Ultrafine soils – the technique, the advances, and the application to GSWA regional map products

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Acknowledgements

- Ian Lau, Tenten Pinchand, Ravi Anand, Paul Morris

One slide to rule them all

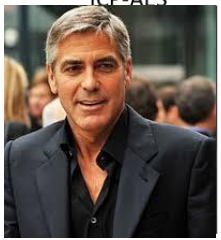
- Increase of 150–250% Au, Cu, Zn
- No “nugget effect”
- GSWA soils Au data 67% bdl → 10% bdl
- World-first, industry-ready workflow

Use the best technique/size fraction for the job

ICP-AES

<250 µm milled fraction

results



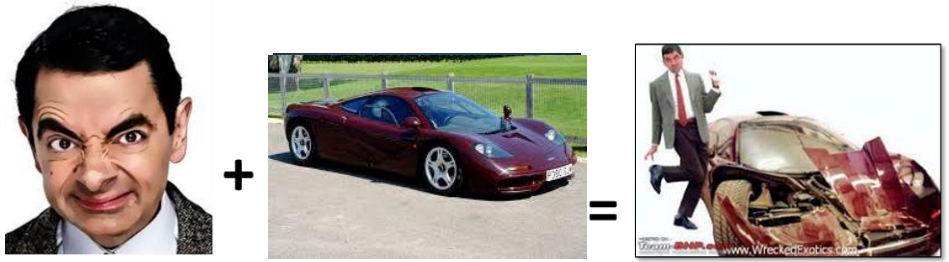
ICP-MS

<2 or 63 µm fraction

results

Modified from Nick Oliver, HCOV Consulting

Again, it’s about picking the right course of action



ICP-AES

<2 or 63 µm fraction

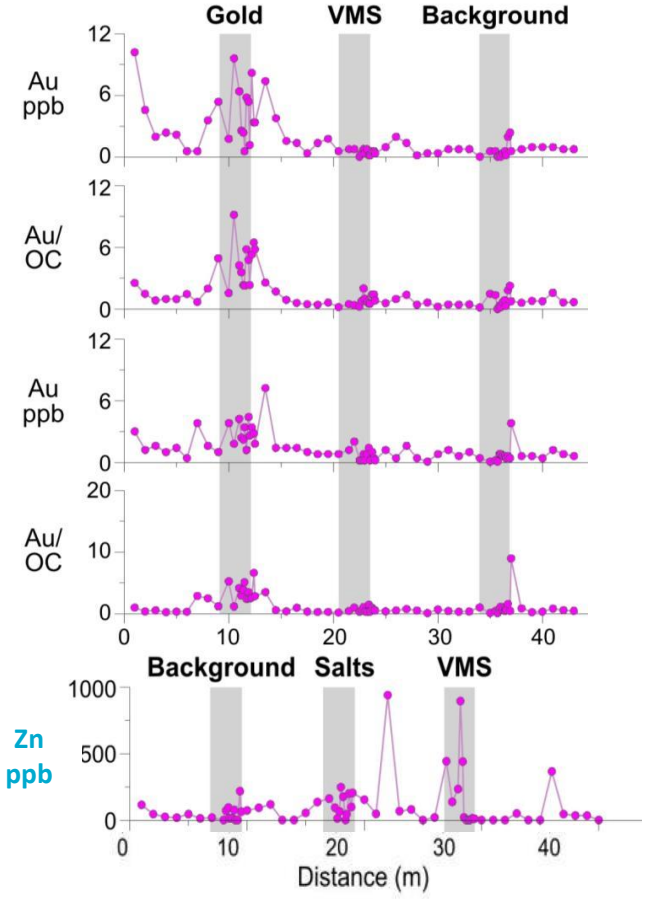
ICP-MS

<250 µm milled fraction

Modified from Nick Oliver, HCOV Consulting

Metal mobility

Anand et al. *Economic Geology* 2014



Fine fractions = ALL the action

- We can't just keep doing the same thing… target element <250 µm or 60 mesh…

Approach

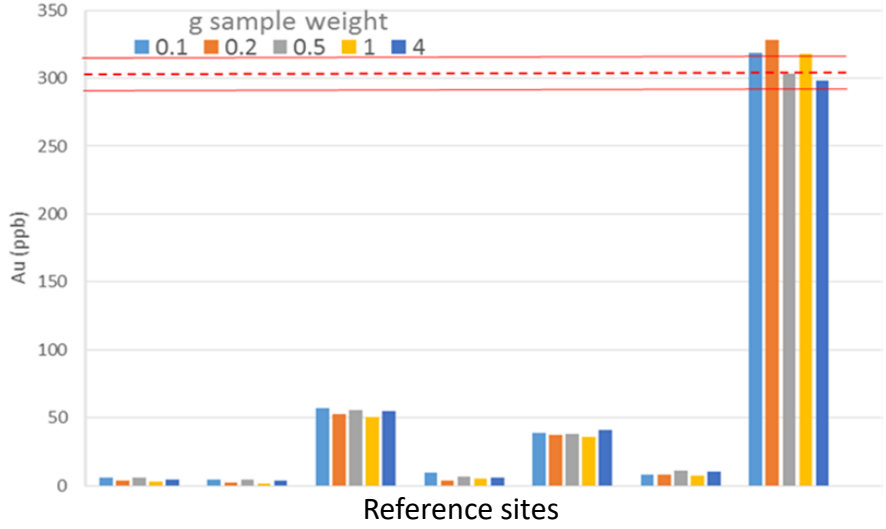
- Using bulk composite soils from >10 Au, Cu, Zn deposits in WA as references
- Test the method (sample/particle size, weight, extraction, dispersion)
- Site/orientation studies
- Regional map

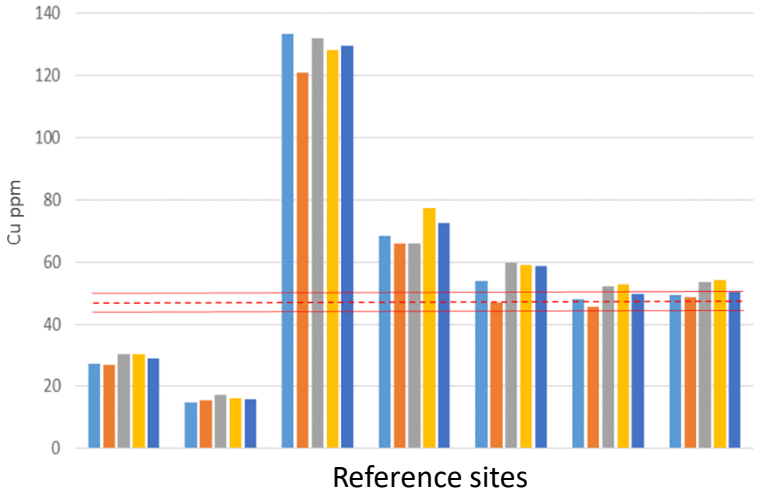
Delivered… in the report – free online from GSWA

- Noble, et al., 2019 GSWA Report 190
- Data on GeoView or CSIRO Data Access Portal

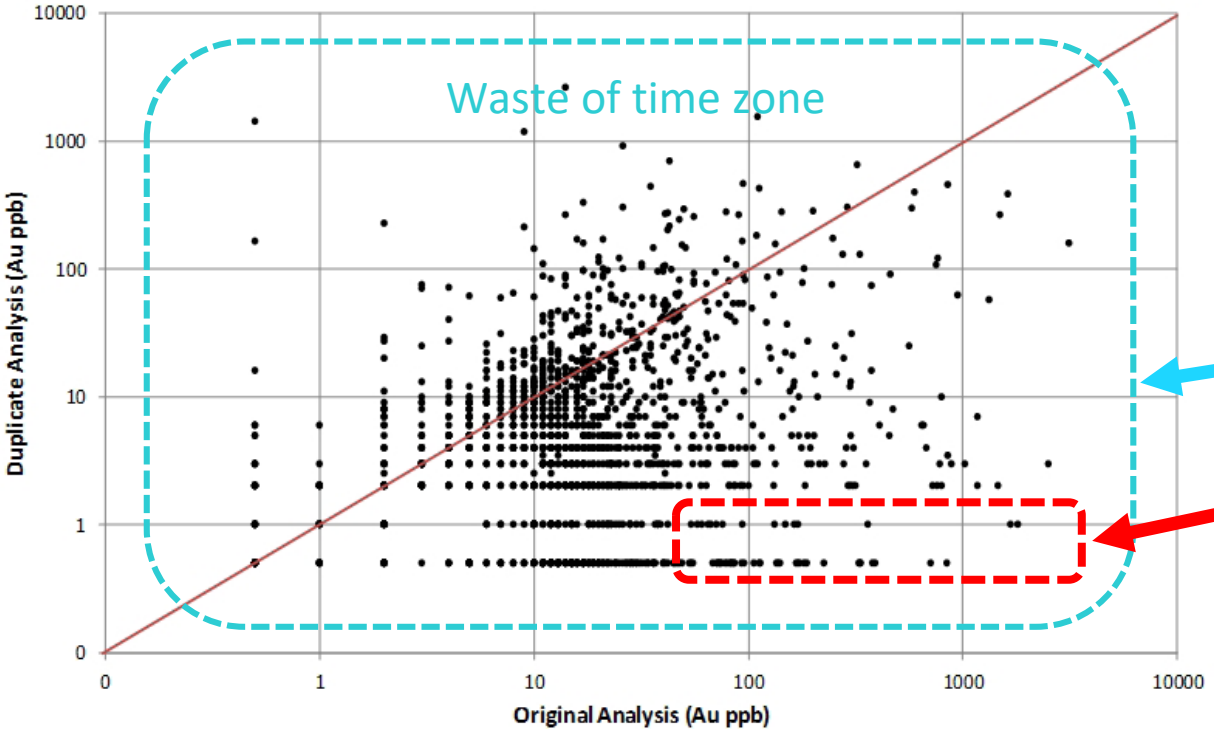
Method development example

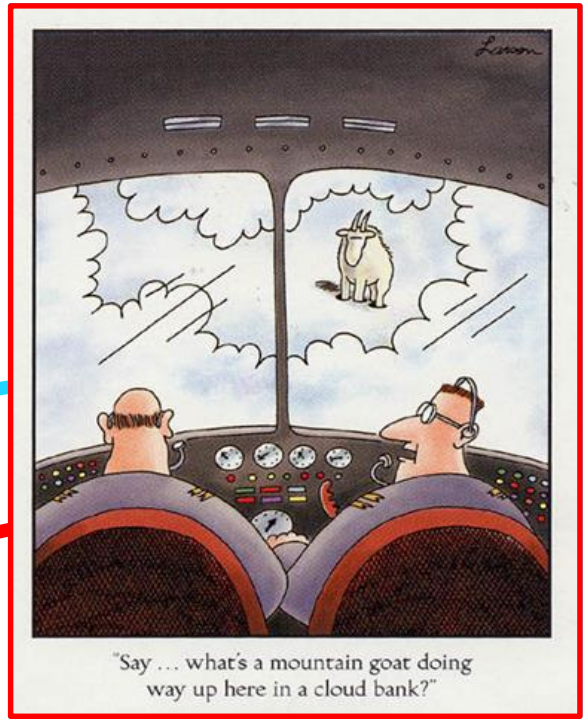
- Weight of sample for Au analysis
- No significant differences (4 g, 1 g, 0.5 g, 0.2 g and 0.1 g)
- Few differences e.g. Ag, Cu, Zn (org-rich/clay-poor)





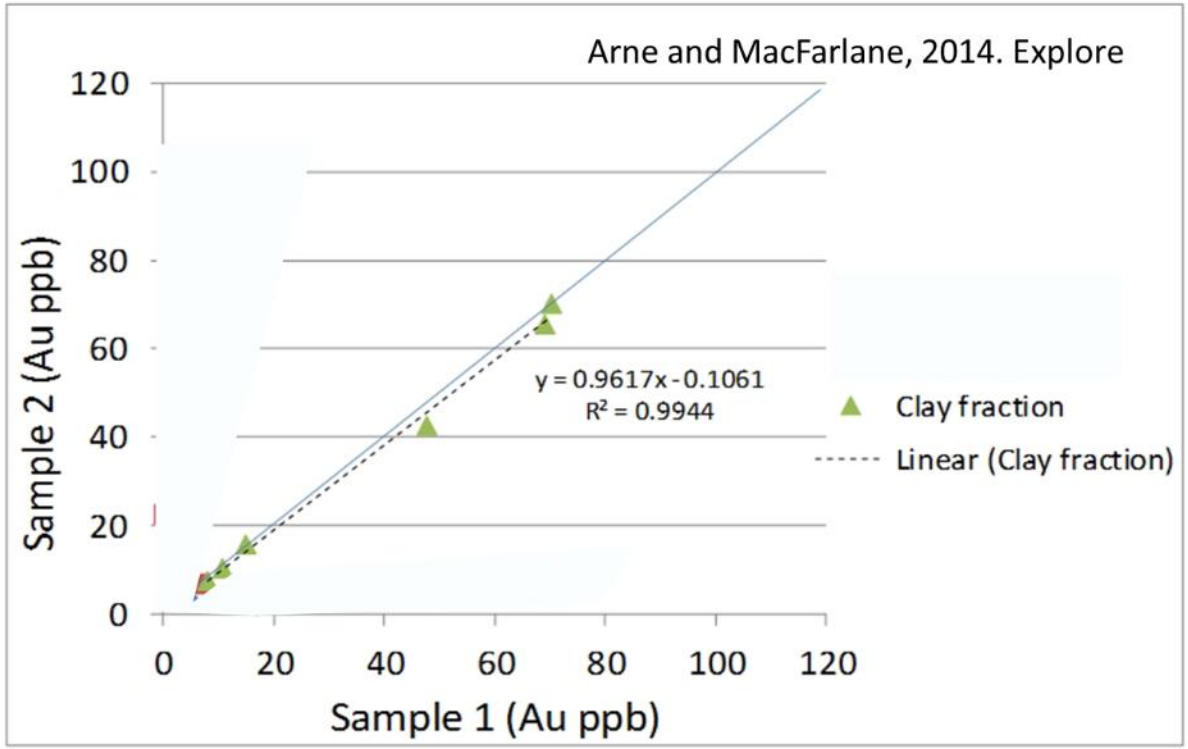
Nuggets are not your friends



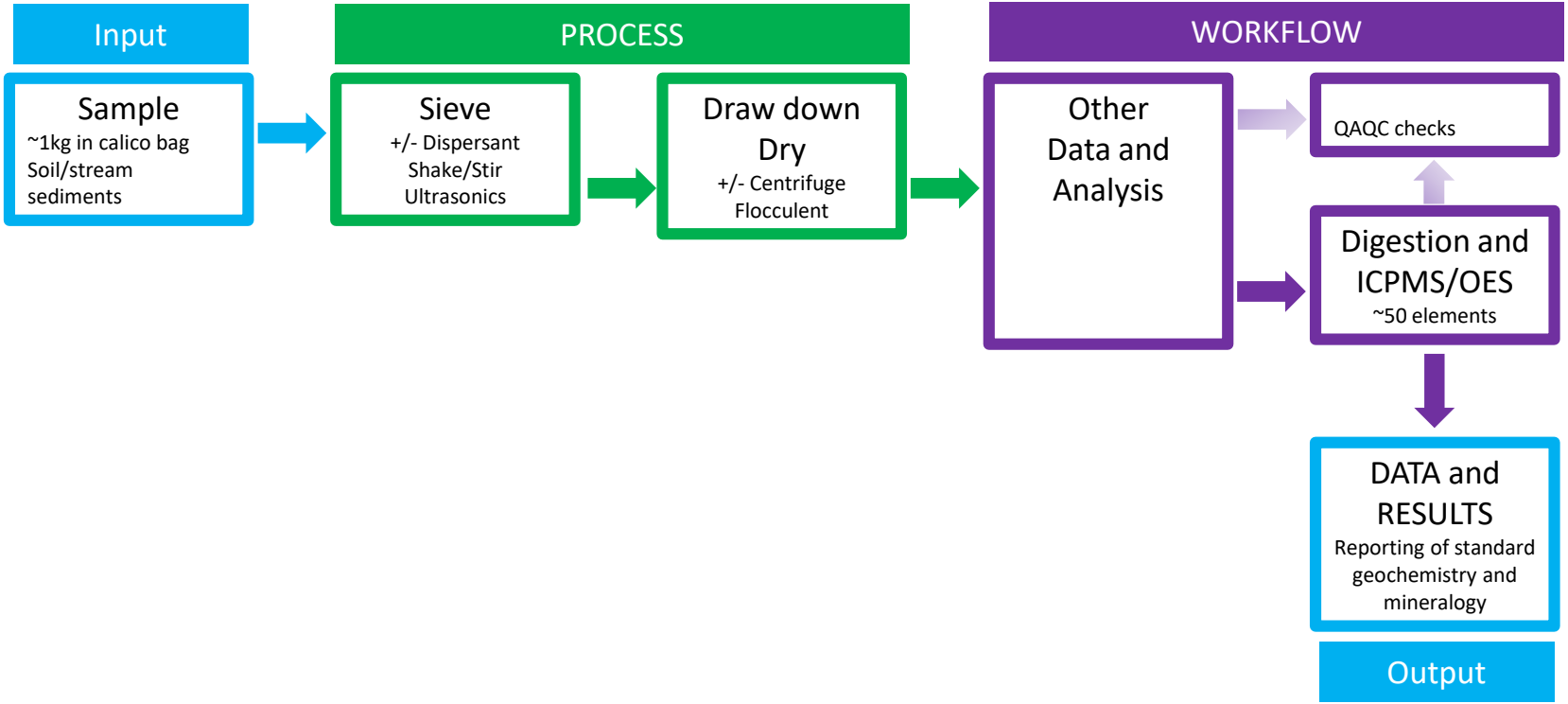


Heon, D (compiler) 2003. Yukon Regional Geochemical Database 2003

Lost nuggets (and hype), but gained confidence



Results: The UltraFine+ workflow



Workflow benefit

- UltraFine+ “est” fine fraction offering for commercial laboratories

Impact to industry already (outside this project)

- ASX release Feb 19, 2019 - Encounter Resources

"The application of Ultrafine+ at Nazare was successful in defining a high quality gold anomaly with significant contrast to background in an area where traditional geochemistry was ineffective. This coherent gold anomaly is coincident with major structural intersection at Nazare"

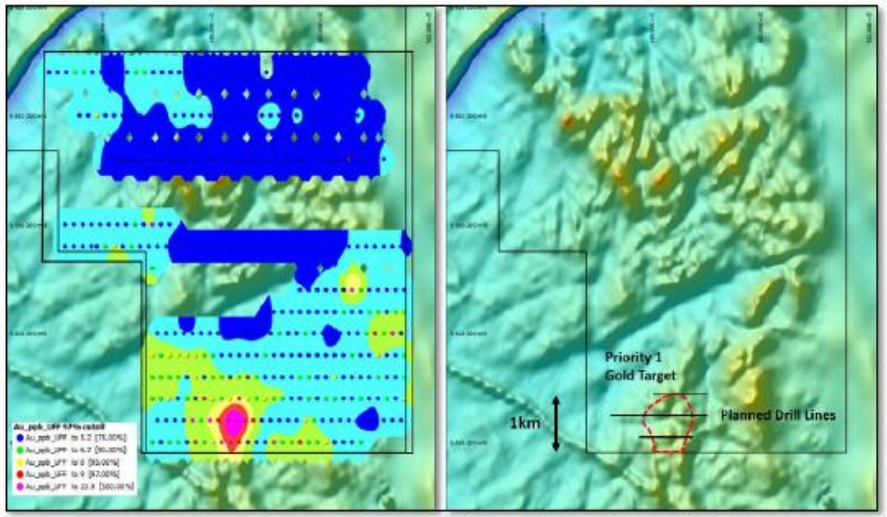
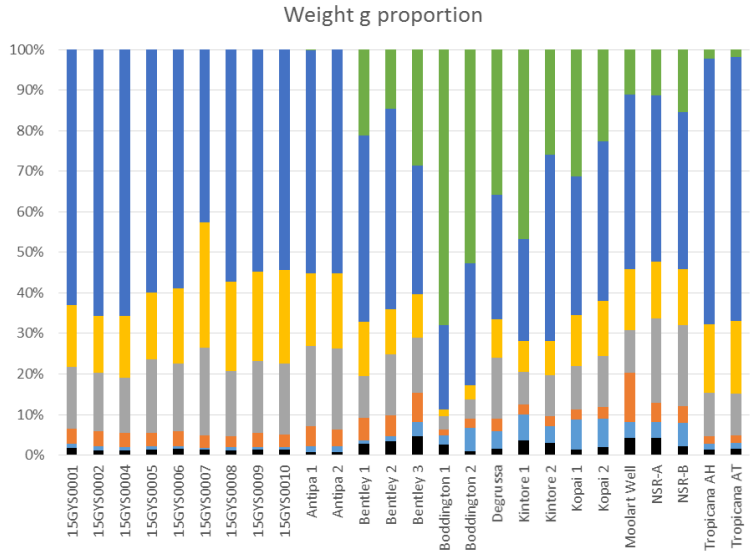
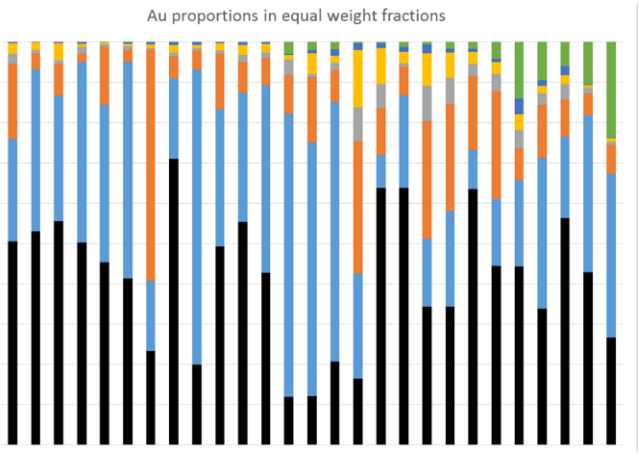


Figure 3 – CSIRO developed geochemical sampling technique trial results at Nazare over airborne TMI (magnetics)

More “interesting results” are in the fine fraction



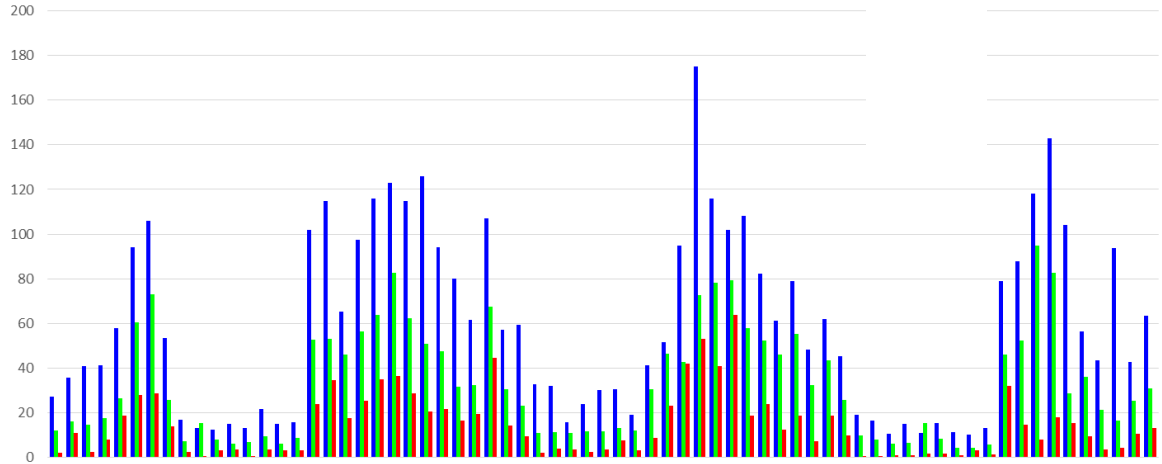


■ <2µm ■ 2-61µm ■ 61µm-125µm ■ 125µm-180µm ■ 180µm-250µm ■ 250µm-2000µm ■ >2000µm

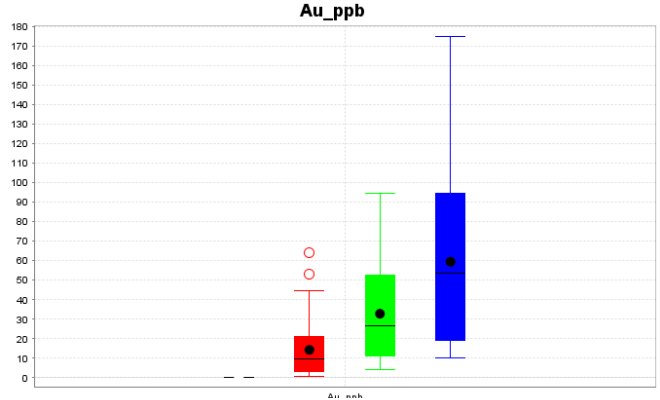
More Au in <2 µm

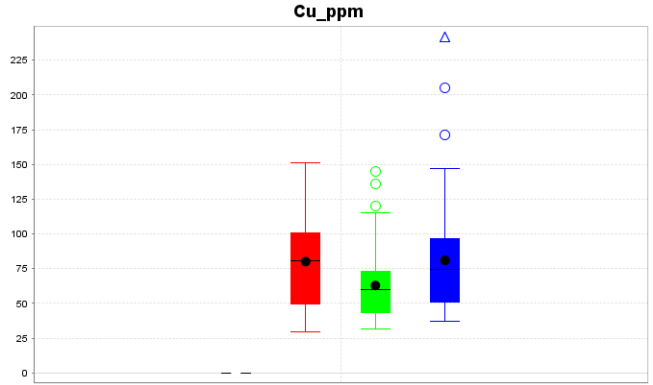
- East Kalgoorlie area

<2 µm
<250 µm
>2000 µm

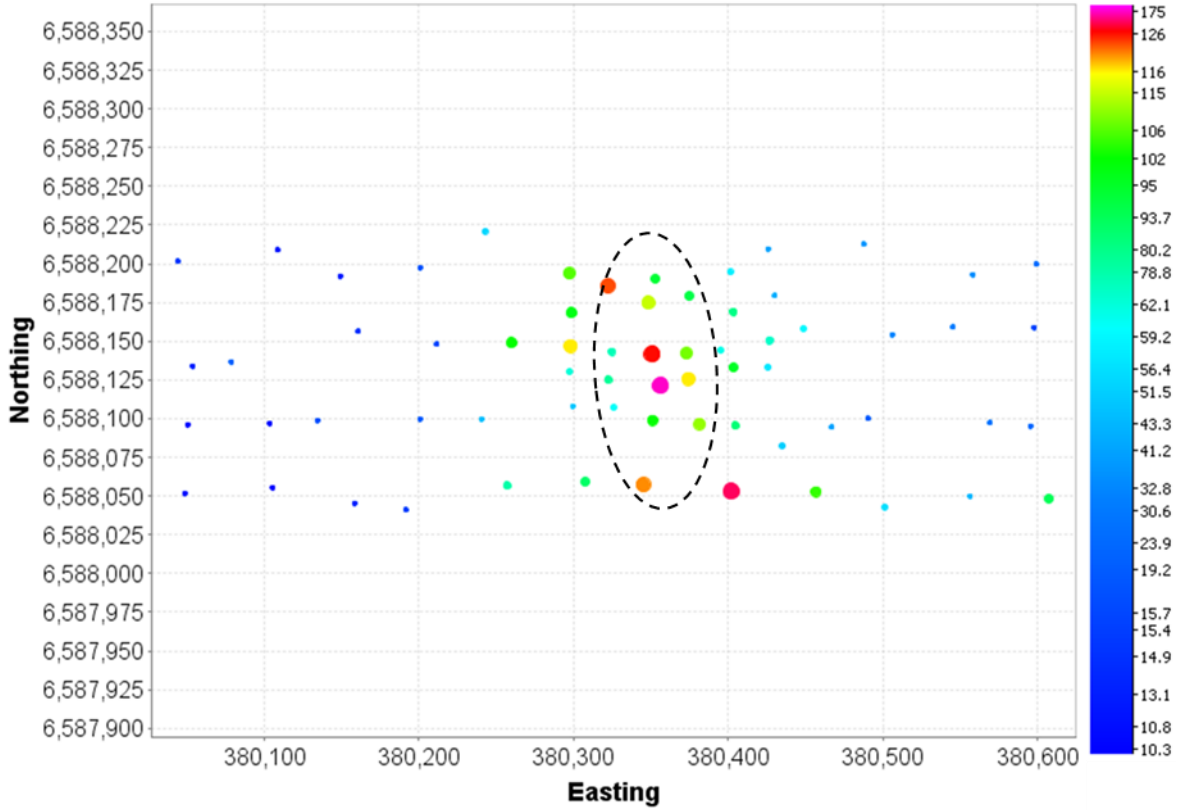


Individual sample sites with 3 particle size fractions

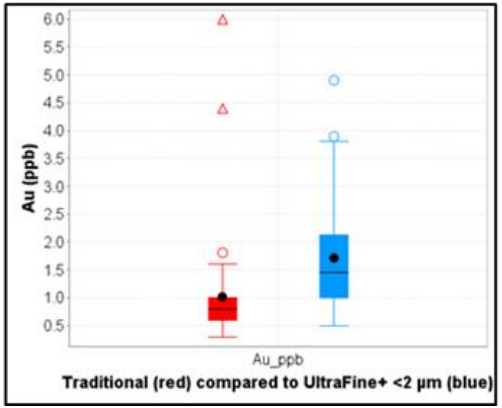


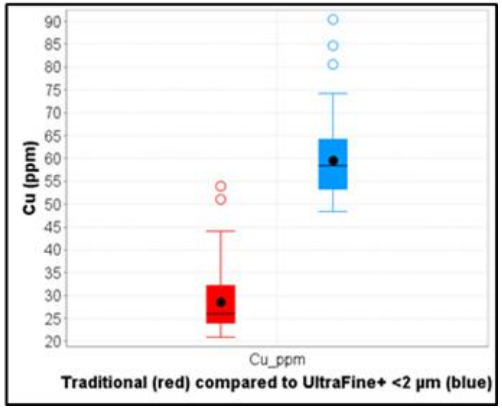


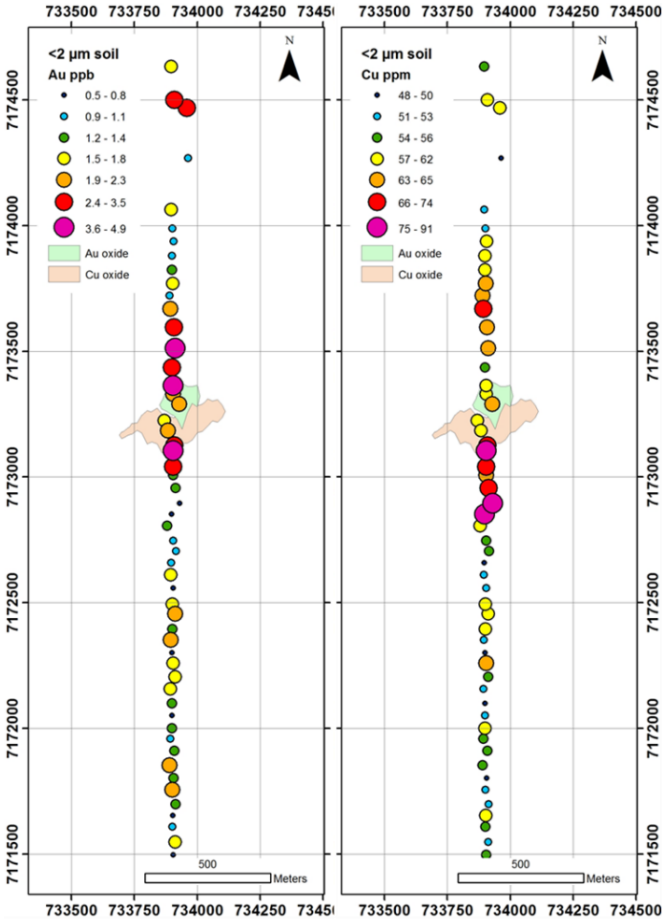
East Kalgoorlie orientation



DeGrussa orientation

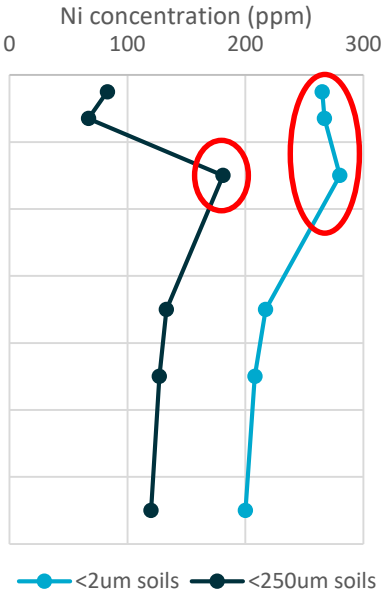


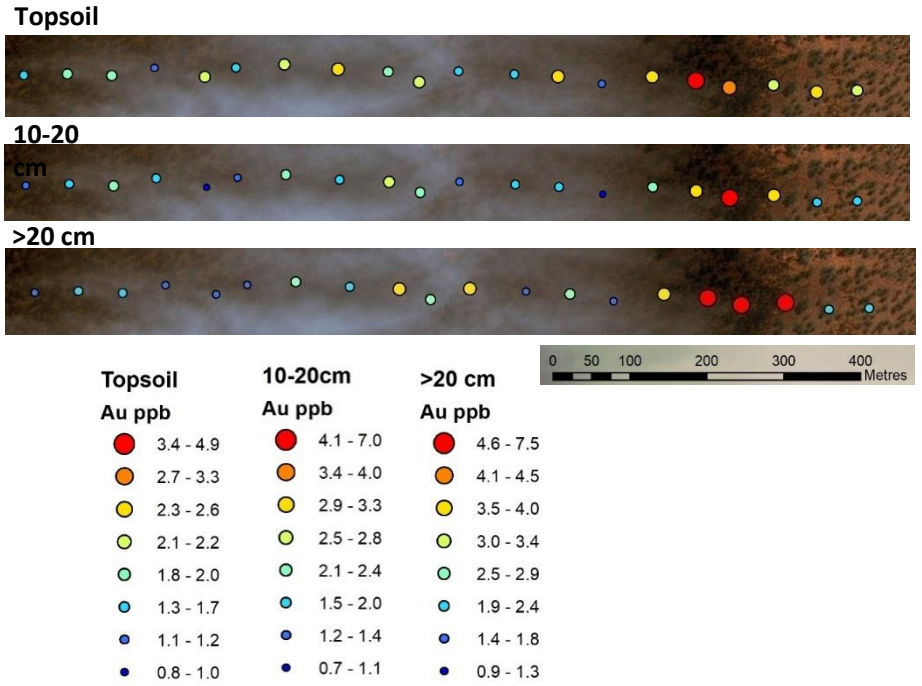




North Miitel and new sites in the Yilgarn

- Profile sampling is more about consistency, but initial tests are exceptional

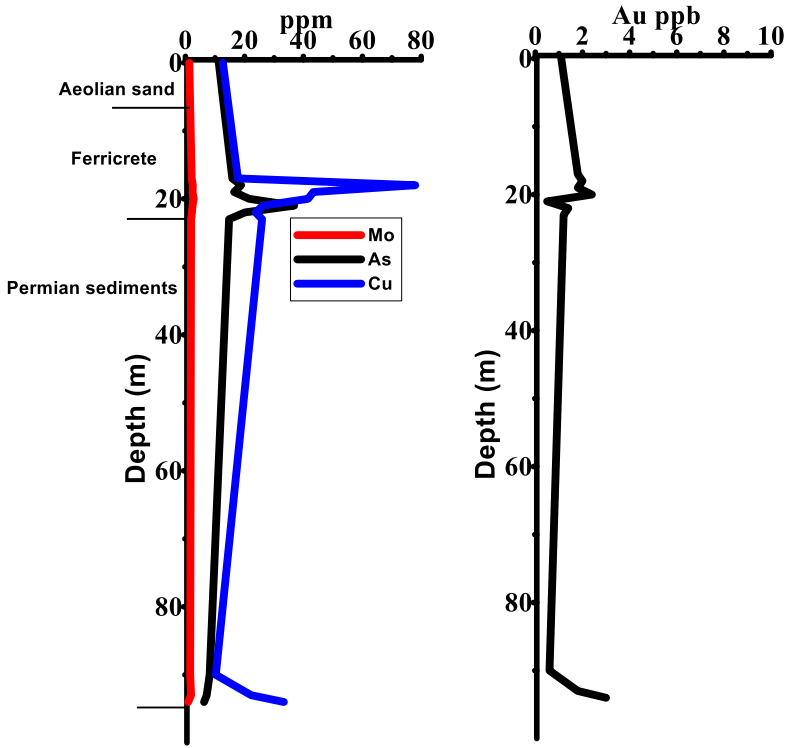




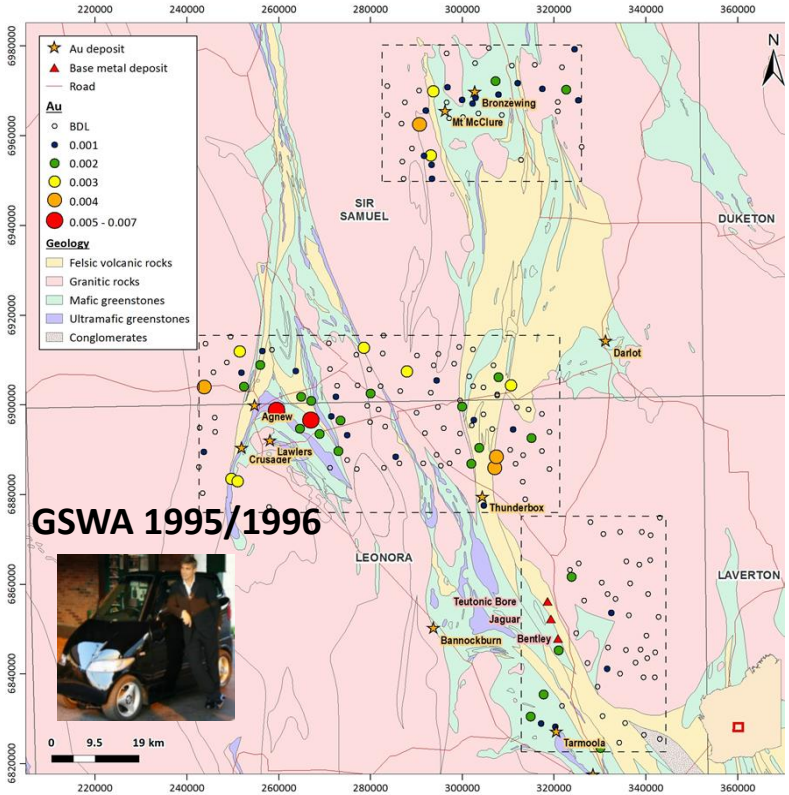
Permian interface

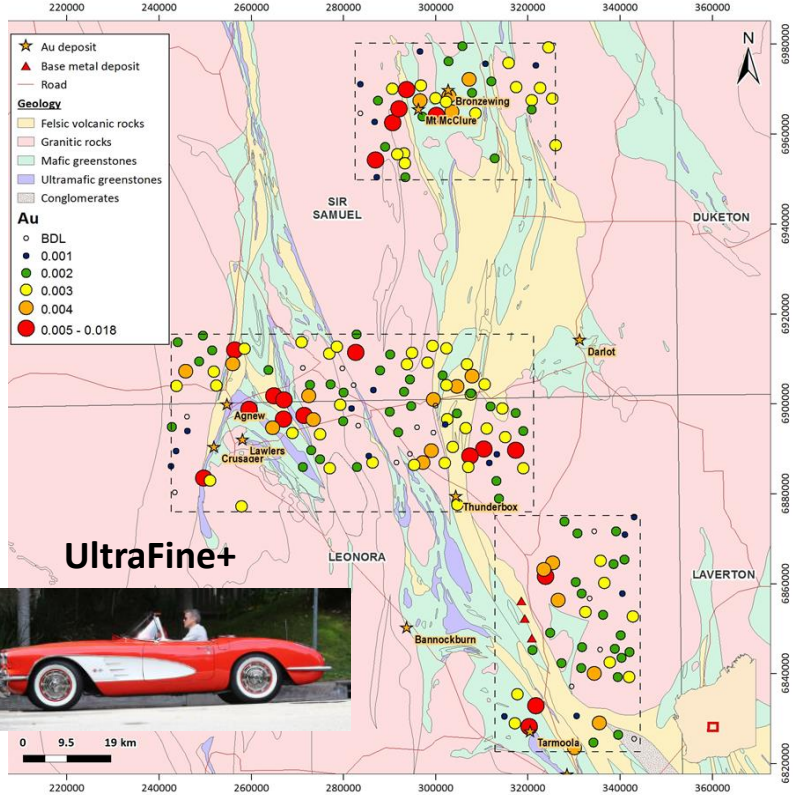
- CuAu deposit – deep transported cover
- Lateral extent?

Profile above mineralization



Gold with results on the same scales



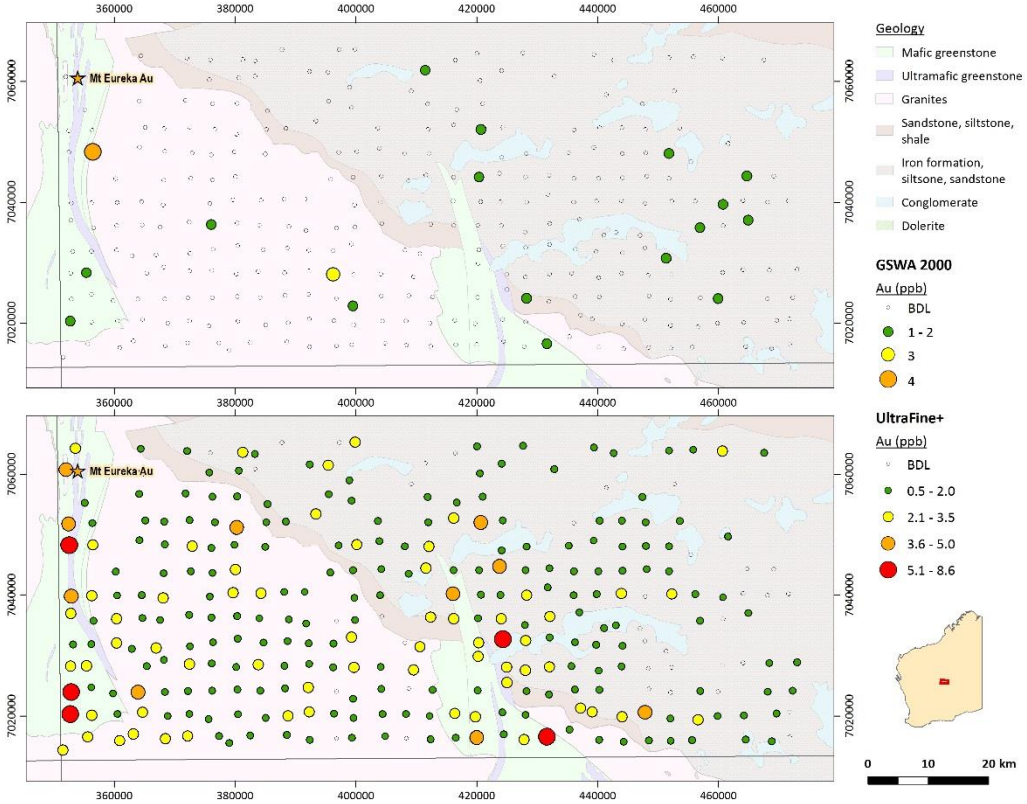


GSWA historic soils reprocessed with UltraFine+

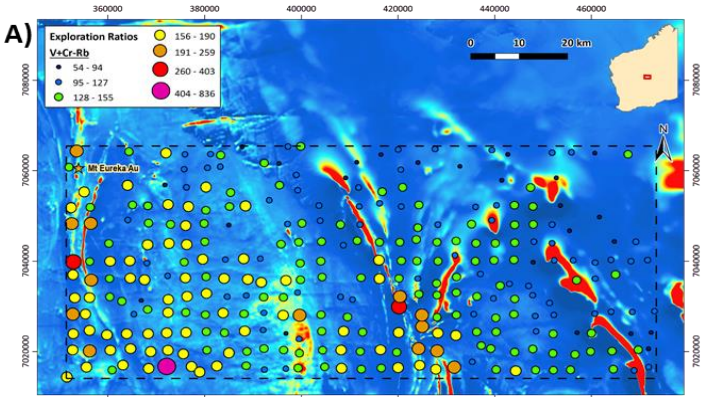
- Original sampling and analysis by GSWA (2000)

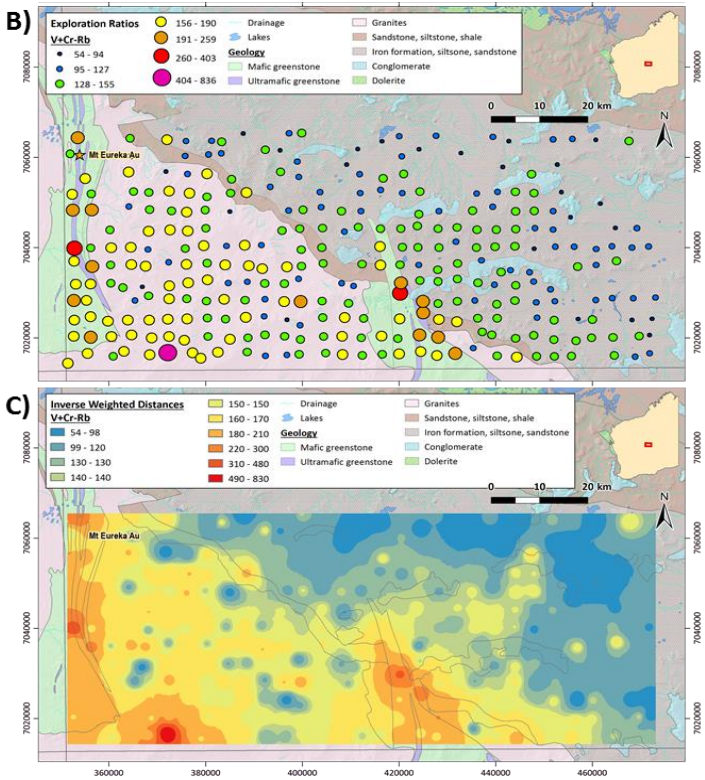
- Same samples using UltraFine+
- 5–9 ppb Au shows Bronzewing

- Not including:

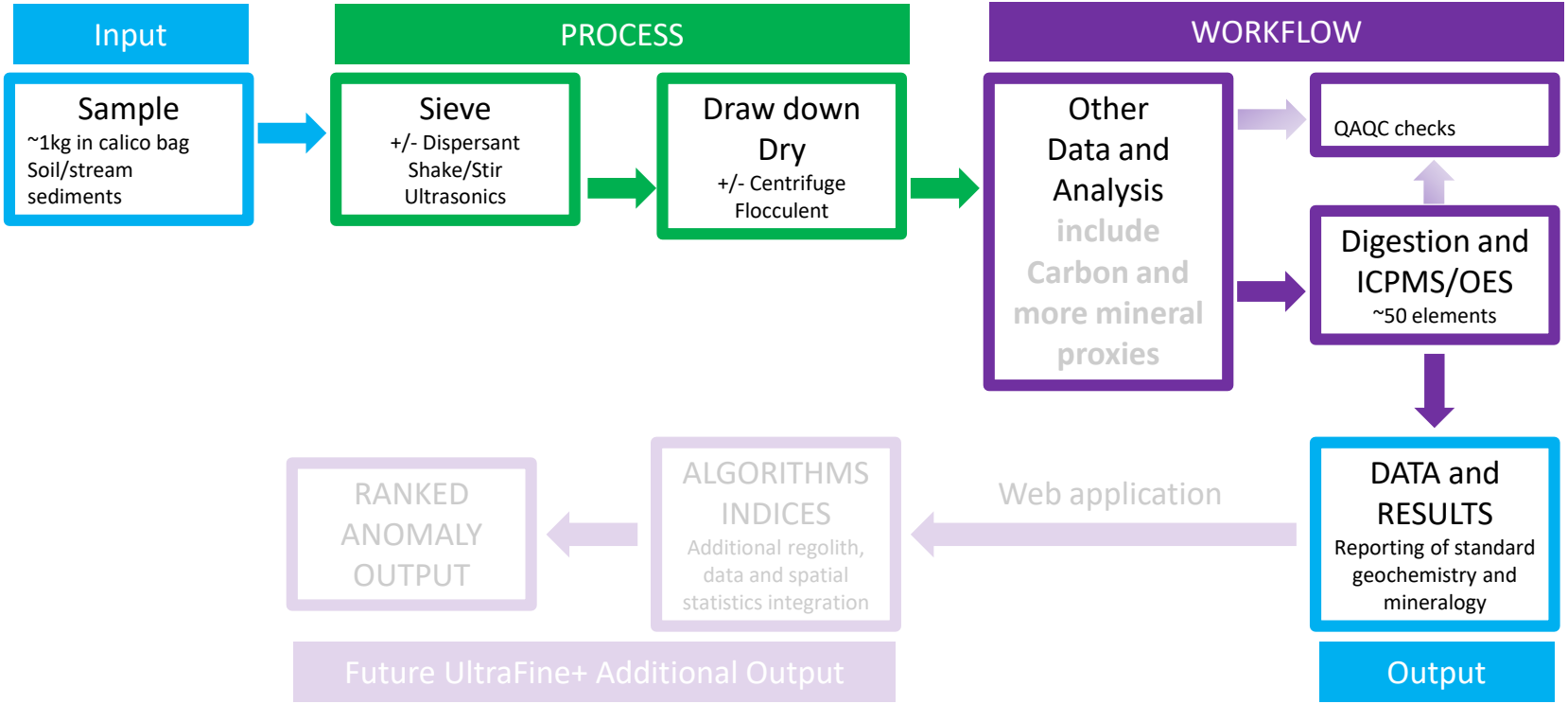


Other map products and more to come



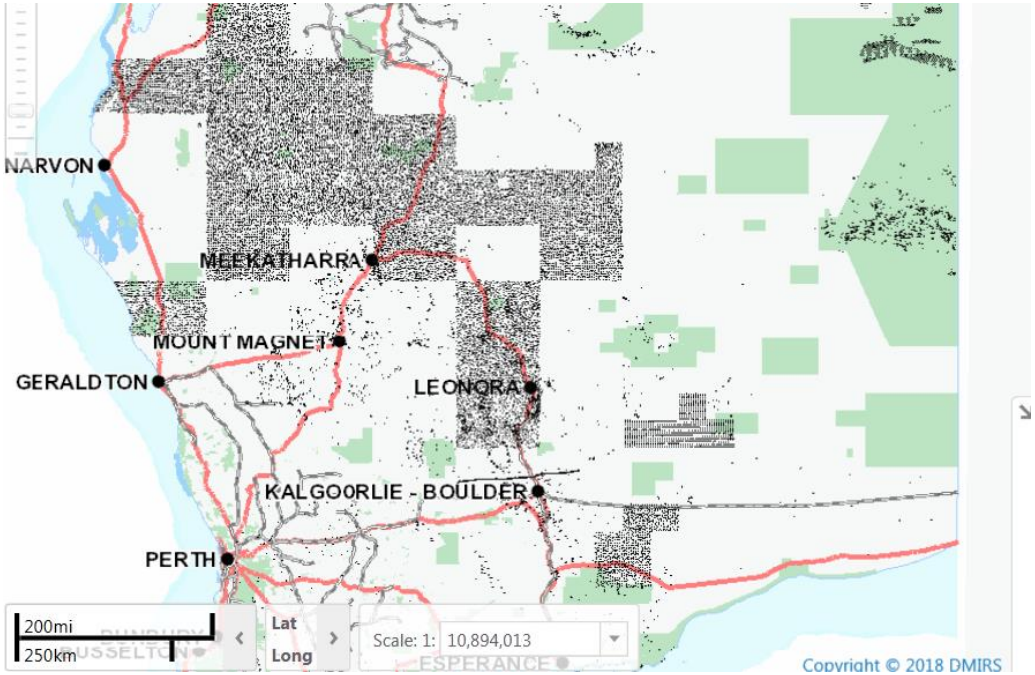


and future development/project



Opportunity: reprocess, evaluate and generate

10,000,000 open data (samples), just a fraction of many, many more samples



Thank you

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