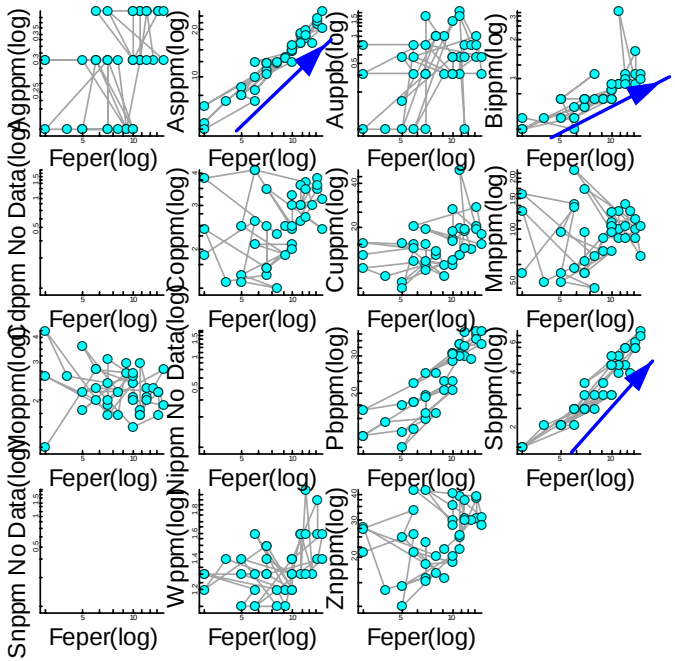

10km
8.2a
8.2b
8.2c

Spatial Linking

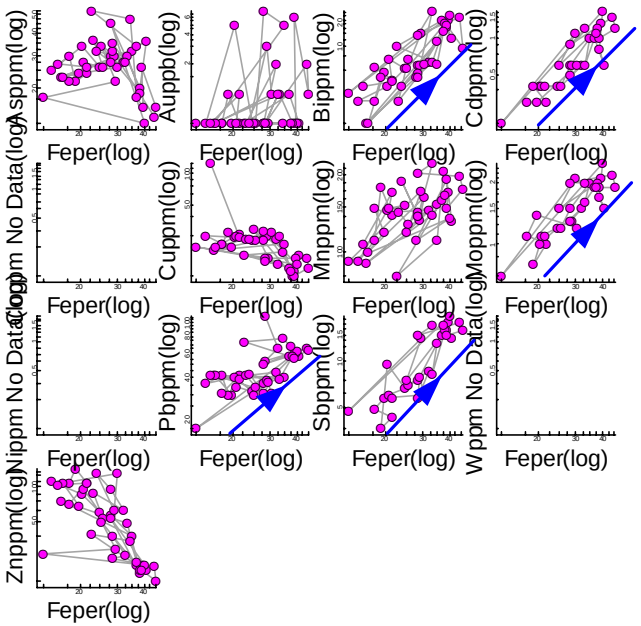




8.2a



8.2b



8.2c

- Link by Easting
- Correlations are….

Fe with …

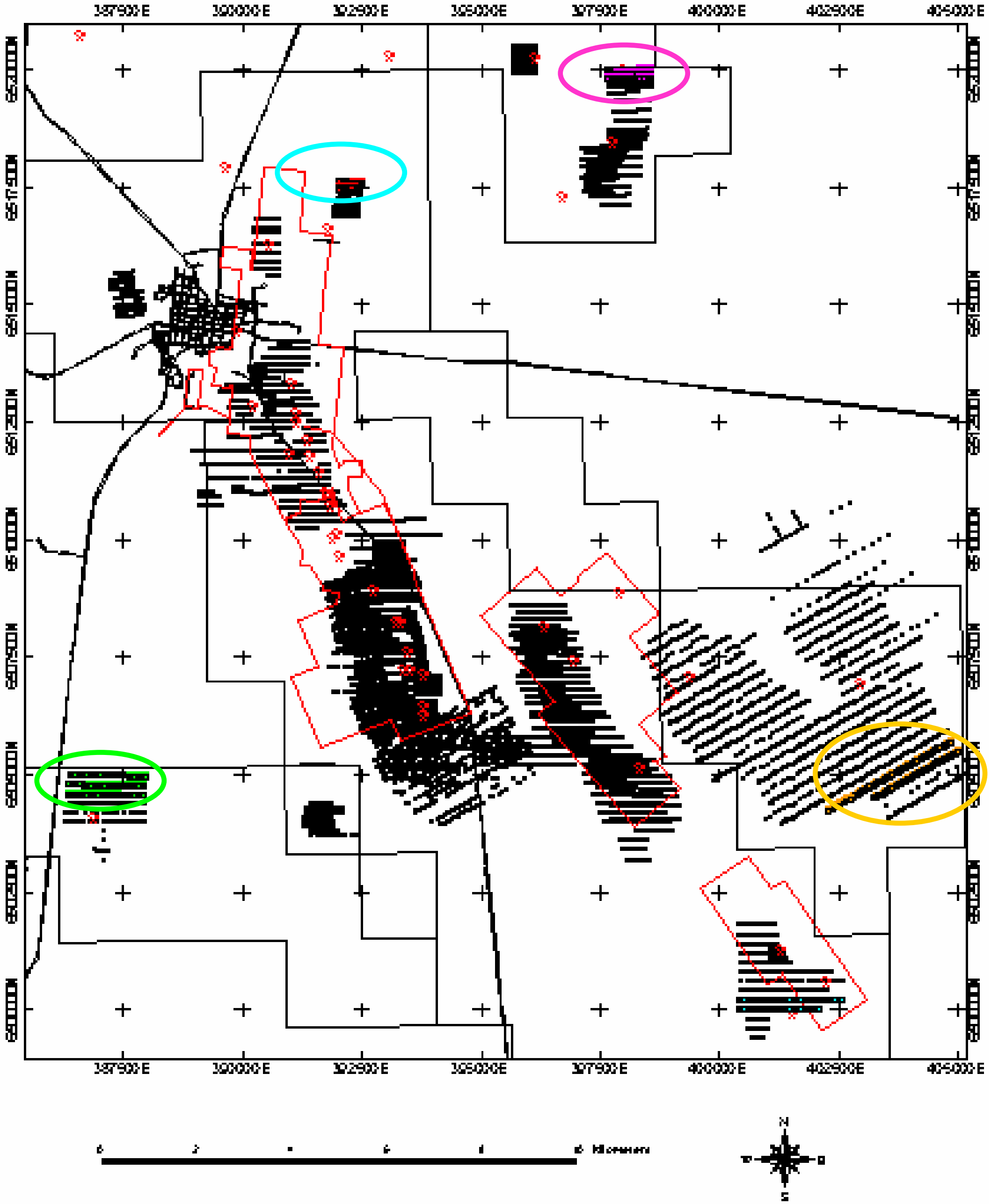
1. As, Bi, Pb, (Mn)
2. As, Bi, Sb, (Mn)
3. Bi, Cd, Mn, Mo, Pb, Sb

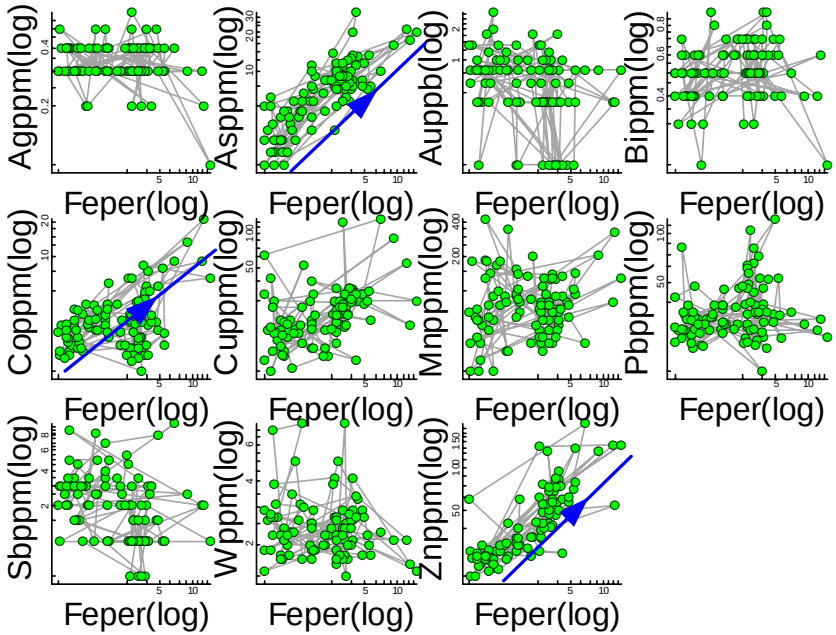
Lessons

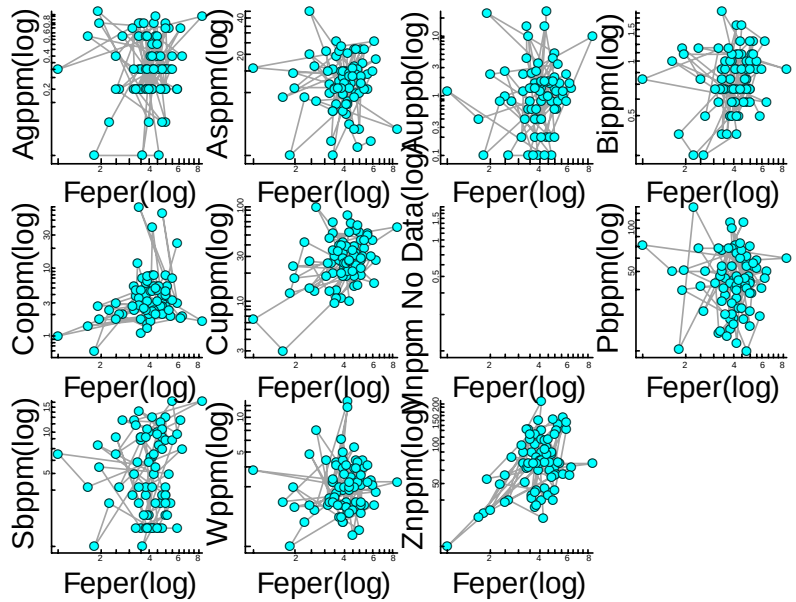
- Background samples : non mineralised
- Correlations different for different areas
- Ratios will be inappropriate - *in some areas*
- Analyse each area separately OR
- Regional interpretation (eg. leveling) need to be acutely aware of and account for these local scale effects

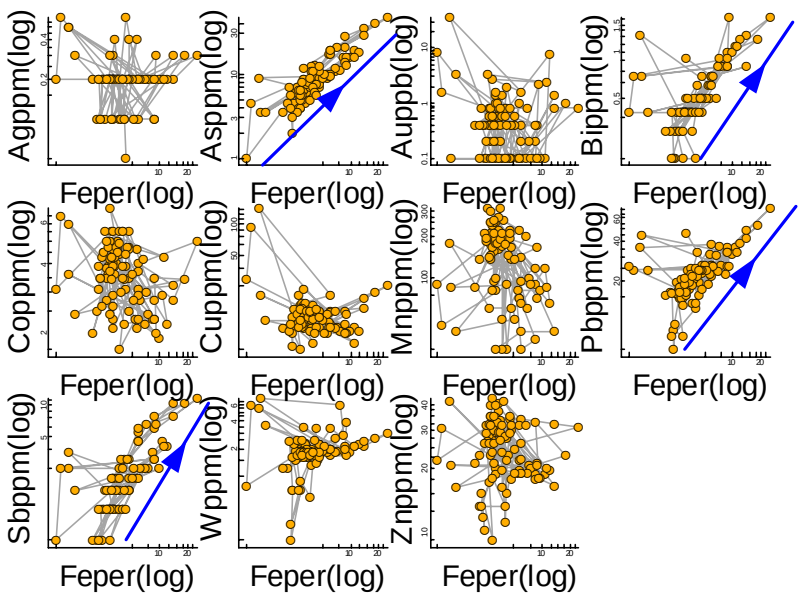
RAB drilling

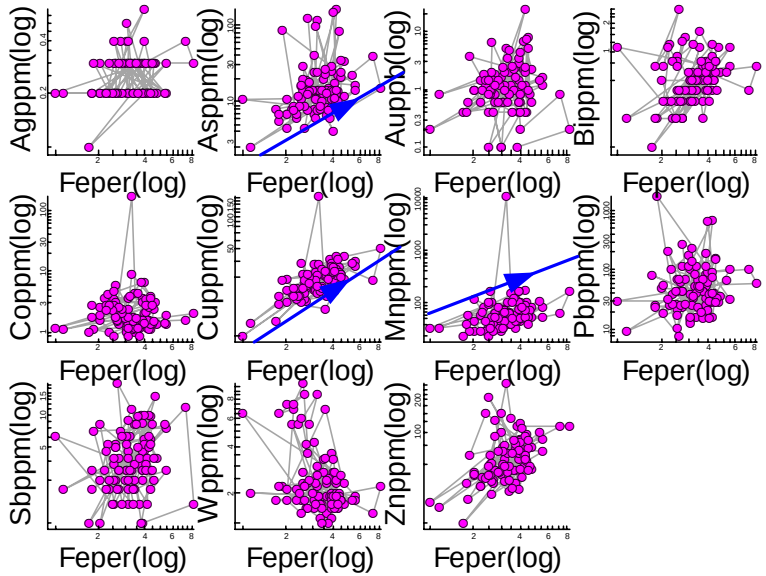
- RAB drilling - point sampling
- “Deep soil” rather than primary bedrock - upper saprolite (2-3m)
- Again background analysis
- Correlations different in different areas and different to lag




Agppm(log)
Asppm(log)
Auppb(log)
Bippm(log)
Coppm(log)
Cuppm(log)
Mnppm(log)
Pbppm(log)
Sbppm(log)
Wppm(log)
Znppm(log)
Feper(log)


Agppm(log)
Asppm(log)
Auppb(log)
Bippm(log)
Coppm(log)
Cuppm(log)
Mnppm No Data(log)
Pbppm(log)
Sbppm(log)
Wppm(log)
Znppm(log)
Feper(log)

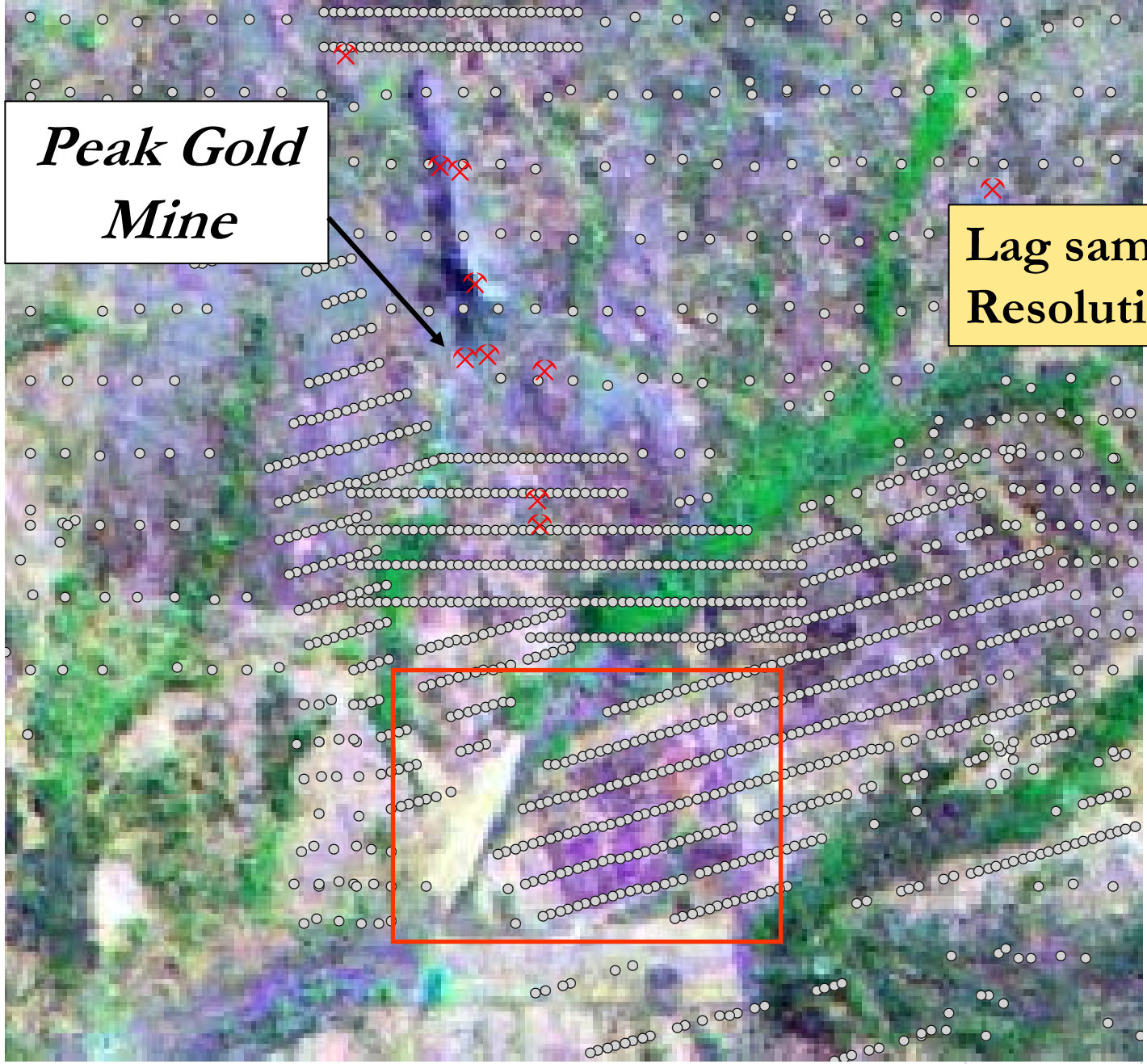

Agppm(log)
Asppm(log)
Auppb(log)
Bippm(log)
Coppm(log)
Cuppm(log)
Mnppm(log)
Pbppm(log)
Sbppm(log)
Wppm(log)
Znppm(log)
Feper(log)


Agppm(log)
Asppm(log)
Auppb(log)
Bippm(log)
Coppm(log)
Cuppm(log)
Mnppm(log)
Pbppm(log)
Sbppm(log)
Wppm(log)
Znppm(log)
Feper(log)

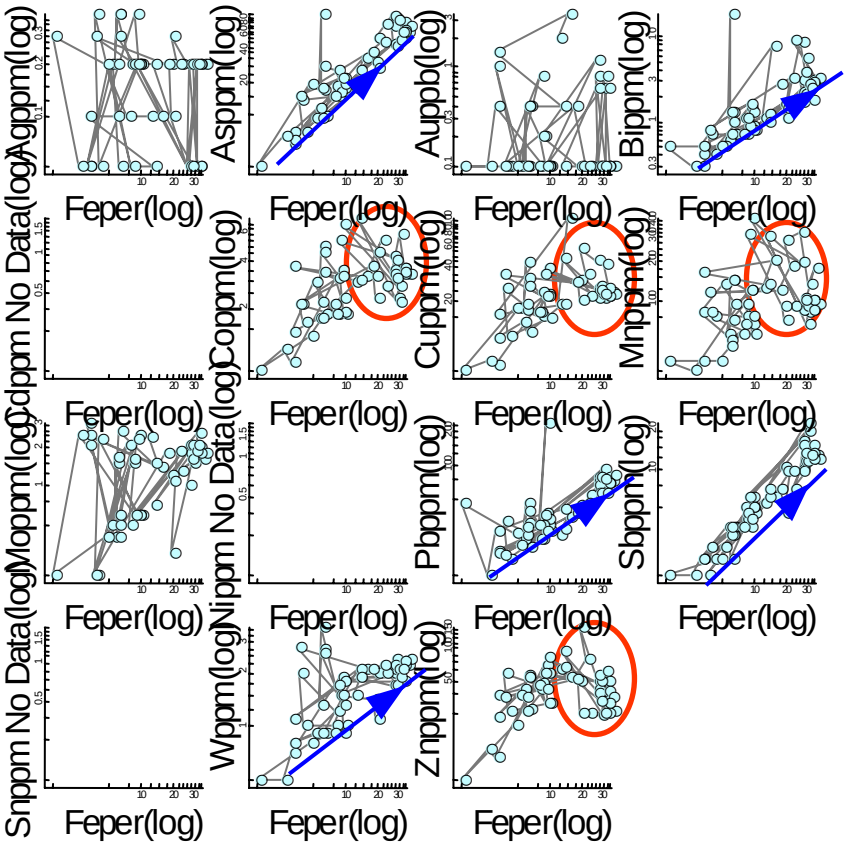
RAB Samples

- Fe with ...
  - 1. As, Co, Zn
  - 2.
  - 3. As, Bi, Pb, Sb
  - 4. As, Cu, Mn
- Correlations with Mn are not as widespread as for Lag samples


New Cobar Open cut (2001)

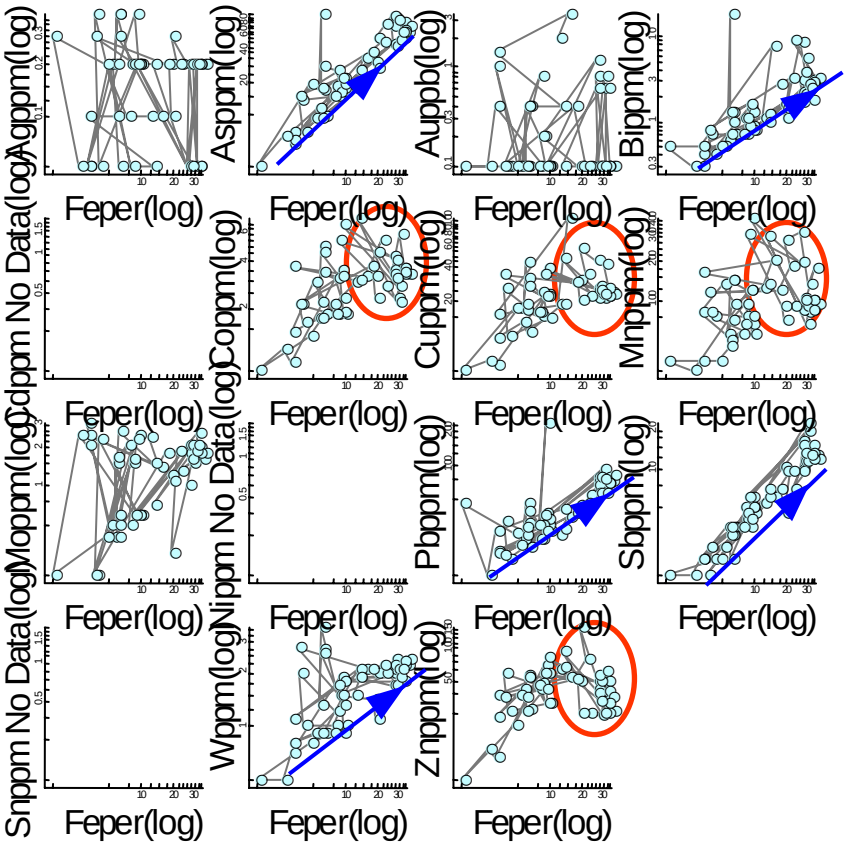

Peak Gold Mine
100m
Lag samples - Resolution

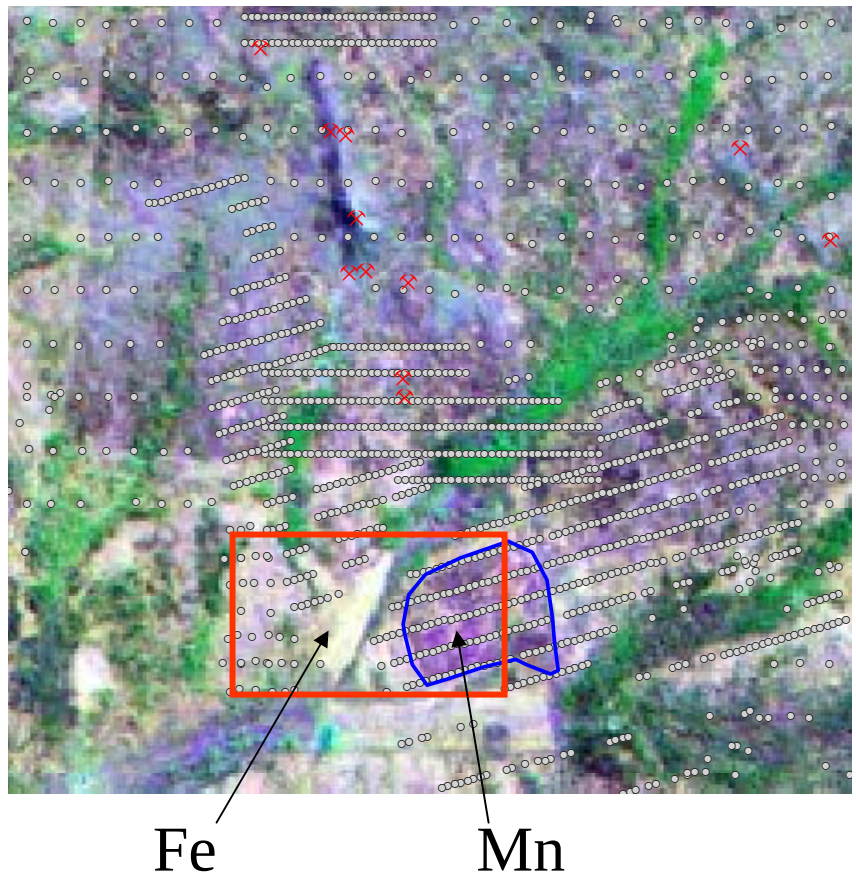
Resolution Lag samples



- Link by East
- Fe -> As, Bi, Pb, Sb, W
- Co -> part Fe
- Also Cu, Mn, Zn
- Mn correlation in PART
- Same SMALL grid has strong Fe and Mn spatially separate

Resolution Lag samples





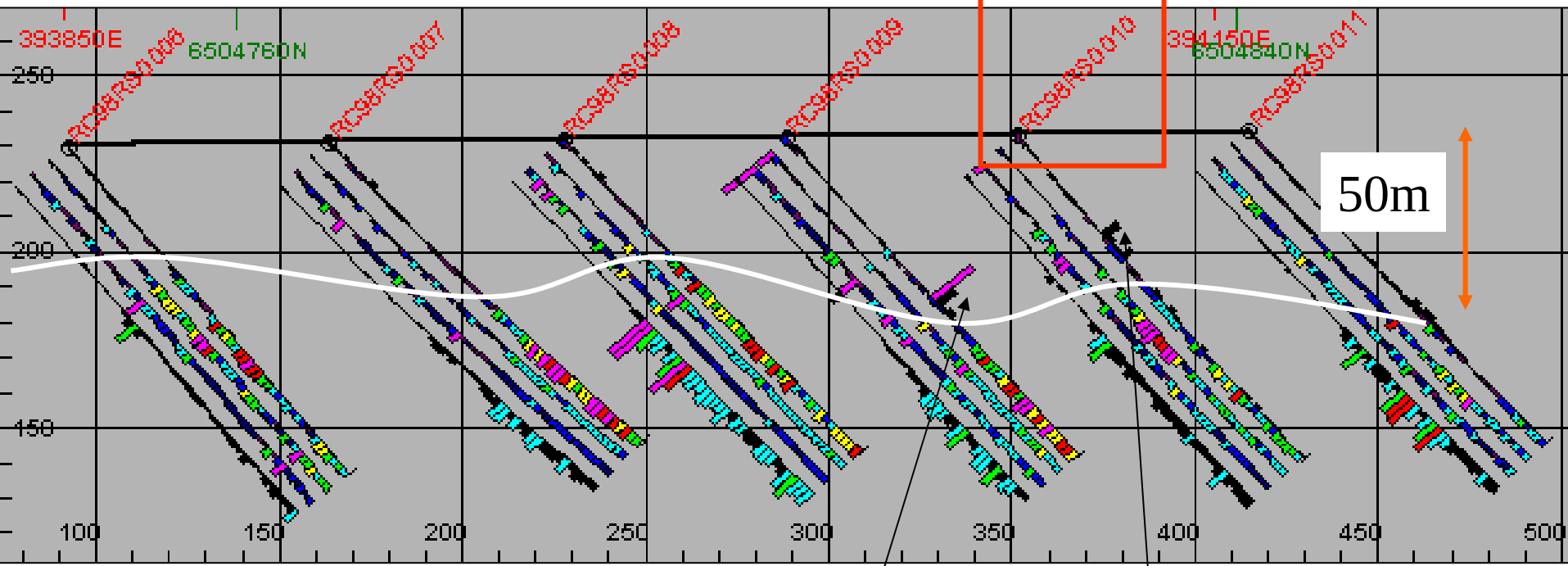
Lessons

- Correlations different for different areas and different sampling media
- Lag showed strong Mn correlation, RAB Fe correlations - LOCALLY!!!
- Not all elements!
- Analyse each media and each area separately OR regional interpretation must account for these local scale effects

Resolution Prospect

- Was depletion present?
- RAB refusal / textured rock - 5m
- Upper saprolite - pink
- Is this a good geochemical sample?

Resolution - Section 4800N



LHS : Mn,Fe, Zn, Pb
RHS : Au

Au 0.16ppm
Quartz vein

Au 0.06ppm
Fe

RC98RS010 - depleted to 52m;
Mn at 54m

Resolution

- Oxidised to 40-80m
- Depletion to 50m (RAB refusal - 5m)
- Enrichment of Mn, Co, Zn adjacent to background Pb. ***HM/GO boundary***
- Minor Au mineralisation above associated with QV and Fe NOT Mn - *Au removed?*
- Drill to below Mn layer(s) / HM-GO as minimum

Lessons

- RAB refusal ***MAY*** not equal good geochemical sample - *in some areas*
- Initial drilling to primary rock / sulphide (penetrate 10m?) to determine whether depletion is present
- Depth of depletion is a local phenomena in the Cobar area

Conclusions

- An orebody is a local scale variation in geochemical data
- “Subtle” signals may be not so subtle if we view data differently
- Regional scale data analysis is likely to miss “excursion” style anomalism
- Complex Regolith -> Rejoice in the Local variability - it will hide ore!

New Occidental Open Cut