Geochemical sampling of cover sequence materials throughout the Gawler Craton

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ARGA 2018, Wallaroo, South Australia  9 April 2018
Why?

Number of discoveries versus expenditures

Even after adjusting for unreported discoveries, over the last decade, expenditures outpaced the number of deposits found.

Note: Discoveries based on deposits >= "Moderate" in size
i.e. >100k oz Au, >10kt Ni, >100Kt Cu, >500kt Zn+Pb, >5kt U3O8, >10Mt Fe, >20Mt Thermal Coal

No World exploration data prior to 1975

Source: MinEx Consulting © March 2017
Averaged 92 metres per 12 hour shift over four successive shifts
At an average of ~15 metres per hour when drilling ahead

Adjacent diamond drilling achieved 25 metres per 12 hour shift
At an average of ~3 metres per hour when drilling ahead

https://www.youtube.com/watch?v=vv1vXoGRv4g
Where? (Gawler only)

Legend:
- Olympic Domain
- IOCG deposit

- Ben van der Hoek PhD project
  - van der Hoek et al. 2012: GEEA
- Eline Baudet PhD project
- Forbes et al. 2015: JGE
- Katherine Stoate PhD project
- Keryn Wolff PhD project
  - Wolff et al. 2017: JGE
  - Wolff et al. 2018: JGE
  - Wolff et al. submitted: JGE
- Kym Custance/Rebecca Hill honours projects
- Verity Normington PhD project
Mechanical dispersion in Permian rocks

Cover sequence overlying the Prominent Hill orebody

Forbes et al. 2015

Monazite chemistry criteria

Whole rock criteria

Adrienne Brotodewo PhD project: zircon chemistry

Forbes et al. 2015
Provenance and geochemistry of Permian glacial rocks

Influence of depositional/weathering processes and source rock composition on background geochemistry

Expected age histograms for potential source regions of glacigene sedimentary rocks in the Troubridge and Arckaringa basins

Verity Normington PhD project
Chemical dispersion in basal cover sequence over Yorke Peninsula

As and Sb within remobilised pyrite preserved within the cover sequence

Basal cover sequence over Yorke Peninsula gridded for modified IOCG prospectivity index of Fabris et al. (2013) using As, Co, S, Sb, Cu, Au, Ce and La.
Chemical dispersion in Early Cretaceous shales and sandstones

- Bulldog Shale and Cadna-owie Formation within the Eromanga Basin and over the Prominent Hill deposit

![Diagram showing chemical dispersion in Early Cretaceous shales and sandstones]

- Weathered Bulldog Shale
- Unweathered Bulldog Shale
- Cadna-owie Formation

Element Deportment?

Prominent Hill deposit
Fe, Cu, Au

Eline Baudet PhD project
Surface material sampling

- Ferricrete and plants over Kangaroo Island

Elements can be host in various potential sampling media at variable concentrations; the element of interest (and scale of the survey) may therefore dictate the best sample media.
Surface material sampling

- Calcrete and plants over the Yorke Peninsula

Distinguishing marine versus pedogenic carbonates

Biogeochemical expression of Cu mineralisation

Carbontate rock samples
N = 215 (this study)

Marine carbonate rocks
n = 12 (Wolff et al. 2017)

Pedogenic carbonate rocks
n = 19 (Wolff et al. 2017)

Vectoring towards Cu mineralisation using regional carbonate sampling surveys

Keryn Wolff PhD project
Wolff et al. 2017, 2018 and submitted, JGE
Lithogeochemistry for background

Conclusions

- Increased understanding of utilising regolith materials for mineral exploration

….but lots more to do!!
Acknowledgements

The work has been supported by the Deep Exploration Technologies CRC whose activities are funded by the Australian Government's CRC Programme.

This is DET CRC Presentation 2018/1099