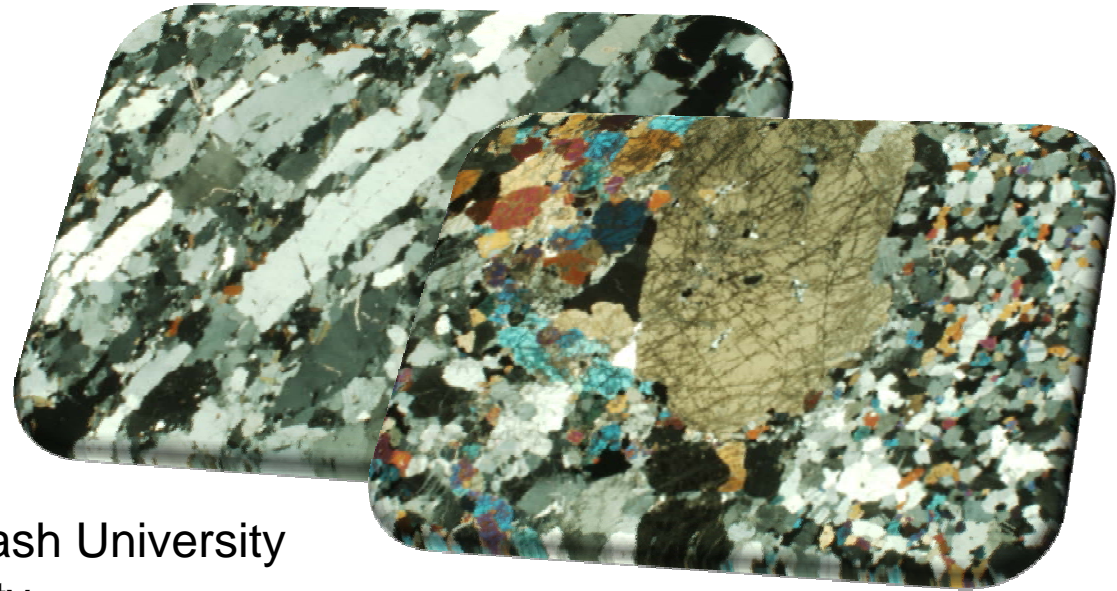


Lu-Hf isotope study of the marginal terranes of the northern Gawler Craton.

R. Armit¹

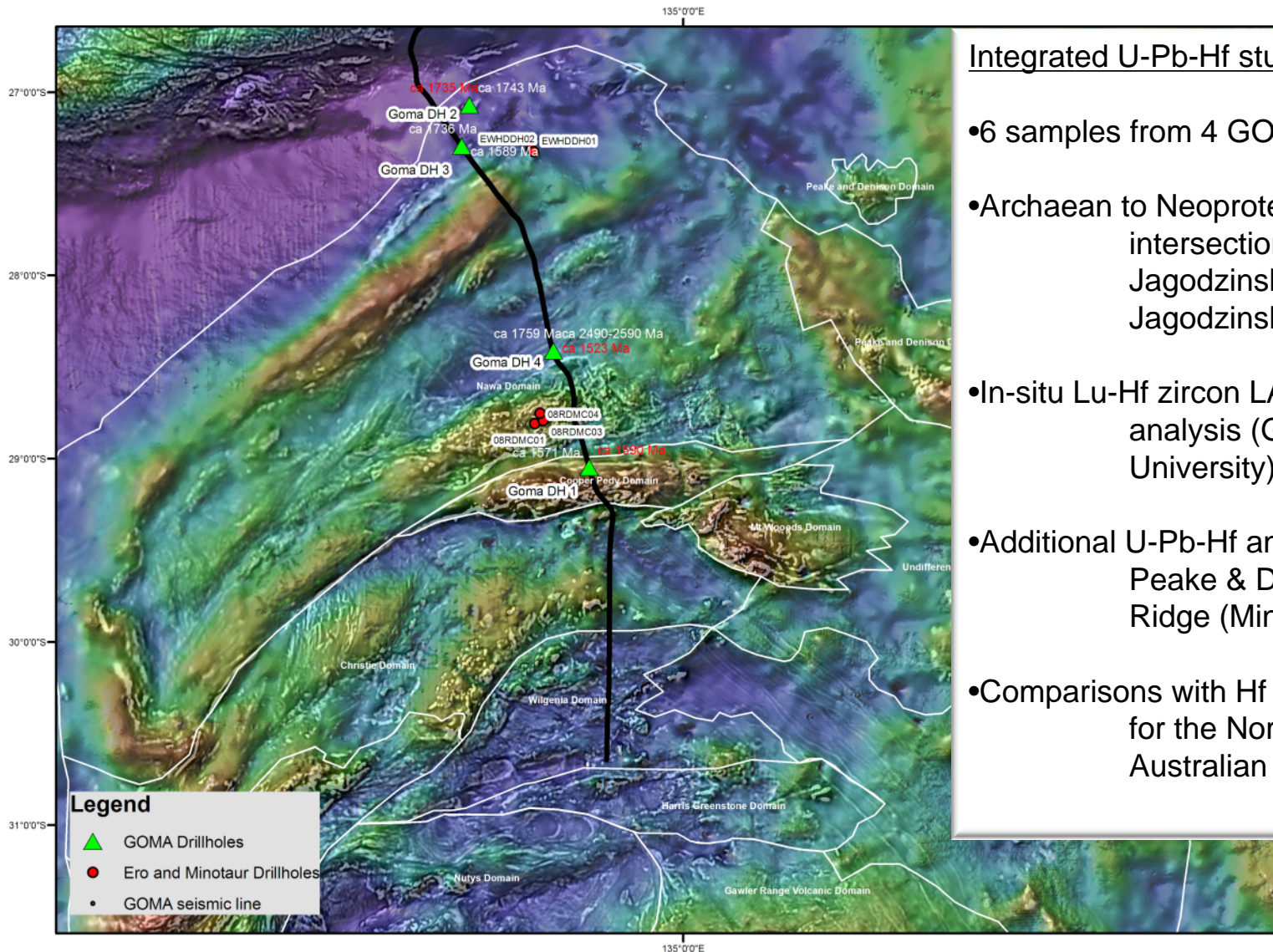
P. Betts¹

B. Schaefer²



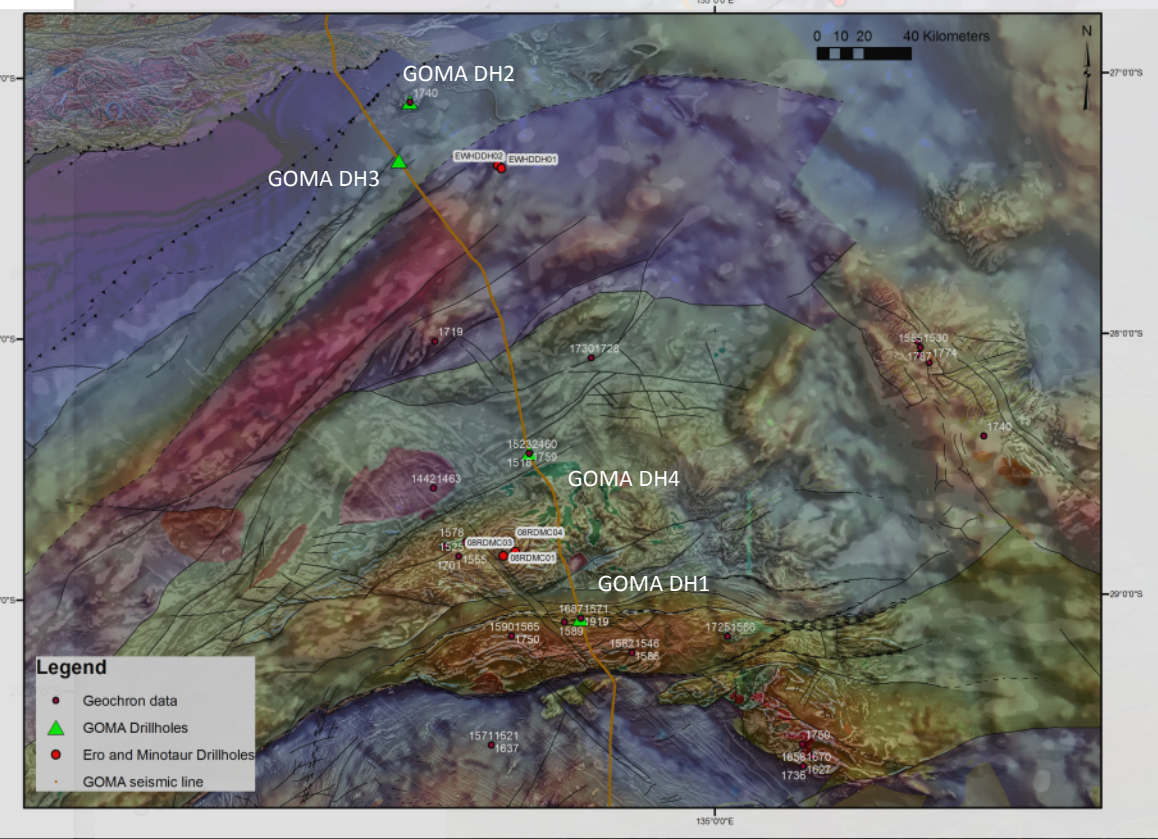
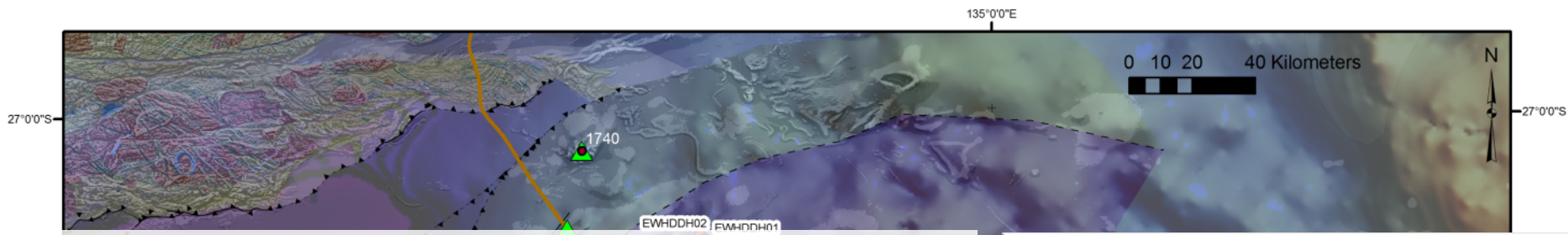
¹School of Geosciences, Monash University

²GEMOC, Macquarie University



Integrated U-Pb-Hf studies

- 6 samples from 4 GOMA drillholes.
- Archaean to Neoproterozoic intersections (U-Pb ages from Jagodzinski et al. (2010); Jagodzinski and Reid (2010)).
- In-situ Lu-Hf zircon LAM-ICPMS analysis (GEMOC, Macquarie University).
- Additional U-Pb-Hf analysis from Peake & Denison Inlier, Mabel Creek Ridge (Minotaur drillholes).
- Comparisons with Hf databases for the North Australian and South Australian Cratons.



Legend

- Geochron data
- ▲ GOMA Drillholes
- Ero and Minotaur Drillholes
- GOMA seismic line

Integrated U-Pb-Hf studies

6 samples from 4 GOMA drillholes include:

GOMA DH1

- ca. 1919 Ma R1707895 orthogneiss.
- ca. 1571 Ma R1707896 bt tonalite.

GOMA DH4

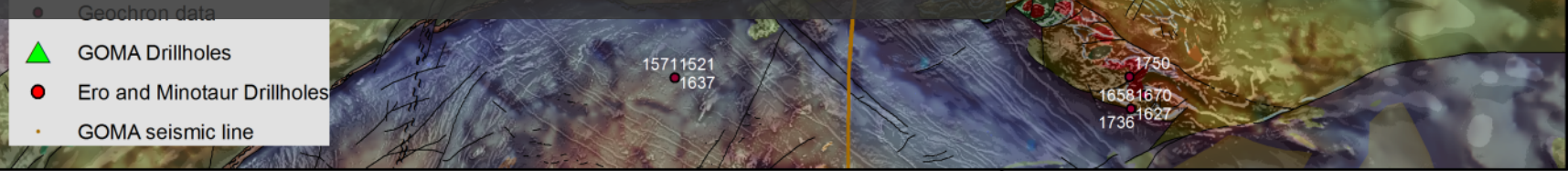
- ca. 2520 Ma R1707908 orthogneiss.
- Inherited ca. 1759 Ma R1707904 quartz monzonite.

GOMA DH2

- ca. 1743 Ma R1707899 paragneiss.

•**GOMA DH3**

- ca. 1131 Ma R1707903 quartzite.

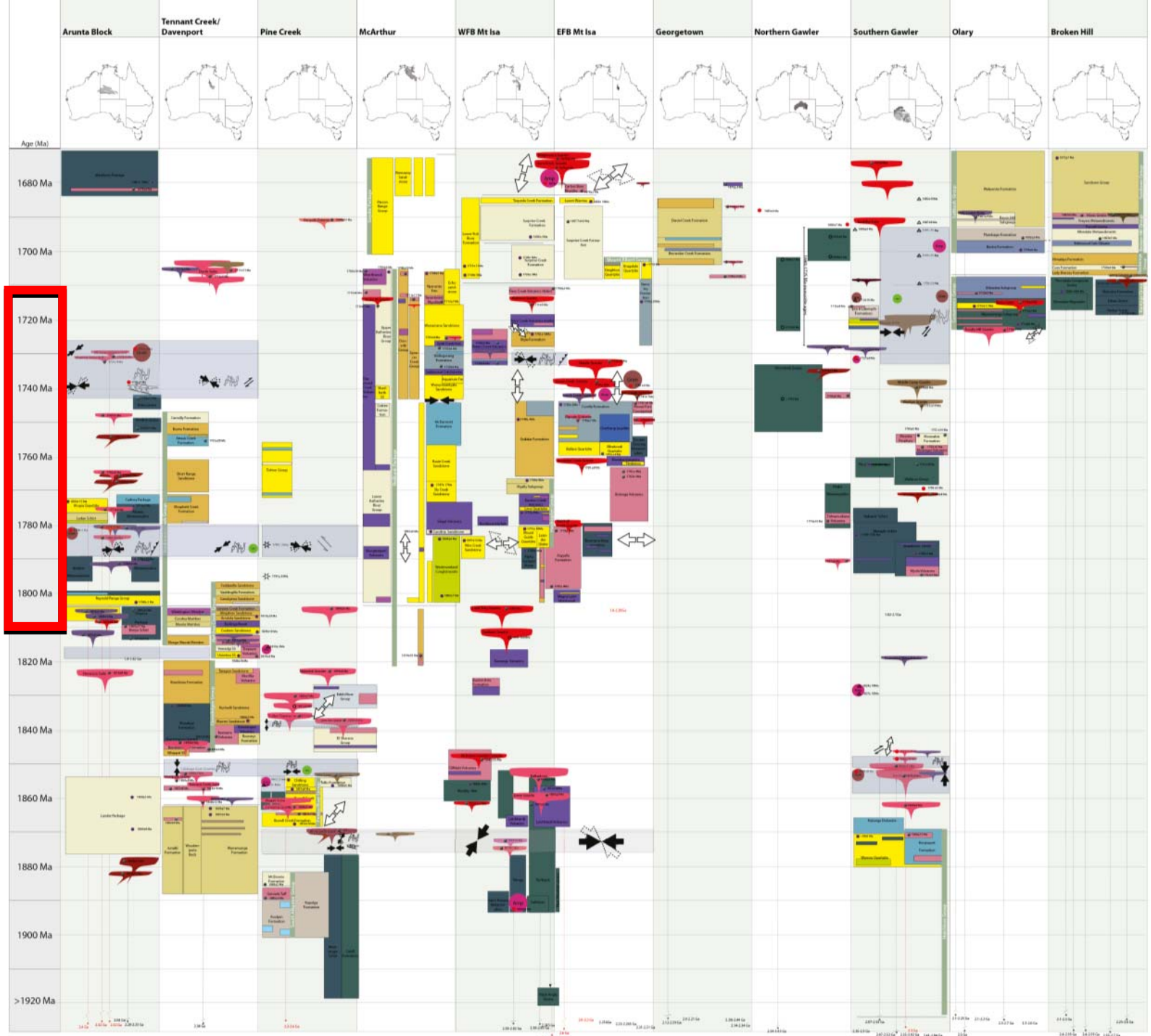


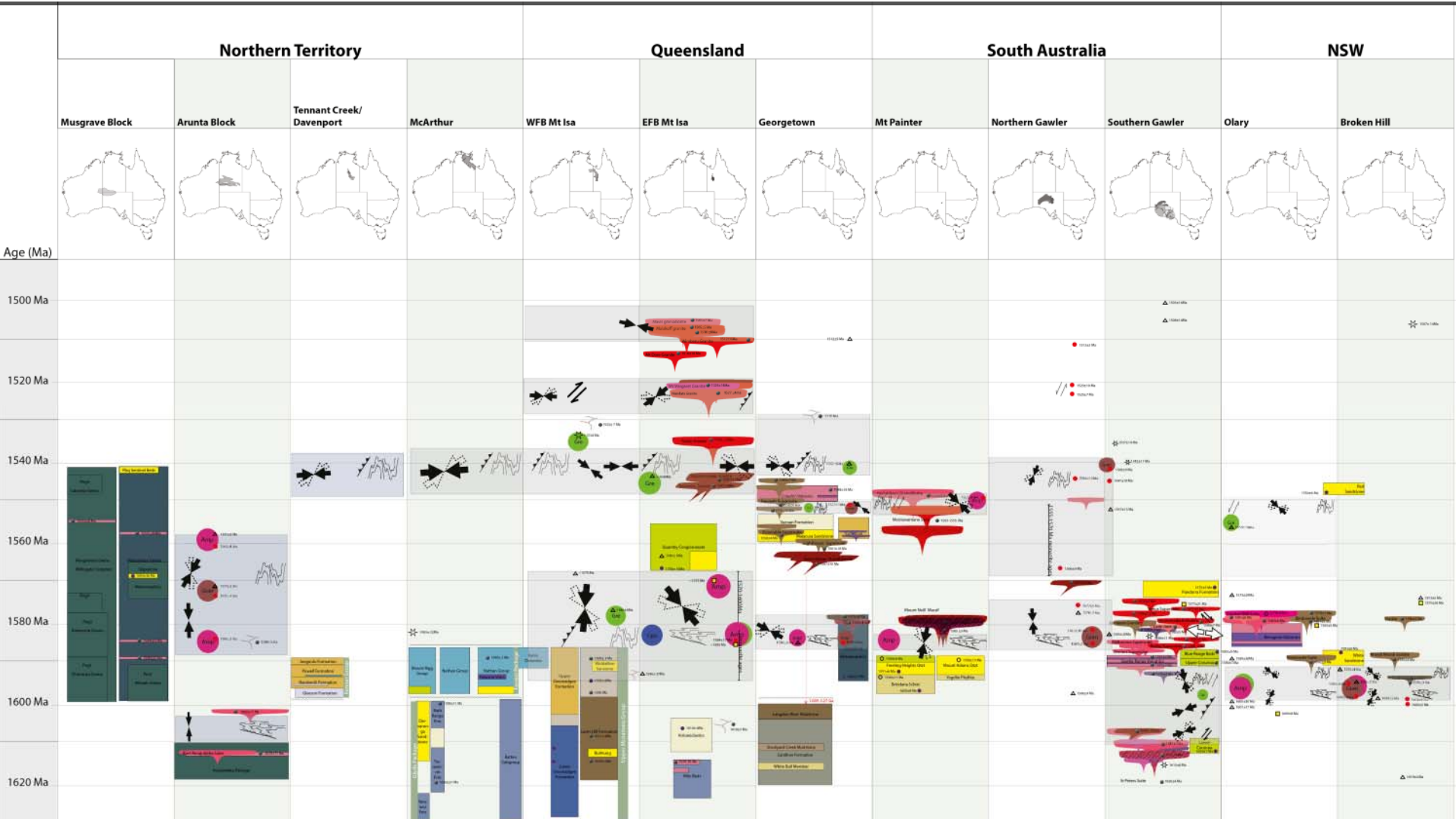
● Geochron data

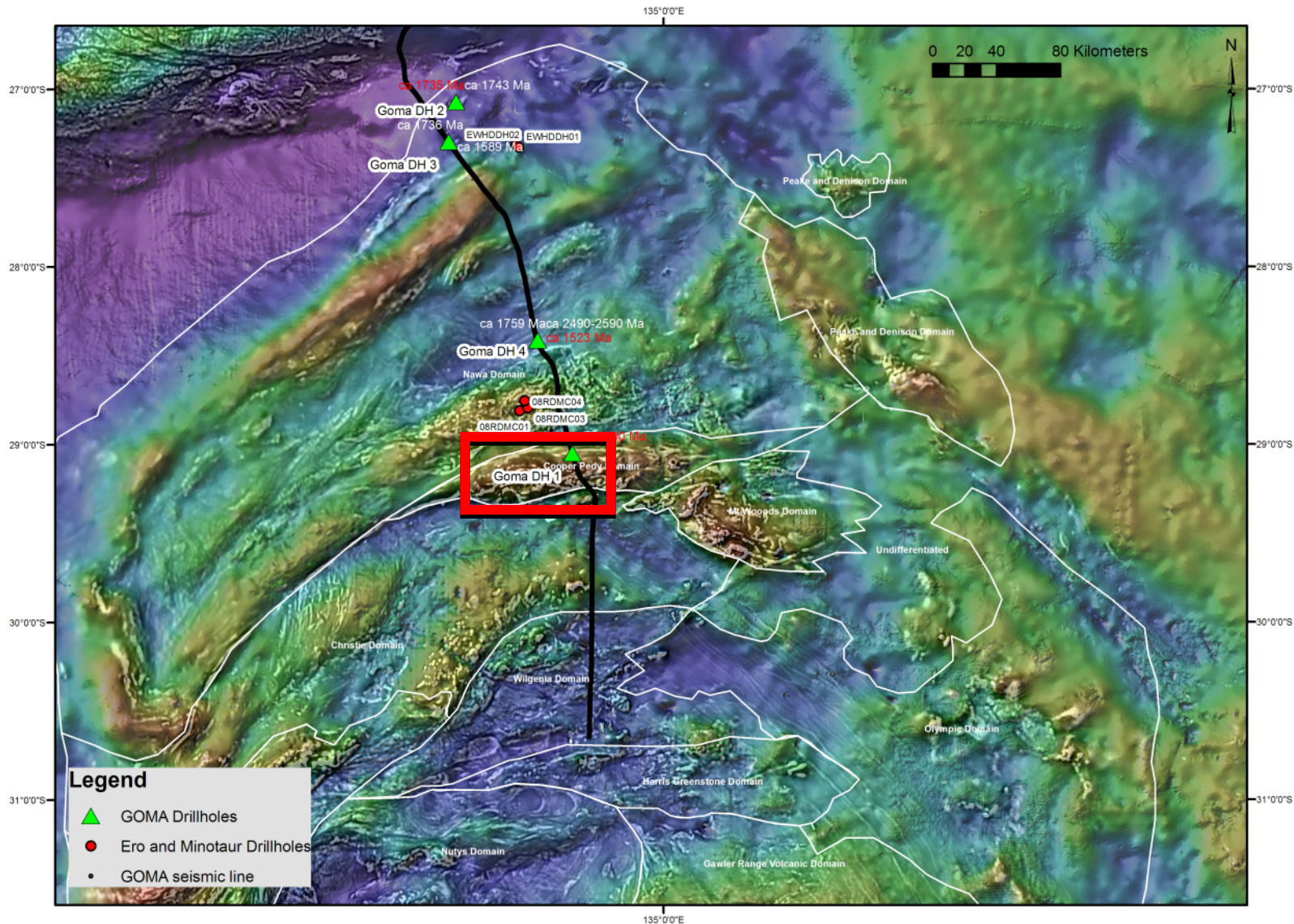
▲ GOMA Drillholes

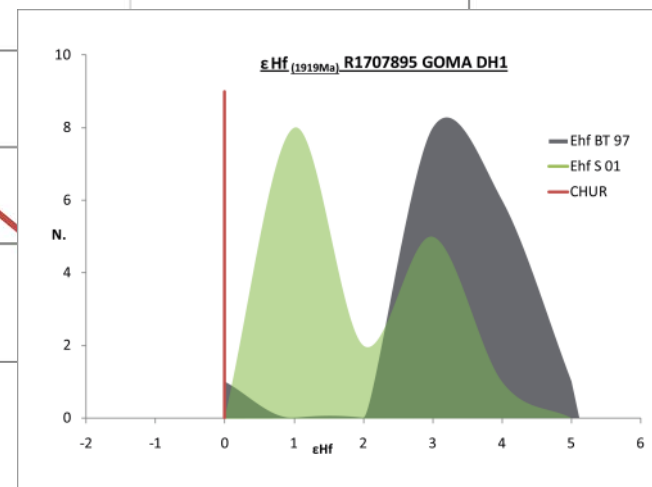
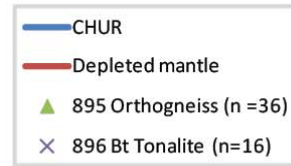
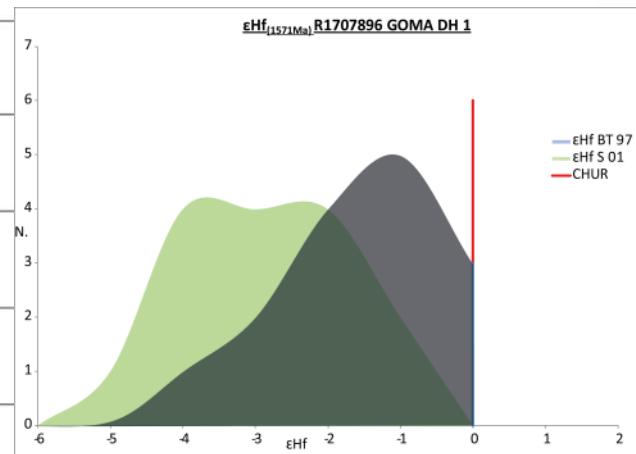
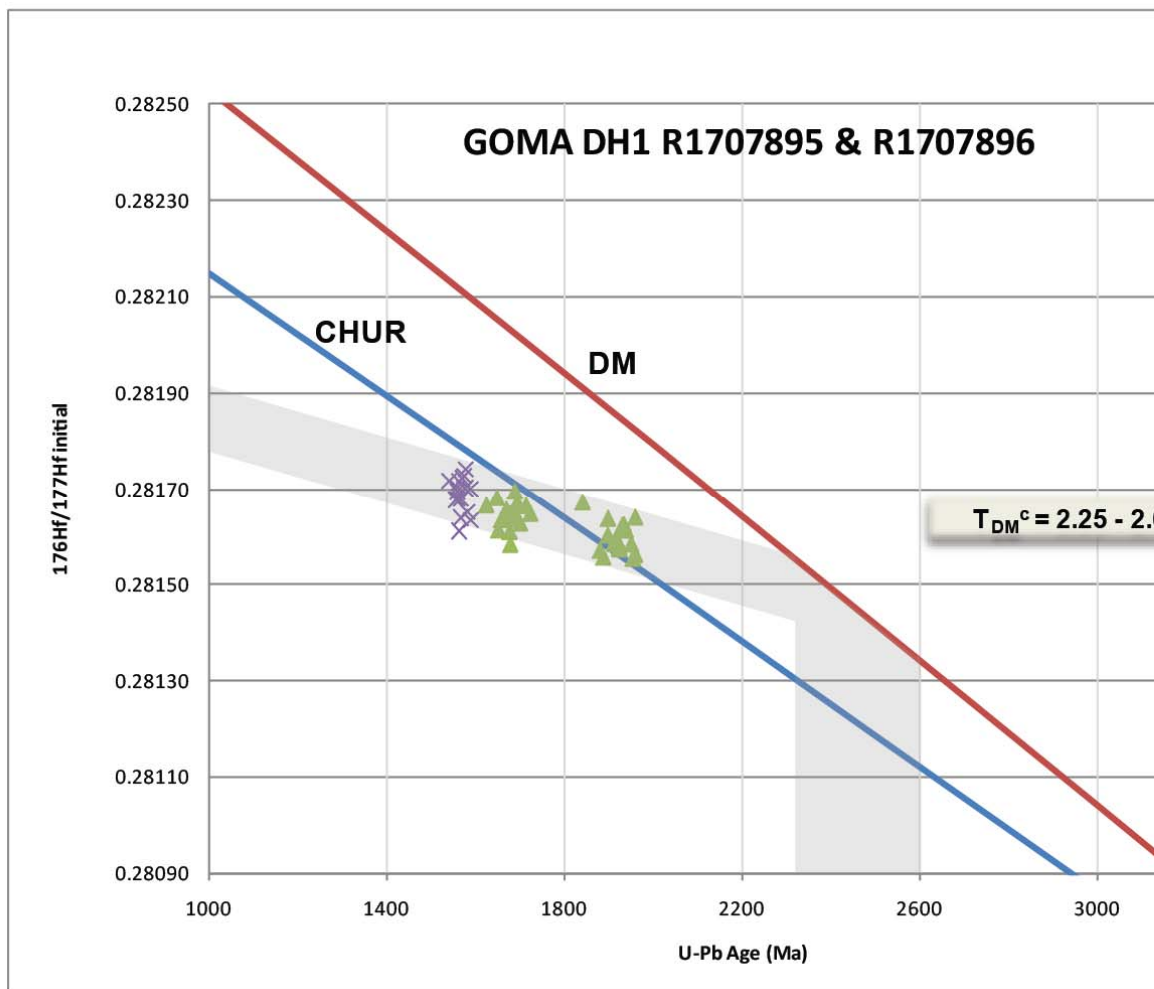
● Ero and Minotaur Drillholes

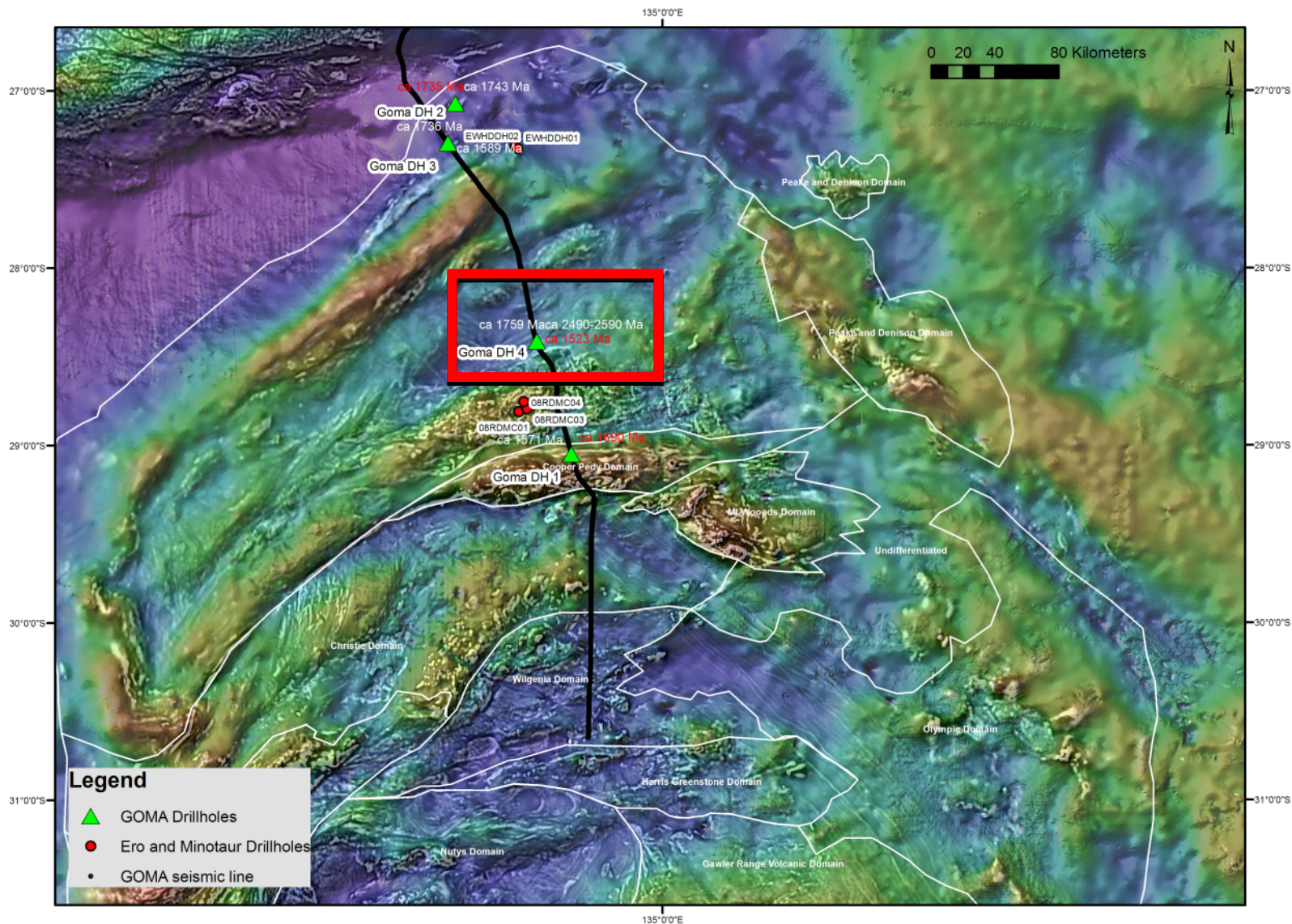
— GOMA seismic line

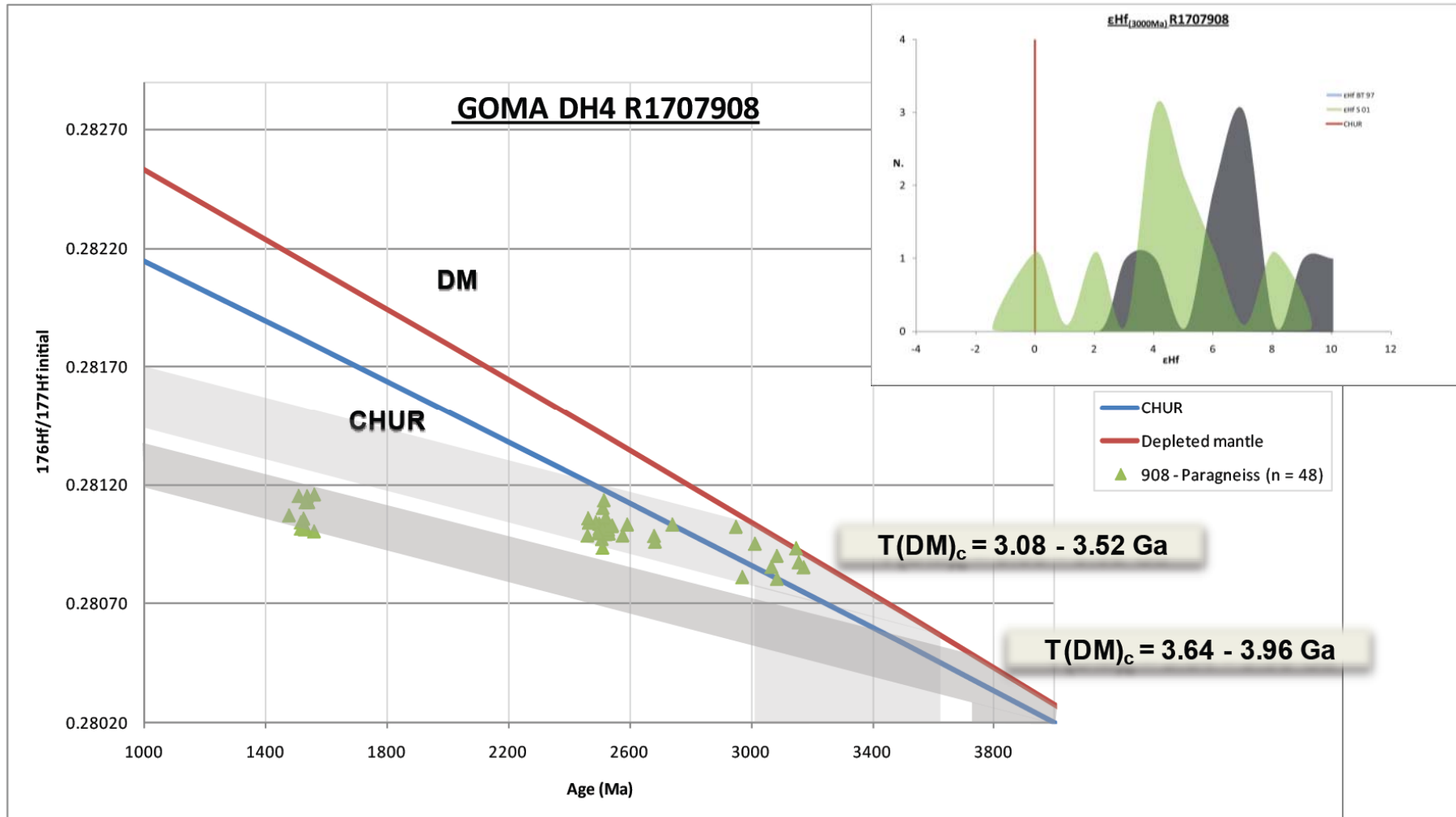


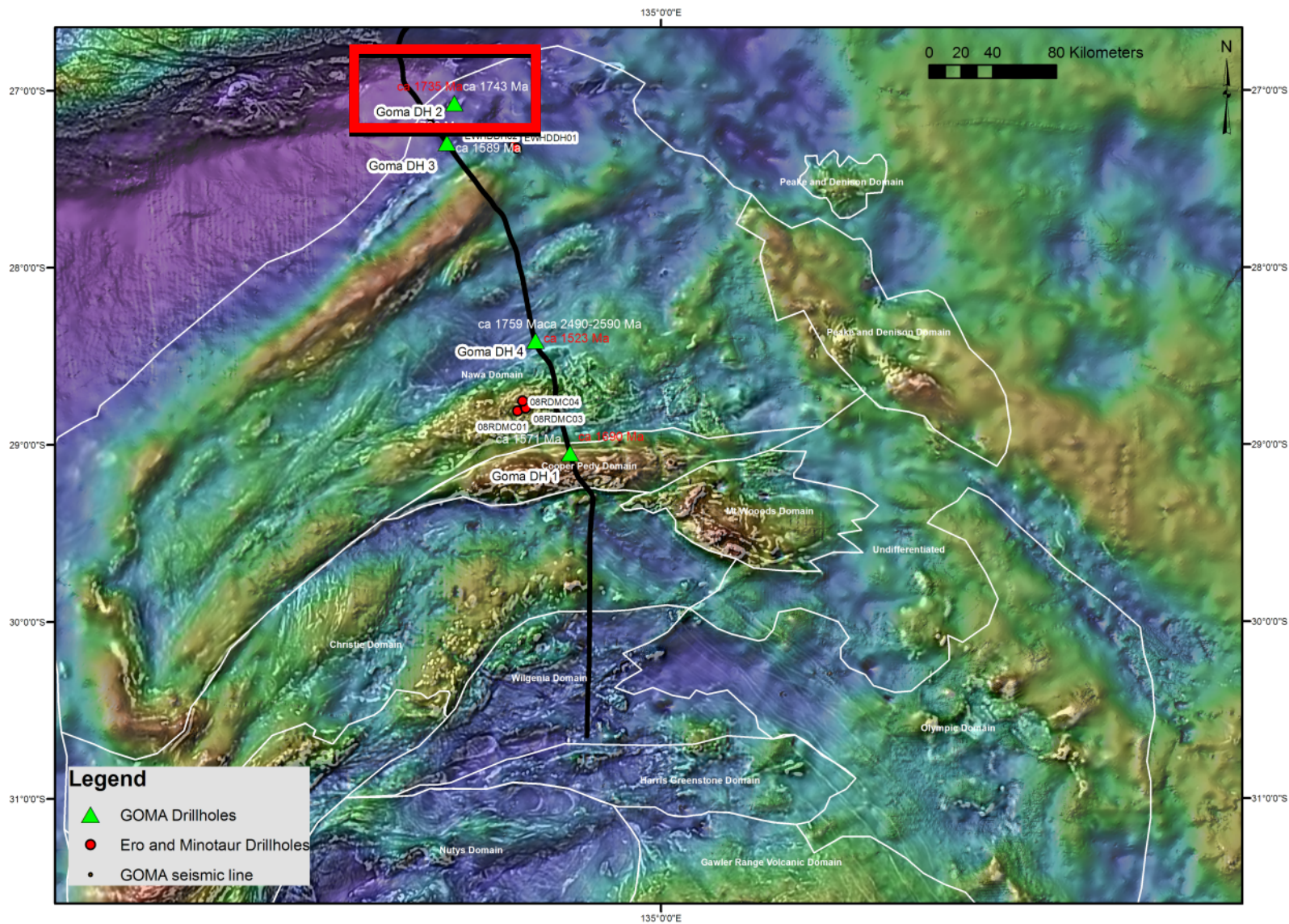






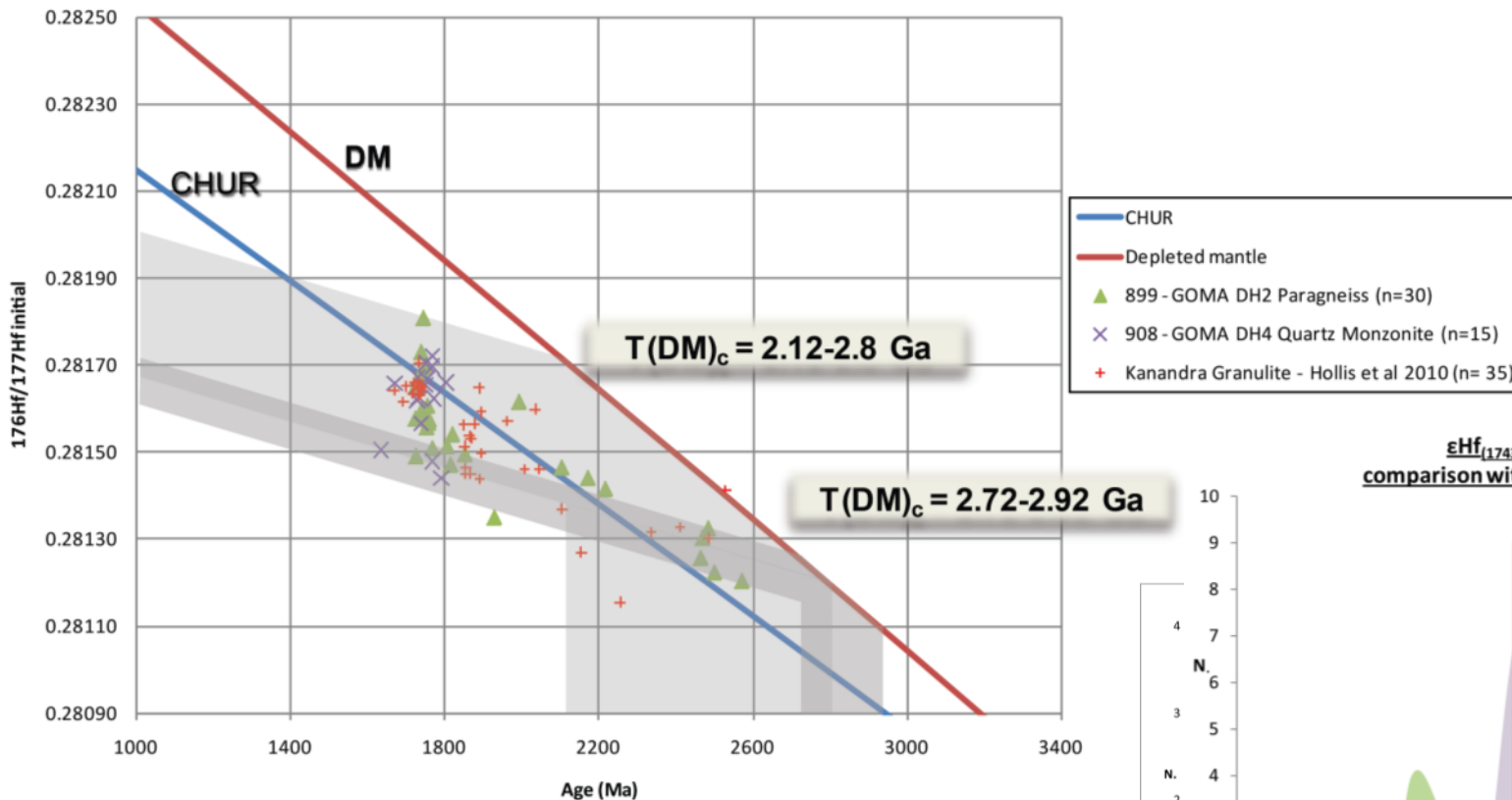




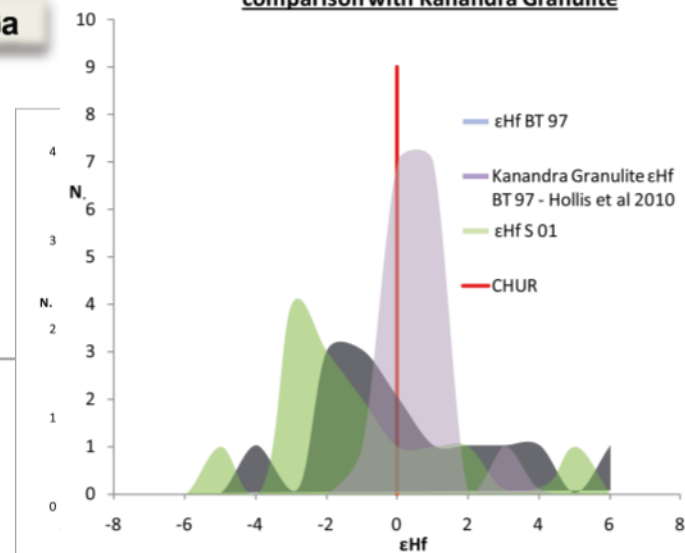


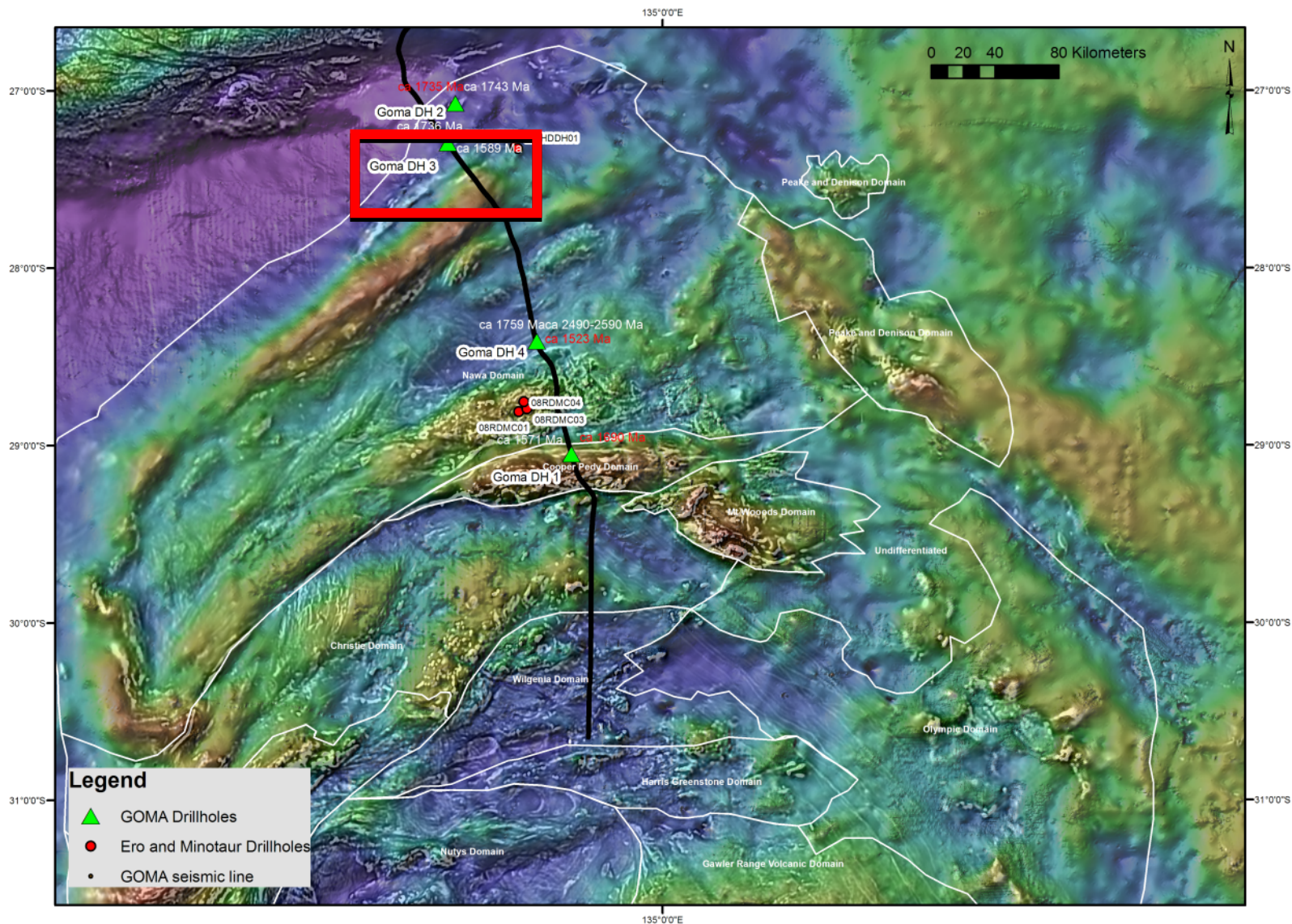


**GOMA DH 2 R1707899:
comparison with R1707904 in GOMA DH4**

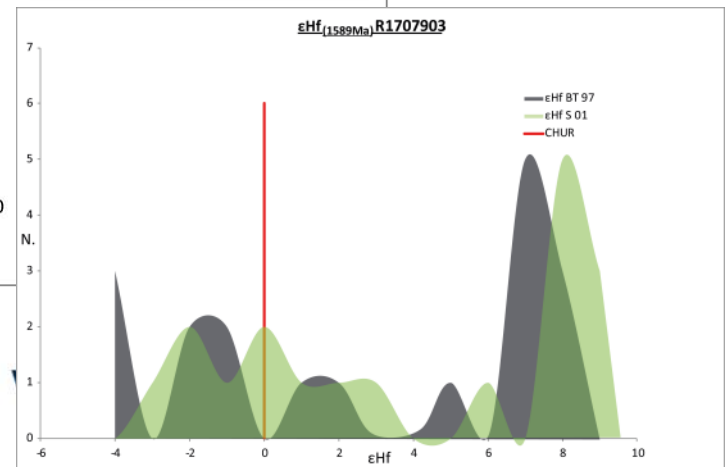
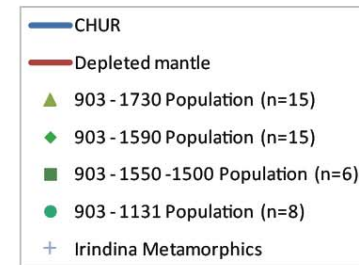
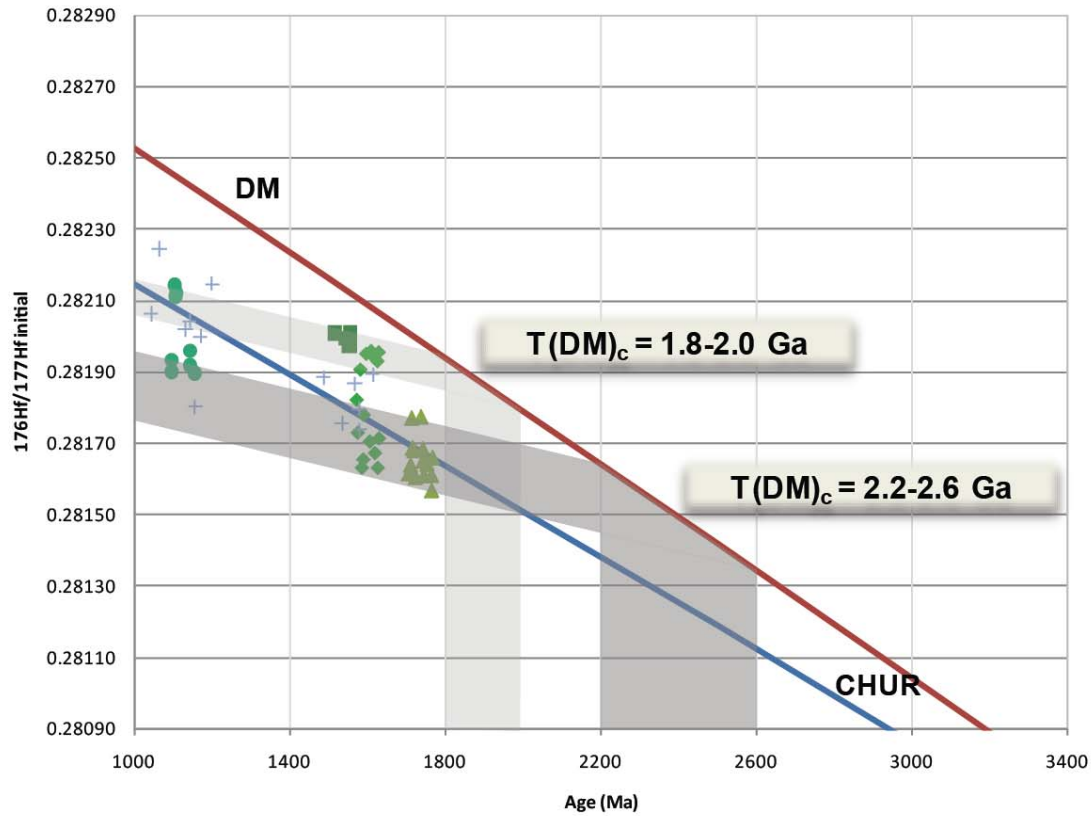


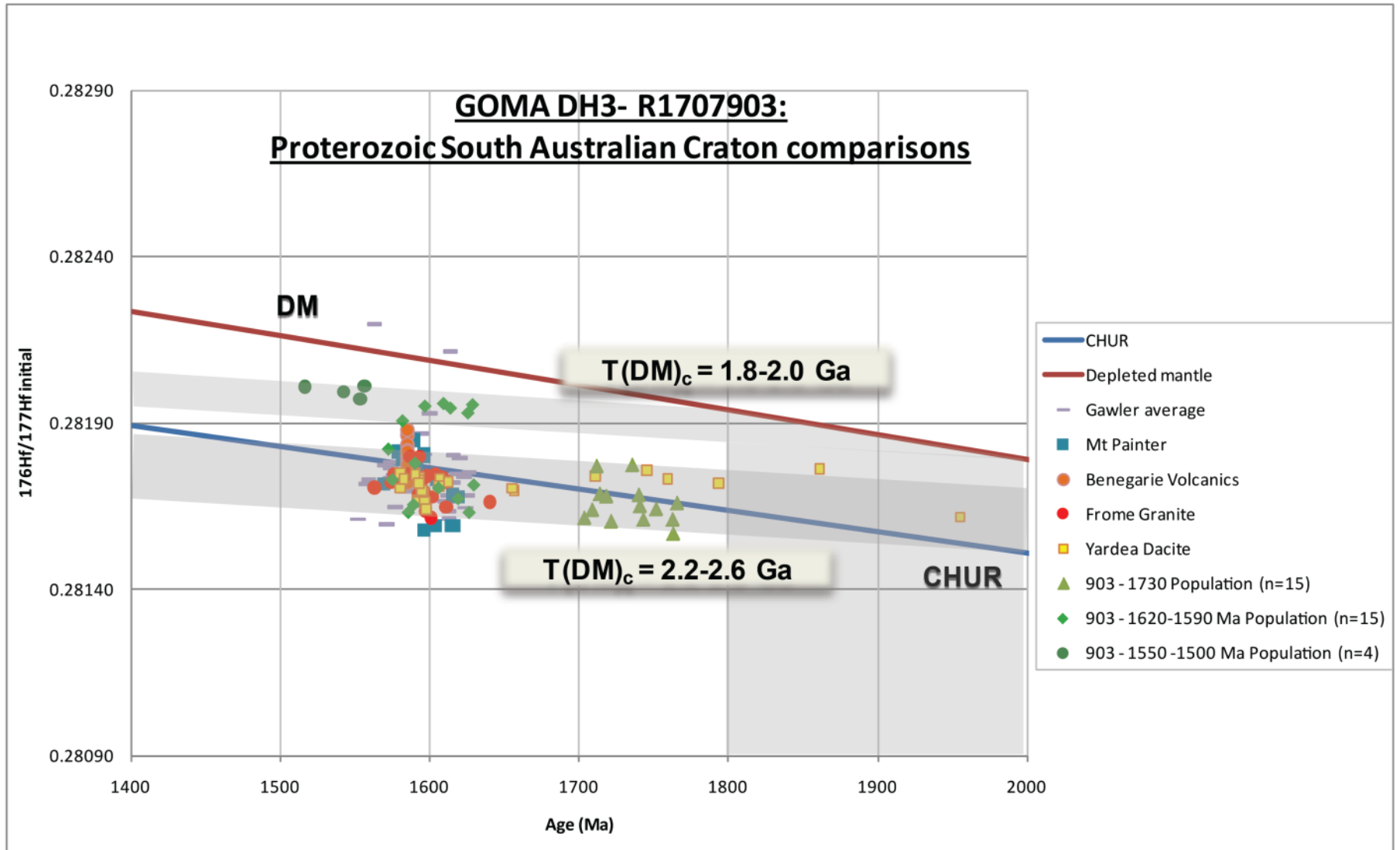
**$\epsilon_{\text{Hf}}(1743\text{Ma})$ R1707899
comparison with Kanandra Granulite**





GOMA DH3 - R1707903









27°0'0"S

27°0'0"S

28°0'0"S

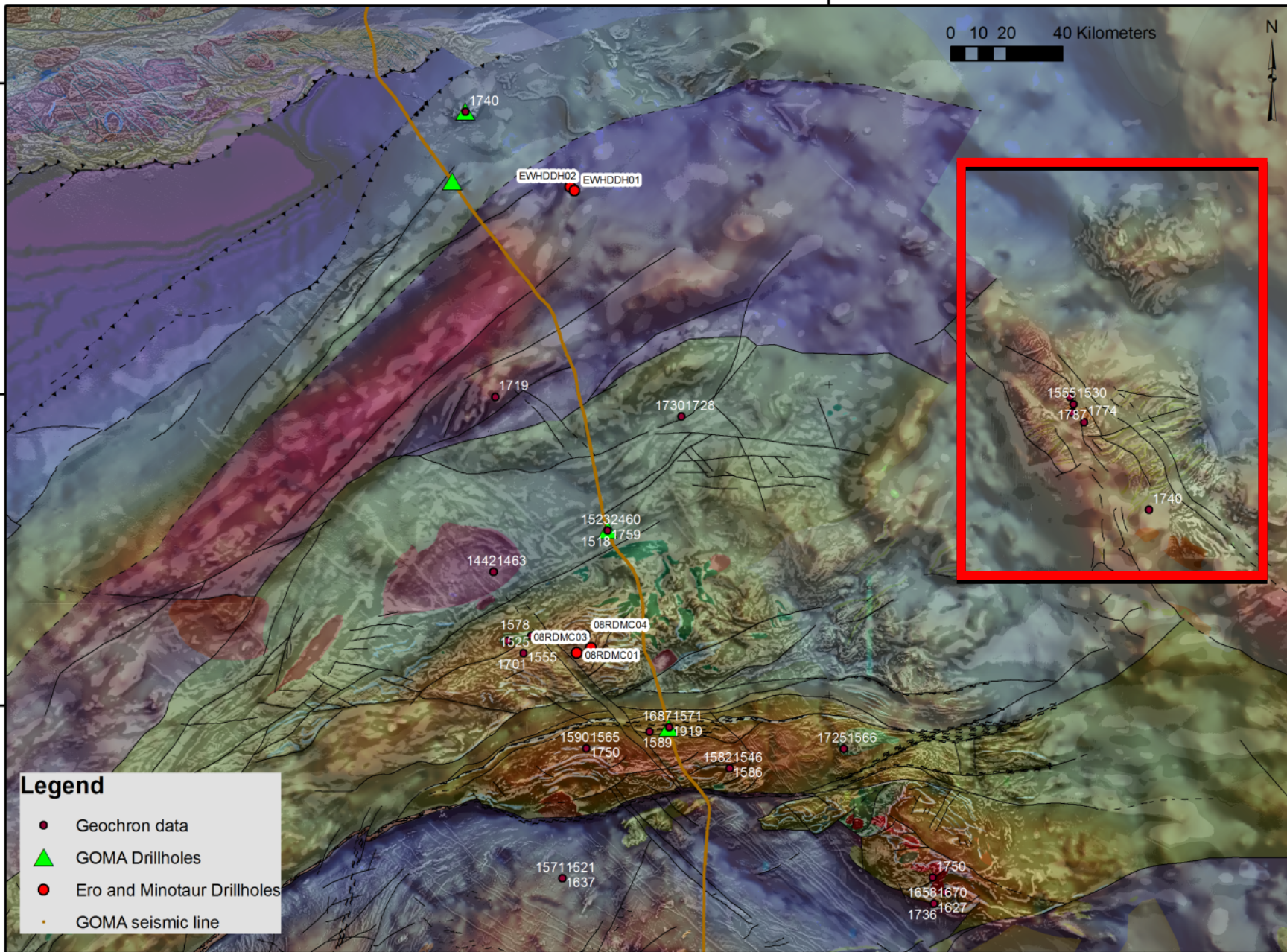
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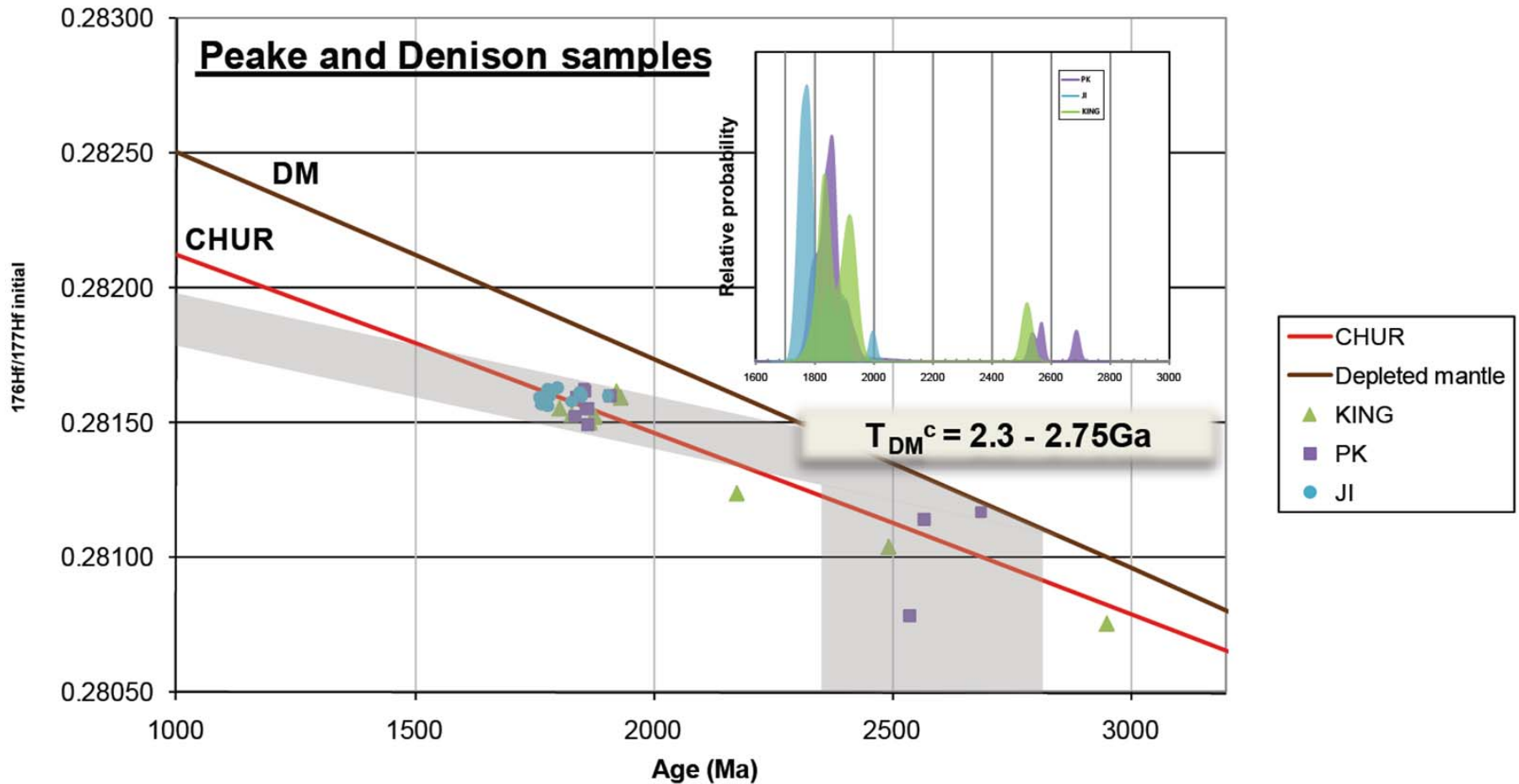
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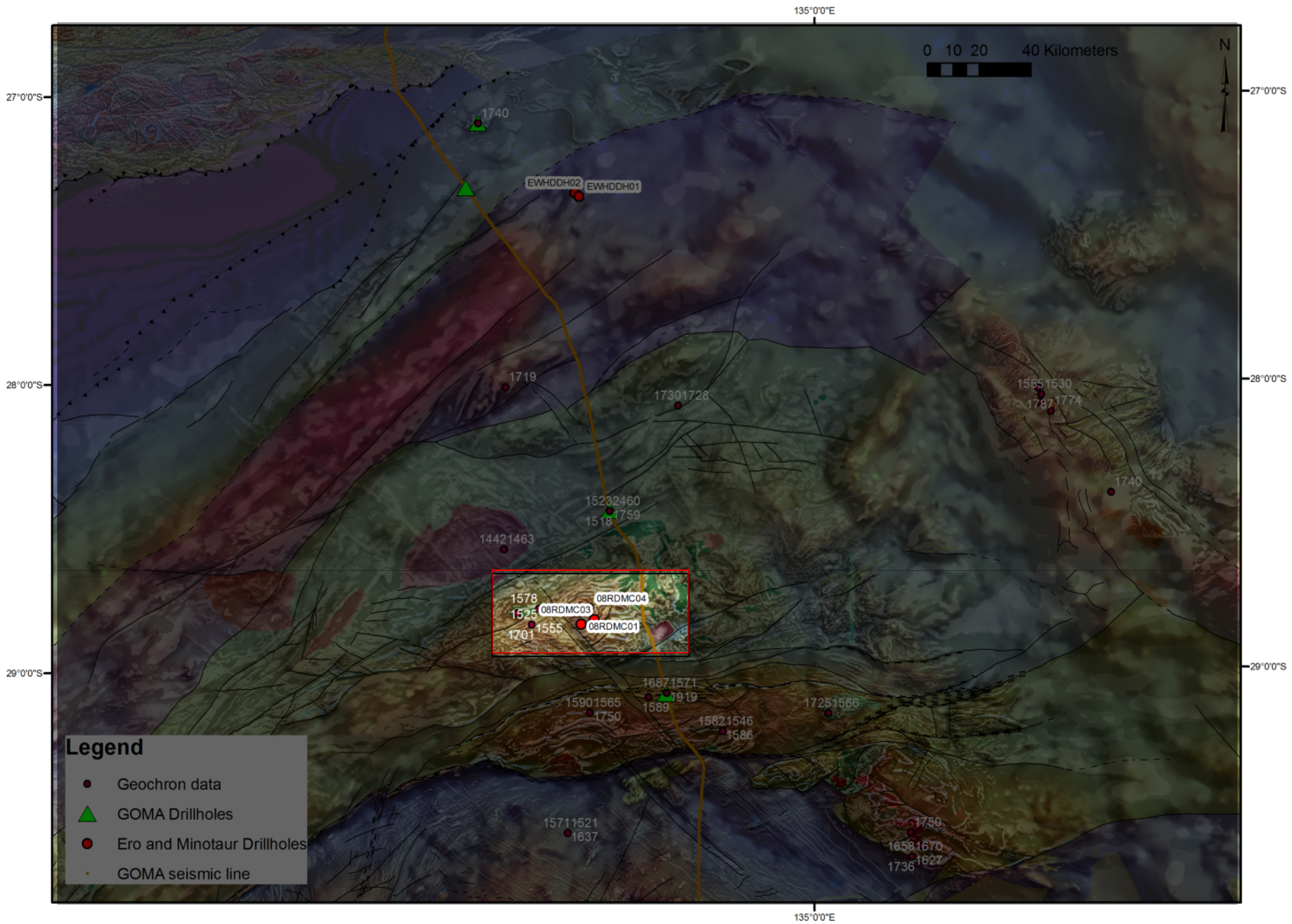
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Legend

- Geochron data
- ▲ GOMA Drillholes
- Ero and Minotaur Drillholes
- GOMA seismic line







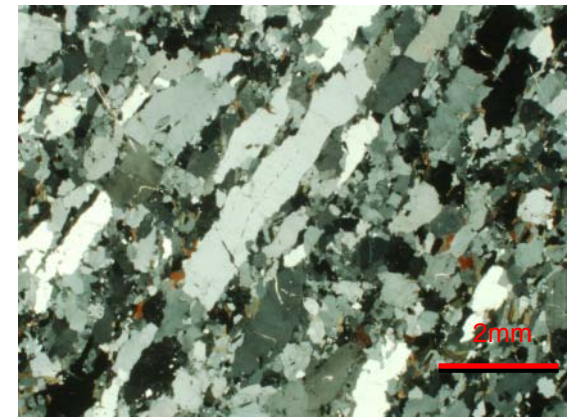
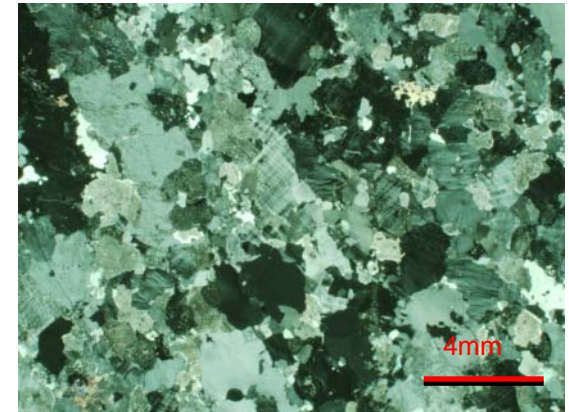
Mabel Creek Ridge: Minotaur holes

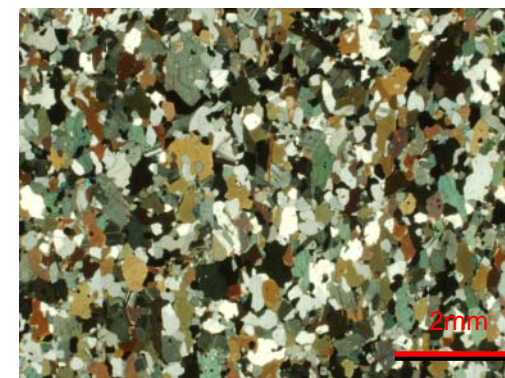
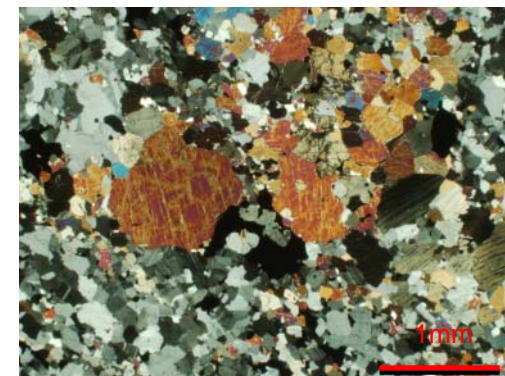
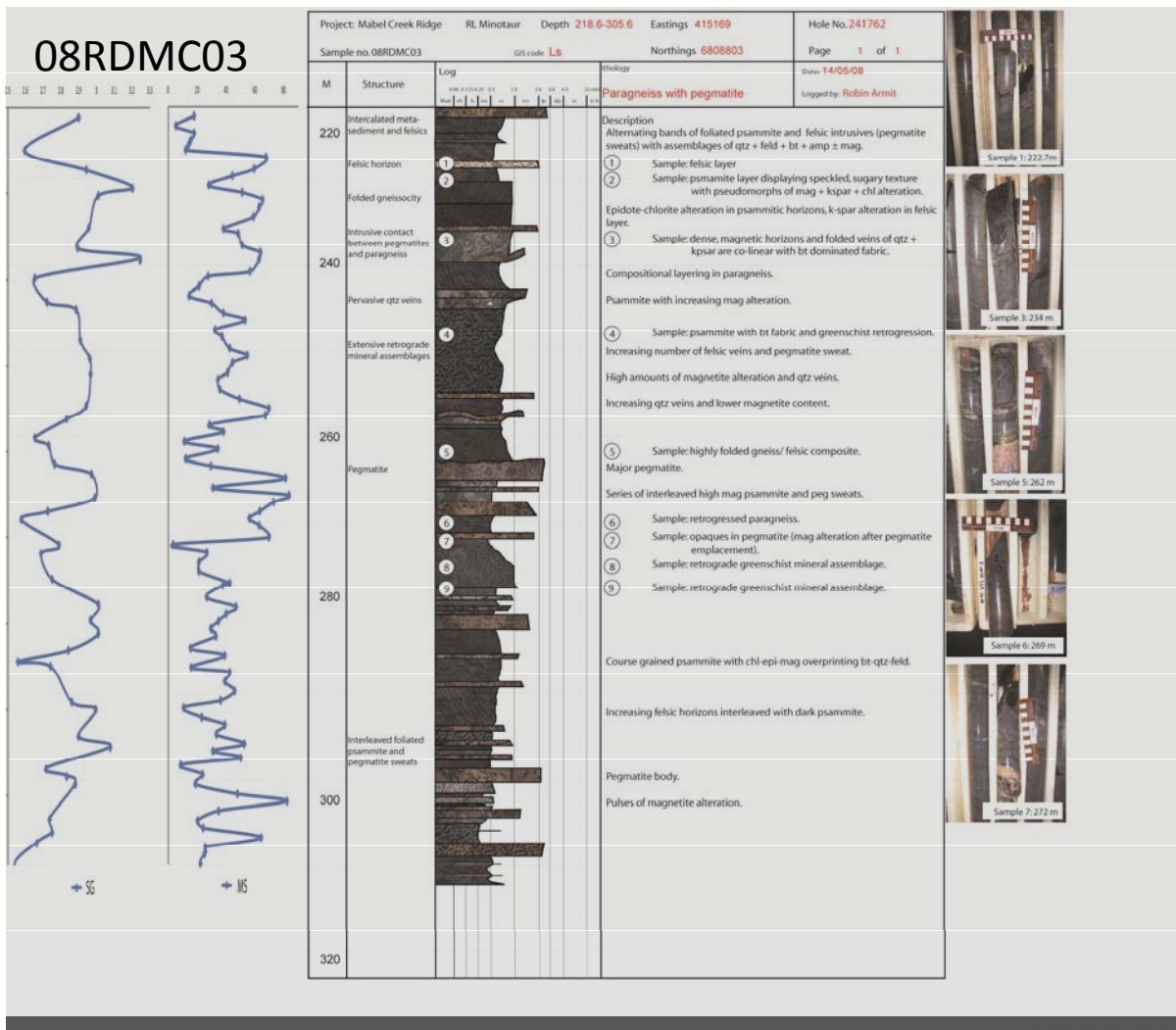




08RDMC01

Project: Mable Creek Ridge		RL Minatour	Depth: 323-343 m Eastings: 409992	Hole No. 241761
Sample no. 08RDMC01		GIS code	Northings: 6807096	Page 1 of 1
M	Structure	Log	PIRRA Lithology	Date: 14/05/08 Logged by: Robin Armit
323	Granite		Granite	Description Foliated granite ① Sample: unfoliated granite Course grained massive granite Minor breccia veins High strain zones massive to weakly foliated granite High strain zone, increasing foliation intensity Foliation defined by Qtz & K-spar with iron dusting Porphyritic texture with iron dusted k-spar and bt up to 50%. Foliated granite lower bt content Qtz-plag-bt gneiss - mafic displaying intense foliation. Single bed. Massive granite ② Foliated granite ?1580 Ma Qtz-k-spar-bt granite gneiss
328	Shear zone			
333	Granite		Granite	
343	Granite gneiss			

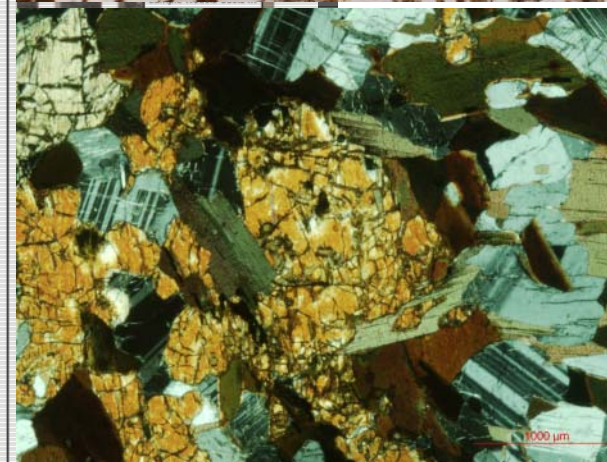
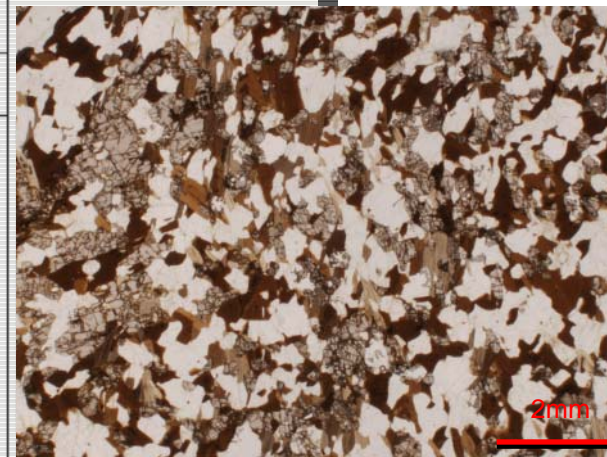






08RDMC04

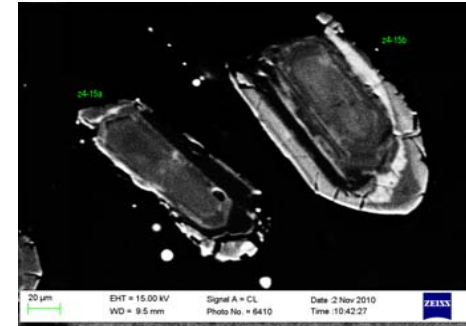
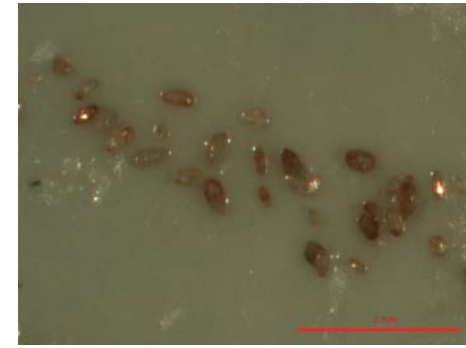
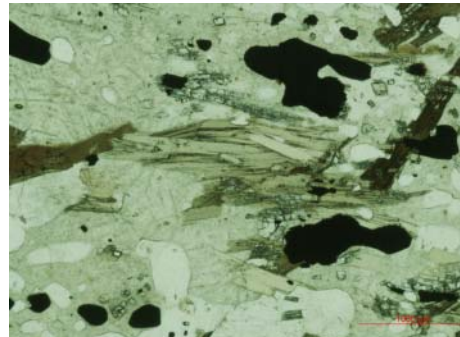
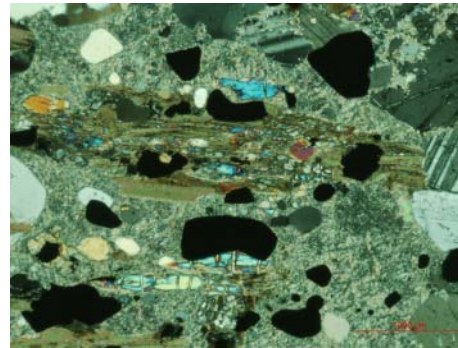
Project: Mabel Creek Ridge		RL Minotaur	Depth 250-405.4	Eastings 413095	Hole No. 241763
Sample no. 08RDMC04		GIS code Ls		Northings 6813135	Page 1 of 1
M	Structure	Log		ithology	
				<p>Mafic gneiss</p> <p>Date: 14/05/08 Logged by: Robin Armit</p>	
250	Breccia			<p>Description Clast to matrix supported breccia consisting of pegmatite and carbonate clasts and dark fine grained matrix.</p>	
	Paragneiss enclave	①		<p>① Sill + Bt rich highly altered paragneiss enclave in meta-gabbro</p>	
275	Compositional layered gneiss			<p>Dark fine grained compositional layering of bt + qtz + amp and qtz + k-spar with magnetite alteration.</p>	
	Pegmatite body			<p>Greenschist alteration of chl + epl over intensely folded gneiss and pegmatite swaths.</p>	
300	Carbonate veins			<p>Increasing carbonate veins and sulphide phases.</p>	
		②		<p>② Sample: course grained compositional layered gneiss. Mag alteration.</p>	
		③		<p>③ Sample: finer grained compositional layered gneiss.</p>	
325				<p>Pervasive vugs in carbonate veins. Carbonate veins stop. Felsic banding increases interleaved with dark bt + qtz + amp foliated gneiss. Intense mag alteration.</p>	
	Interleaved gneiss and felsic bands			<p>Pervasive potassic alteration with abundant plag overprint.</p>	
350				<p>Highly folded gneisses and felsic layers.</p>	
375	Folded gneiss			<p>Late brittle faulting overprinting structural fabric at high-angle.</p>	
400				<p>Mag alteration.</p>	

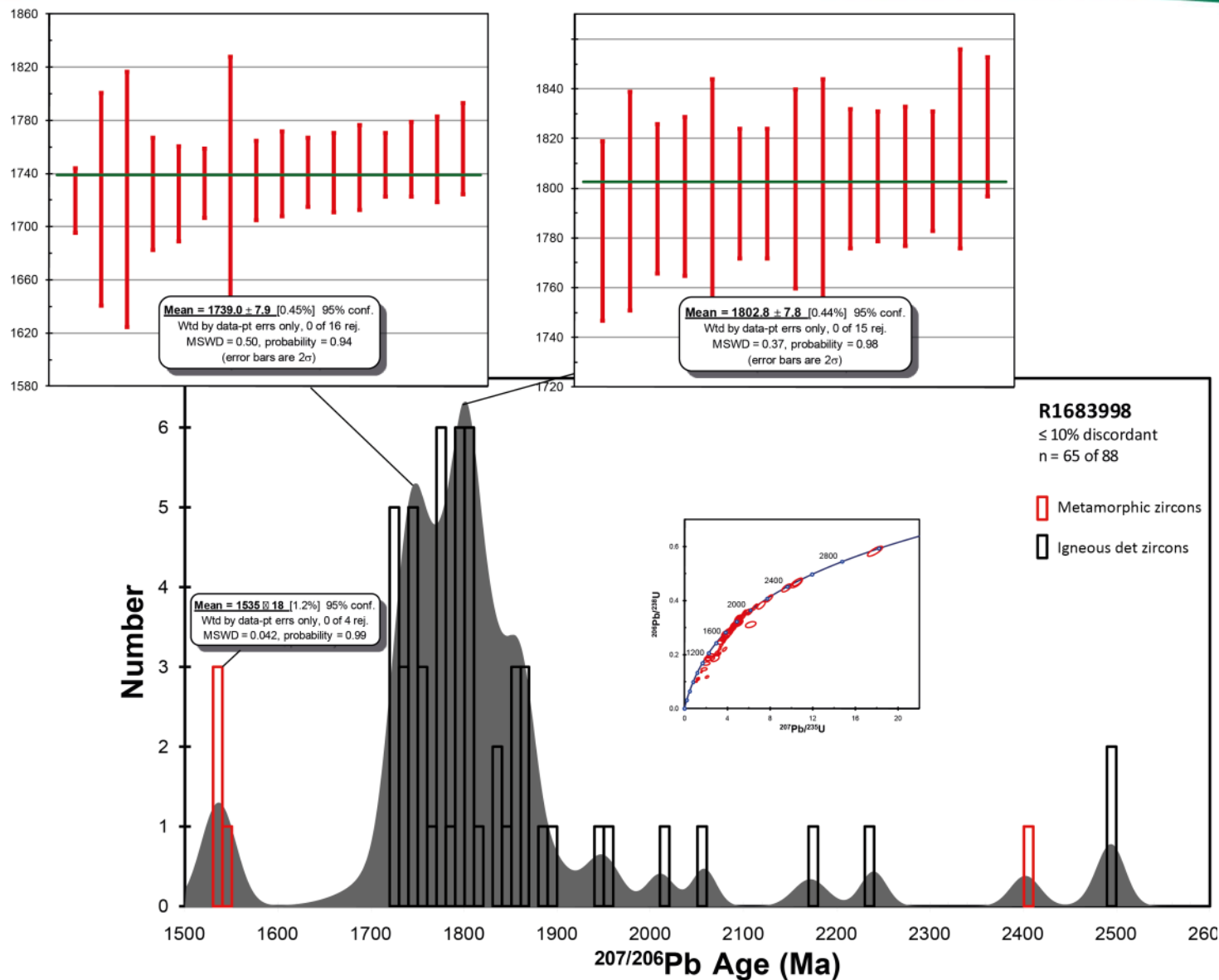


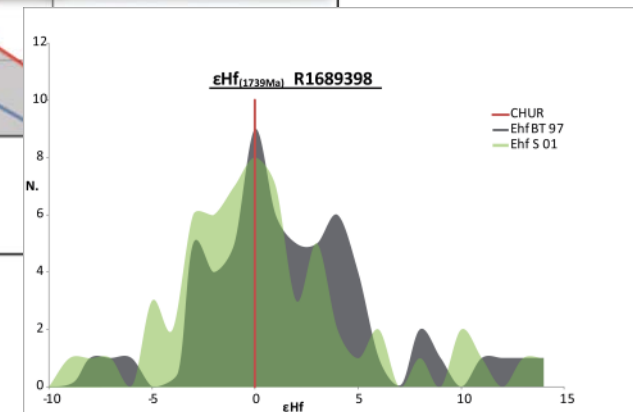
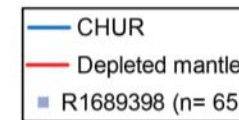
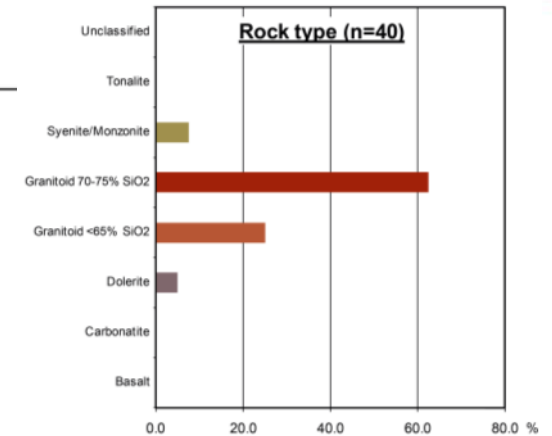
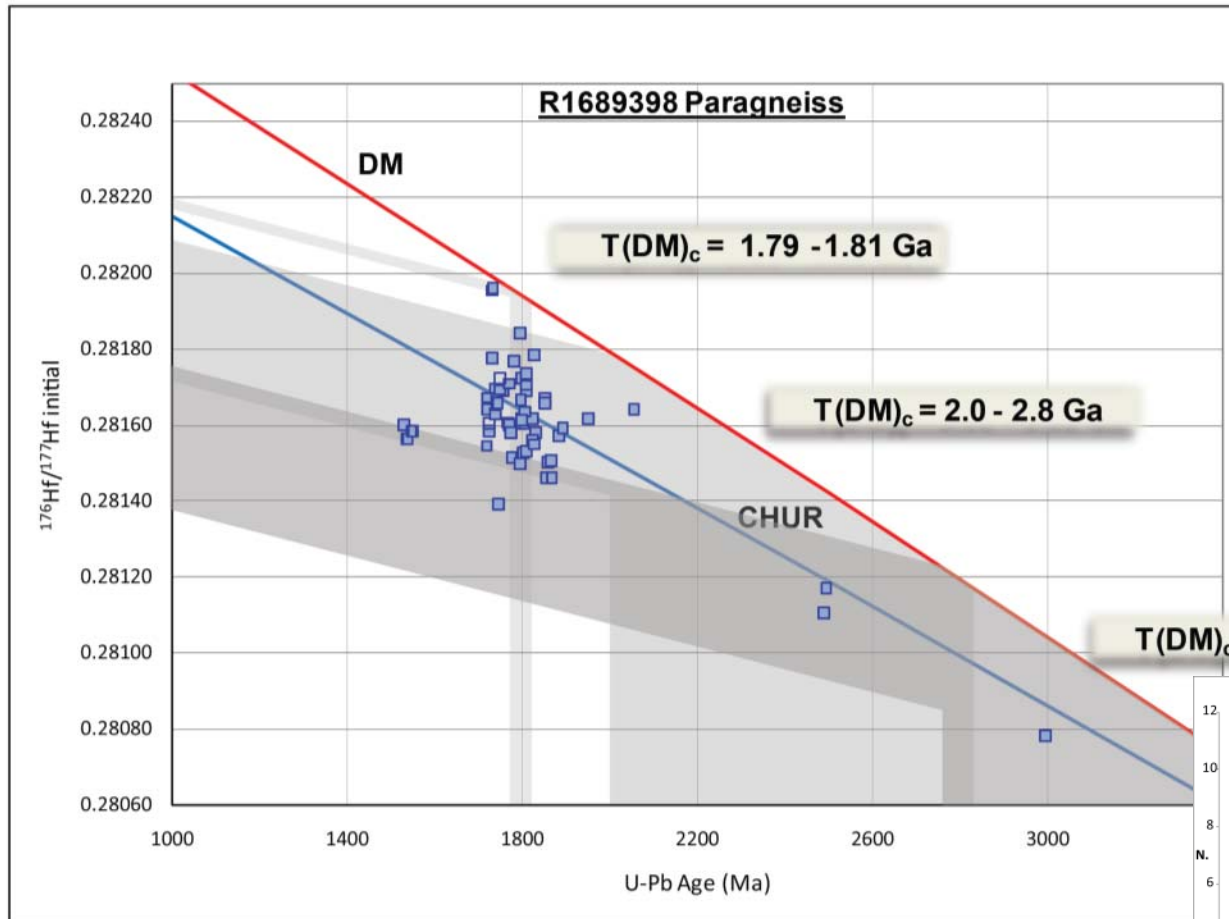
08RDMC04: R1689398

Interval: 257.2-257.9 metres

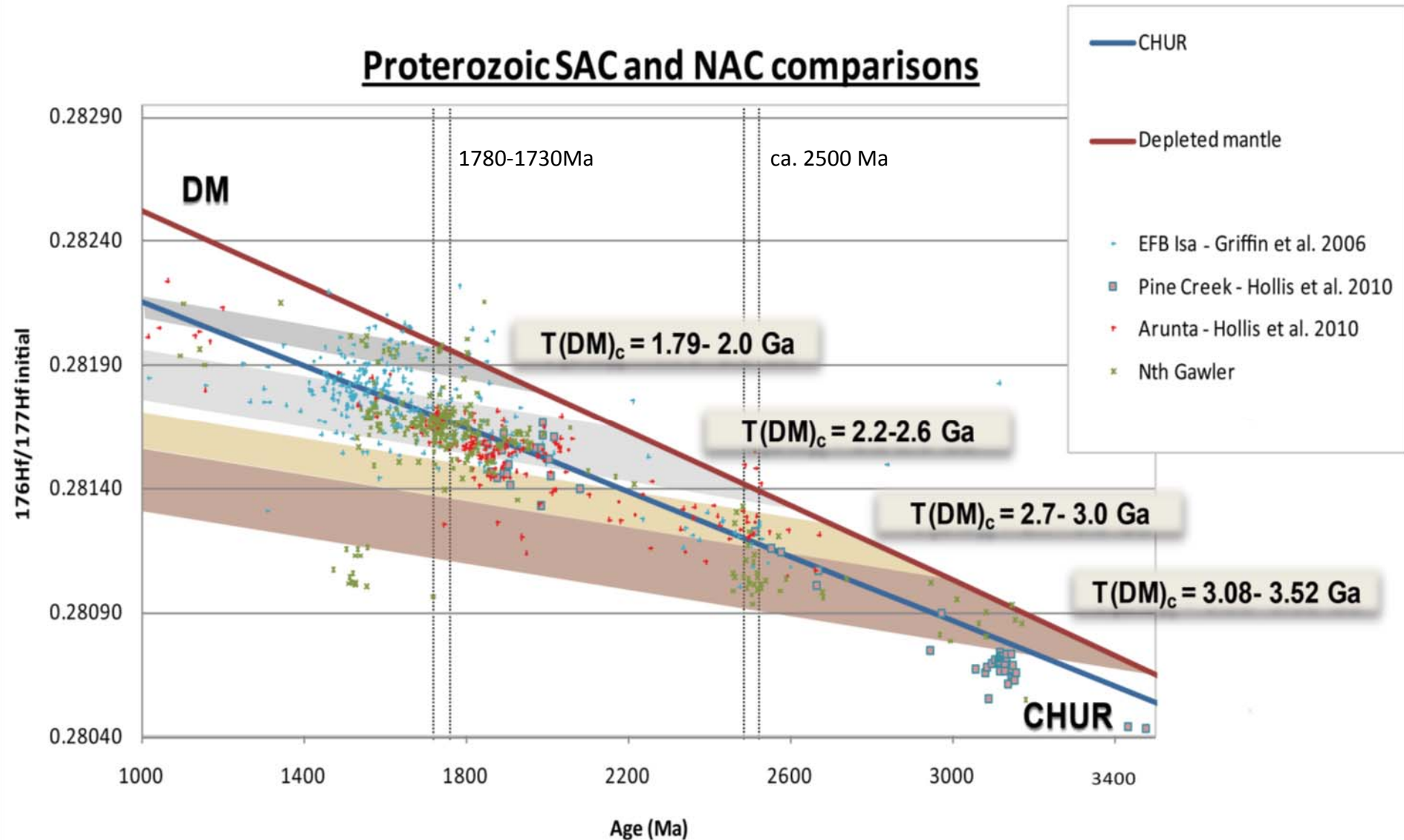
bt+sill+plag+mag paragneiss enclave







Proterozoic SAC and NAC comparisons



Conclusions

Isotopic characteristics of the ca. 1780-1730 Ma Palaeoproterozoic paragneisses in the northern Gawler Craton are similar to packages in the Arunta Region e.g. Kanandra Granulite (Hollis et al. 2010) and reflects re-working of relatively juvenile 2.2 to 2.6 Ga material and a small contribution of juvenile ca. 1.8 Ga material.

Similarities in the Palaeoproterozoic isotopic crustal evolution of the northern Gawler Craton extends to the western Gawler Craton (Howard et al., In Press), Peake and Denison Inlier and the Arunta Region (Hollis et al., 2010). This may reflect widespread Palaeoproterozoic basin development straddling both the North Australian Craton and South Australian Craton.

ca. 2500 Ma Archaean crustal evolution of the northern Gawler Craton appears to reflect both the re-working (more evolved Hf) of an older crustal component (pre-3.0 Ga) and more juvenile 2.7 to 3.0 Ga material.

ca. 1589 Ma and ca. 1131 Ma zircon populations support derivation from 2 crustal sources including re-worked 2.2-2.6 Ga crust and less evolved (Musgravian) 1.8-2.0 Ga material. This could provide support for the proximity of the northern Gawler to the Musgrave block in Neoproterozoic reconstruction space.