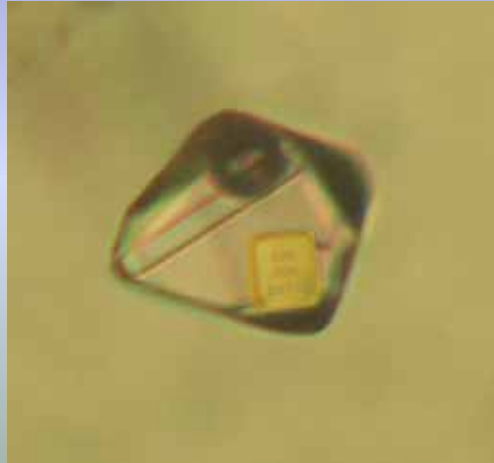


Gawler Craton Gold Province - Fluid Inclusion Studies

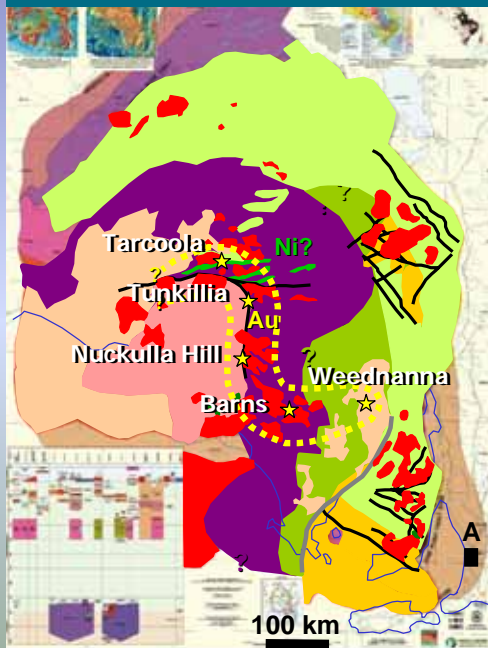
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Adelaide Resources Ltd
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Equinox Resources Ltd



The Gawler Craton gold Province



Central Gawler Au Province

courtesy R. Skirrow

Why analyse Fluid Inclusions?

Fluid Inclusions *can* give us information on:

- pressure and temperature conditions of mineral forming processes
- composition of mineral forming fluids
- ... and the variation of all this through time

Analysis of Fluid Inclusions

- Nuckulla Hill
- Barns
- Weednanna
- Weednanna North / Mawson

Analysis of Fluid Inclusions

- Fluid Inclusion Petrography - age relationships
- Microthermometry - composition and FI assemblage characterisation
- Laser Raman Spectroscopy of gaseous phases and daughter minerals

Barns - Fluid Inclusion Results

Petrography

Fluid inclusions are hosted by different generations of quartz (1&2)

Quartz 1: Very early primary 2-phase inclusions followed by three phase inclusions at variable degree of filling. Phase separation is strongly indicated.

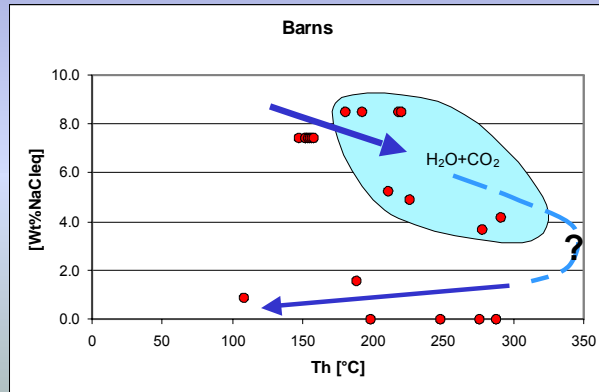
Quartz 2: Primary and secondary two phase, very uniform phase ratios within individual clusters



Barns - Fluid Inclusion Results

Microthermometry

1. early moderate salinity, **H₂O**
2. low salinity **H₂O-CO₂** fluids with rising temperature
3. low salinity, late primary and secondary **H₂O** fluids, possibly a cooling path.



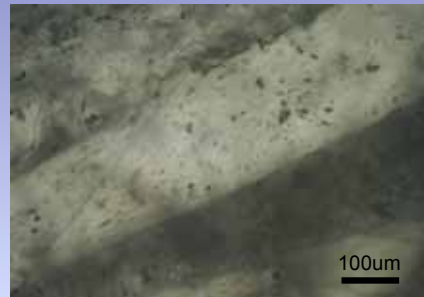
Nuckulla Hill - Fluid Inclusion Results

Petrography

Fluid inclusions are hosted by idiomorphic quartz and carbonate in veinlets.

Carbonate: two-phase primary inclusions

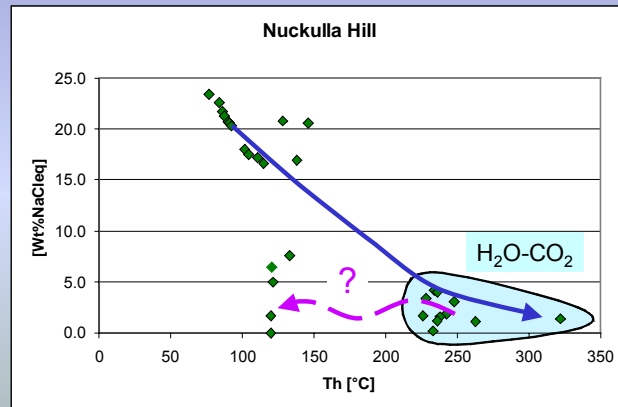
Quartz: two and three phase primary inclusions with very variable degrees of filling.



Nuckulla Hill - Fluid Inclusion Results

Microthermometry

1. early moderate salinity, **H₂O** with low eutectic (-36 to -38°C) of complex fluids
2. low salinity **H₂O-CO₂** fluids with rising temperature
3. low salinity late primary and secondary **H₂O** fluids possibly the cooling path.

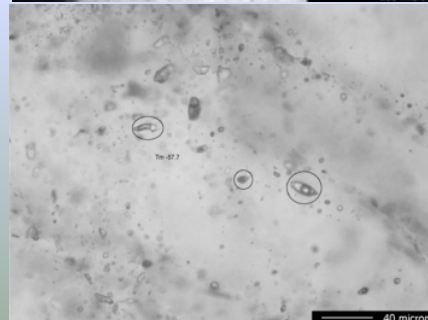
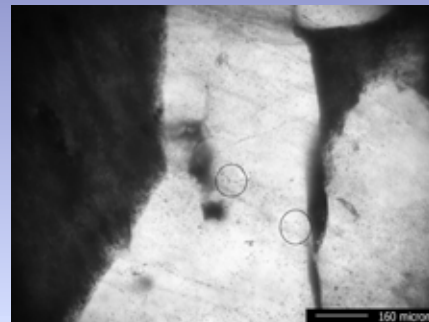


Weednanna - Fluid Inclusion Results

Petrography

Fluid inclusions are hosted by different generations of mildly deformed and ideomorphic quartz aggregates.

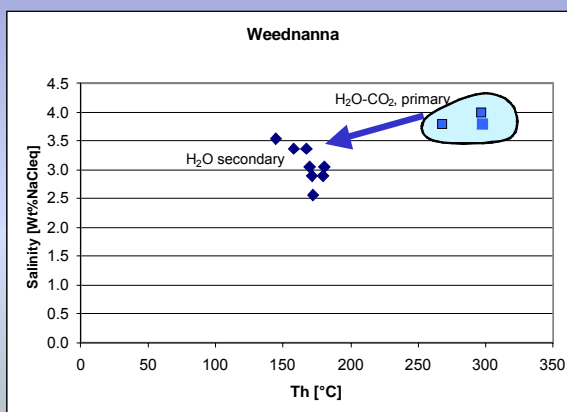
- Quartz** : partly deformed quartz contains
- early primary three-phase inclusions and
 - late secondary two phase inclusions



Weednanna - Fluid Inclusion Results

Microthermometry

Early primary CO₂-H₂O inclusions
Secondary saline H₂O inclusions.



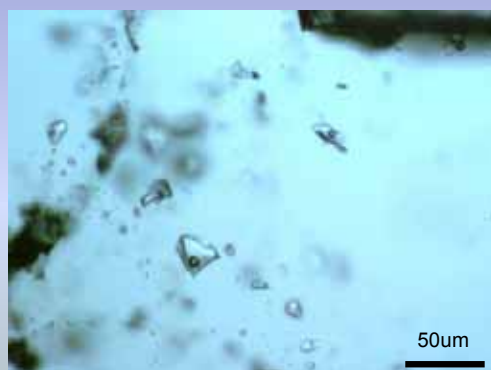
Weednanna North (Mawson) - Fluid Inclusion Results

Petrography

Clusters of undeformed idiomorphic quartz needles and columns with distinct growth zones. All inclusions are two phase.

Inclusions were measured from the core to the rim of quartz needles to determine evolution of fluid composition.

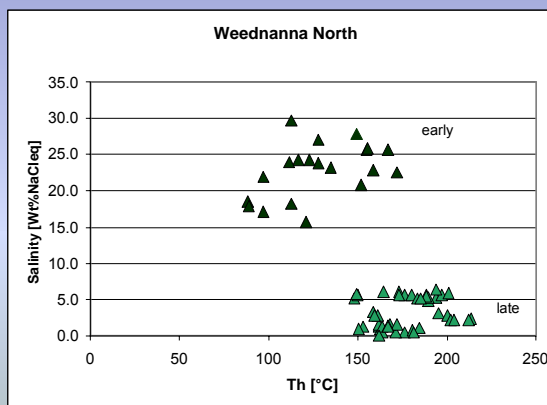
Youngest quartz growth contains large two phase inclusions.



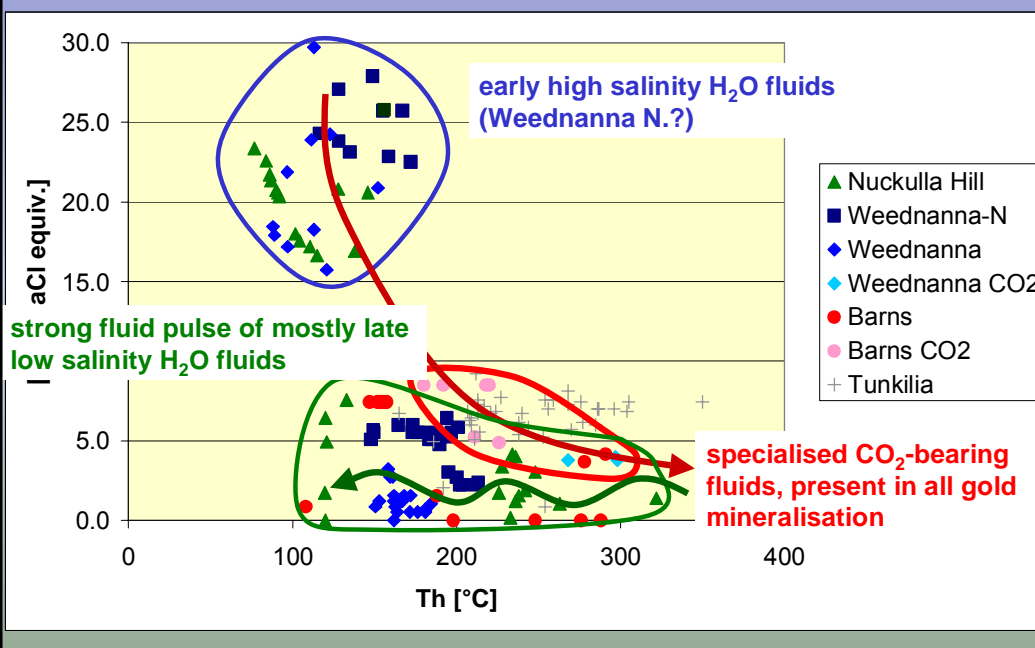
Weednanna North (Mawson) - Fluid Inclusion Results

Microthermometry

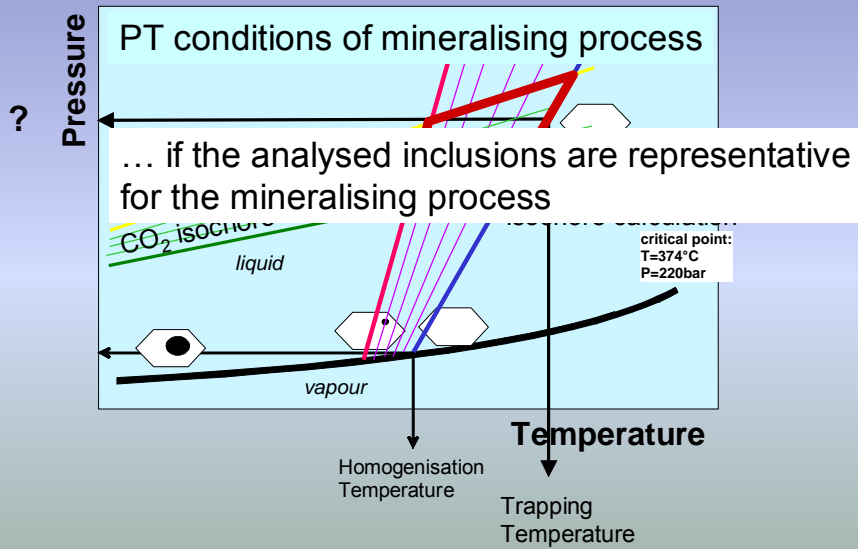
- Early primary high salinity H₂O inclusions
- Late primary low salinity inclusions.
- in intermediate zones both are present but no fluid mixing indicated
- no CO₂



Summary of fluid inclusion characterisation

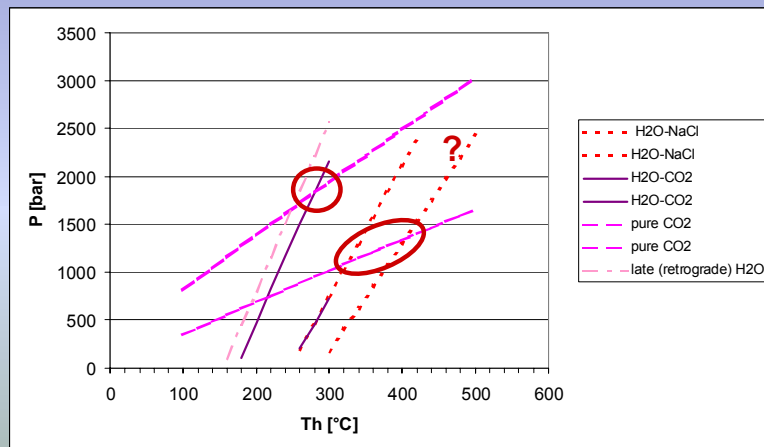


Fluid Inclusion Isochores



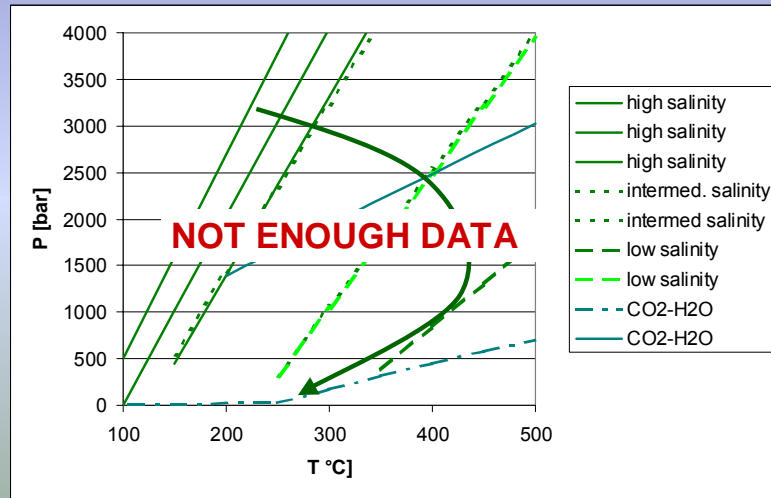
Barns - Fluid Inclusion Results

Isochore calculation



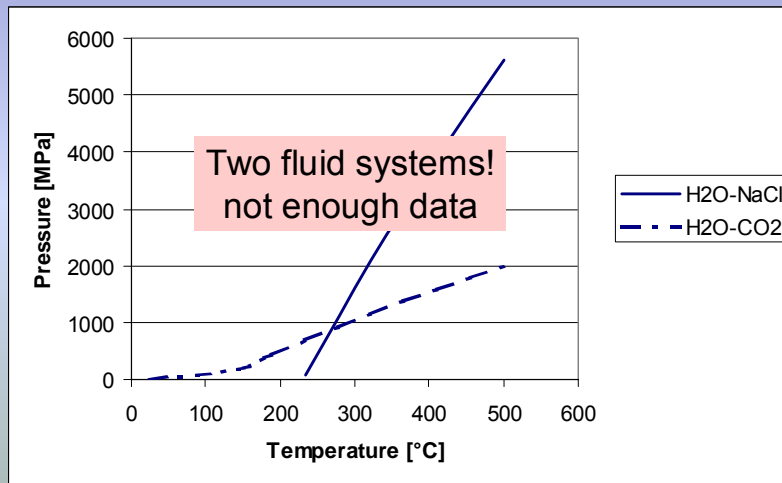
Nuckulla Hill - Fluid Inclusion Results

Isochore calculation



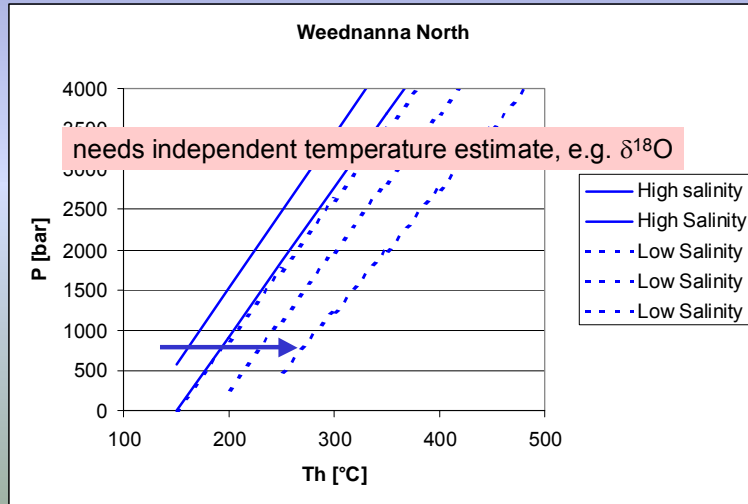
Weednanna - Fluid Inclusion Results

Isochore calculation

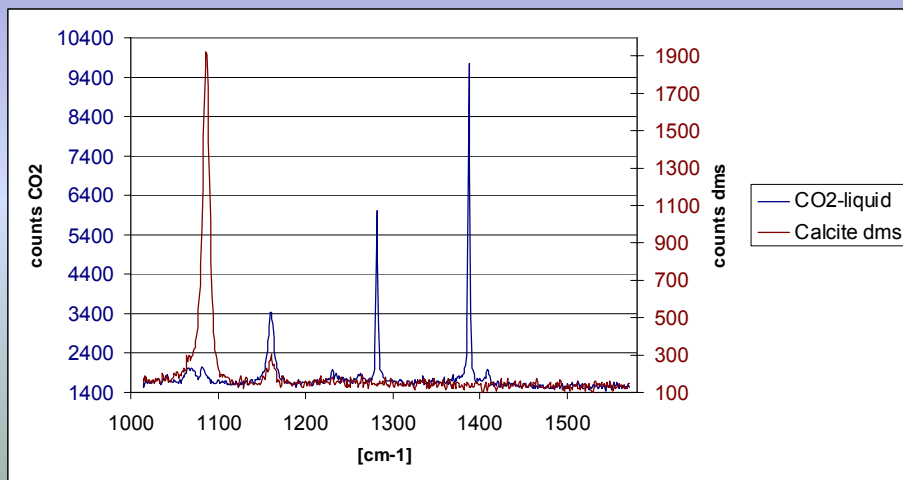


Weednanna North (Mawson) - Fluid Inclusion Results

Isochore calculation



Raman spectra of liquid CO_2 and calcite daughter minerals



SUMMARY

1. different fluid systems have been distinguished and are consistent with style of alteration and Ar-ages
2. evolution of fluid chemistry evident
3. CO₂ bearing fluids, typical candidates for mesothermal gold mineralising fluid systems, identified regionally in all Au targets
4. strong indication for (H₂O-CO₂) phase separation which is a potent precipitator
5. Wednanna North (Mawson) is different

What's Next?

- more samples and more time to analyse them (chip samples of 5 to 10mm are not ideal but possible!)
- relate petrographic and fluid inclusion information as best as possible
- stable isotopes ($\delta^{18}\text{O}$, $\delta^{13}\text{C}$, $\delta^{34}\text{S}$, δD) of mineral parageneses for independent temperatures
- relate fluid inclusion assemblages to structural history