



Government of Western Australia
Department of Mines and Petroleum

U–Pb Geochronology of the Madura Province


John de Laeter Centre



**EXPLORATION
INCENTIVE SCHEME**

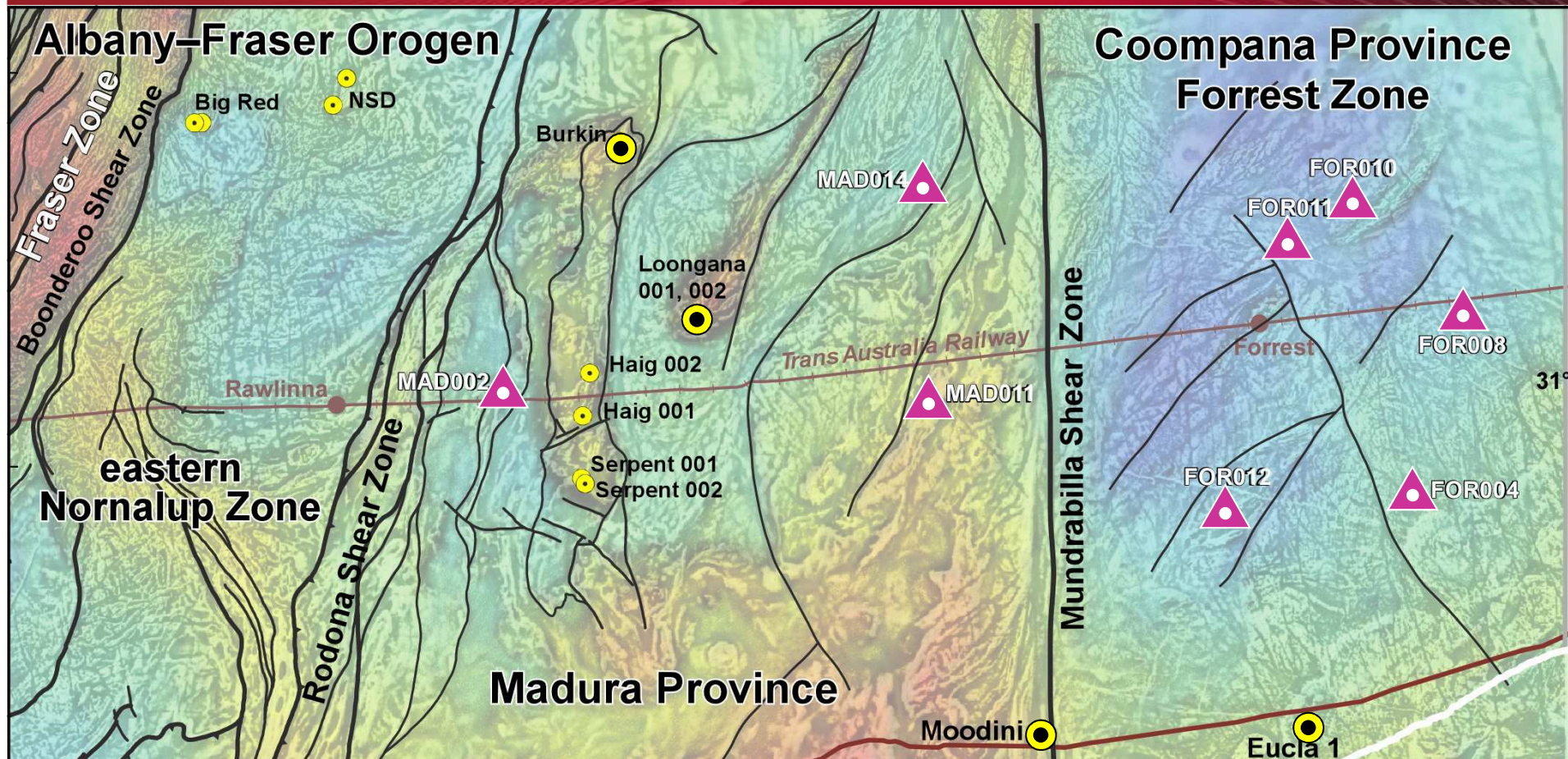


Eucla Basement Stratigraphic Drilling – Results Release

10 September, 2015



GSWA geochronology samples



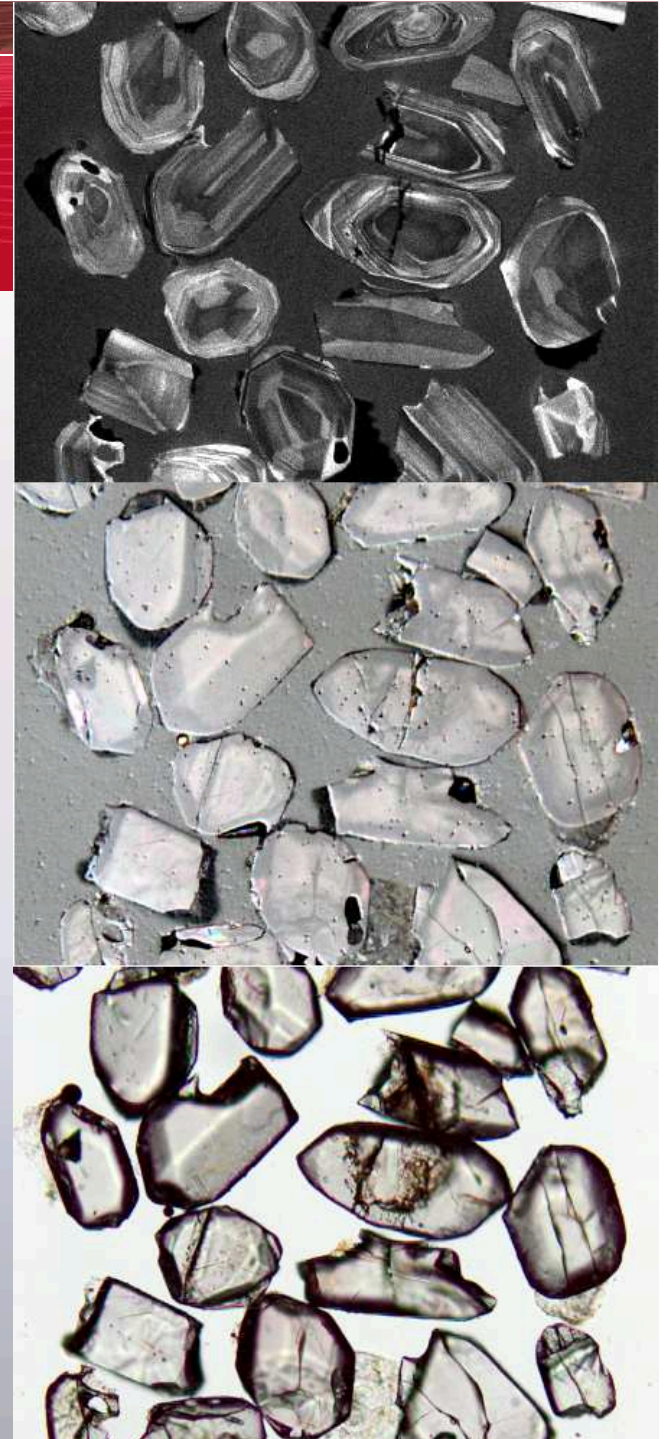
- ▲ GSWA
- Industry

Madura Province (12 samples)
4 samples from 3 GSWA drillholes
8 samples from 3 industry drillholes

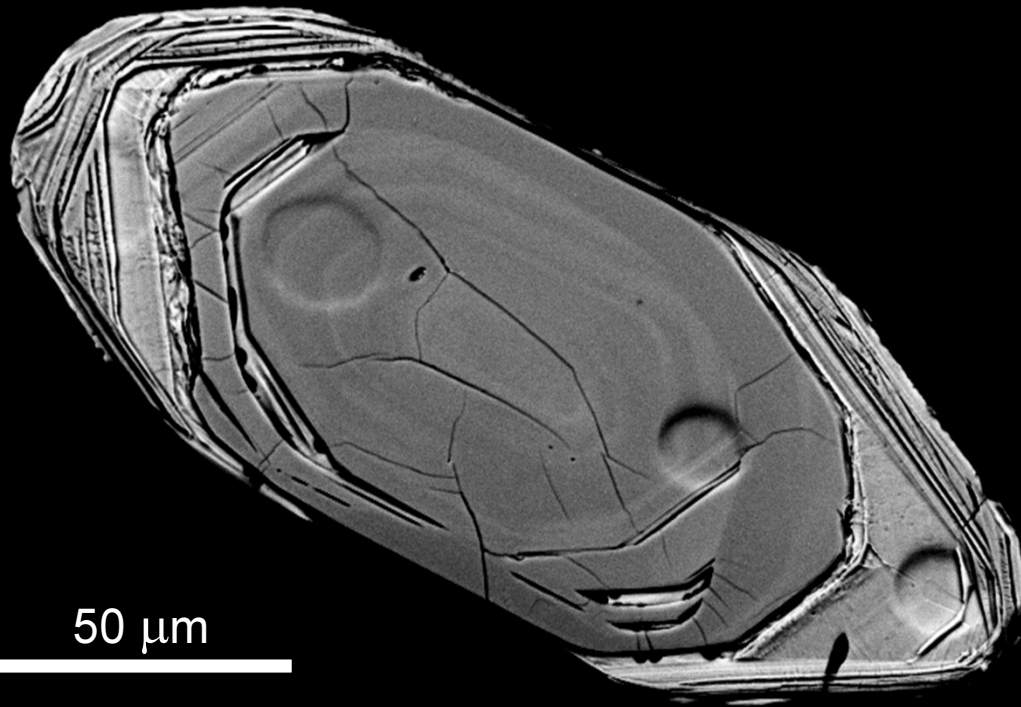
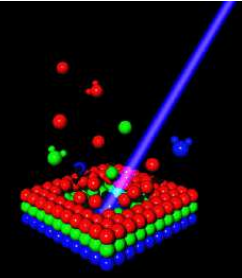
Forrest Zone (15 samples)
14 samples from 5 GSWA drillholes
1 sample from 1 industry drillhole

Analytical methods

- clean, unweathered drillcore samples
- mineral separations at GSWA laboratory
- optical and CL imaging of all zircons
- SIMS U-Pb analysis using SHRIMP ion microprobes
- interpretation using geological, geochemical, and isotopic information
- ages quoted with 95% uncertainties



SHRIMP U–Pb geochronology



50 μm

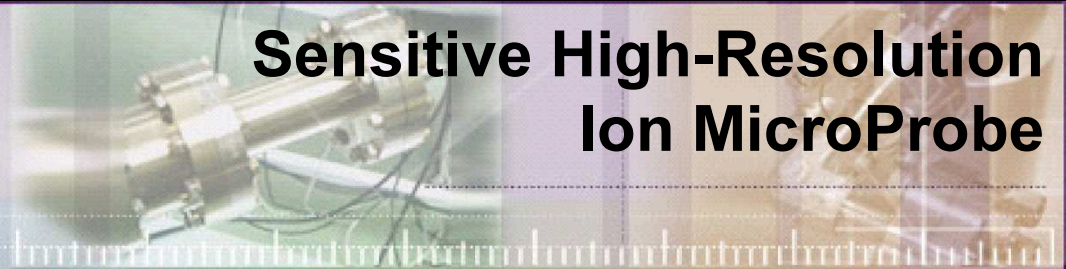
secondary electron image



rapid *in situ* U-Th-Pb
microsampling of
geological materials

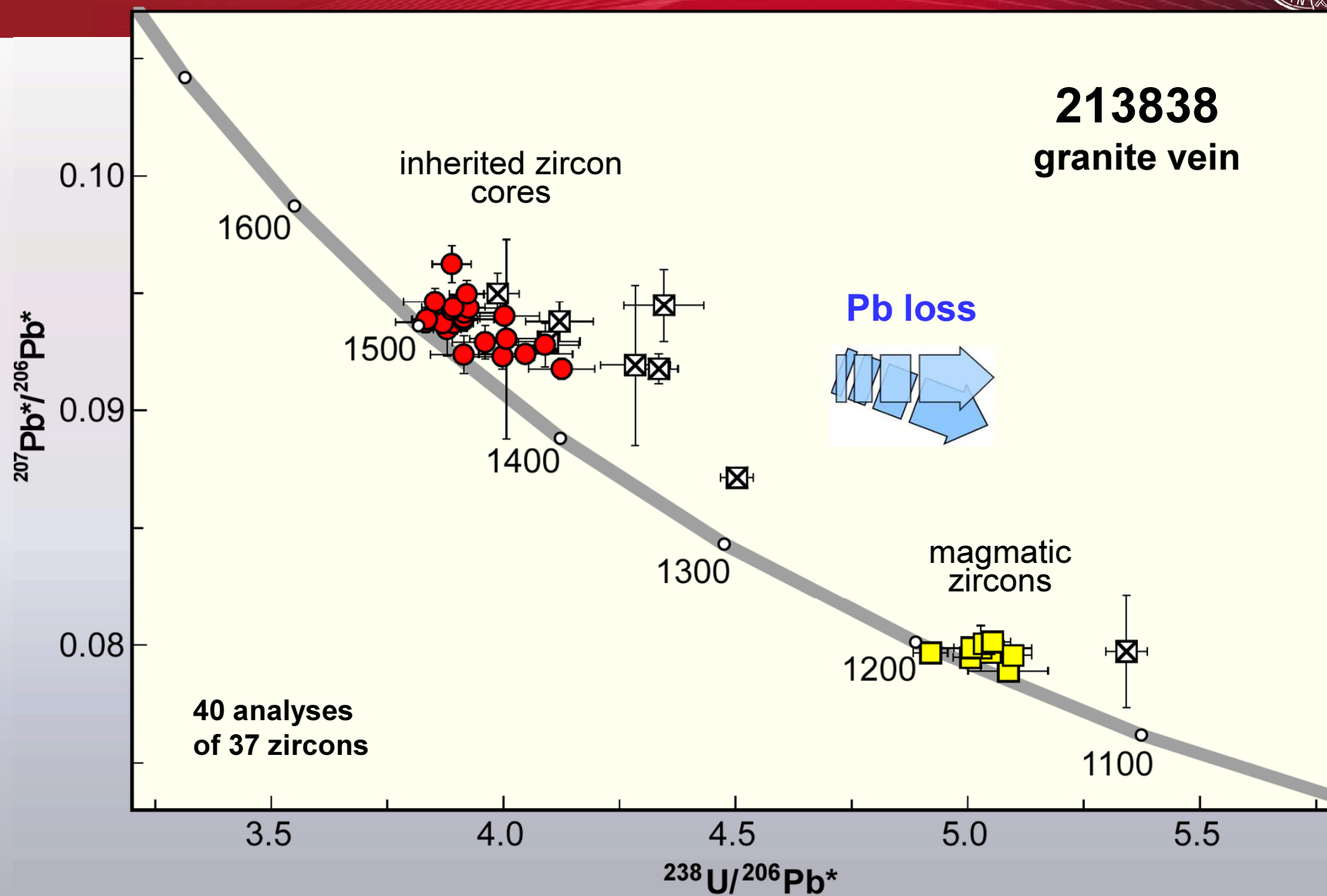
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Sensitive High-Resolution
Ion MicroProbe



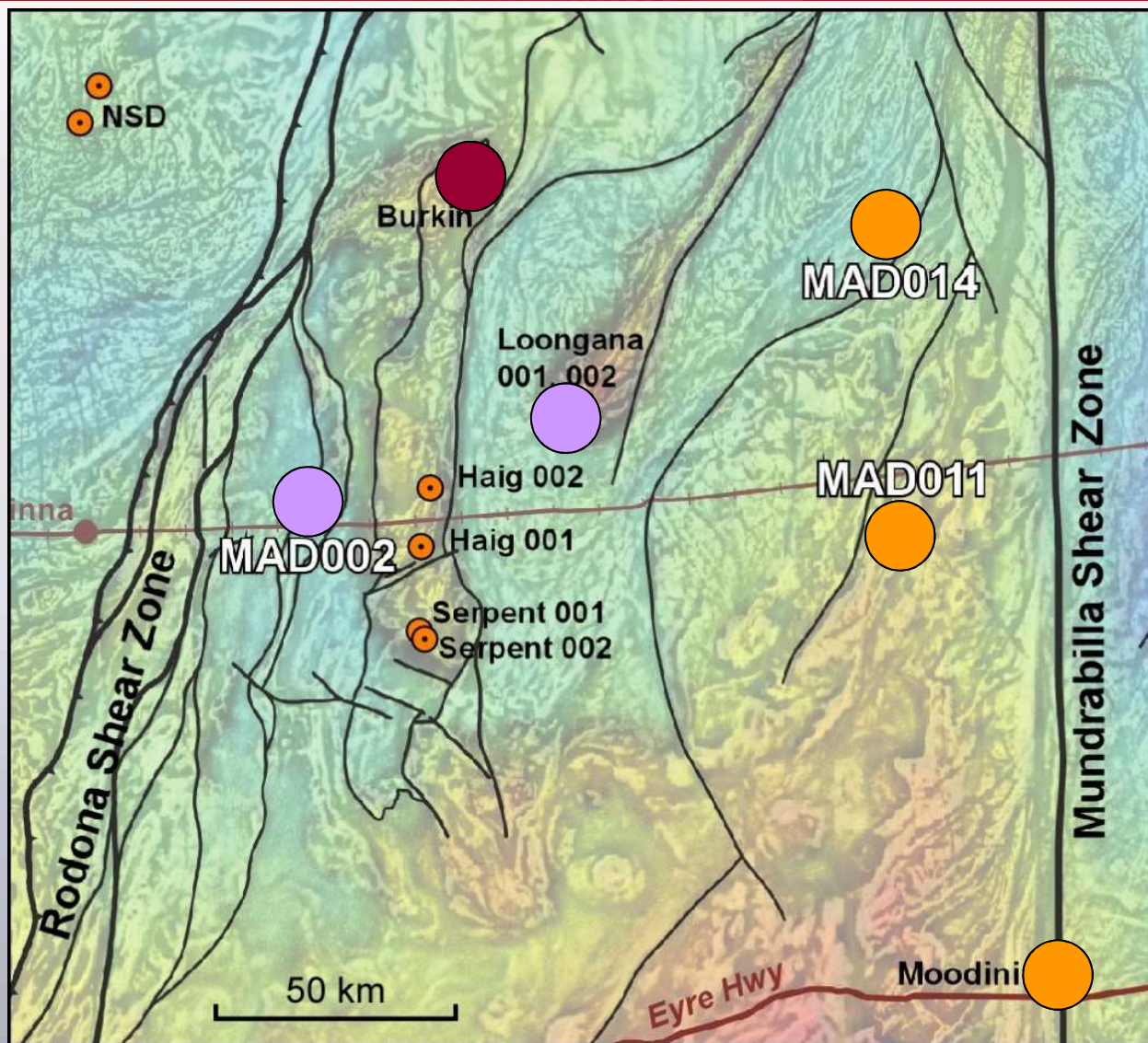





U–Pb concordia diagram





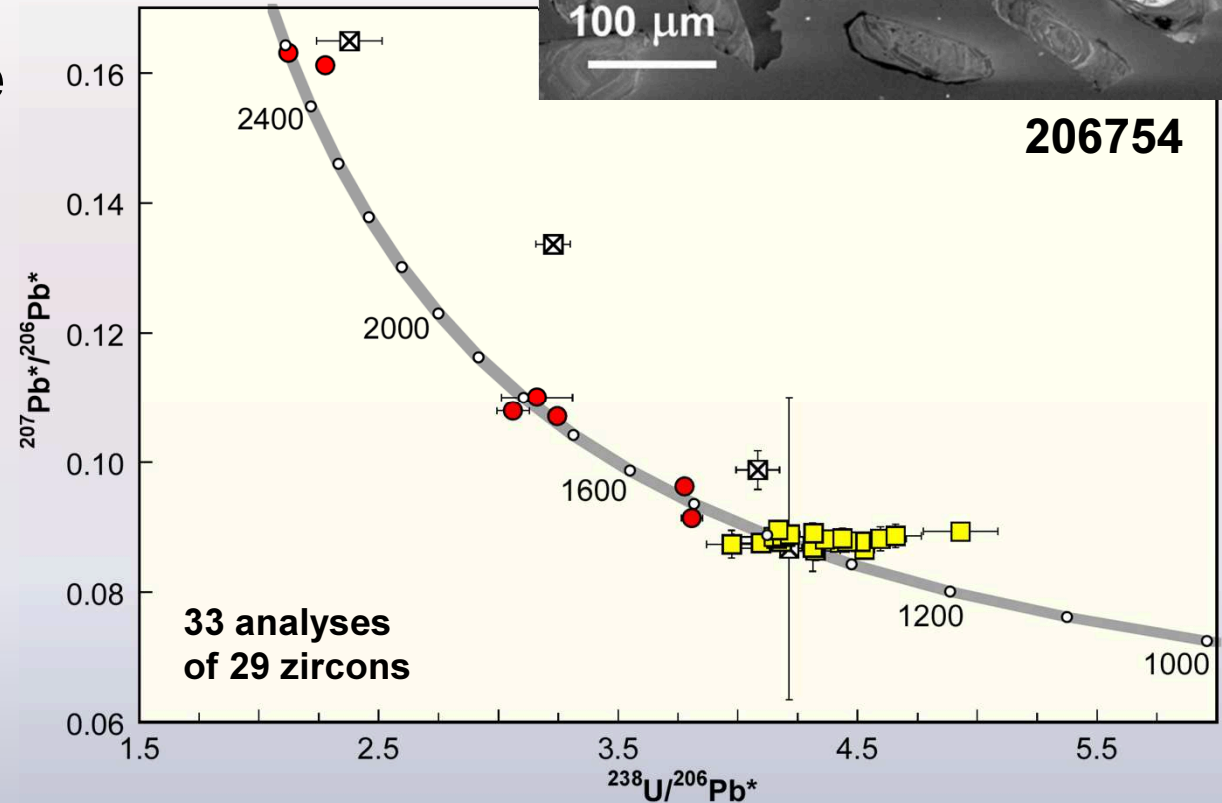
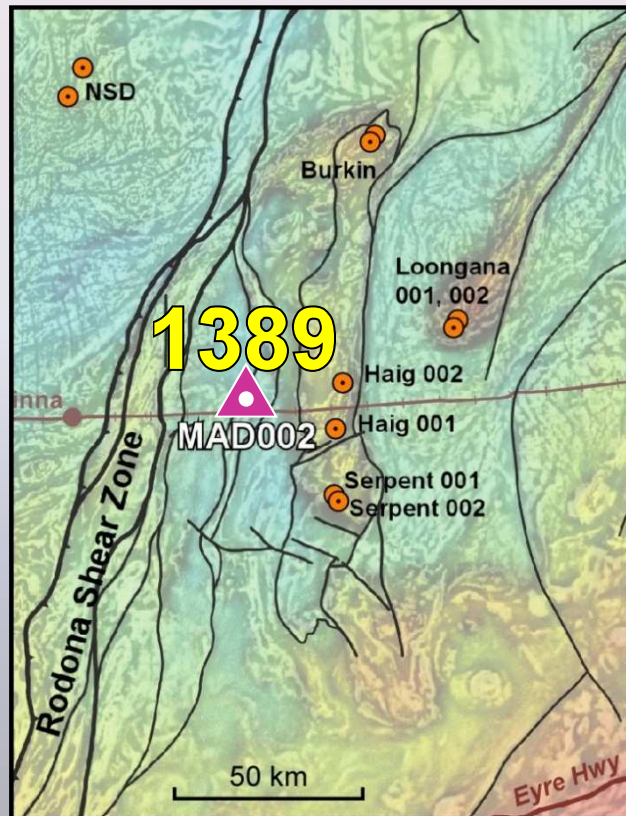
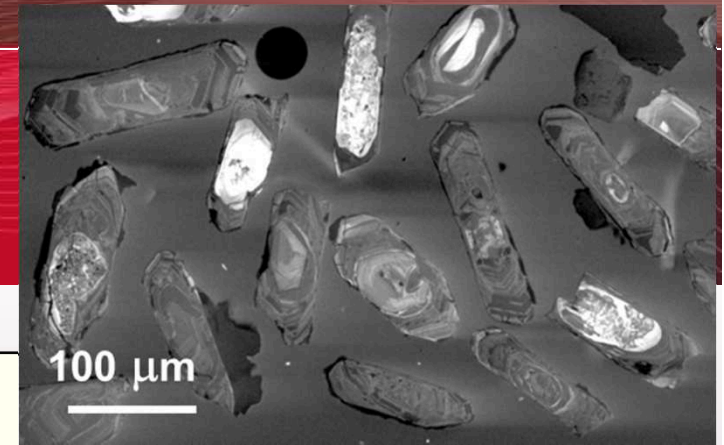
Madura Province



- Moodini Supersuite** 1181–1125 Ma (5 samples) 
- Haig Cave Supersuite** 1415–1389 Ma (6 samples) 
- Burkin gneiss** 1478 Ma 

MAD002, 488.58 – 488.83 m

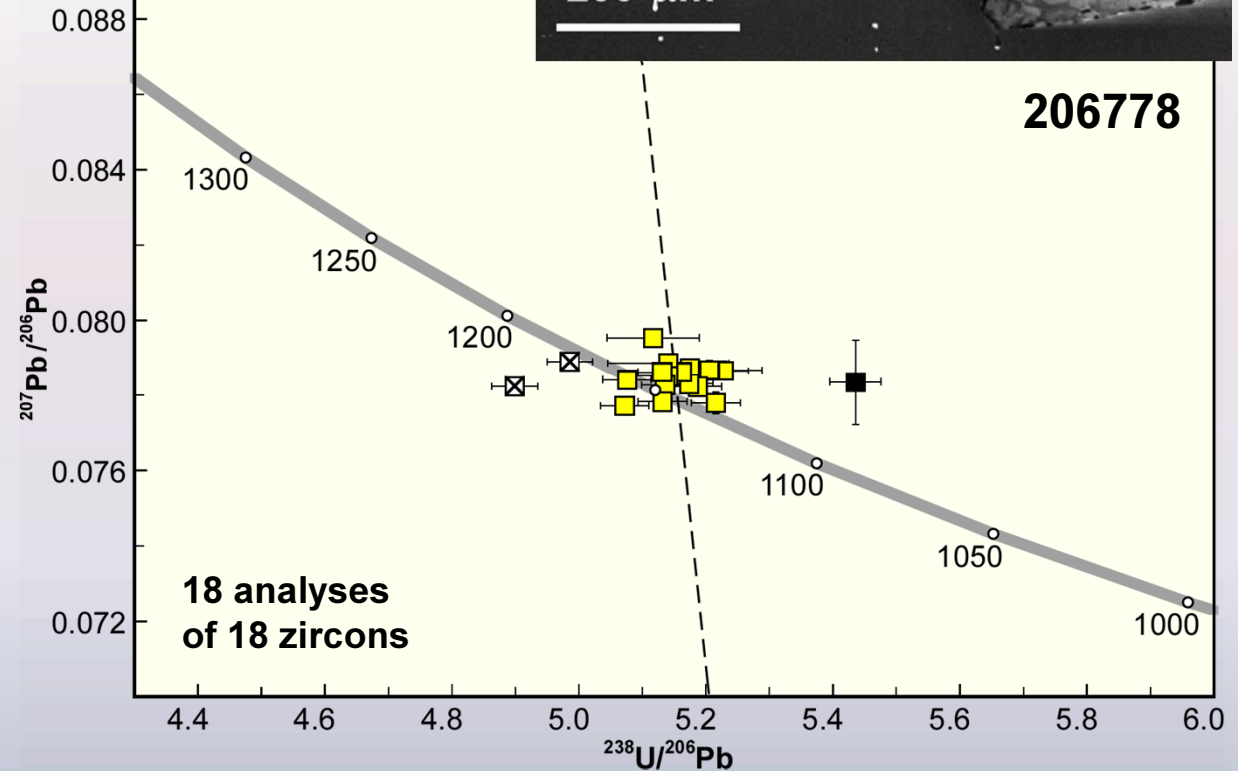
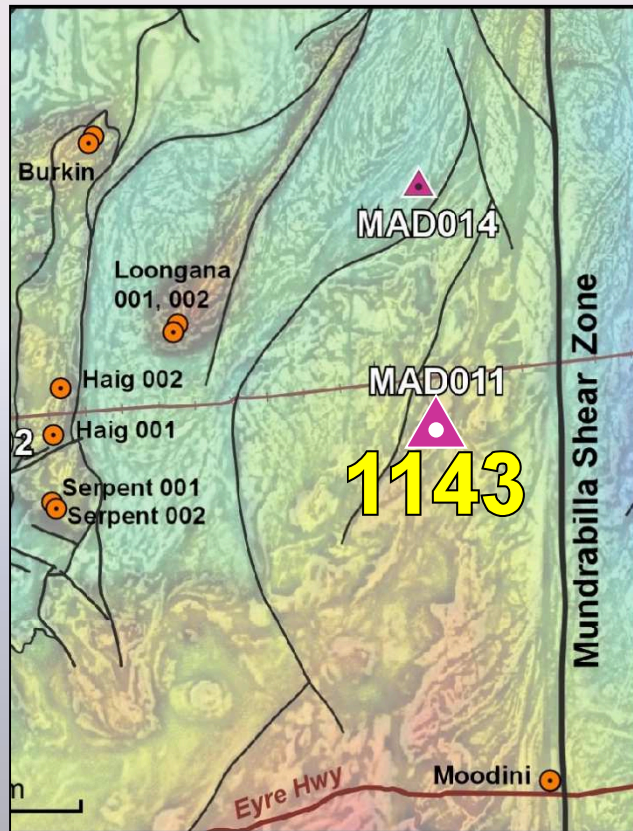
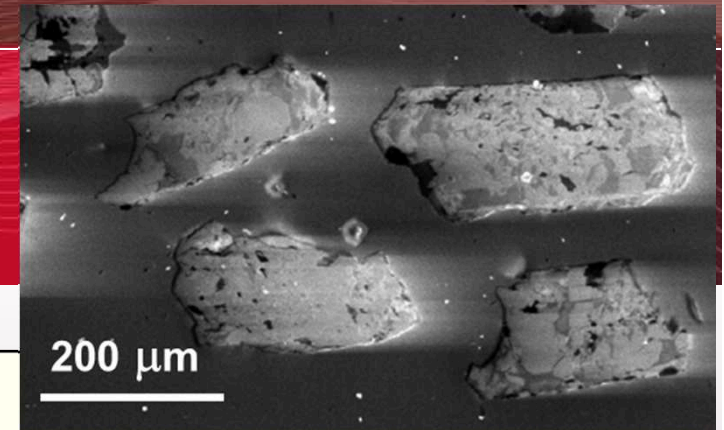
206754, plagiogranite
Haig Cave Supersuite
zoned zircons,
some with older cores



- crystallization: 1389 ± 7 Ma
- inheritance: c. 1475, 1550, 1760, 2480 Ma

MAD011, 491.00 – 491.92 m

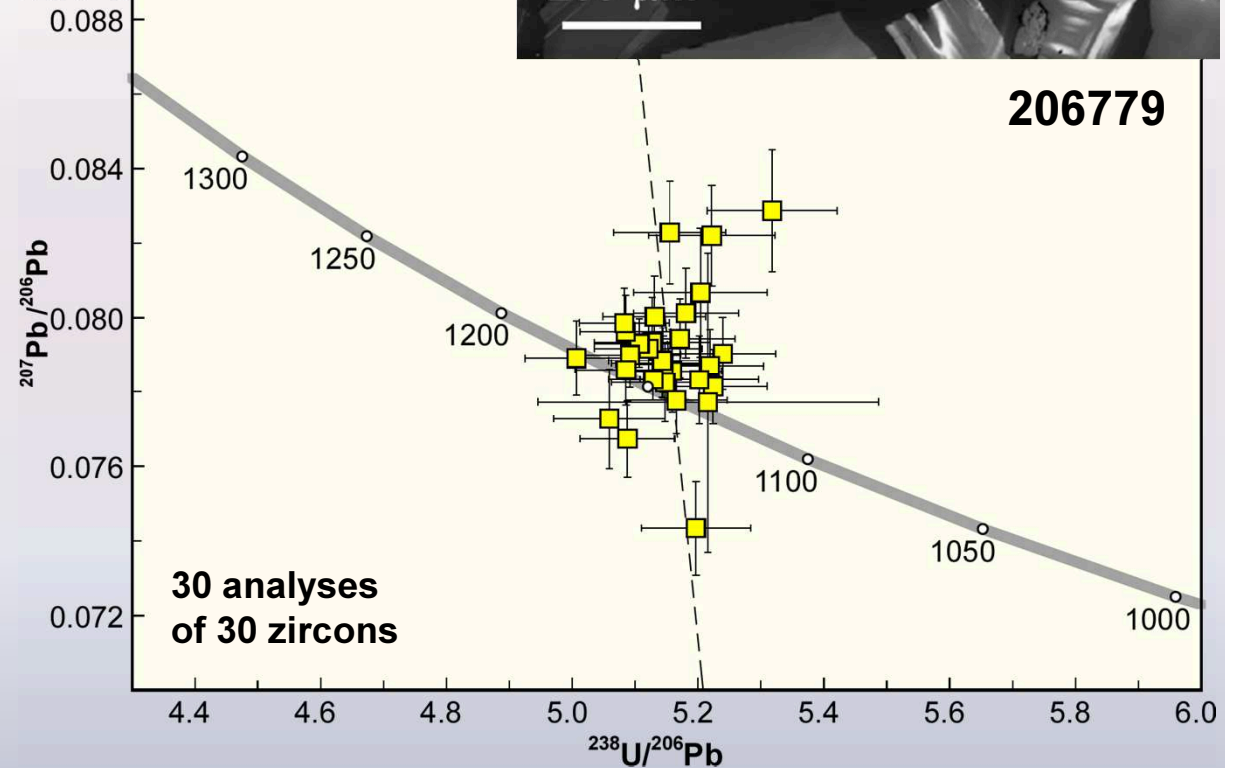
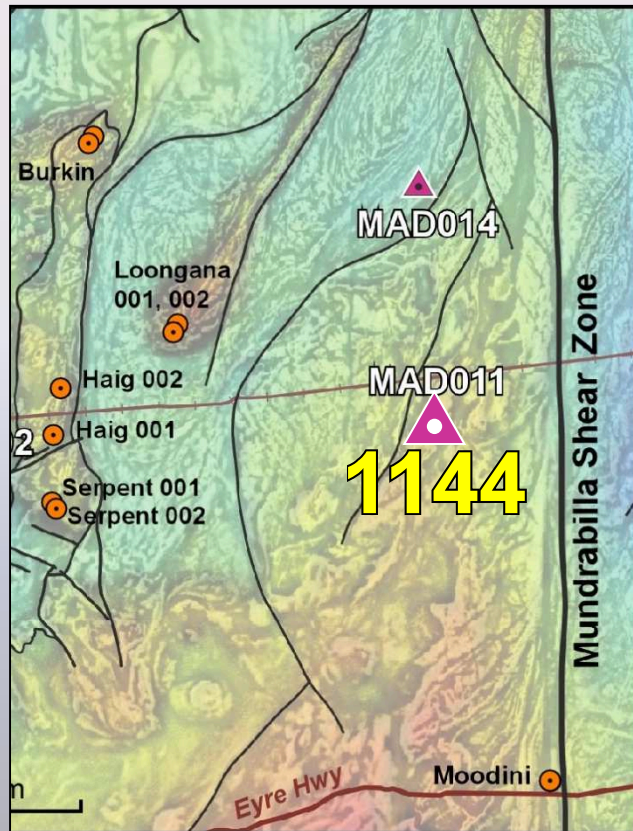
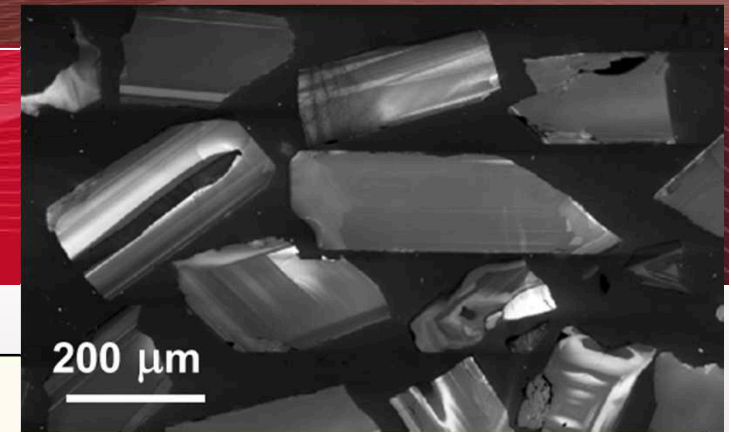
206778: c/g monzogabbro
Moodini Supersuite
high-U metamict zircons



- **crystallization: 1143 ± 5 Ma**
- **outliers reflect analytical effects & Pb loss**

MAD011, 562.01 – 562.32 m

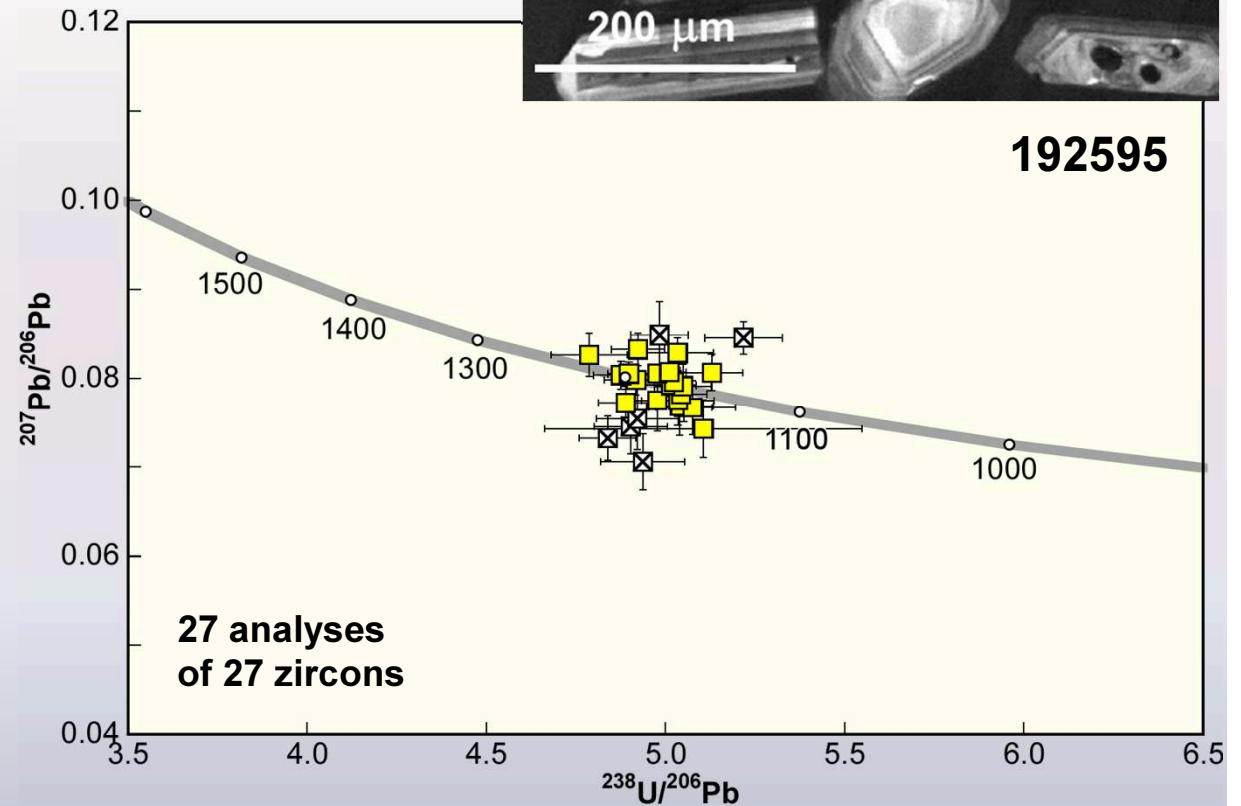
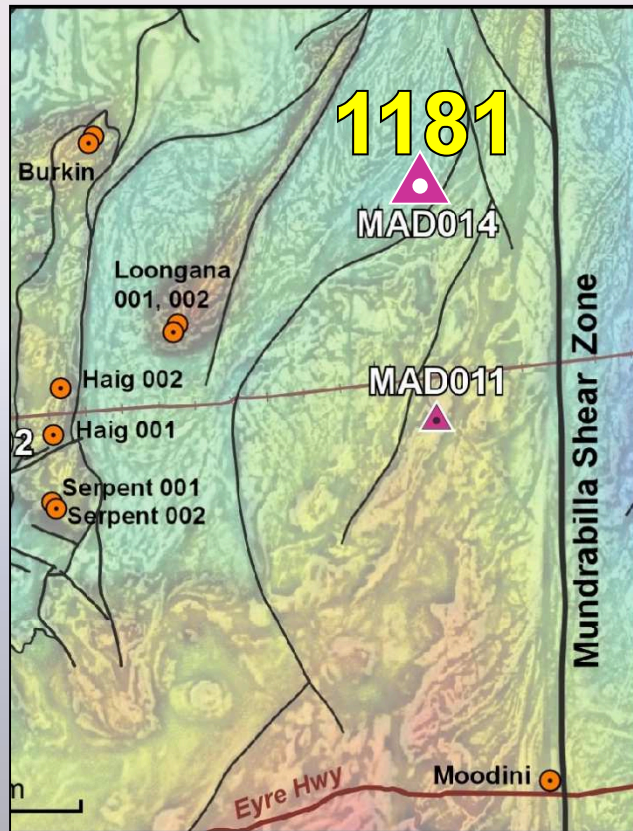
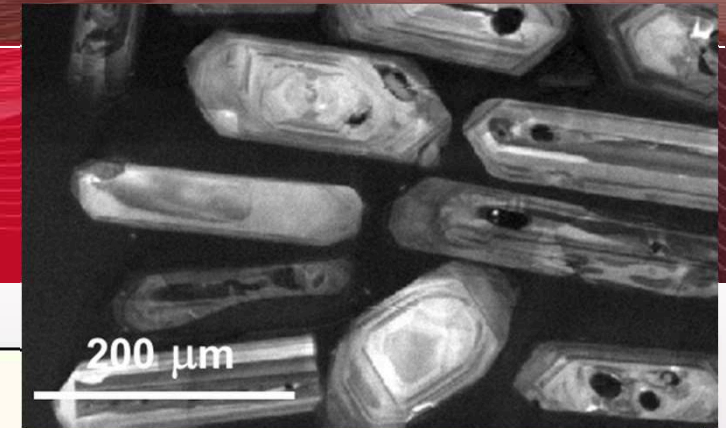
206779: m/g monzogabbro
Moodini Supersuite
low-U zircons, high Th/U



- crystallization: 1144 ± 7 Ma

MAD014, 433.27 – 433.87 m

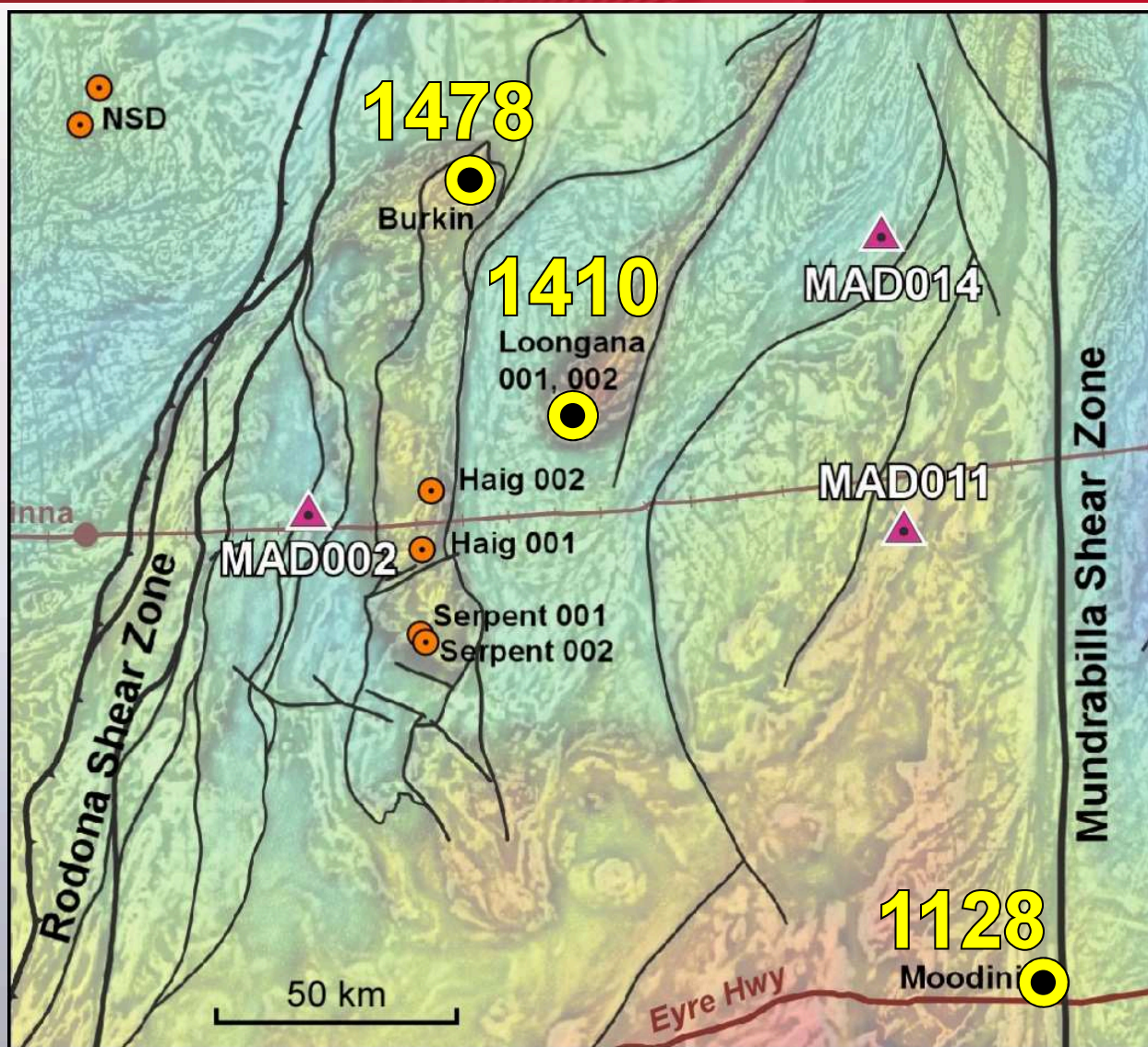
**192595: granodiorite,
Moodini Supersuite
euhedral zoned zircons
low-U**



- **crystallization: 1181 ± 7 Ma**
- **7 slightly discordant analyses discarded**



Previous geochronology



Burkin

leucosome in gneiss
magmatism(?) 1478 ± 4 Ma
inheritance 2408–2293,
 1538 ± 17 Ma

Loongana

Haig Cave Supersuite

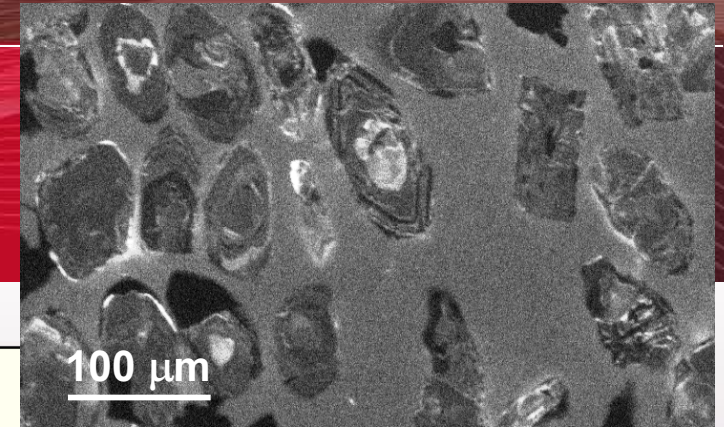
metagabbro 1403 ± 6 Ma
tonalitic gneiss 1407 ± 6 Ma
metatonalite 1408 ± 7 Ma
tonalitic gneiss 1411 ± 6 Ma
amphibolite 1415 ± 7 Ma

Moodini

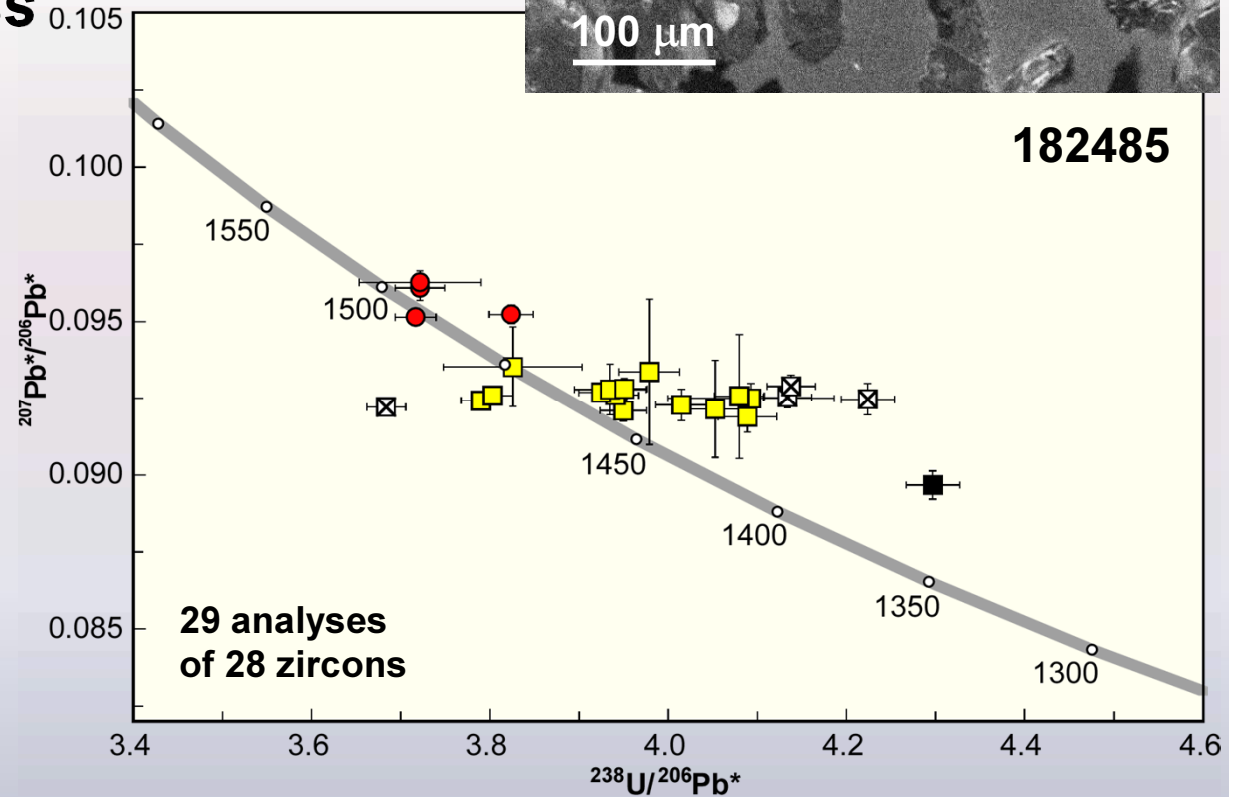
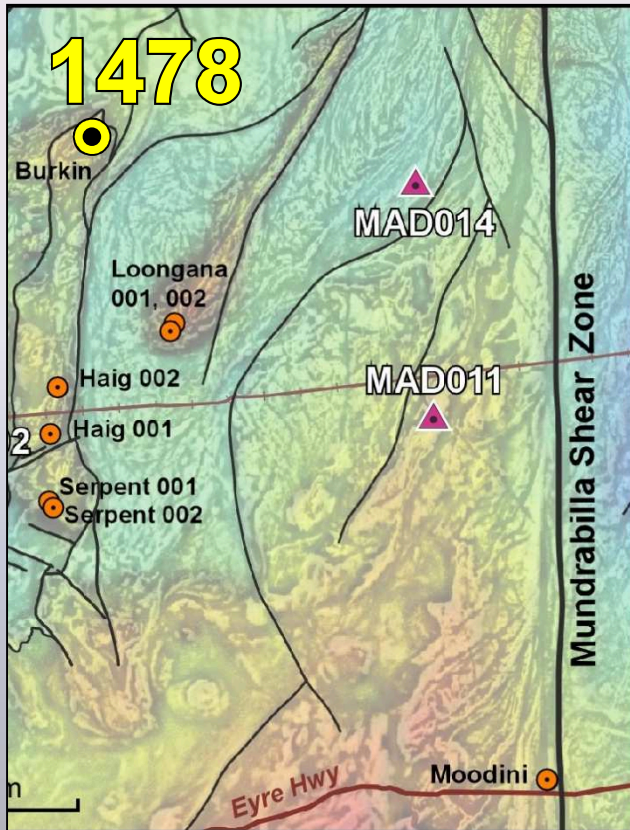
Moodini Supersuite

metagranite 1125 ± 7 Ma
metagranite 1132 ± 9 Ma

BKD2, 271.38 – 272.08 m



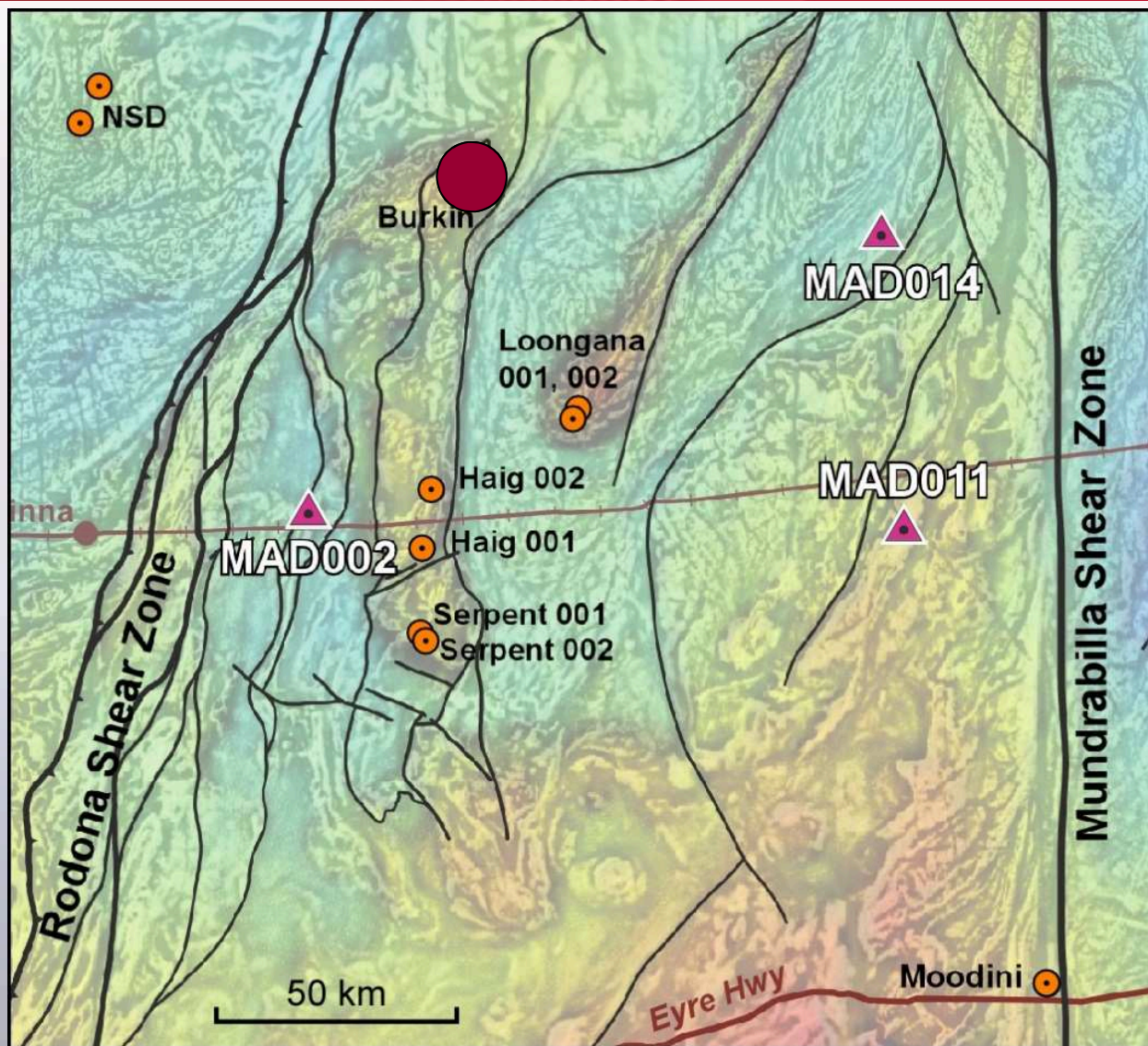
182485: granitic gneiss
zoned zircons;
some with older cores



- **crystallization: 1478 ± 4 Ma**
- **inheritance: c. 1538, 2293–2408 Ma**



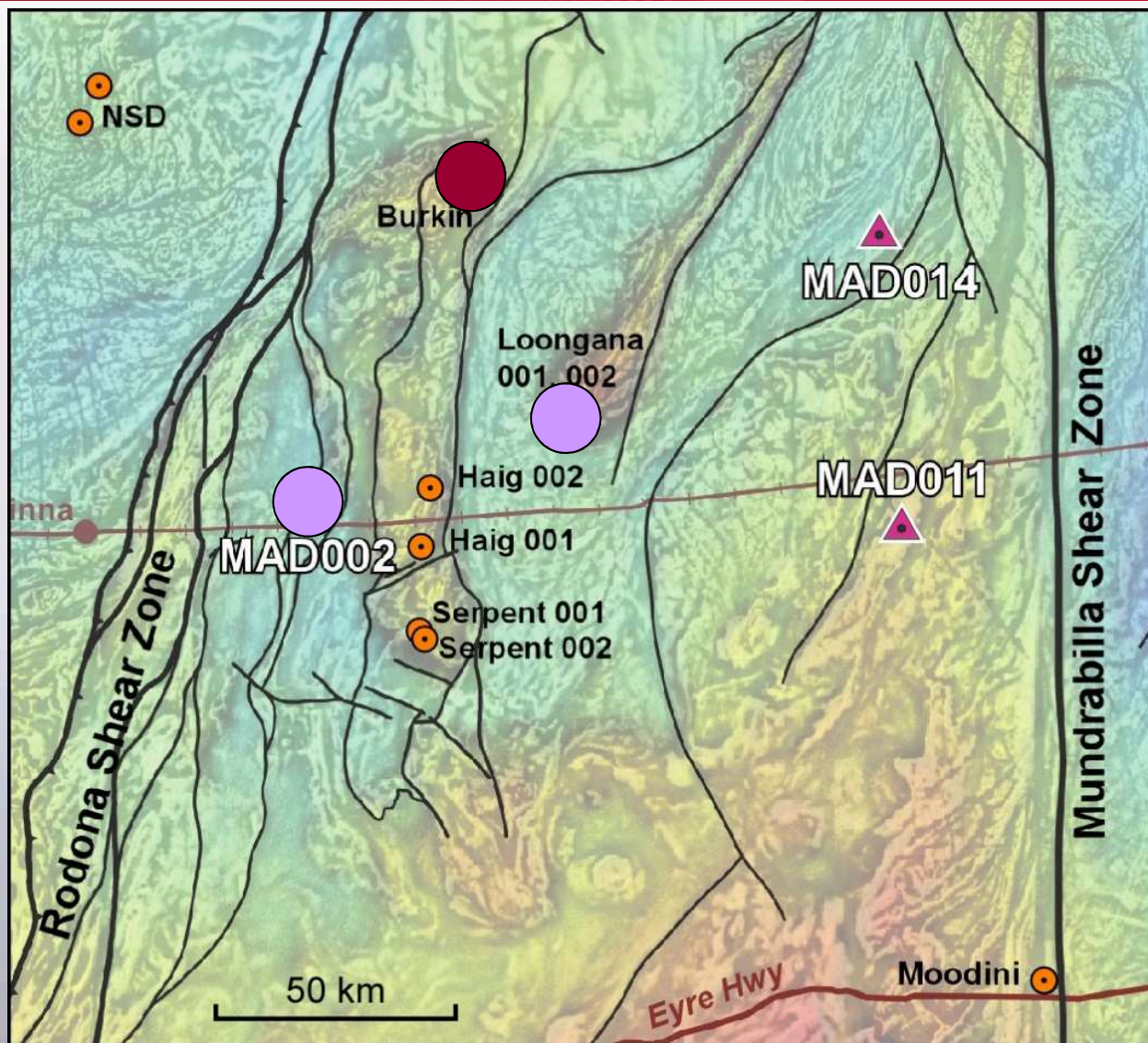
Madura Province



Burkin gneiss ●
1478 Ma



Madura Province

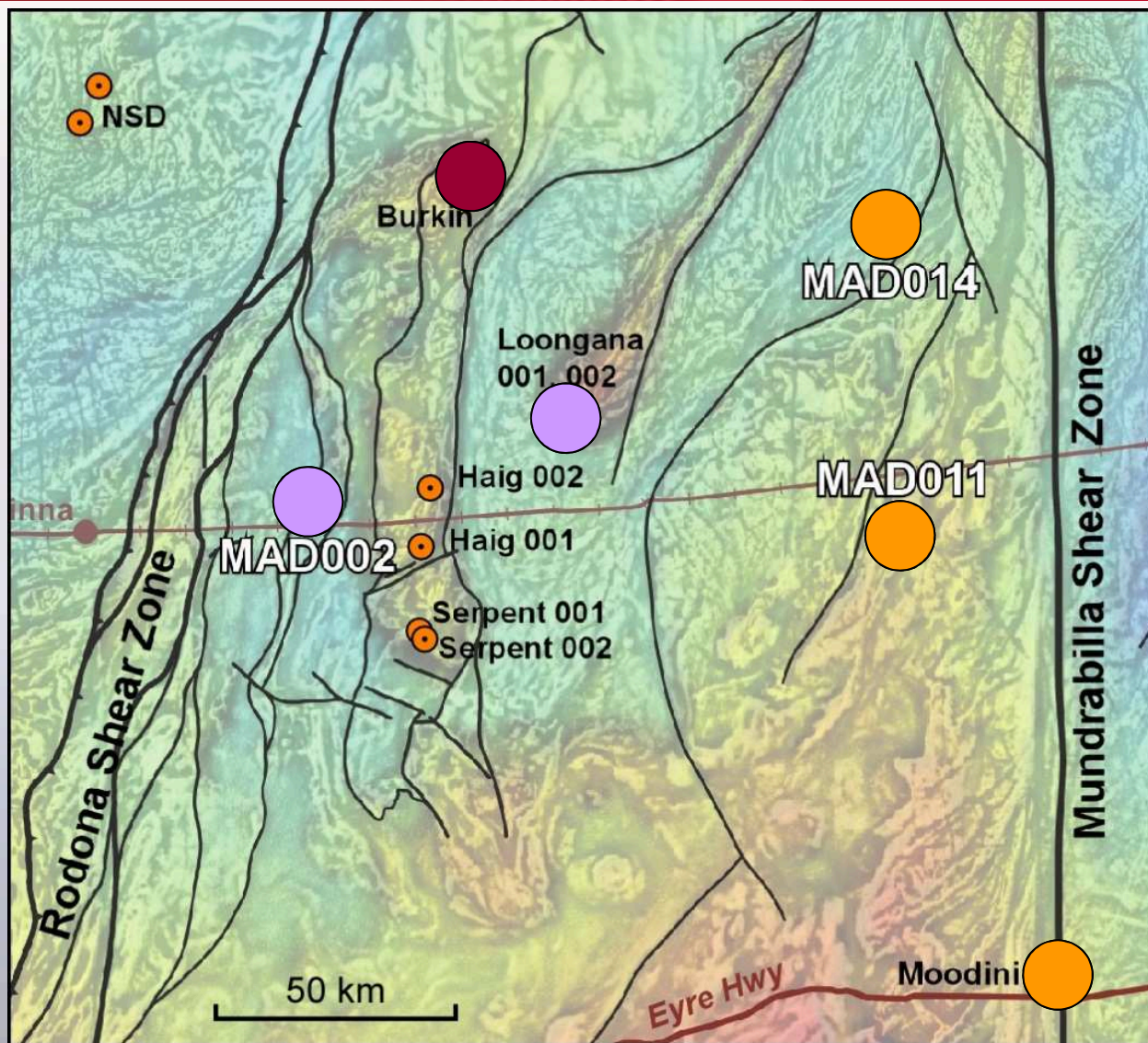





**Haig Cave
Supersuite** ●
1415–1389 Ma
(6 samples)

Burkin gneiss ●
1478 Ma



Madura Province



- Moodini Supersuite** 1181–1125 Ma (5 samples) 
- Haig Cave Supersuite** 1415–1389 Ma (6 samples) 
- Burkin gneiss** 1478 Ma 



Comparison with Albany–Fraser Orogen

Moodini Supersuite

1181–1125 Ma

Esperance Supersuite

1200–1140 Ma

Haig Cave Supersuite

1415–1389 Ma

Burkin gneiss

1478 Ma

Detrital zircons in

Arid Basin

