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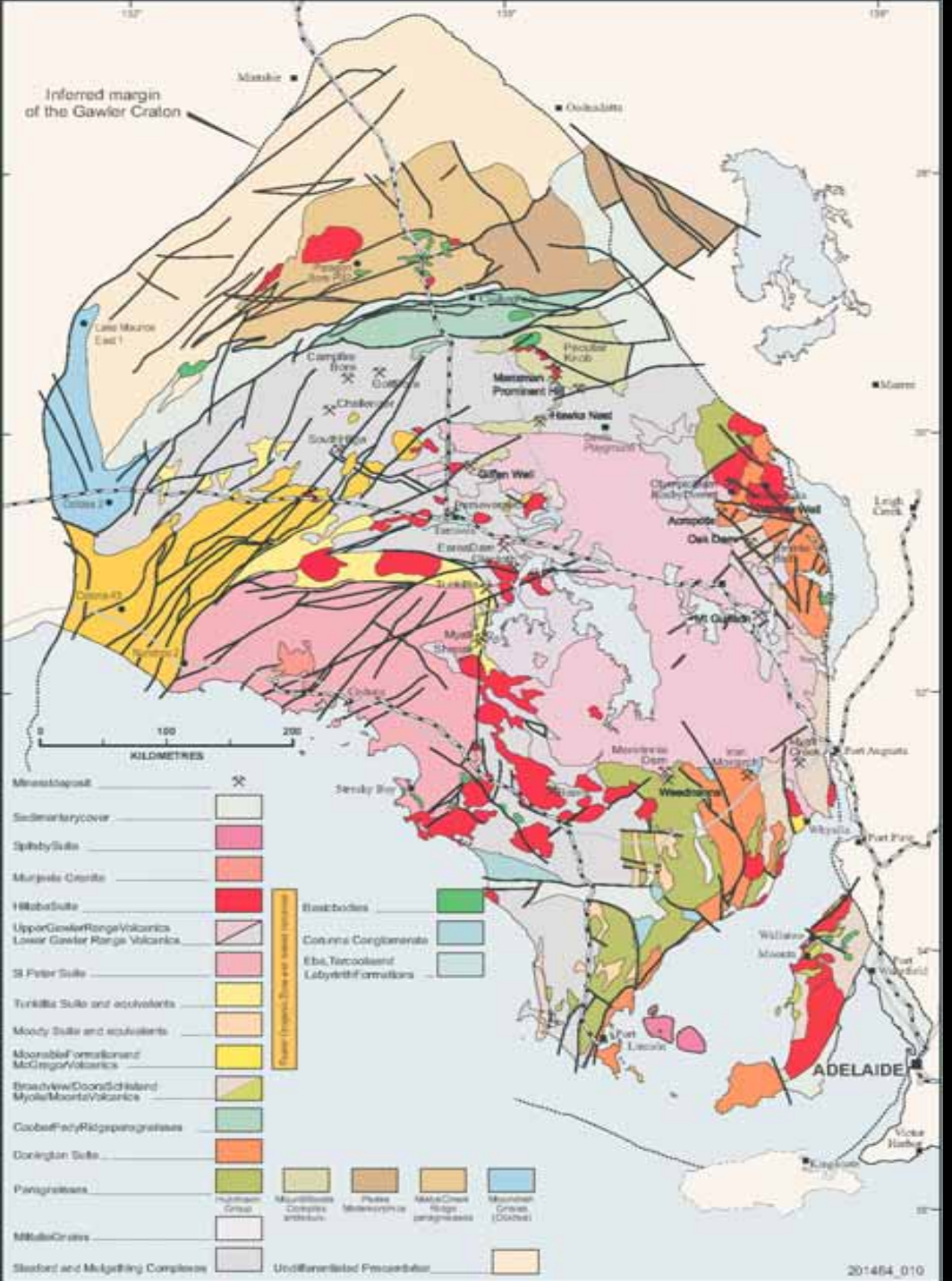
Hiltaba–GRV A- and I-type supersuites: relationship to IOCG and Au mineralisation

Towards understanding the formation of disparate mineral systems: differences in crustal conditions shown by the Hiltaba granites and GRV

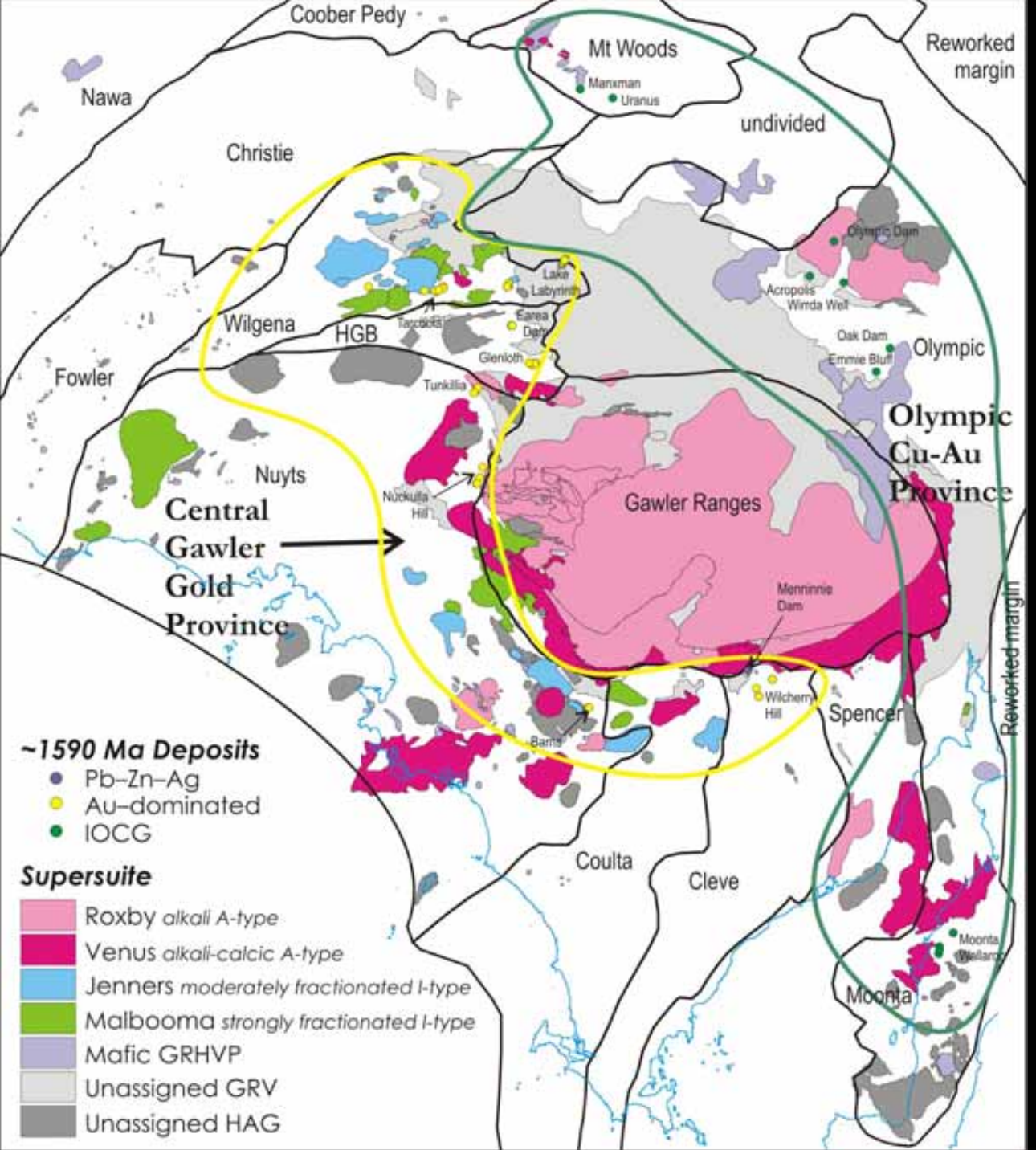
Anthony Budd

Gawler IOCG workshop

Adelaide, February 24th 2006



- **Hiltaba “Suite”insufficient – Hiltaba Association Granites**
- **HAG comagmatic with GRV – Gawler Ranges-Hiltaba Volcano-Plutonic Association (GRHVP)**
- **Spatial & temporal association with IOCG, Au, & base metal mineralisation**
- **Are there spatial variations in the GRHVP that reflect the distribution of IOCG / Au deposits?**
- **Cause or effect?**



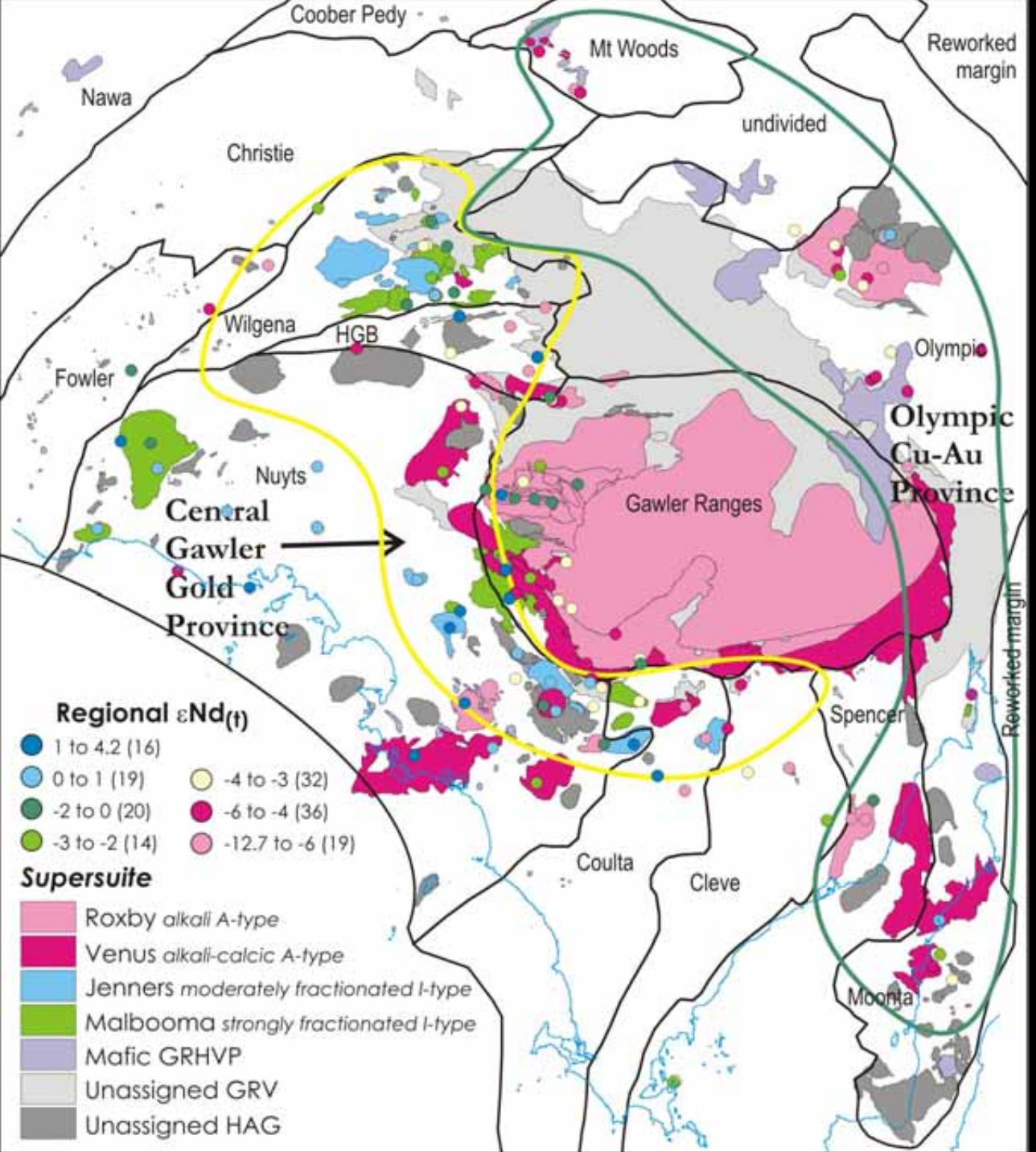
- **Tarcoola region: two moderately oxidised I-types, *Malbooma* and *Jenners* supersuites**
- **IRG-like**
- **GRHVP in other areas includes two A-type Supersuites, the *Roxby* and *Venus* Supersuites**
- **Correlation to mineralisation**

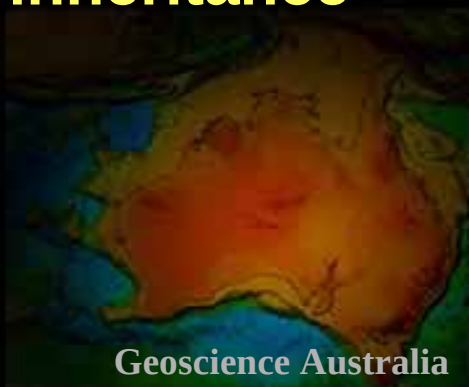
GRHVP Subdivision

	Jenners	Malbooma	Roxby	Venus
Type	I	I	A	A
Fe/Mg	low	low-mod	high	mod
Ga/Al	low	mod	mod	high
HFSE	low	low	high	high
T_{Zr}°C	720 – 820	720 – 800	780 – 900	740 – 880
Rb/Sr	low	low-high	mod-high	mod-high
εNd_t	-3 – +2	-3 – +2	-6 – +1	-5 – +1
Age	young	young	old	old

εNd

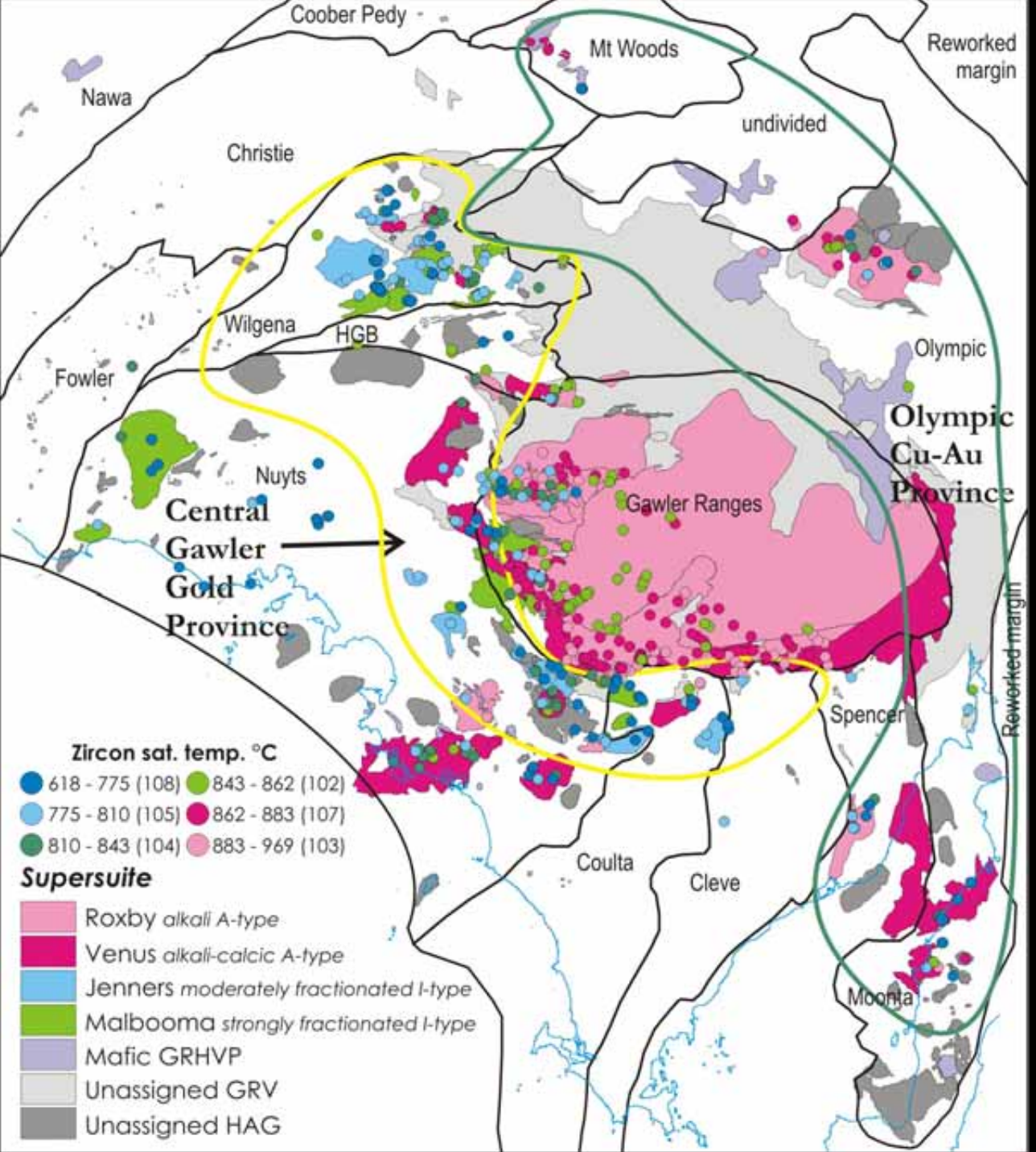
- A-type supersuites tend to have evolved εNd (except Venus Bay area)
- I-type supersuites tend to have less evolved εNd
- Probably due to source inheritance

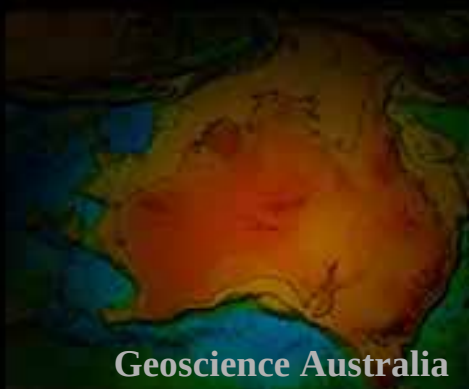




Zircon saturation temperature

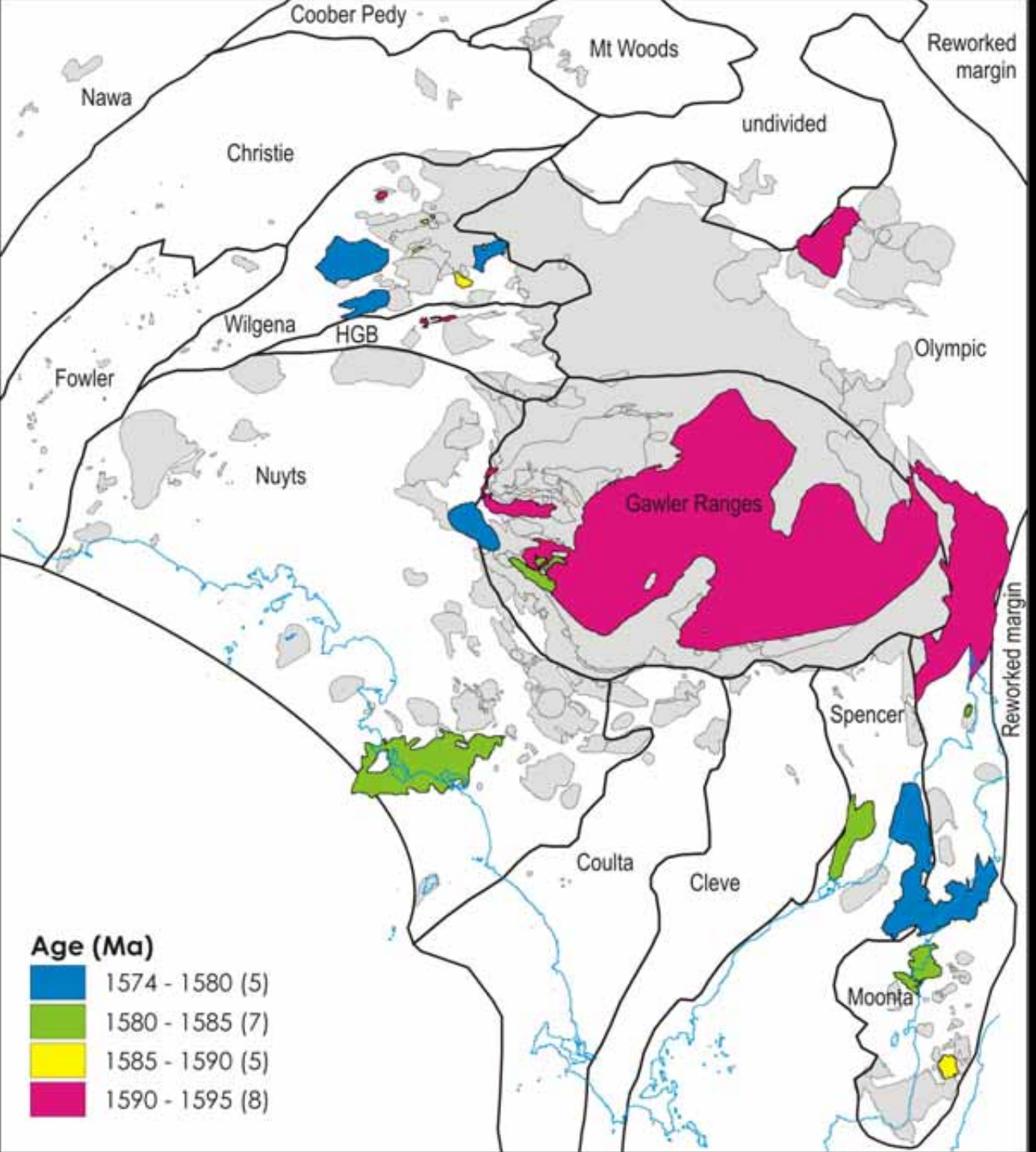
- TZr°C: minimum temperature
- A-types hotter, *Roxby* hottest
- I-types cooler

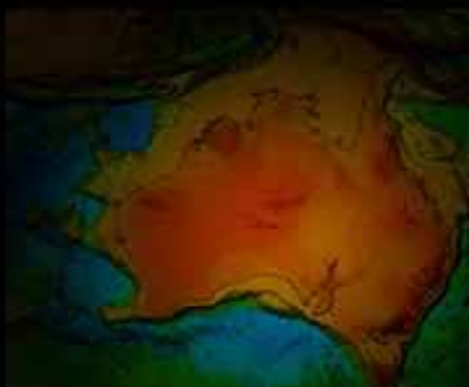




Age distribution

- 25 U-Pb zircon ages
- A-types possibly older?
- Tarcoola I-types: 1590 & 1575 Ma
- No *spatial-temporal* distribution overall
- Need more data





Implications

- **IOCG mineralisation associated with very high temperature fractionated A-type magmas, isotopically evolved terranes**
- **High temperature fractionated I-type magmas found in less isotopically evolved terranes, in the Central Gawler Gold Province**
- **GRHVP is a reflection of different basement and melting conditions**
- **Proximity to granites probably important to mineralisation – A / I-type subdivision may be important to deposit type, at least for heat**

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Budd, A.R. 2006. *The Tarcoola Goldfield of the Central Gawler Gold Province, and the Hiltaba Association Granites, Gawler Craton, South Australia.* Australian National University. Unpublished PhD thesis. 507 pp.