

New zircon and monazite geochronology from recent GOMA Drilling

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PACE

HOT PROSPECTS



Government of South Australia
Primary Industries and Resources SA

www.minerals.pir.sa.gov.au



Australian Government
Geoscience Australia

In 2008 Geoscience Australia as part of its Onshore Energy Security Program (OESP) collected deep seismic reflection data across the northern Gawler Craton into the Musgrave Province.

This was the **GOMA** seismic line (**G**awler-**O**fficer-**M**usgrave-**A**madeus)

The traverse followed the Adelaide to Darwin railway line for ~ 630 km, from Tarcoola in the south to the southern margin of the Amadeus Basin in the Northern Territory.

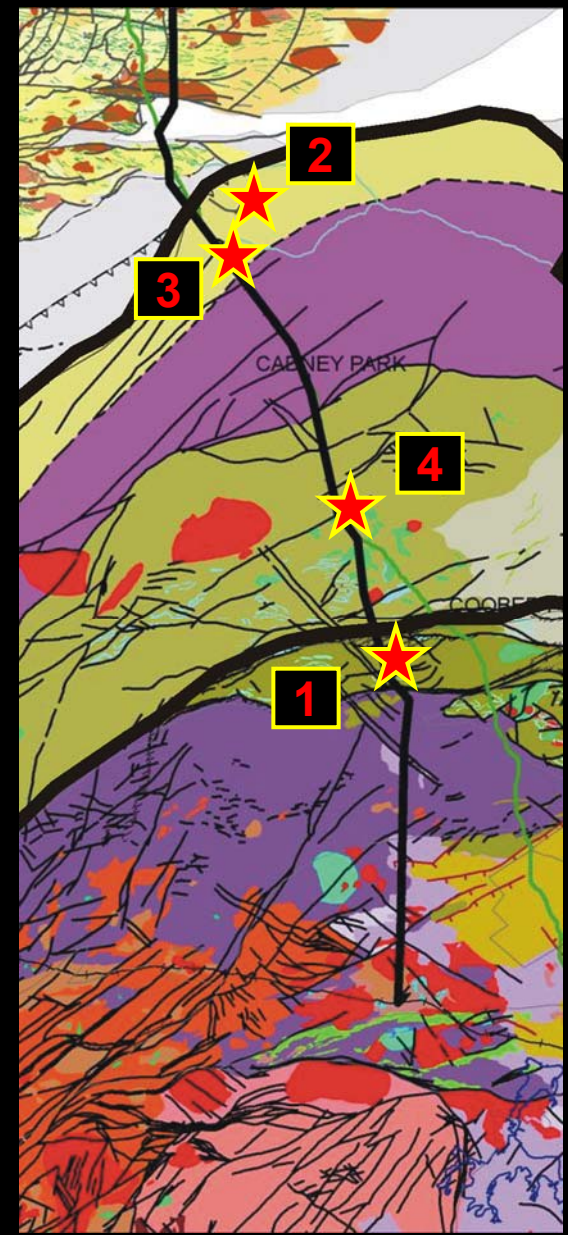
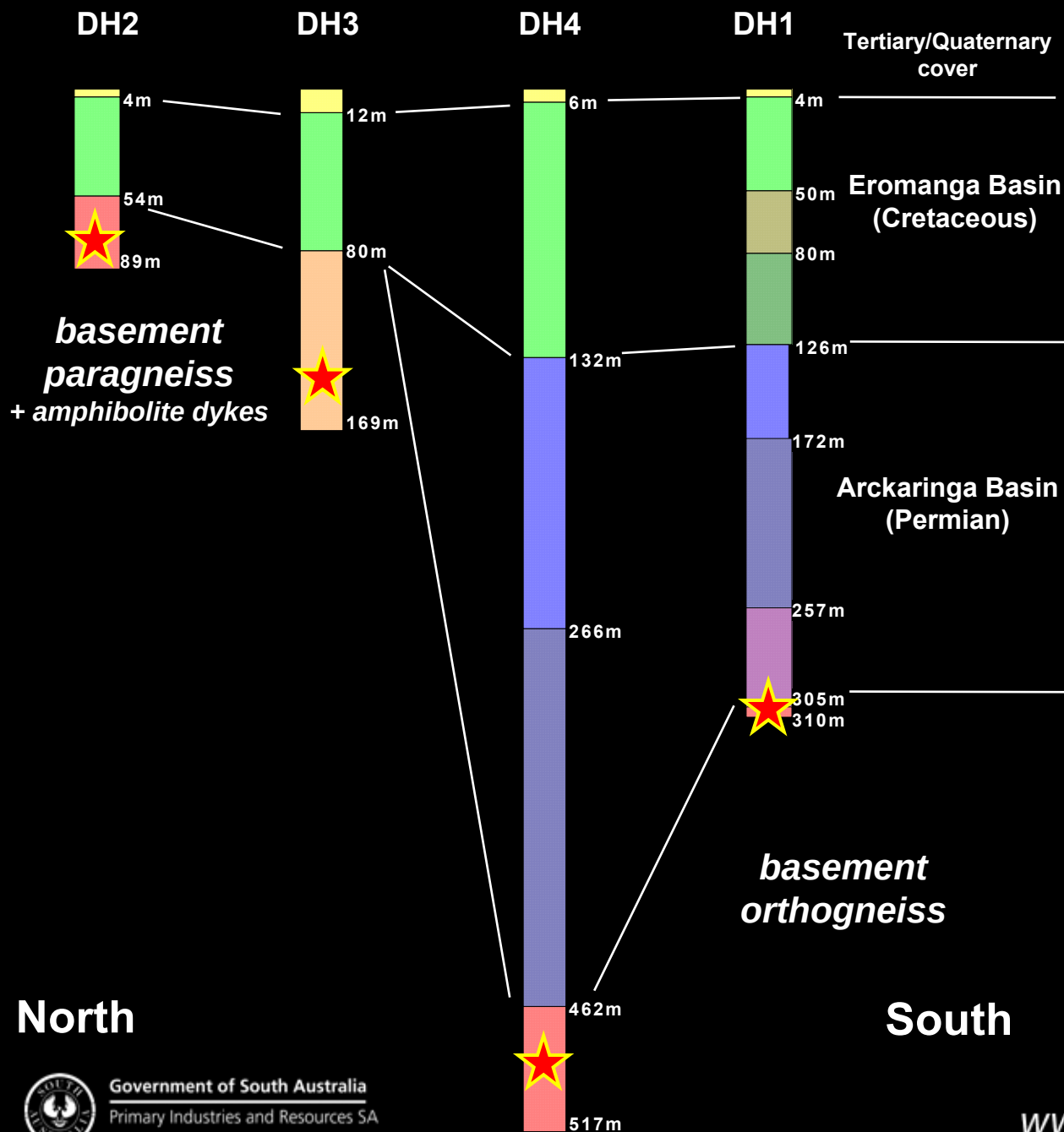


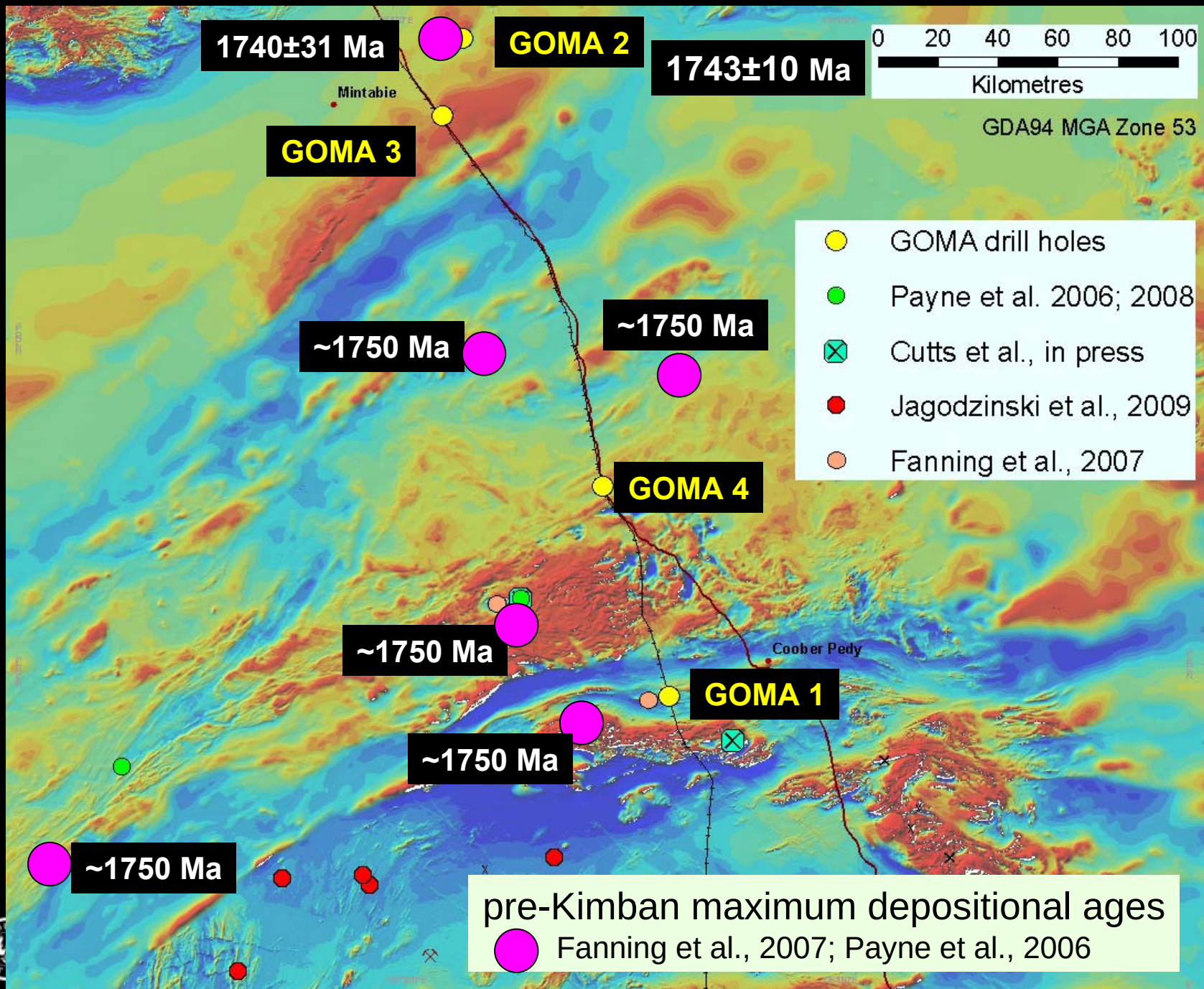
Due release date December, 2010



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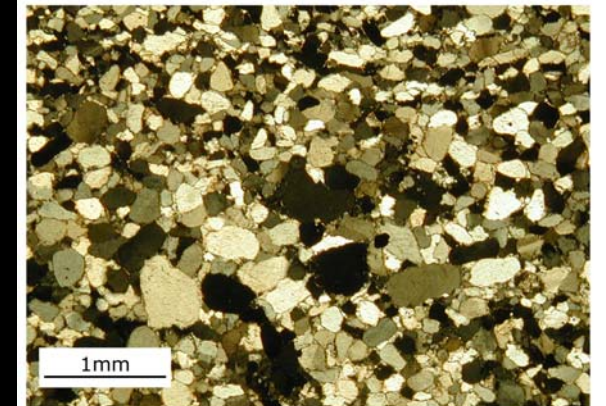
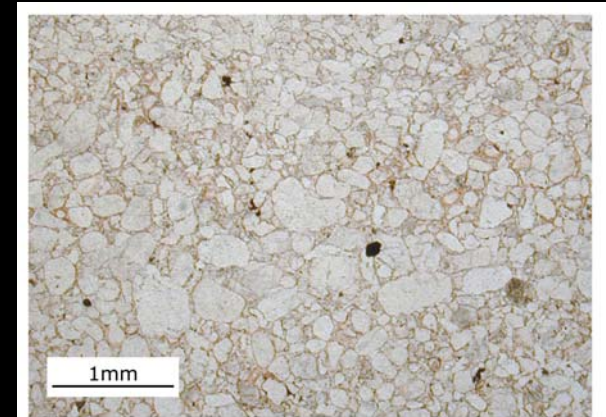
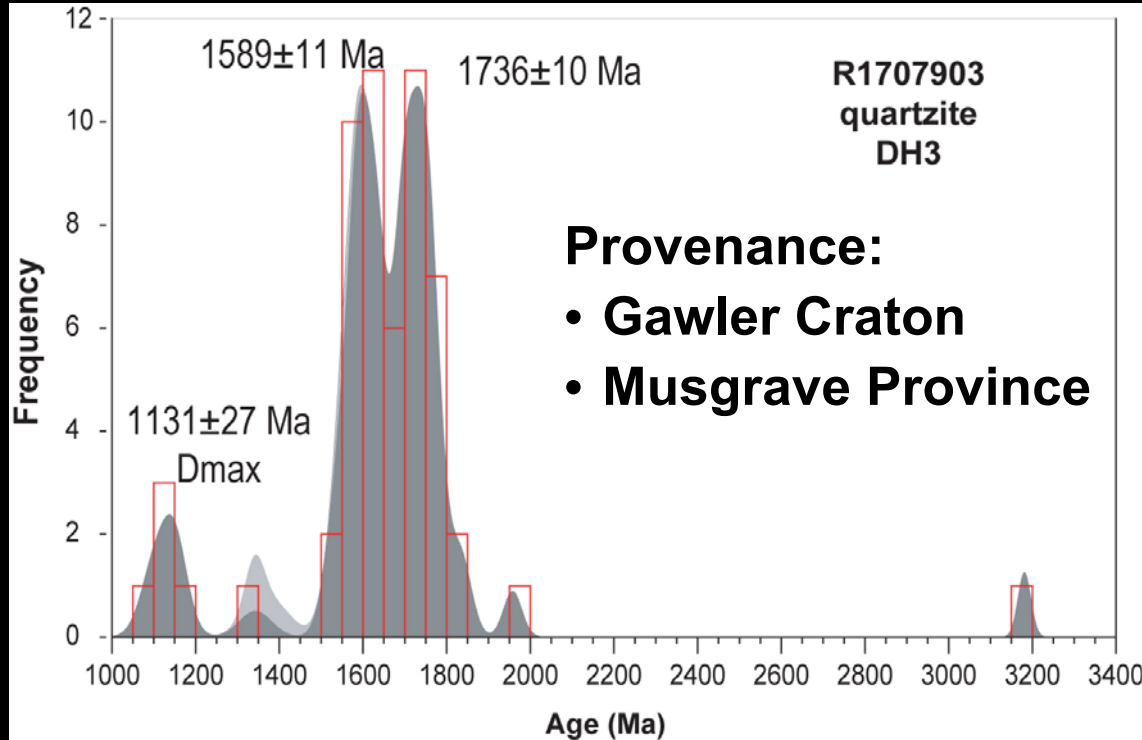




GOMA DH3 155.08-155.91m



R1707903 unmetamorphosed well-bedded fine to coarse-grained sandstone GOMA DH3 155.08-155.91m



R1707903

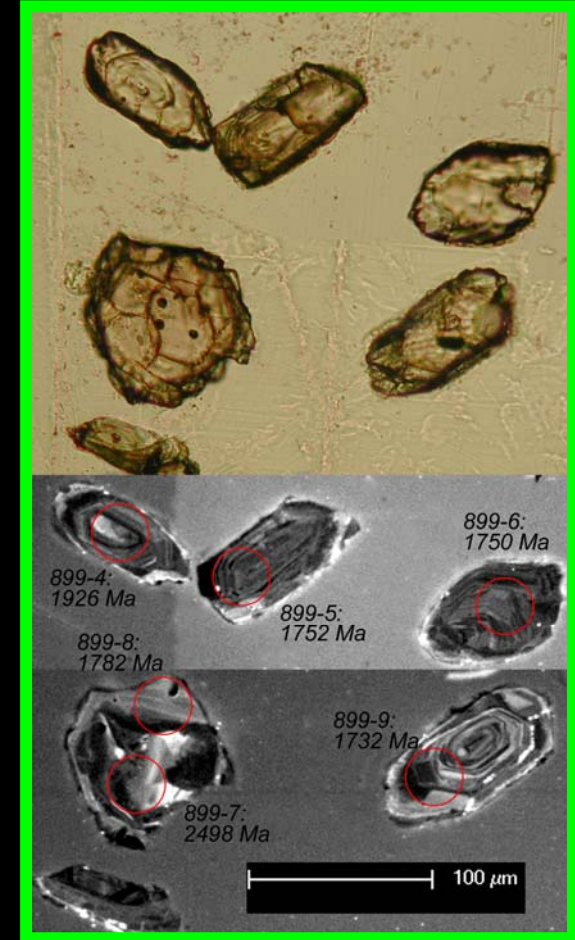
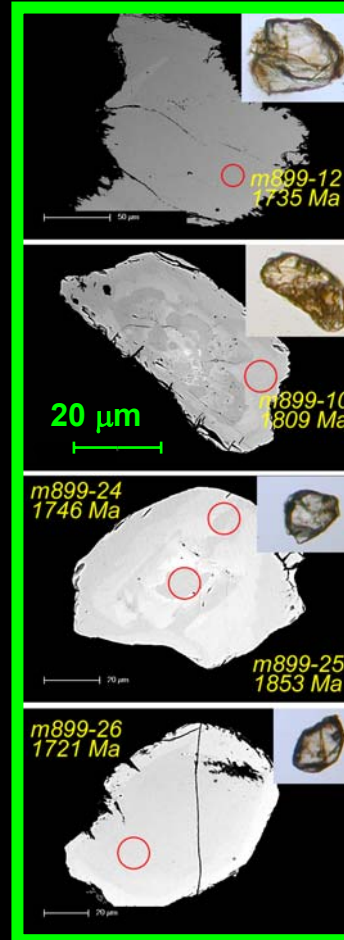
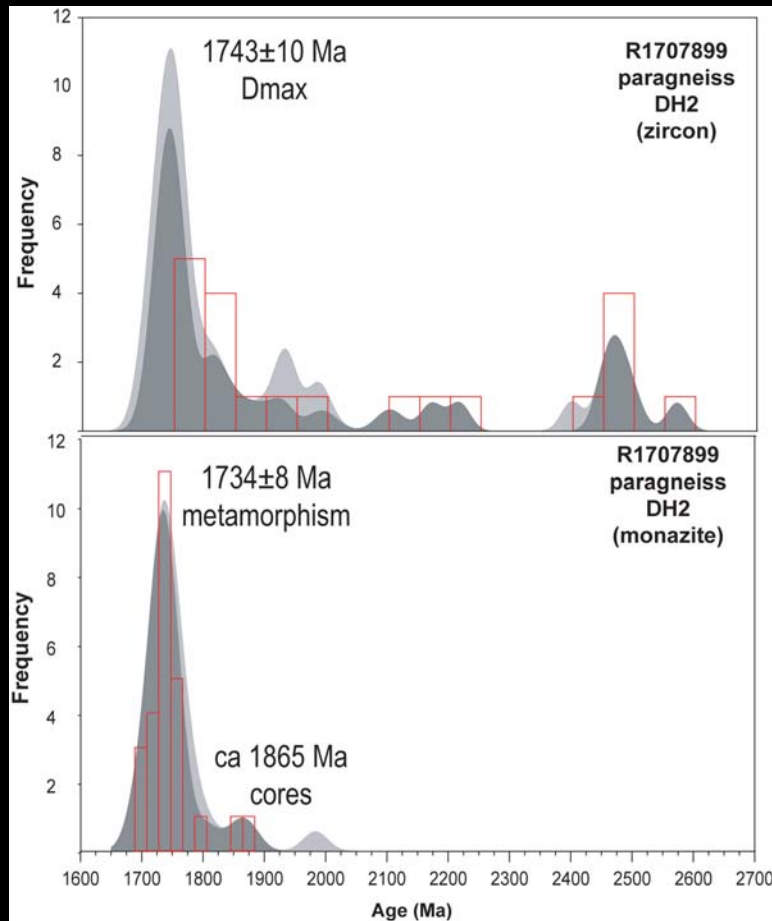


GOMA DH4



R1707899 sillimanite–biotite–quartz–feldspar paragneiss

GOMA DH2 75.4-75.8 m



R1707899



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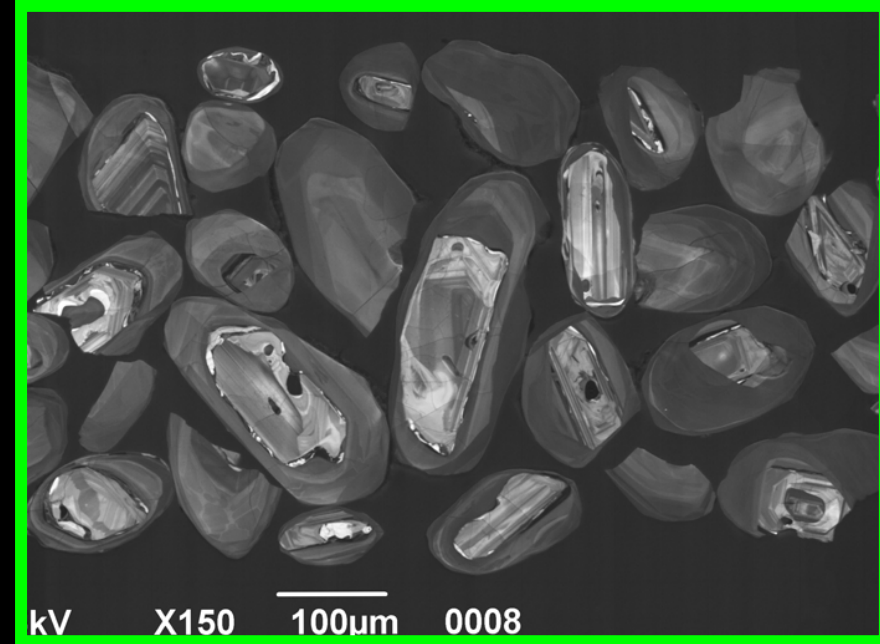
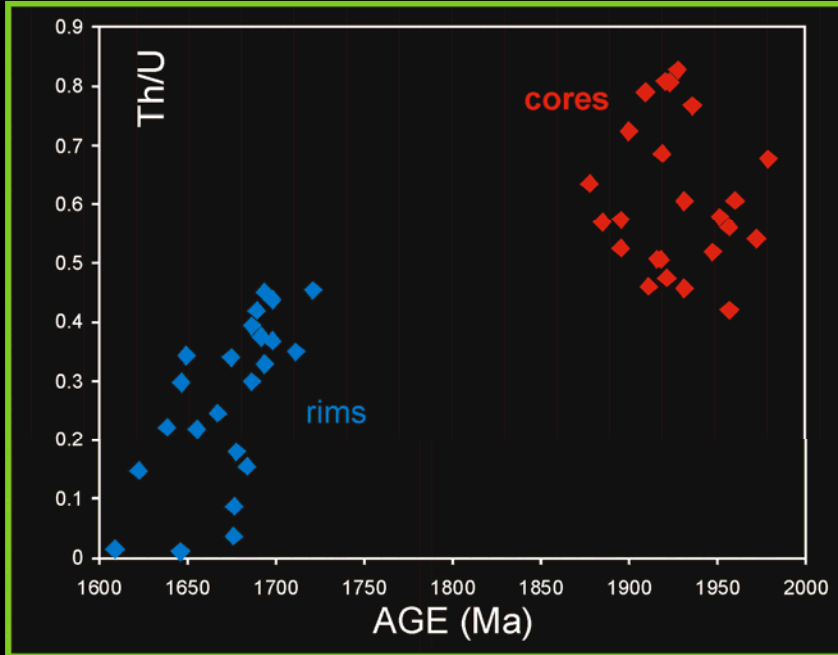
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GOMA DH1



R1707895 Quartz-feldspar-biotite-magnetite orthogneiss

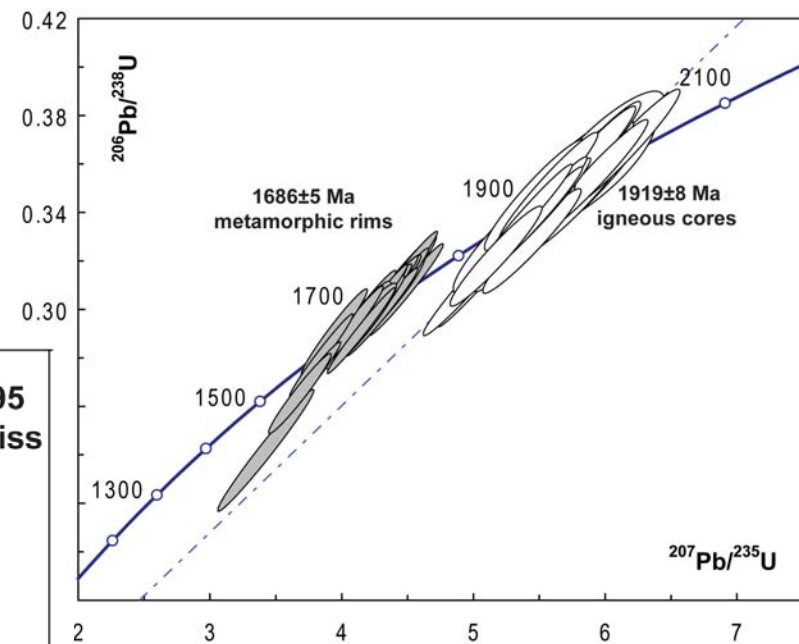
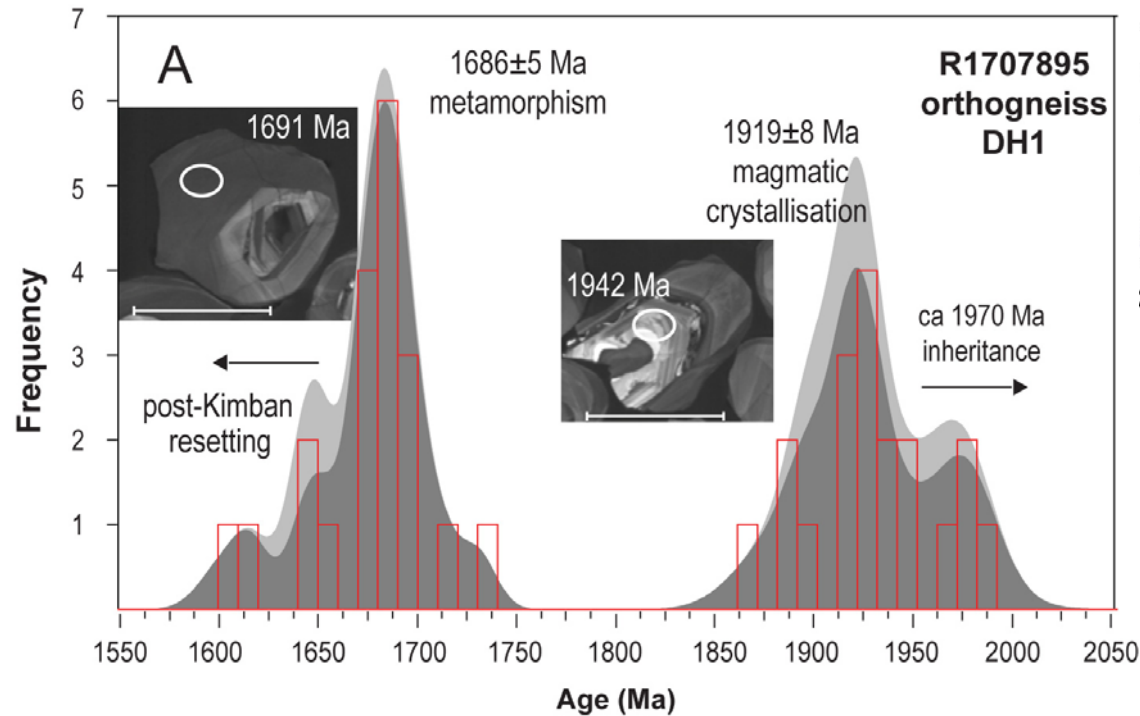
GOMA DH1 307.65-307.85 m

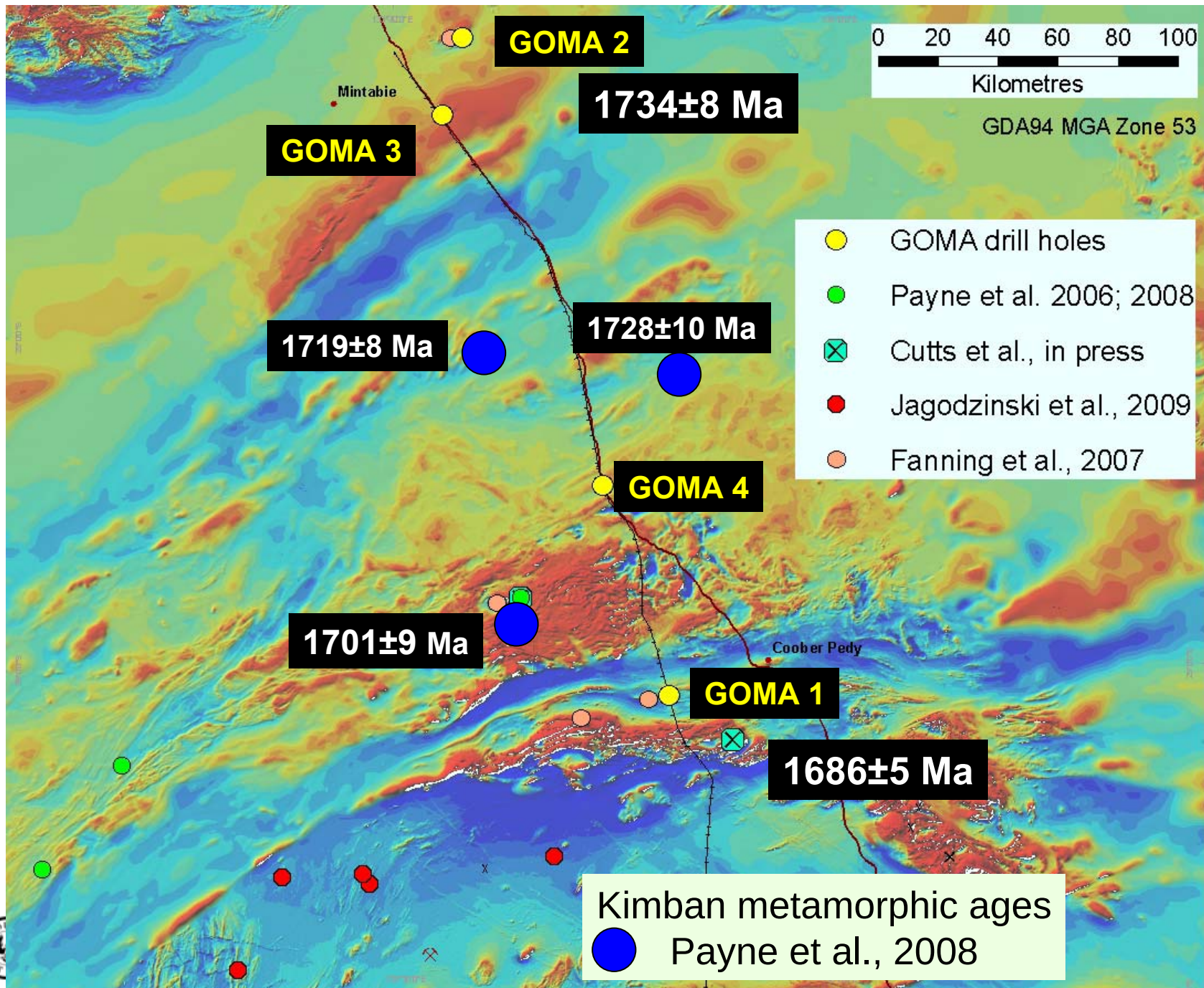


- Zoned, resorbed igneous cores
- Darker, homogenous metamorphic rims



R1707895 Orthogneiss GOMA DH1 307.65-307.85 m



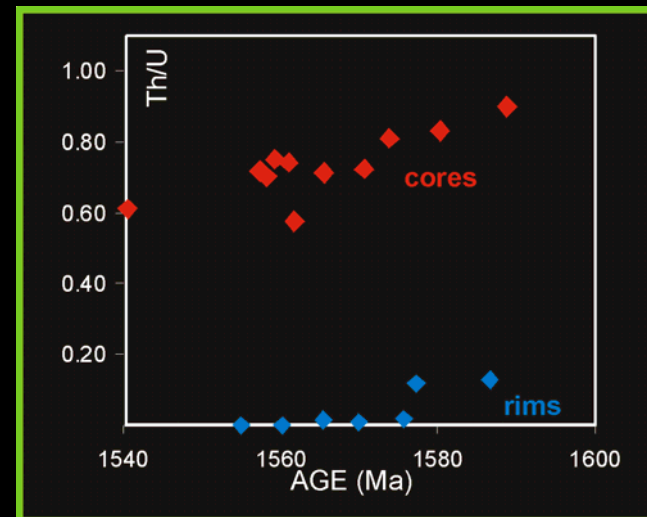
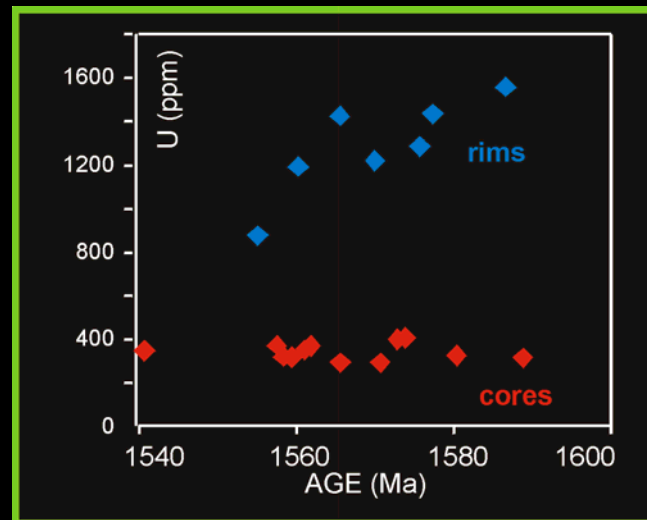
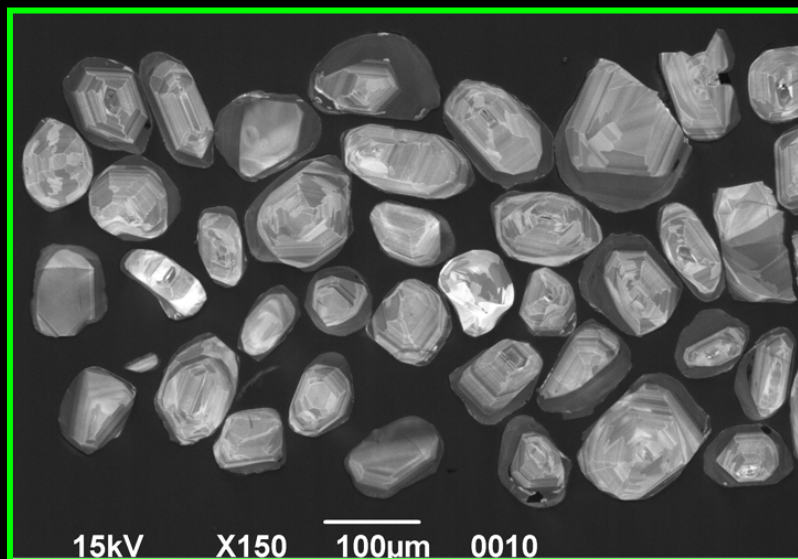


R1707896

Fine-grained biotite tonalite

GOMA DH1 308.7-308.9 m

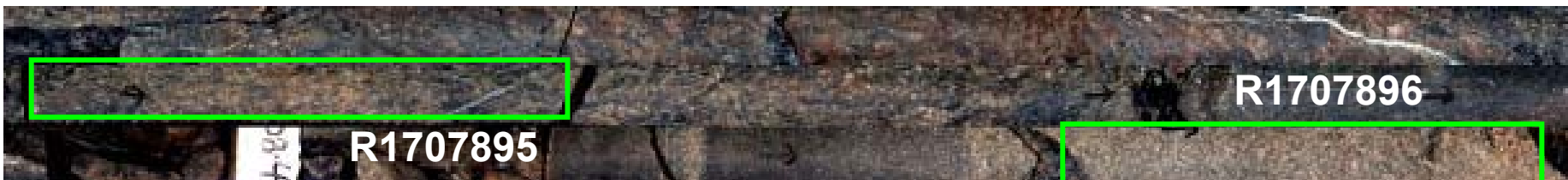
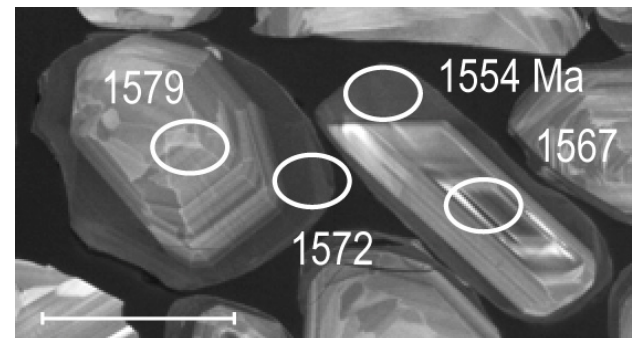
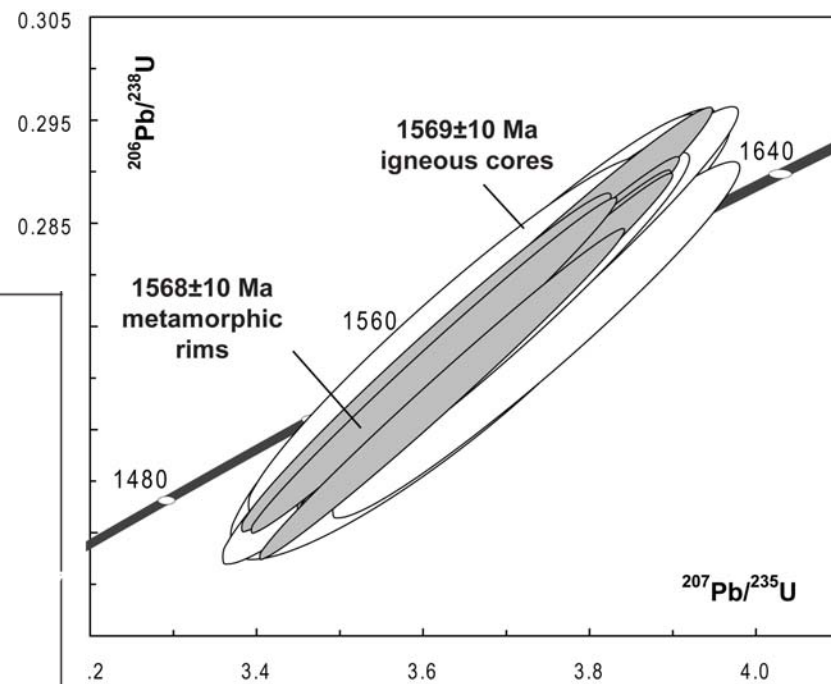
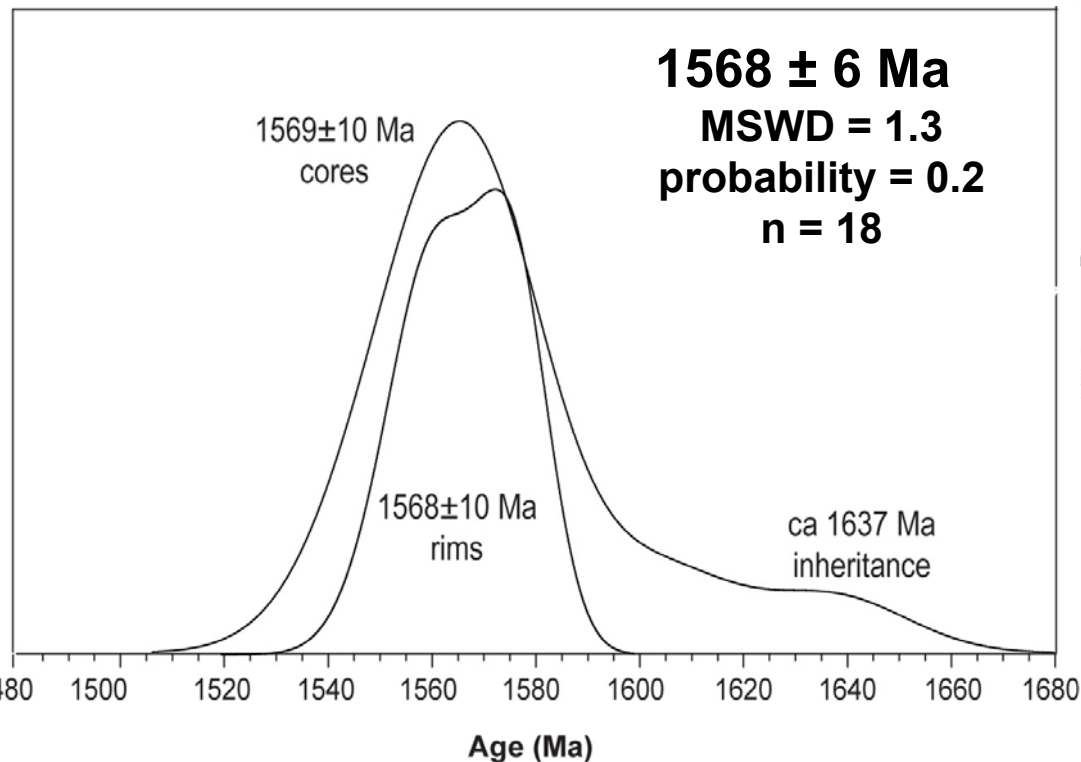
- Oscillatory zoned igneous cores
- Dark homogenous metamorphic rims



R1707896

Fine-grained biotite tonalite

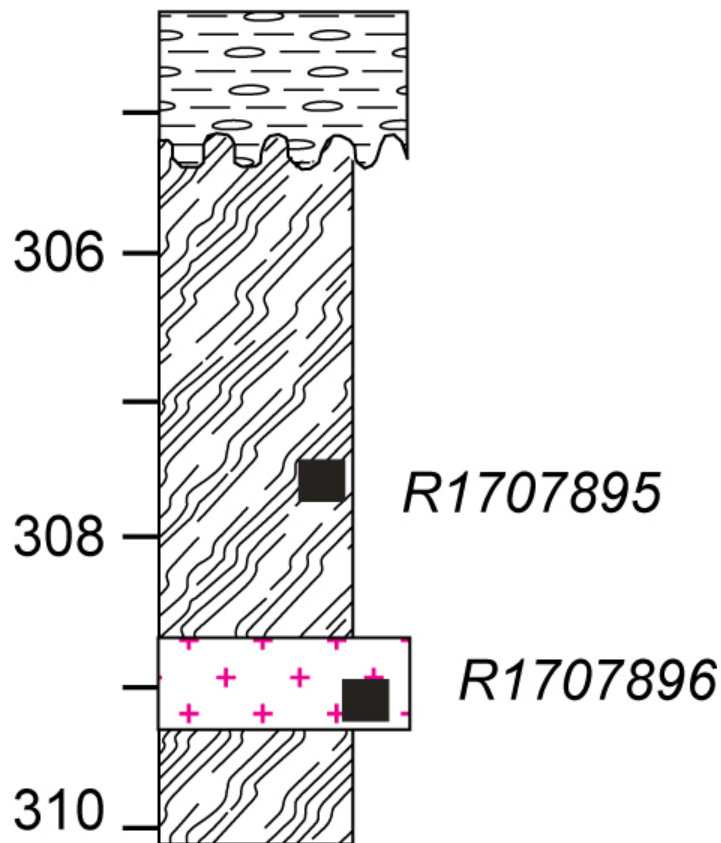
GOMA DH1 308.7-308.9 m



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GOMA DH1

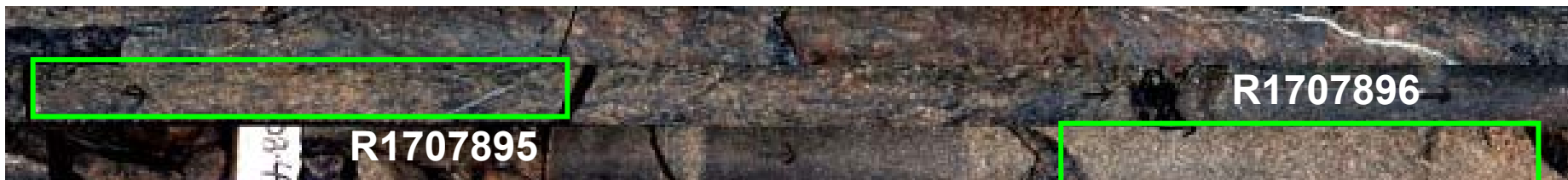


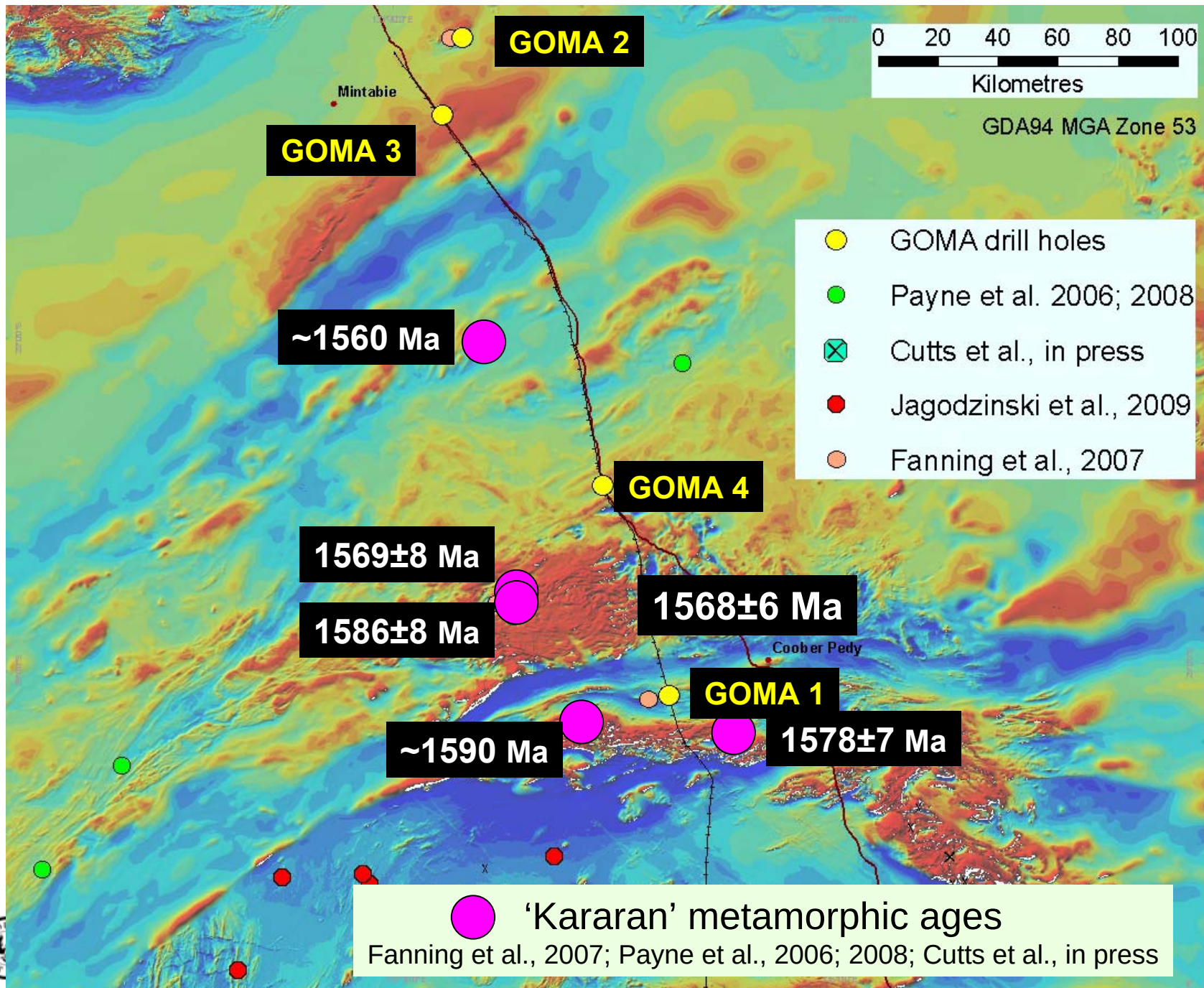
minor resetting
at ca 1650 -1570 Ma

metamorphosed
at 1690 Ma

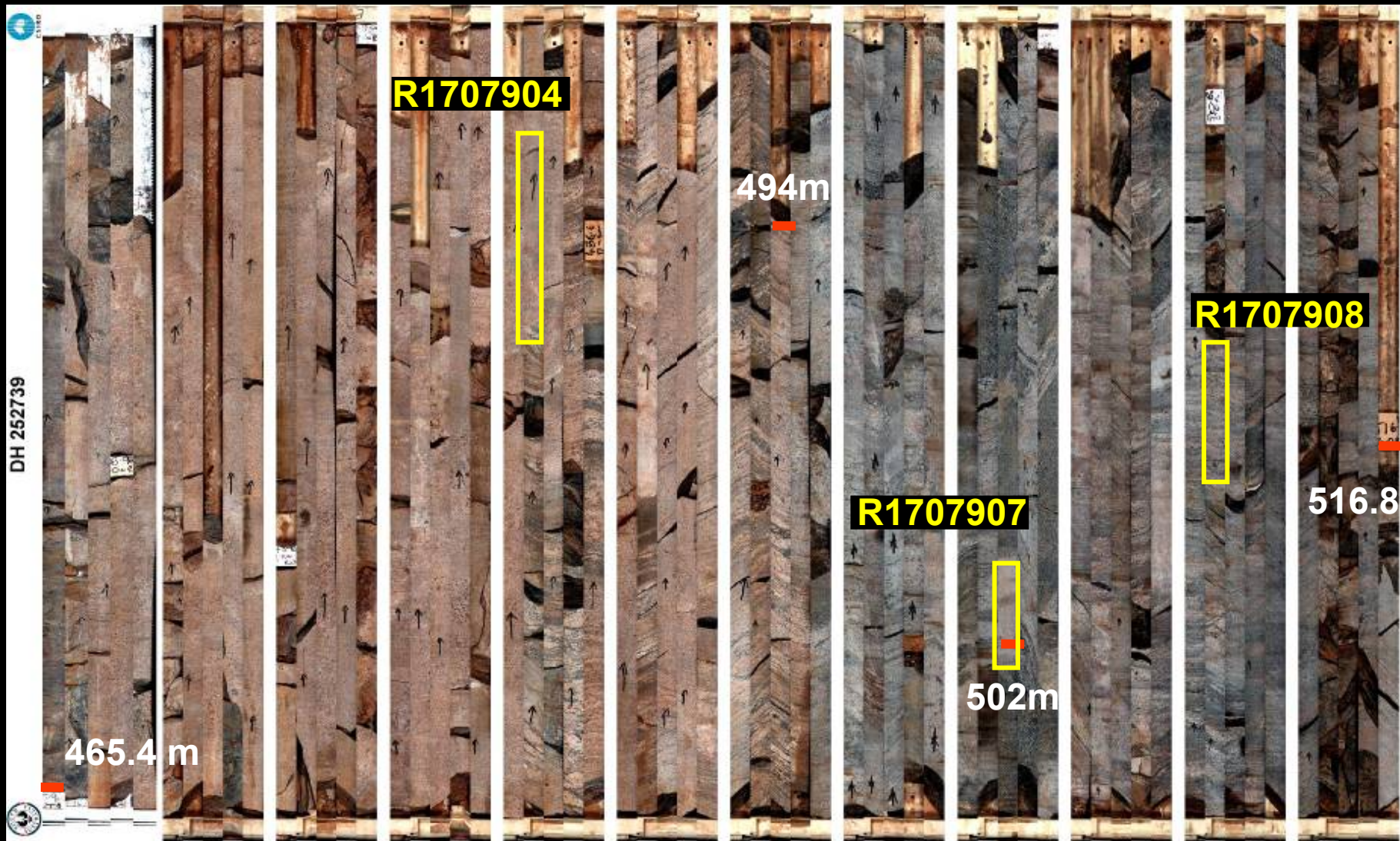
emplaced at
1920 Ma

emplaced and
metamorphosed
at ca 1570 Ma





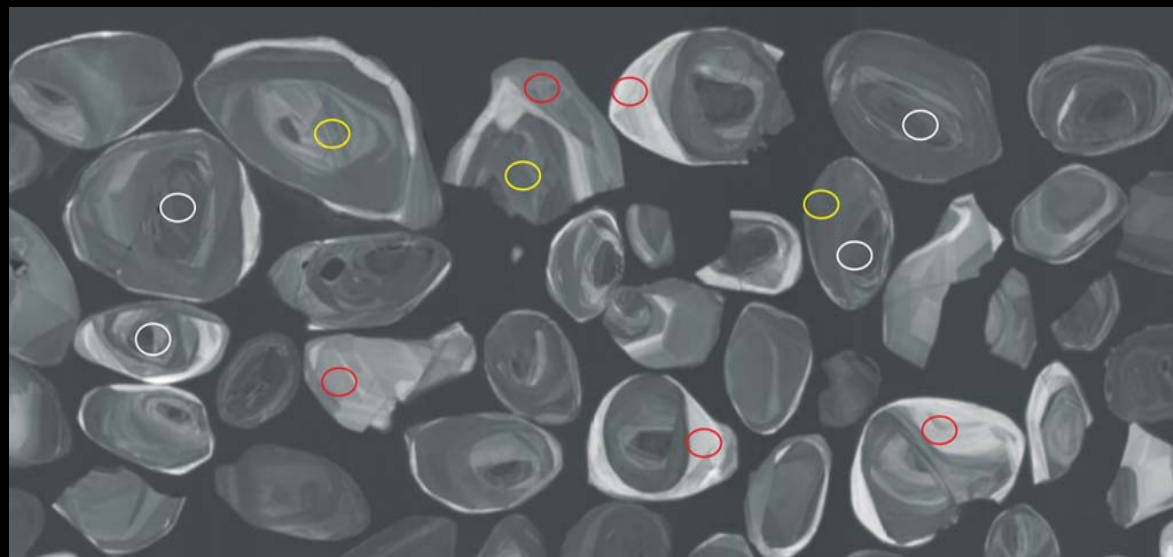
GOMA DH4

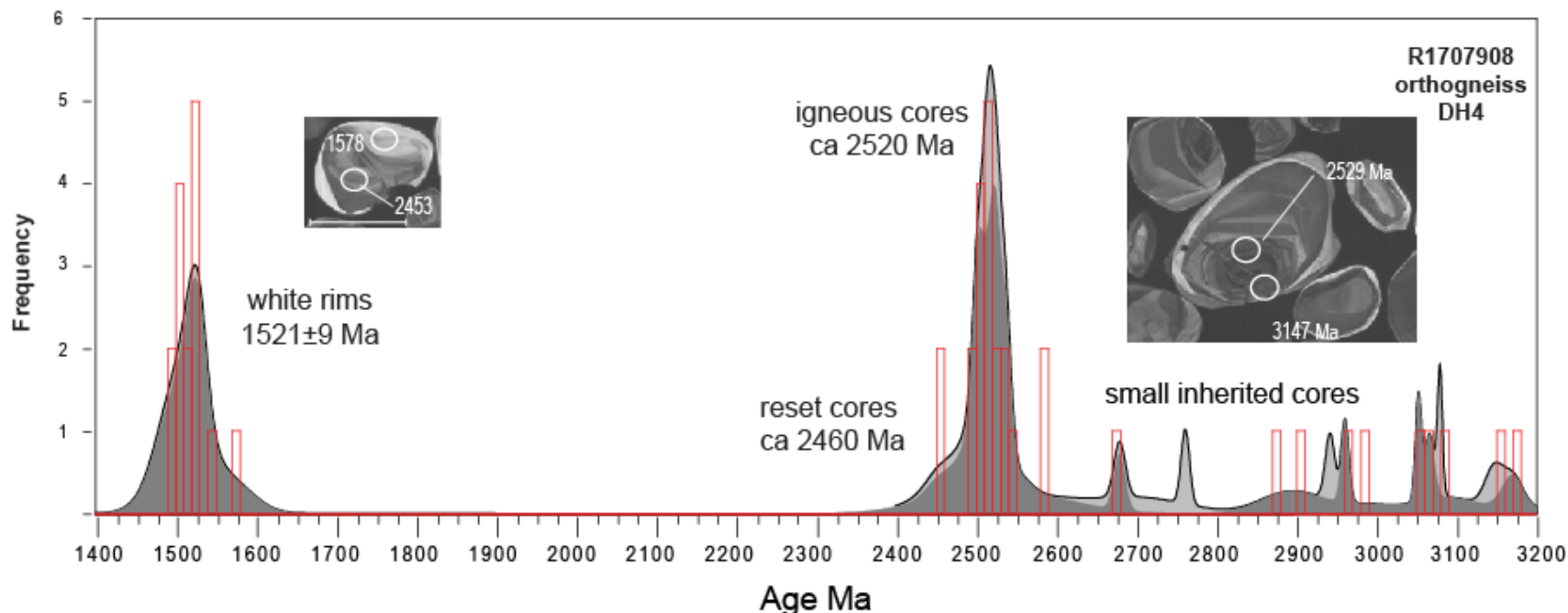


R1707908: quartz-feldspar-biotite-hornblende orthogneiss

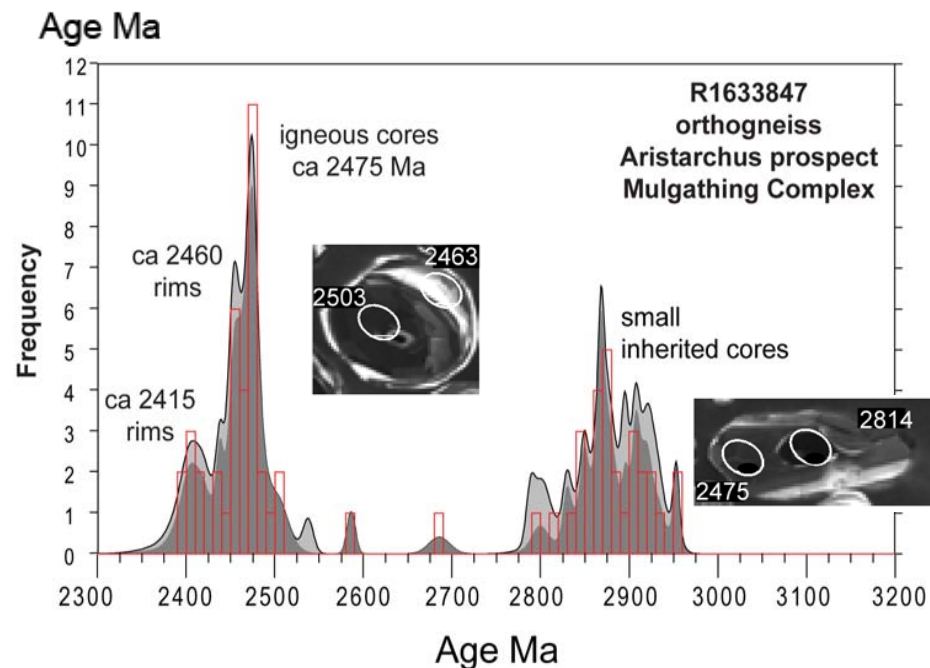
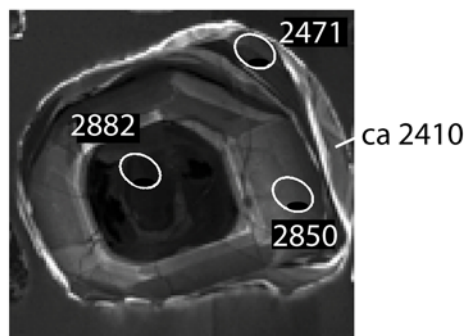
GOMA DH4 510 m

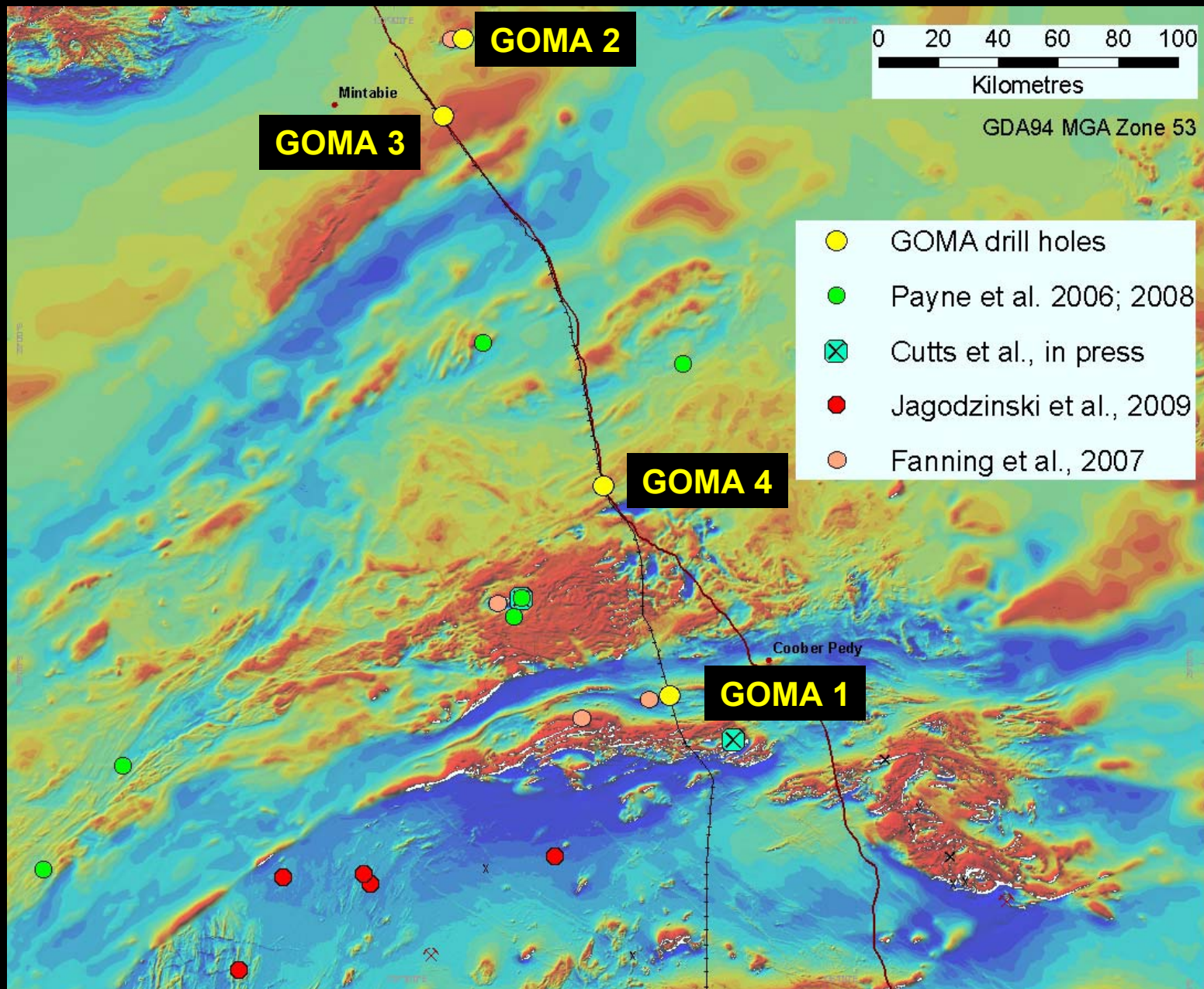
- Abundant inheritance as small cores 2680 - 3170 Ma
- Homogenous black to zoned cores ca 2520 Ma
- Light CL rims ca 1523 Ma

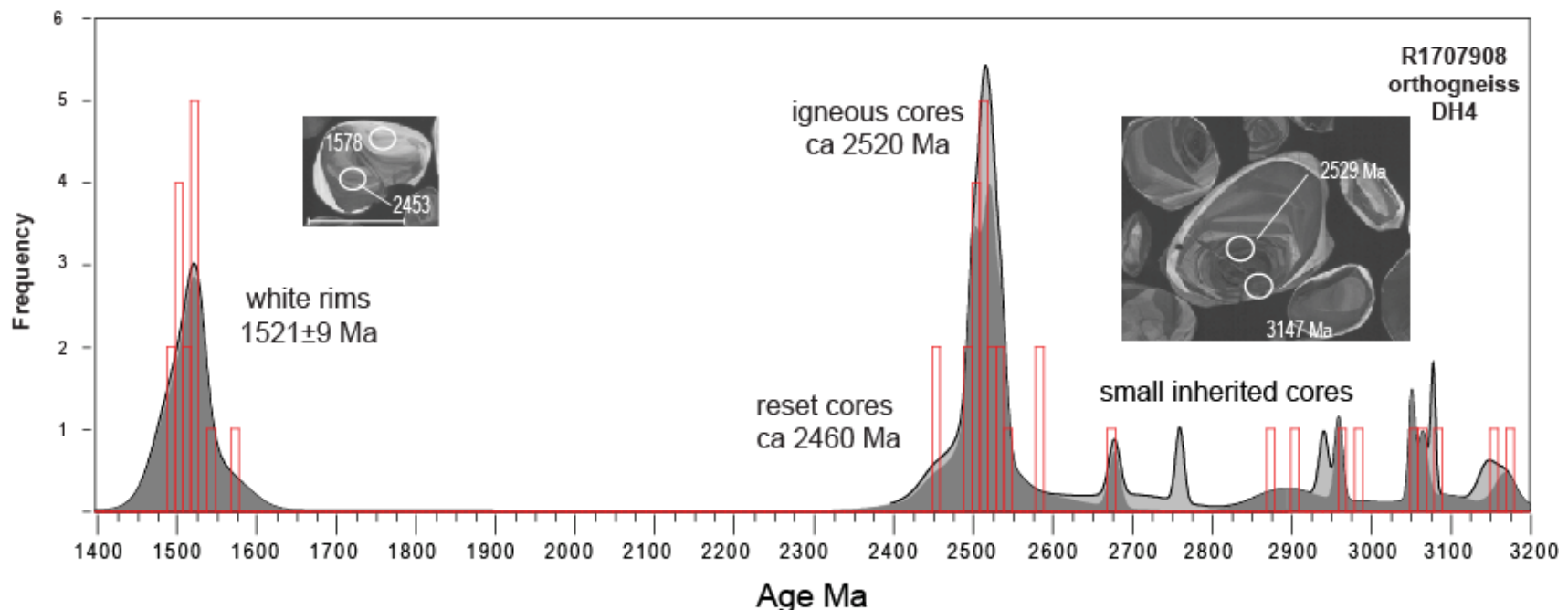




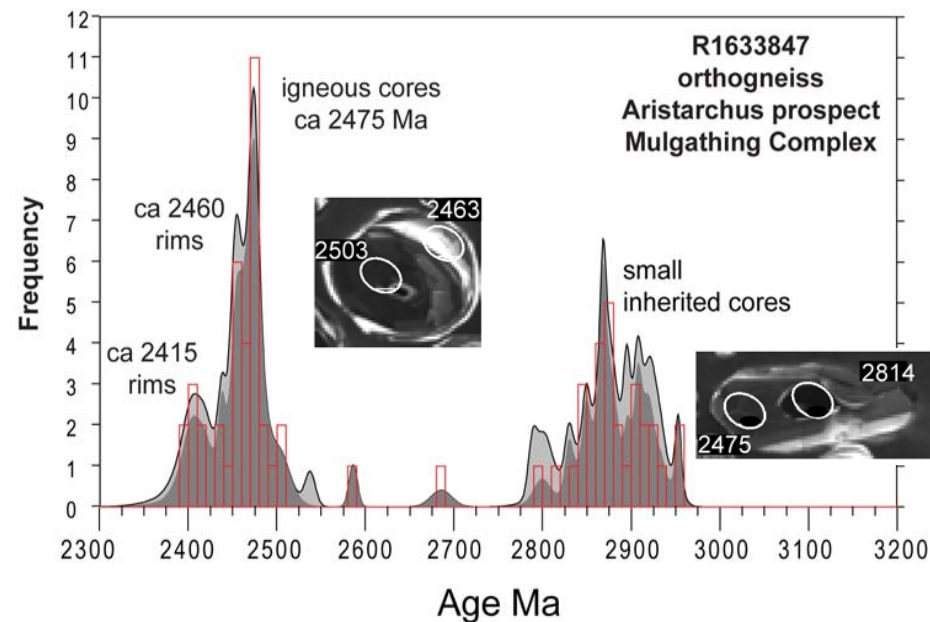
- Age pattern of cores consistent with Mulgathing Complex orthogneisses







- Age pattern of cores consistent with Mulgathing Complex orthogneisses
- No evidence of late Sleaford (2410 - 2450 Ma) or Kimban (1720-1690 Ma)
- Post Kararan (1570-1545) zircon growth at 1521 ± 9 Ma



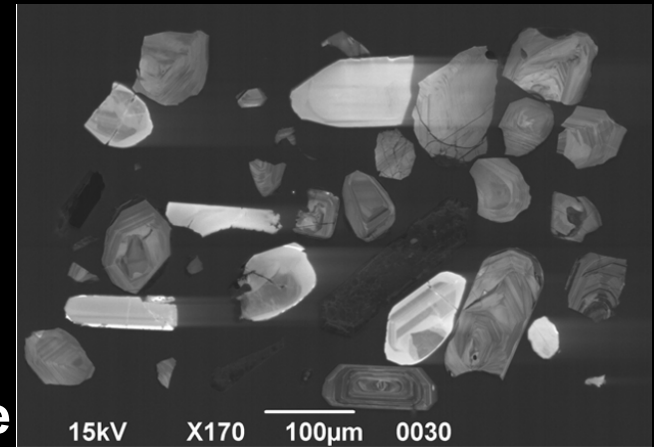
R1707904

quartz monzonite

Kspar-quartz-plagioclase

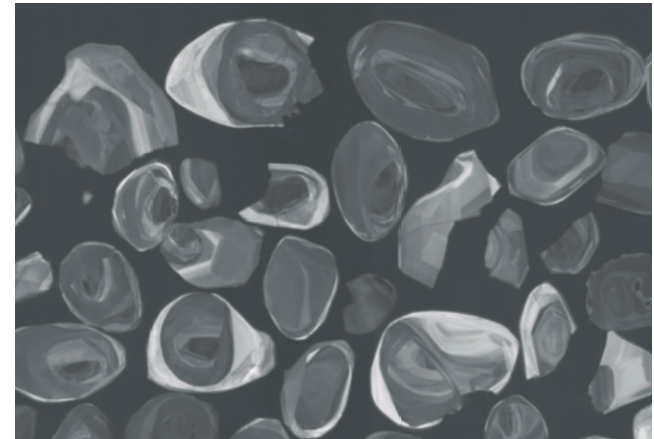
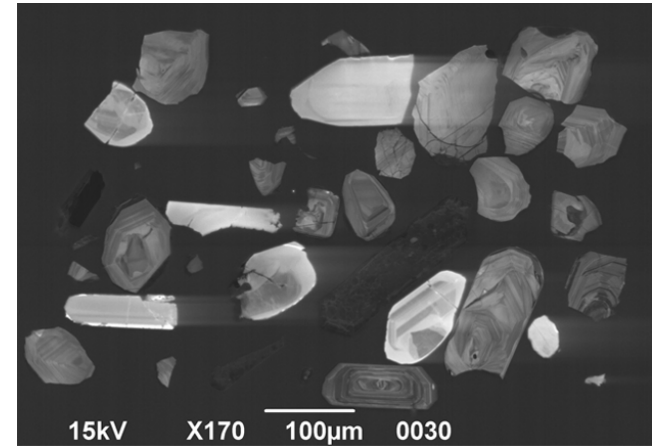
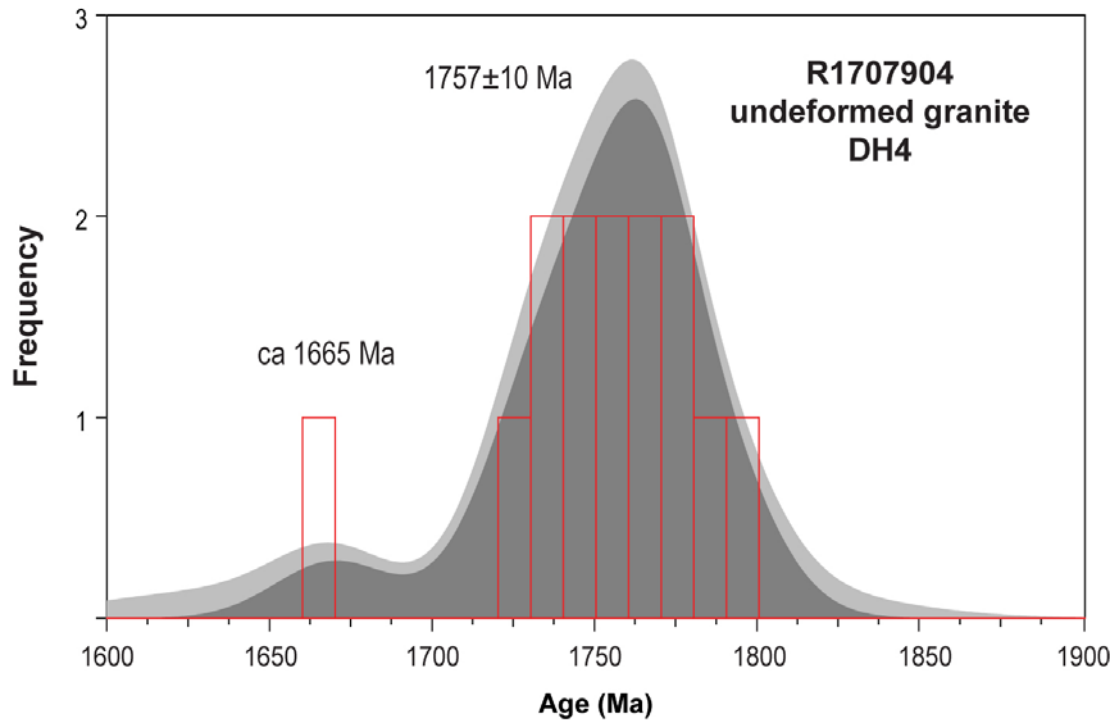
GOMA DH4 484 m

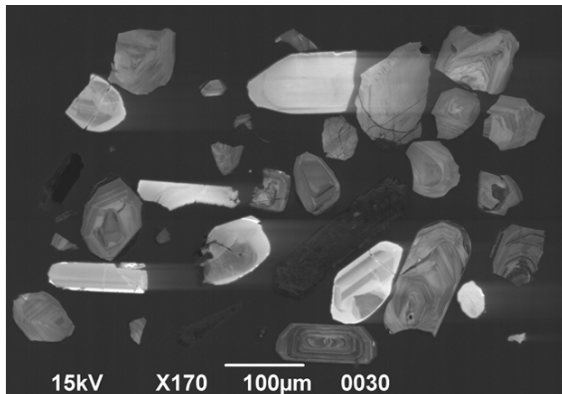
- Low yield about 15 grains from 30 cm $\frac{1}{4}$ core



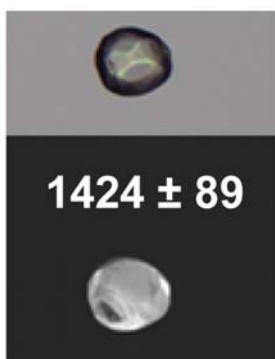
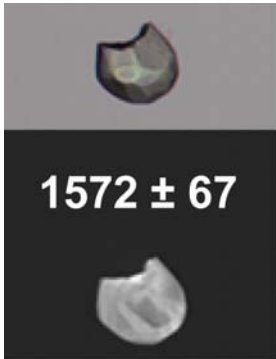
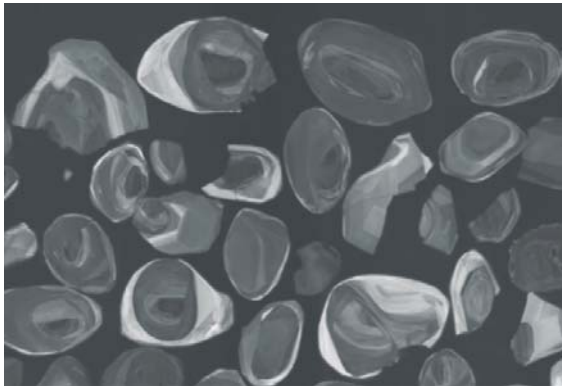
R1707904
quartz monzonite
GOMA DH4 484 m

**No sign of zircon
overgrowth at
1521 Ma**





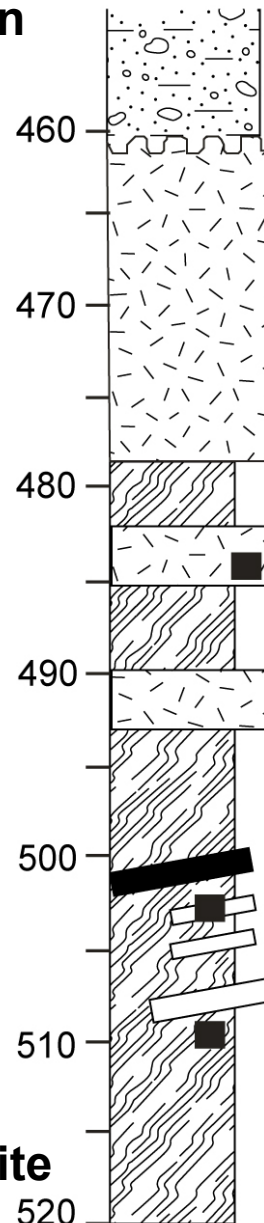
**No sign of zircon
overgrowth at
1521 Ma**



} 1518 Ma

**granophyric
leucocratic
monzo- to syenogranite**

DH4



**≤ 1520 Ma
high-level
intrusion**

~~1759 Ma~~

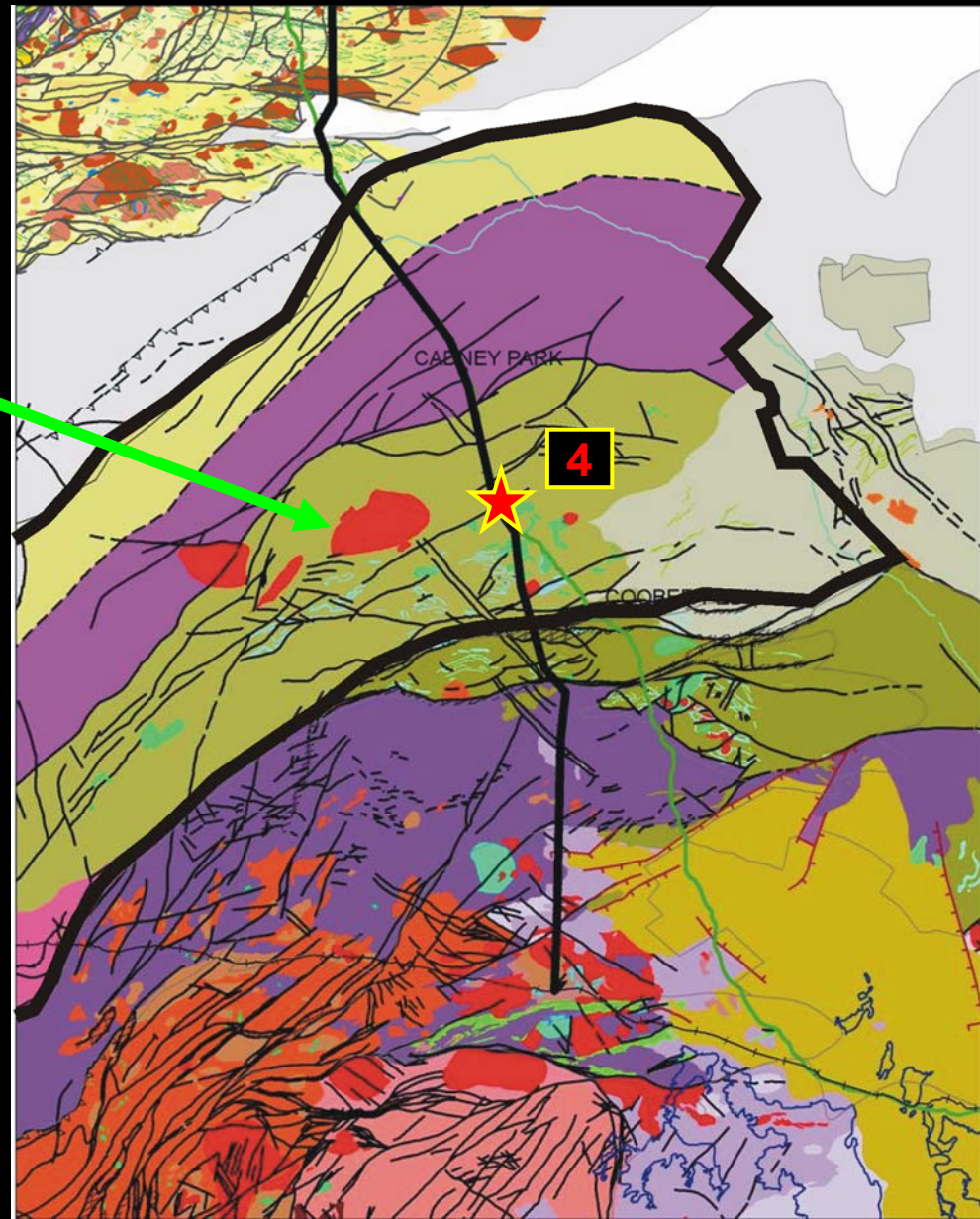
**1521 Ma
metamorphism?
magmatism?
metasomatism?**

**ca 2560 Ma
metamorphism?**

**emplaced at
ca 2520 Ma**



- Nearby high level, undeformed intrusions
- Monazites ca 1470 Ma (*Swain unpublished*)
- No zircon



Acknowledgements

- **PIRSA Geological Survey of South Australia responsible for the GOMA Drilling team, in particular Rian Dutch, Marc Davies and Mark Flintoft.**
- **SHRIMP geochronology is undertaken as part of a National Geoscience Agreement between Geoscience Australia (GA) and PIRSA. The Geochronology group at GA is acknowledged for providing excellent preparation and analytical facilities and for valuable discussions on the methods and specifics of the northern Gawler Craton geochronology.**
- **Ben Wade at Adelaide Microscopy, the University of Adelaide is acknowledged for his patient and cheerful assistance with the LA-ICPMS work undertaken by AR.**
- **high resolution drill tray pictures were obtained using HyLogger™, a trade mark of CSIRO**