

Stable Isotope Studies at Wisc-SIMS

Analyzed: Isotopes: Li, C, $^{16,17,18}\text{O}$, Mg, Si, S, Fe, Br
Trace elements, H

Planned: Isotopes: H, B, N, Cl, Ca

John W. Valley

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Noriko Kita

Takayuki Ushikubo

Reinhard Kozdon

Aaron Cavosie

Zeb Page

Mike Spicuzza

Philipp Heck

Ian Orland

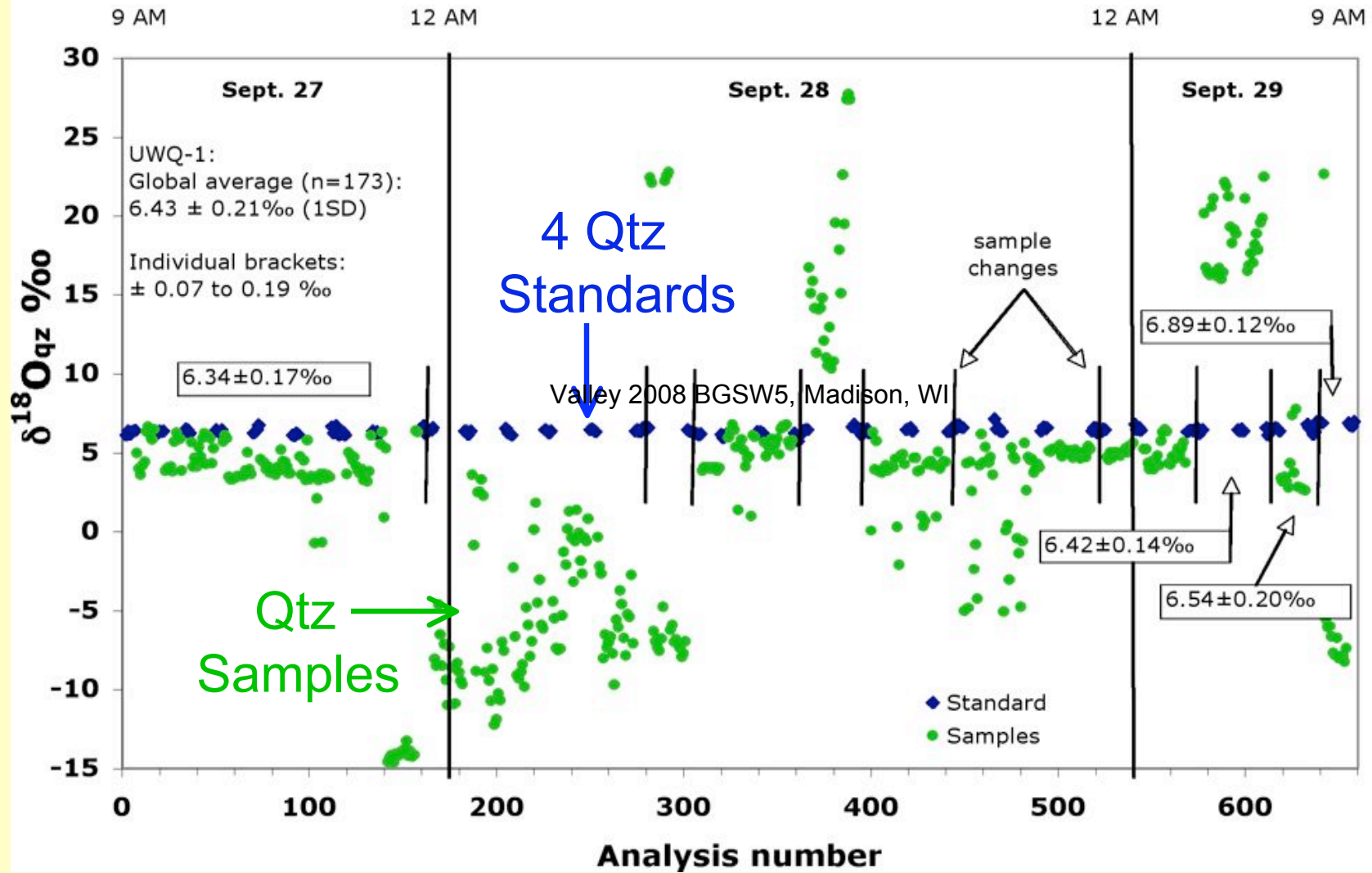
Bin Fu

Jim Kern



Valley 2008 BGSW5, Madison, WI

Sept 27-29, 2006: 48hours, 658 analyses, Quartz



Average Precision = $\pm 0.13\text{‰}$ 1SD

1SE = $\pm 0.02\text{‰}$ N=173

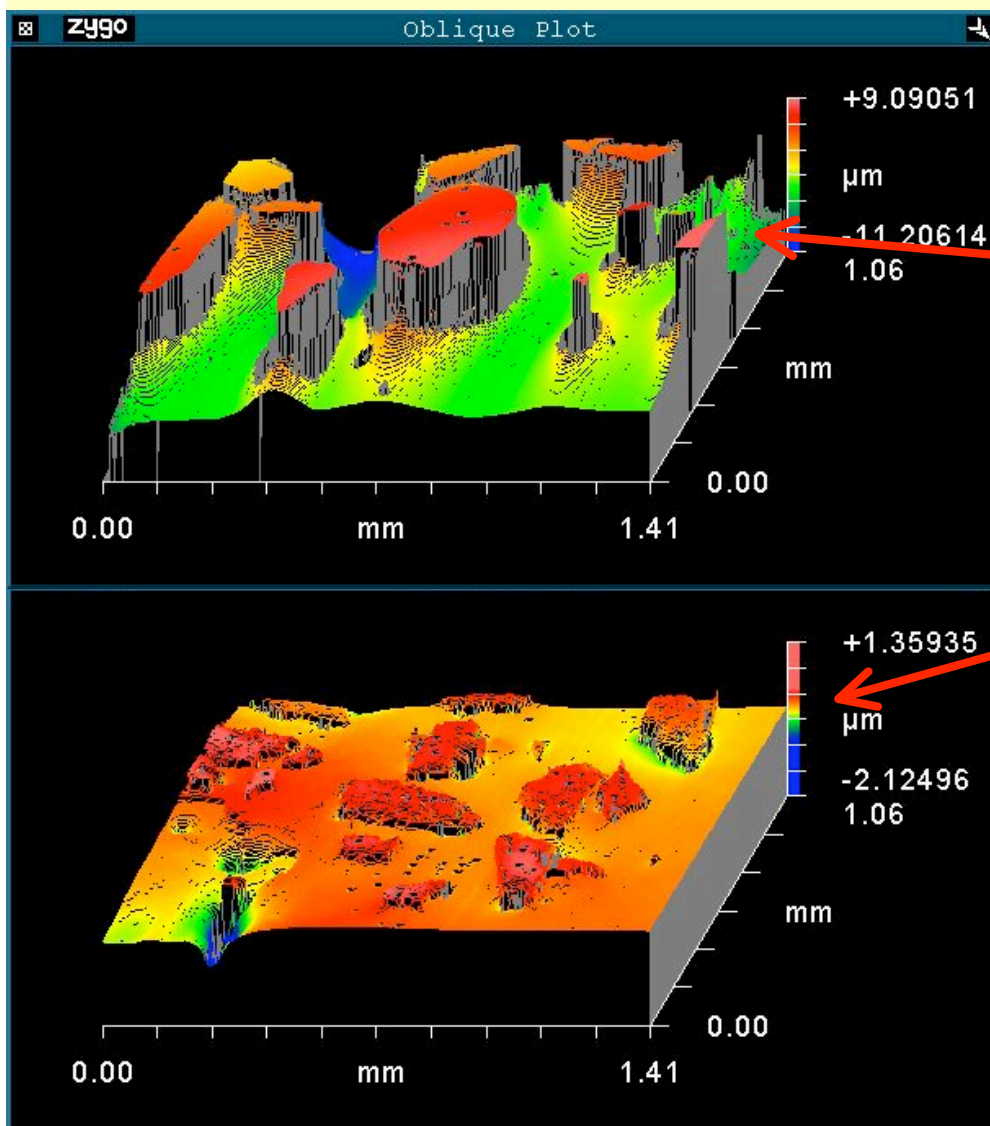
Rusk et al. 2007



Valley 2008 BGSW5, Madison, WI

Precision vs. Accuracy:

X-Y-Z effects



Zircon Standard

10 μm relief

$$\delta^{18}\text{O} = 6.47 \pm 0.39\text{‰}$$

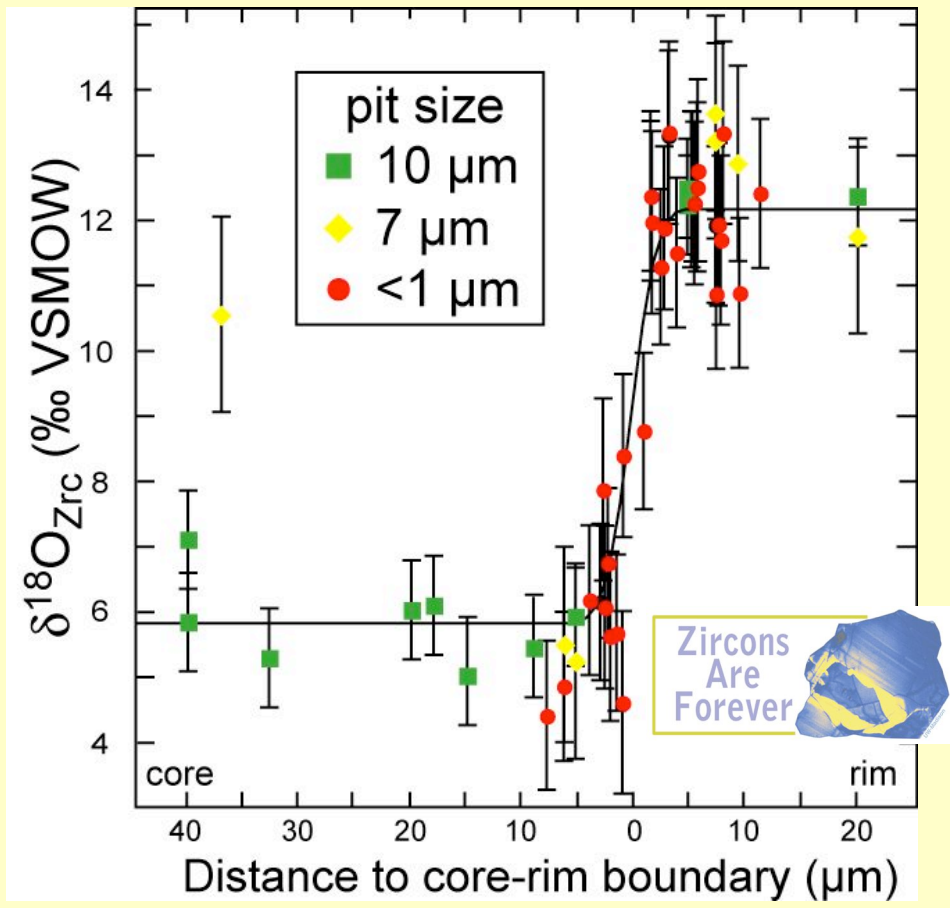
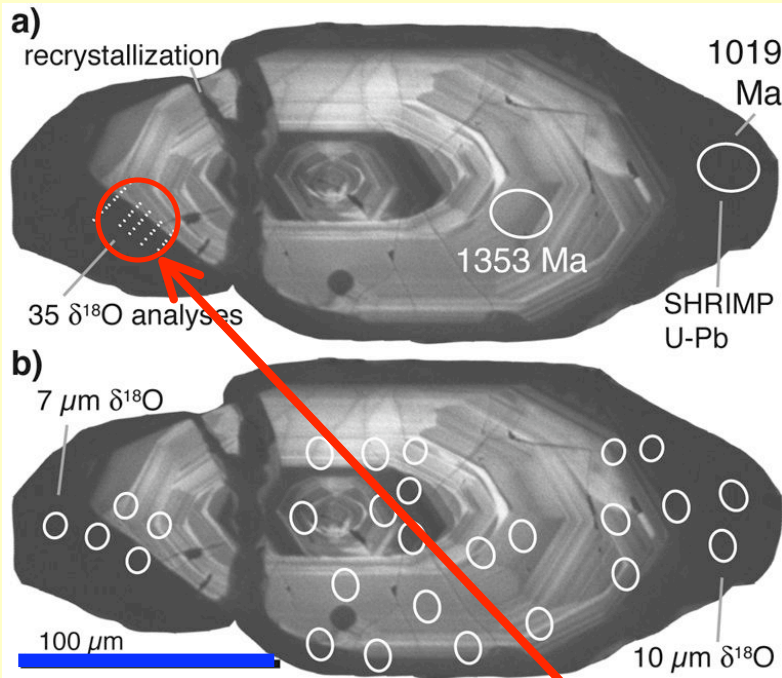
0.4 μm relief

$$\delta^{18}\text{O} = 6.84 \pm 0.12\text{‰}$$





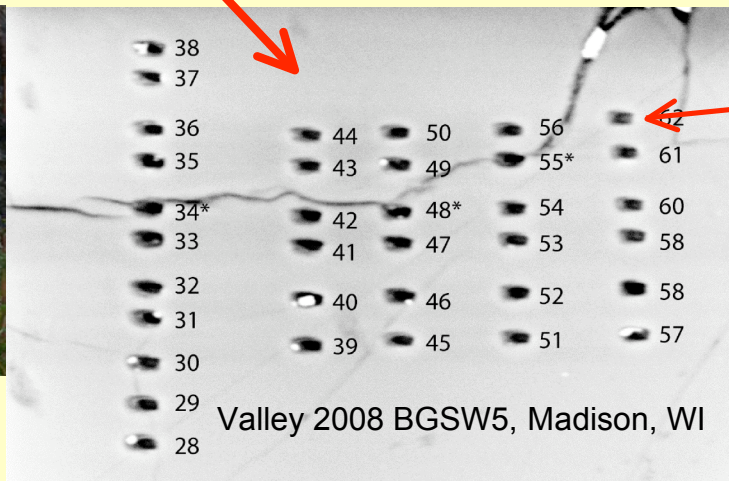
Sub-micron spot - $\delta^{18}\text{O}$



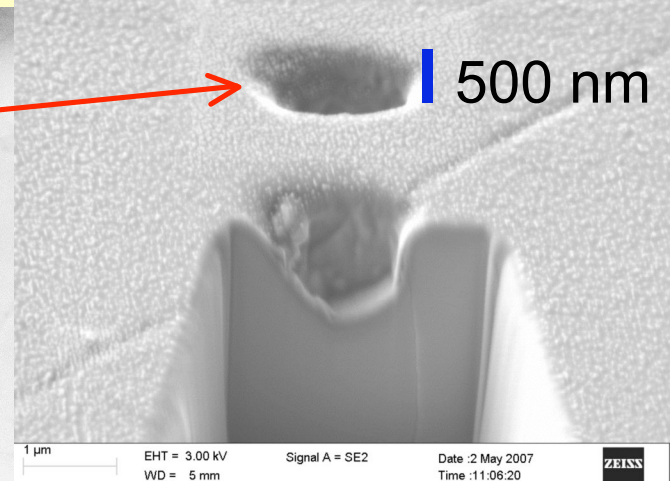
Page et al. 2007 Am. Min.



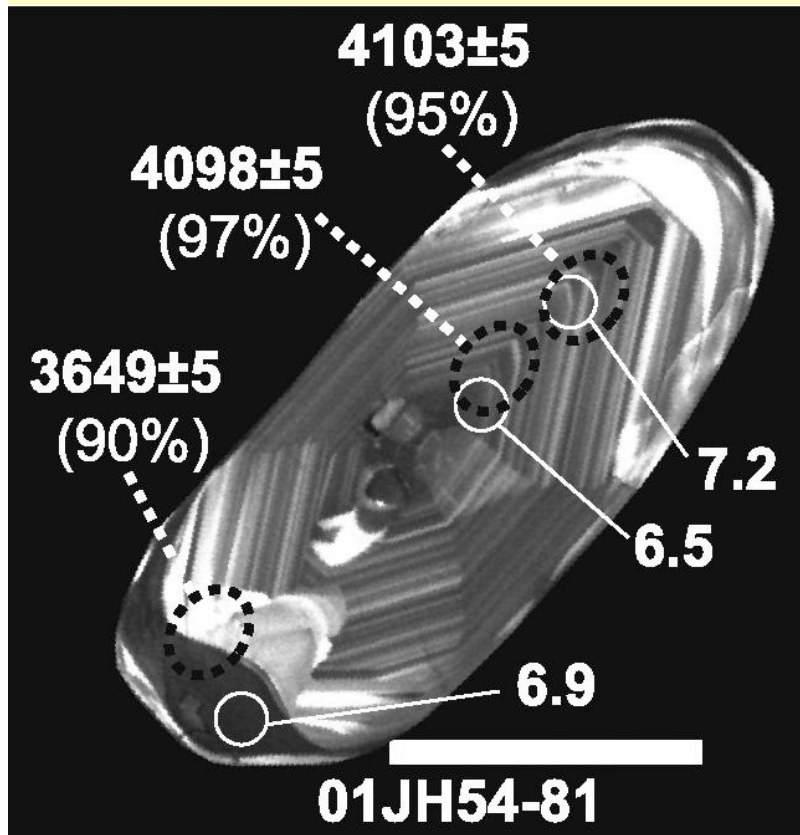
Zeb Page



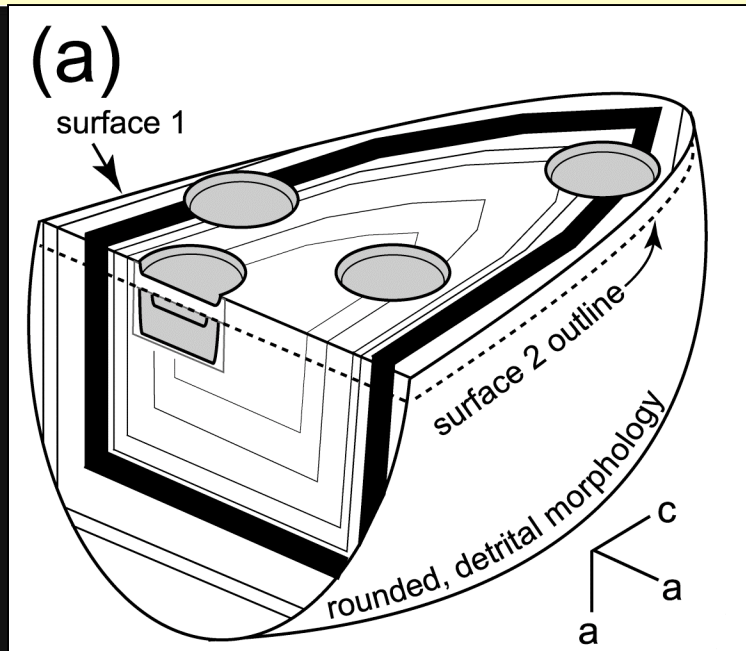
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Zircons- U/Pb, $\delta^{18}\text{O}$, $\delta^7\text{Li}$, REEs, Ti



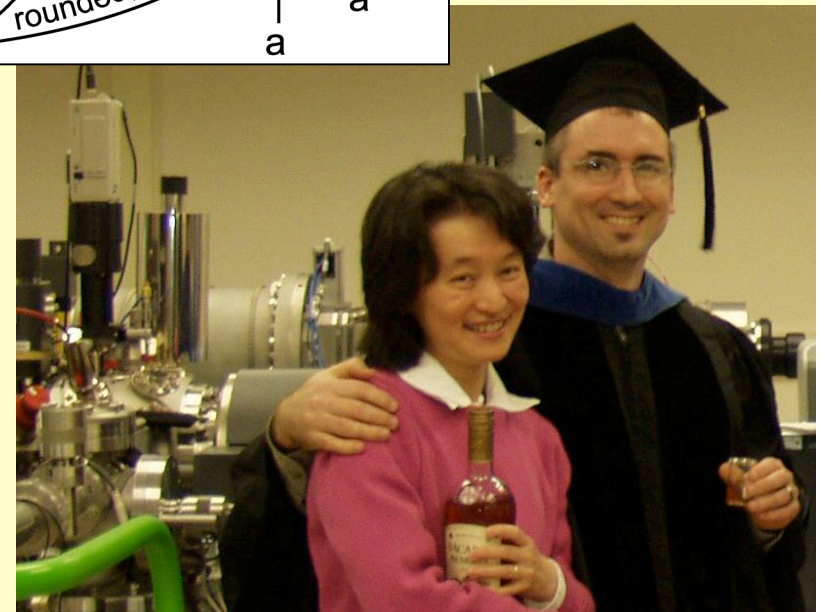
100 μm



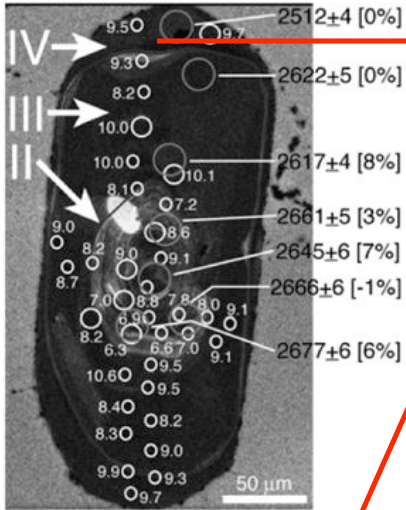
Cavosie et al. 2006 GCA

Valley 2008 BGSW5, Madison, WI

Aaron Cavosie
Noriko Kita



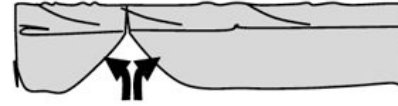
ZIRCON ZONIGRAPHIC COLUMN



Zircon Grain 6

c)

IV. Huronian rifting



III. Lower crustal metamorphism & mantle root formation



II. Arc unroofing, erosion, & sedimentation



I. Arc Genesis

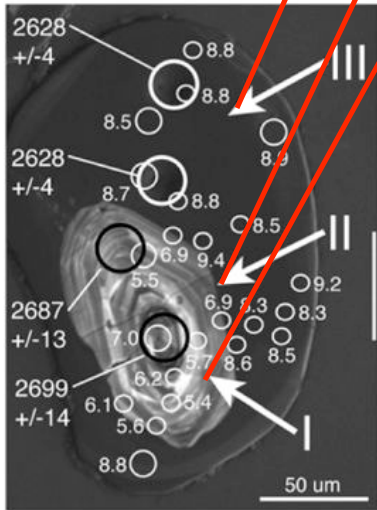


iv. <2510 Ma

iii. 2660-2580 Ma

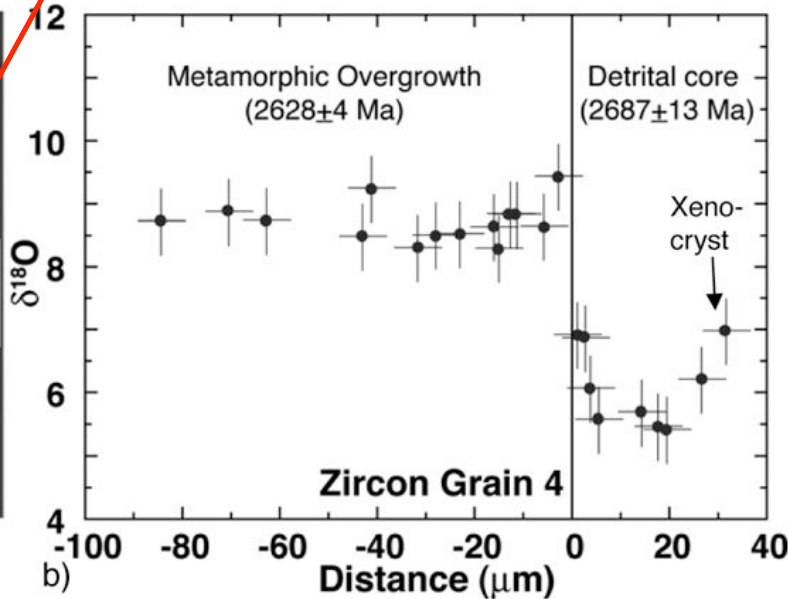
ii. 2670-2660 Ma

i. 2870-2670 Ma



Zircon Grain 4

a)



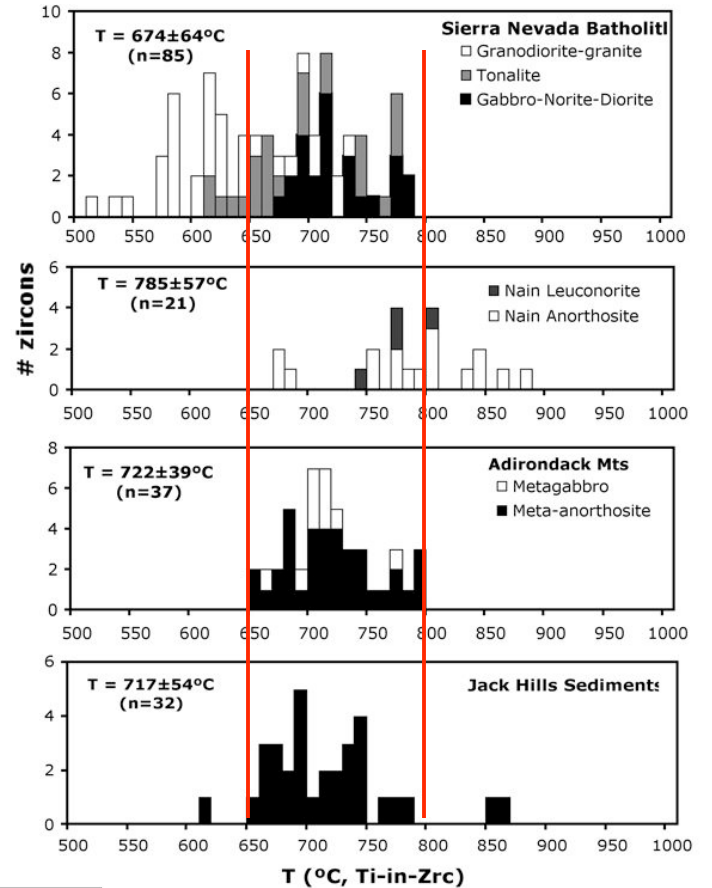
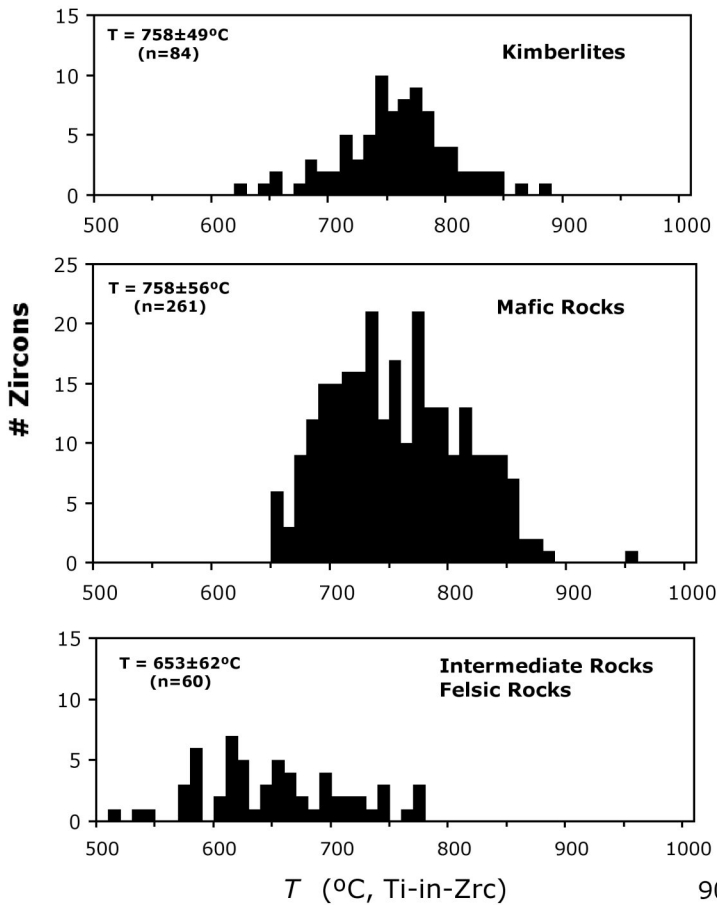
b)

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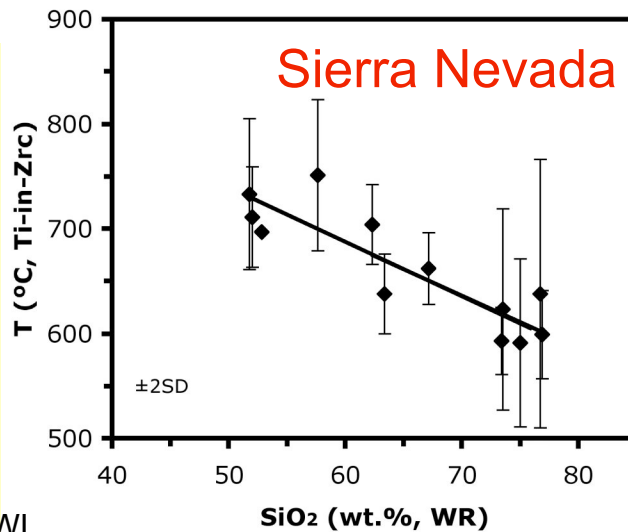
Moser et al. 2008
Geology



Ti-in-zircon



Fu et al. 2008 CMP



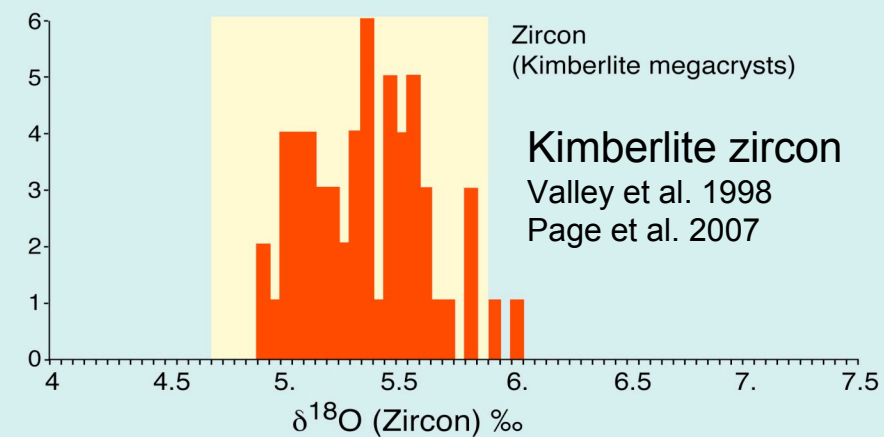
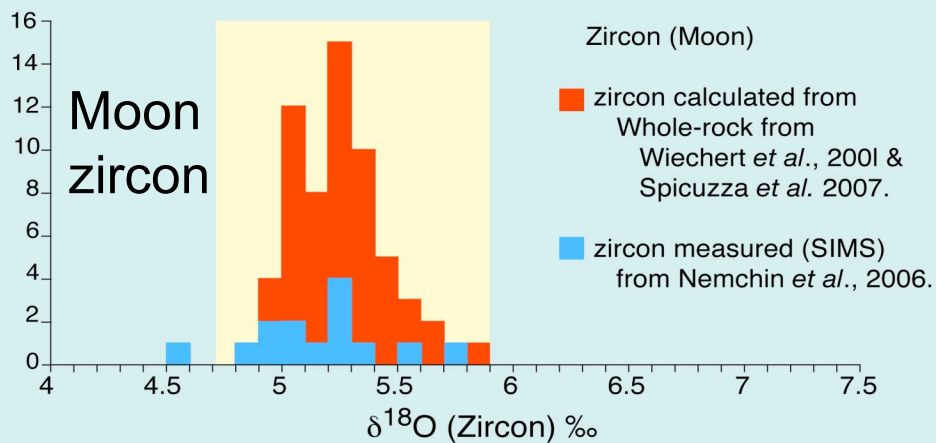
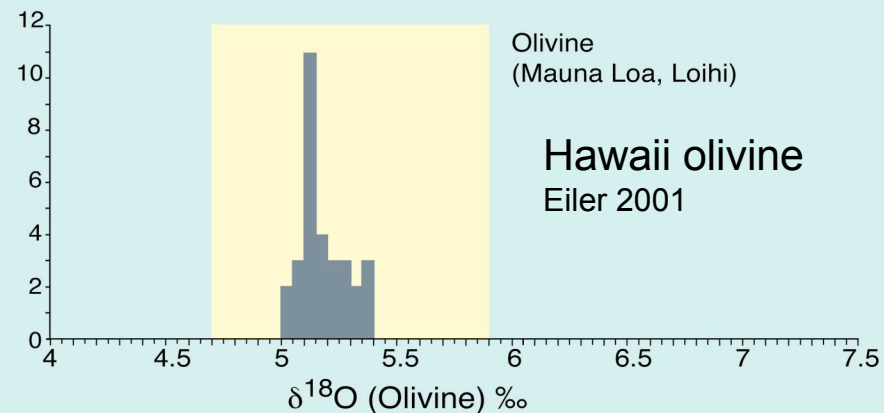
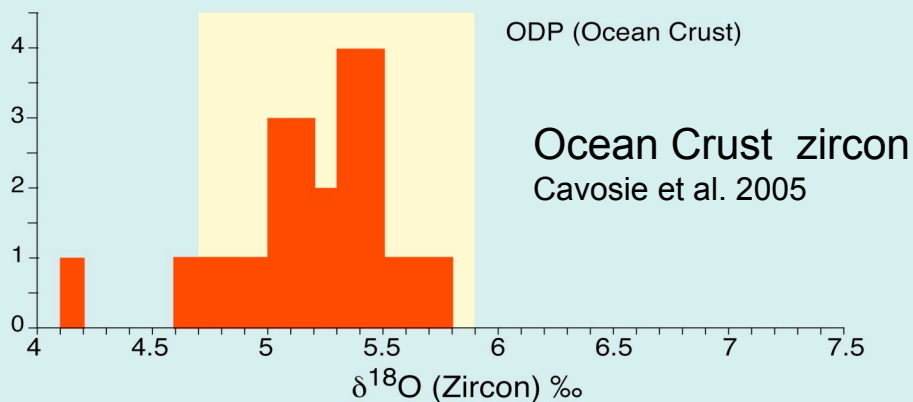
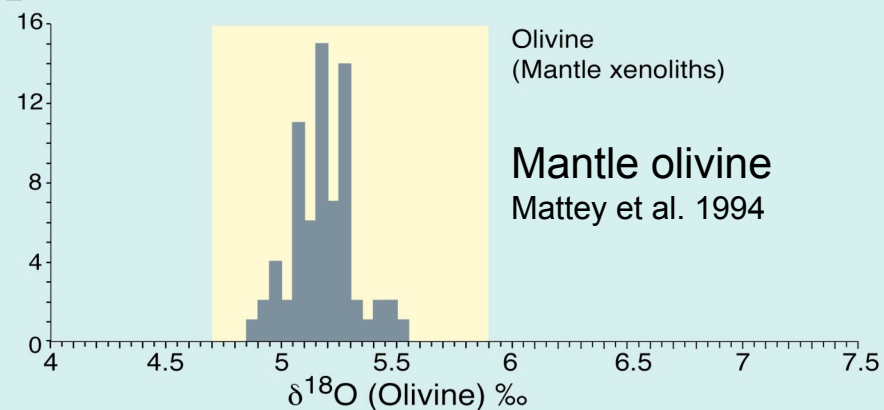
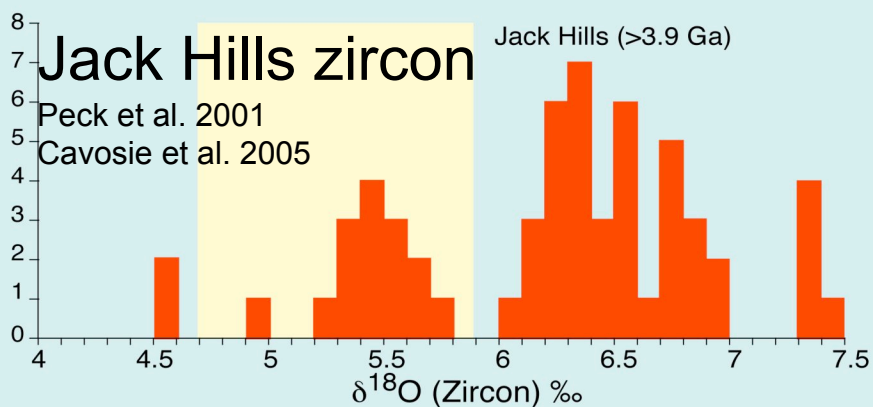
Bin Fu

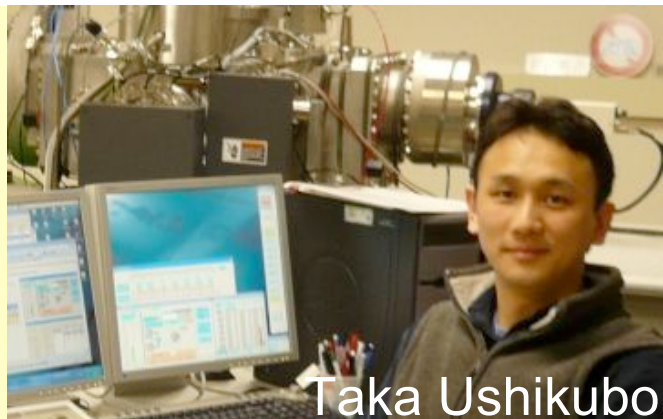


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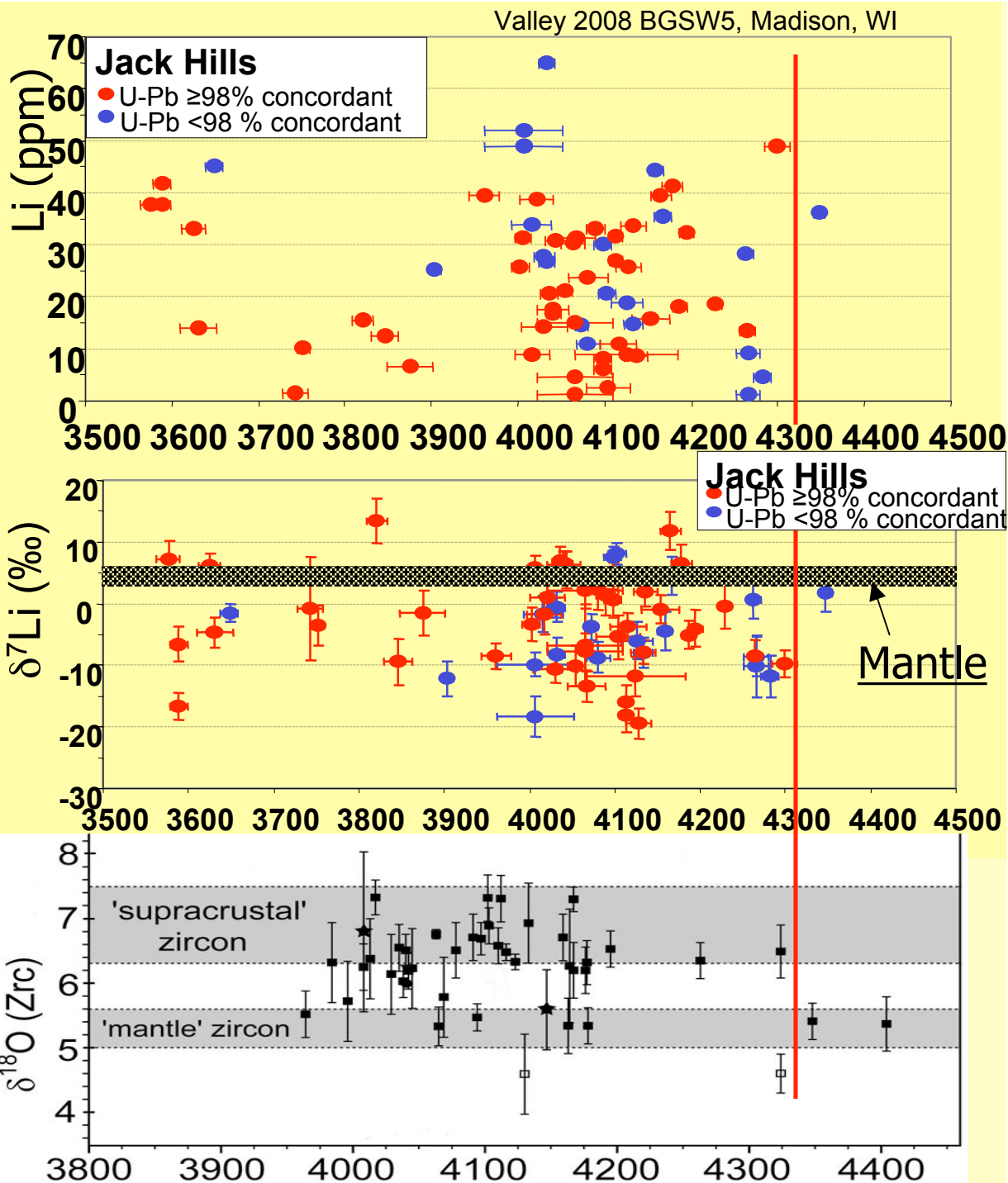
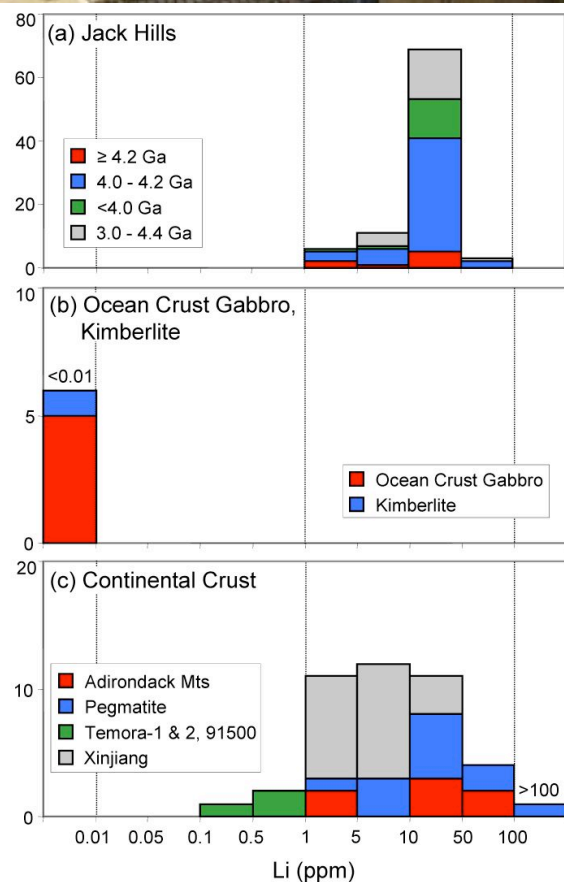
Oxygen isotope ratio

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Taka Ushikubo



Ushikubo et al.
2008 EPSL

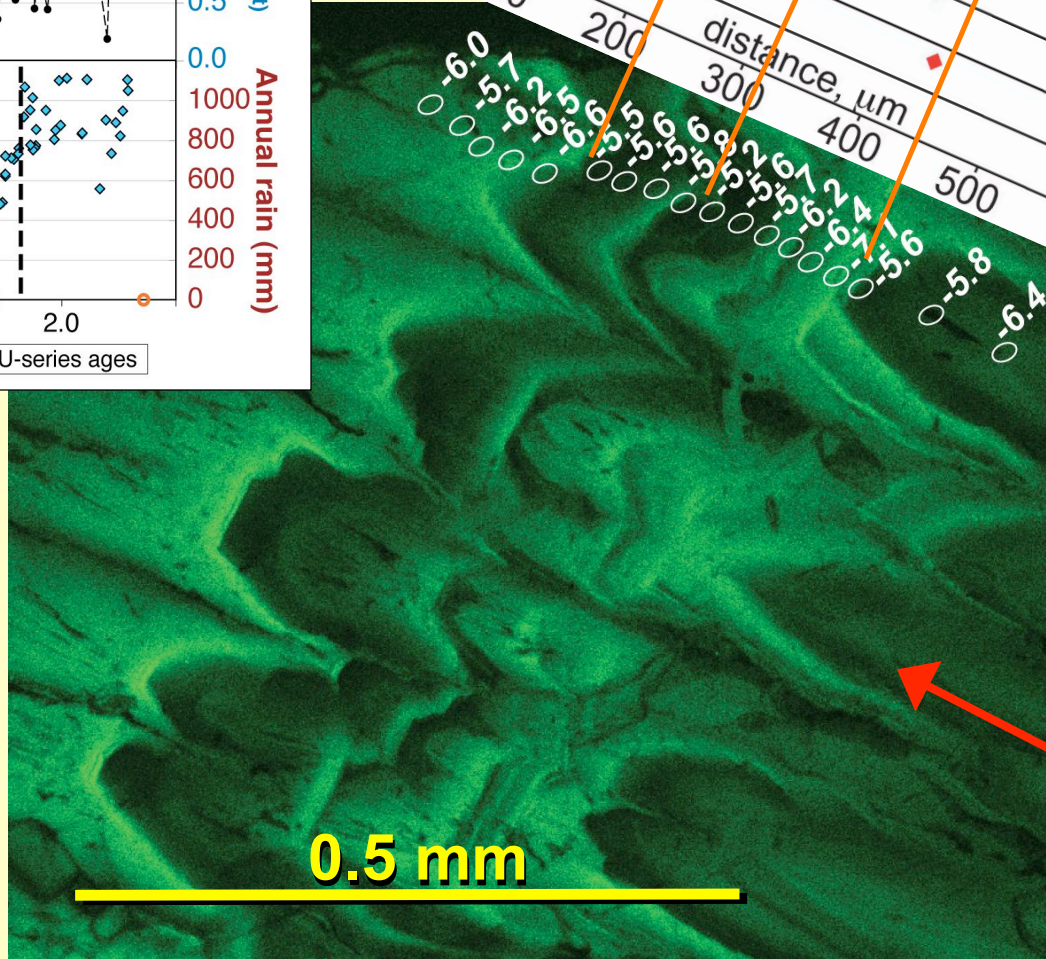
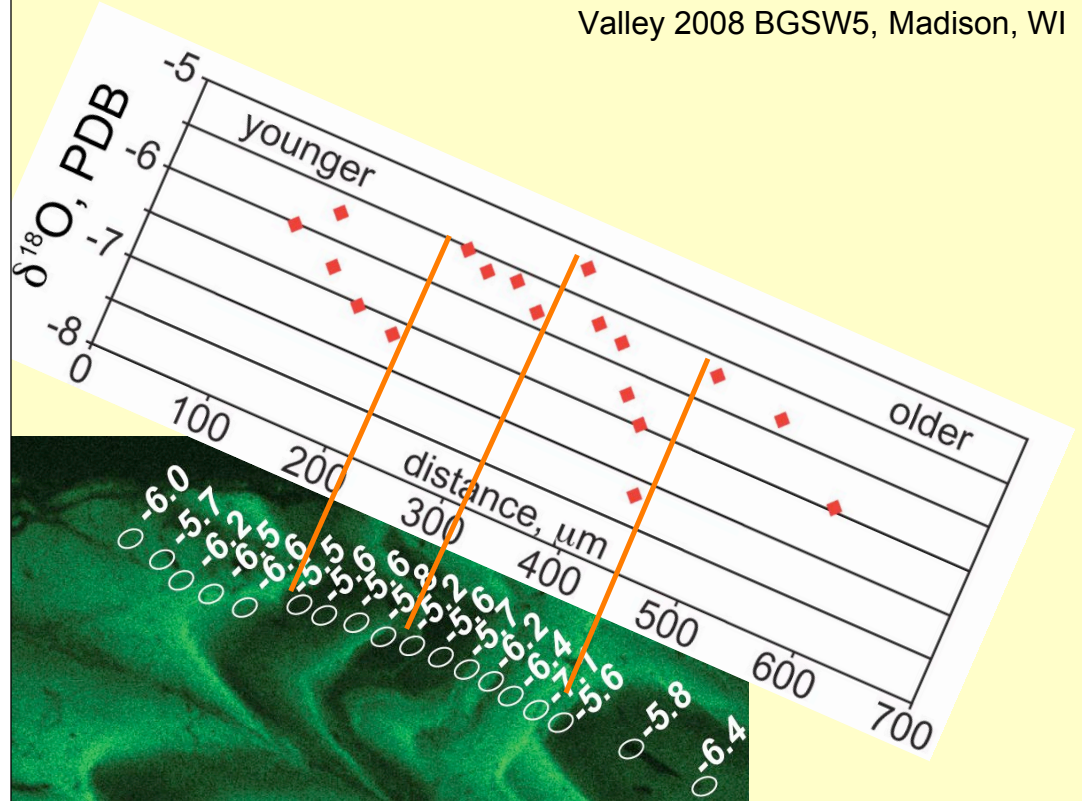
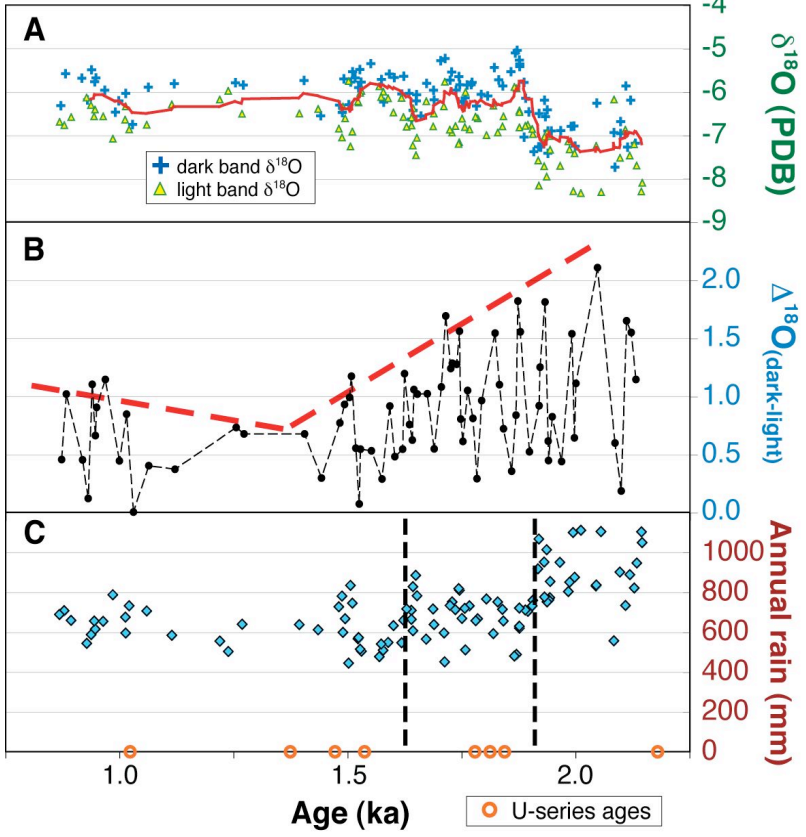
Orland, Bar-Matthews et al. 2008, Quat. Res.



Ian Orland

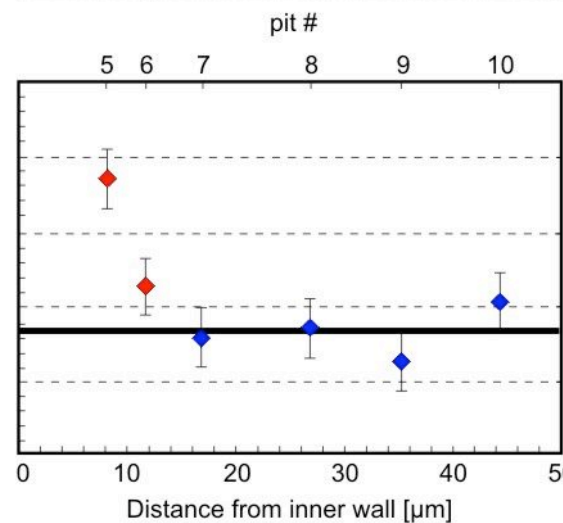
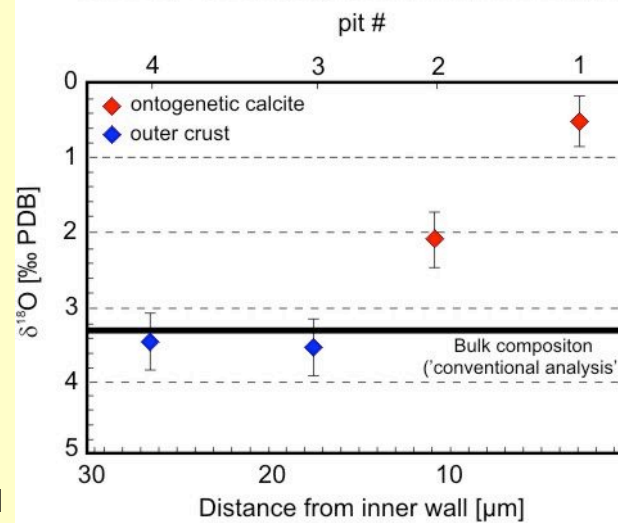
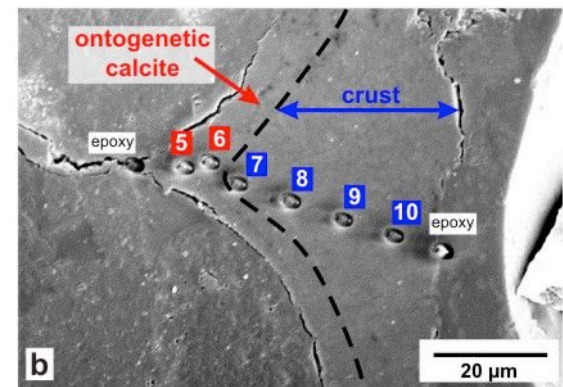
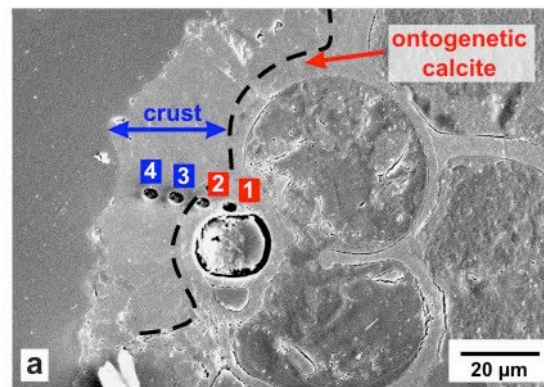
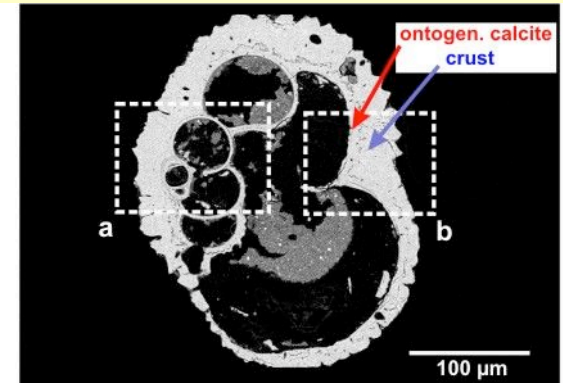
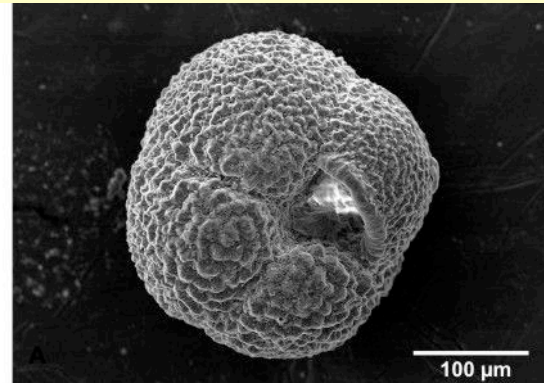
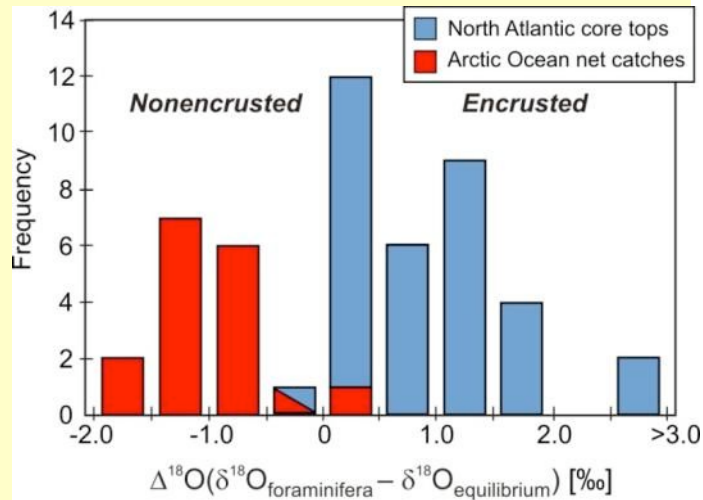


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N. pachyderma (sin.)

Core top sample, North Atlantic

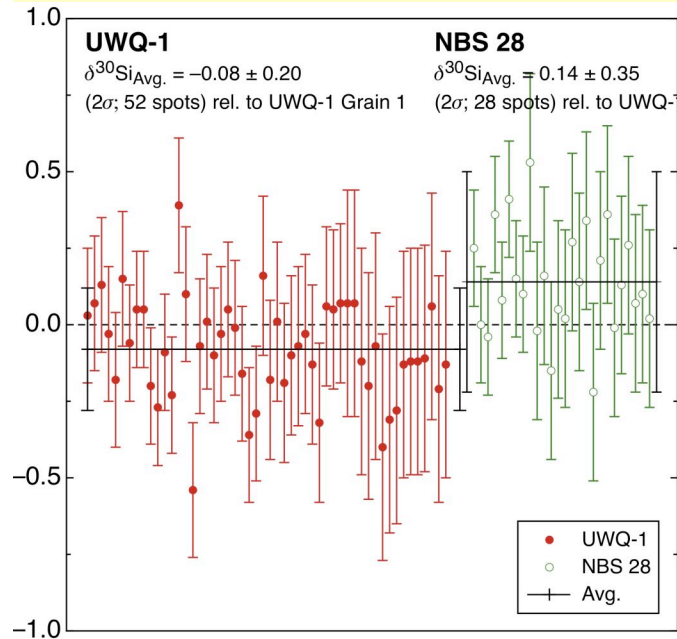
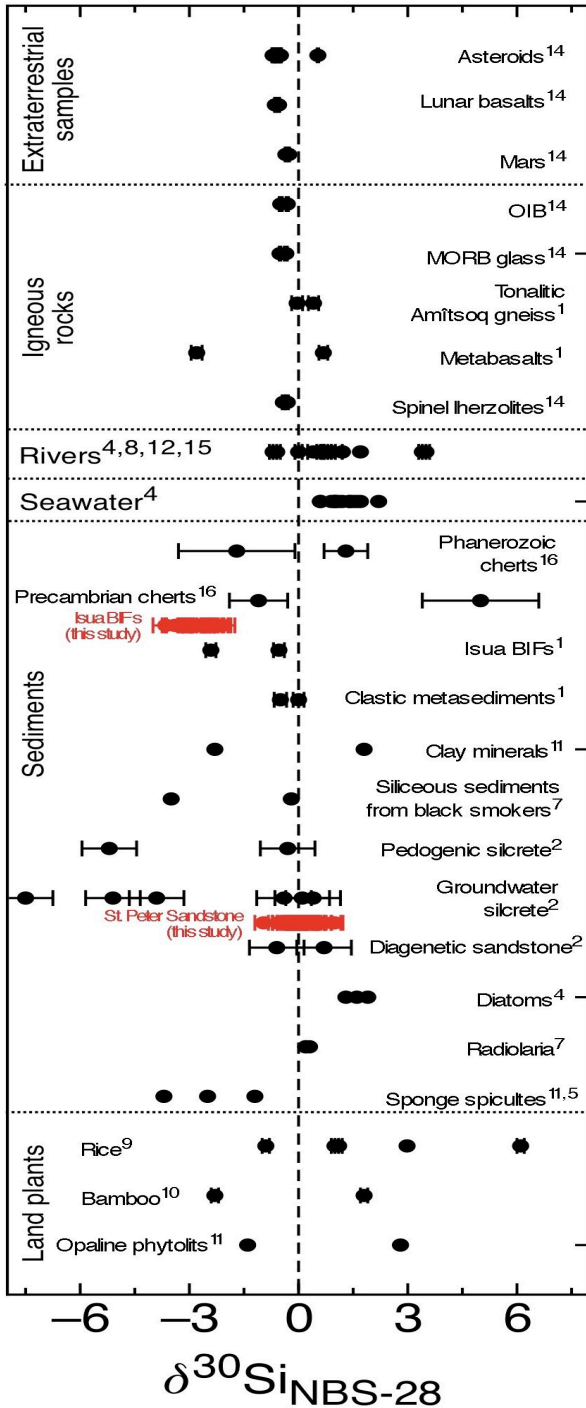


Reinhard Kozdon

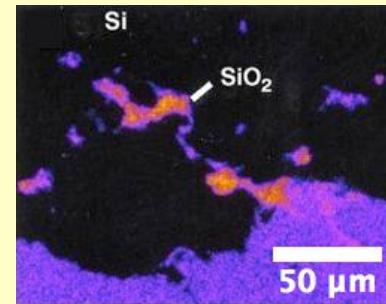


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Silicon isotopes



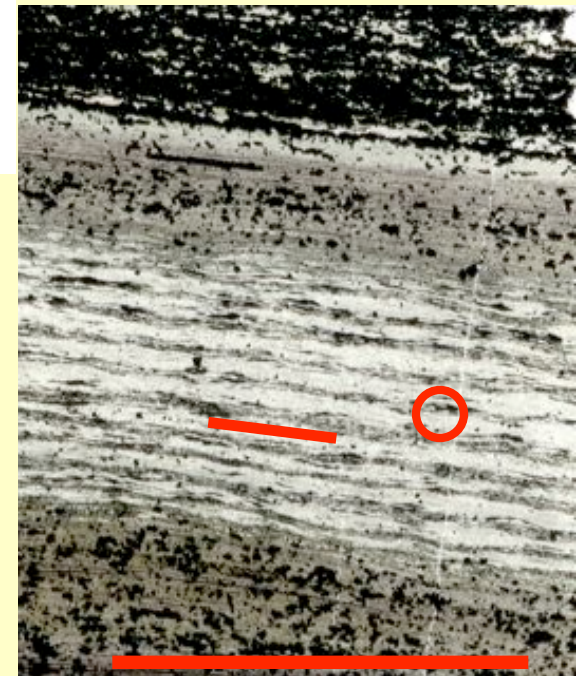
Philipp Heck



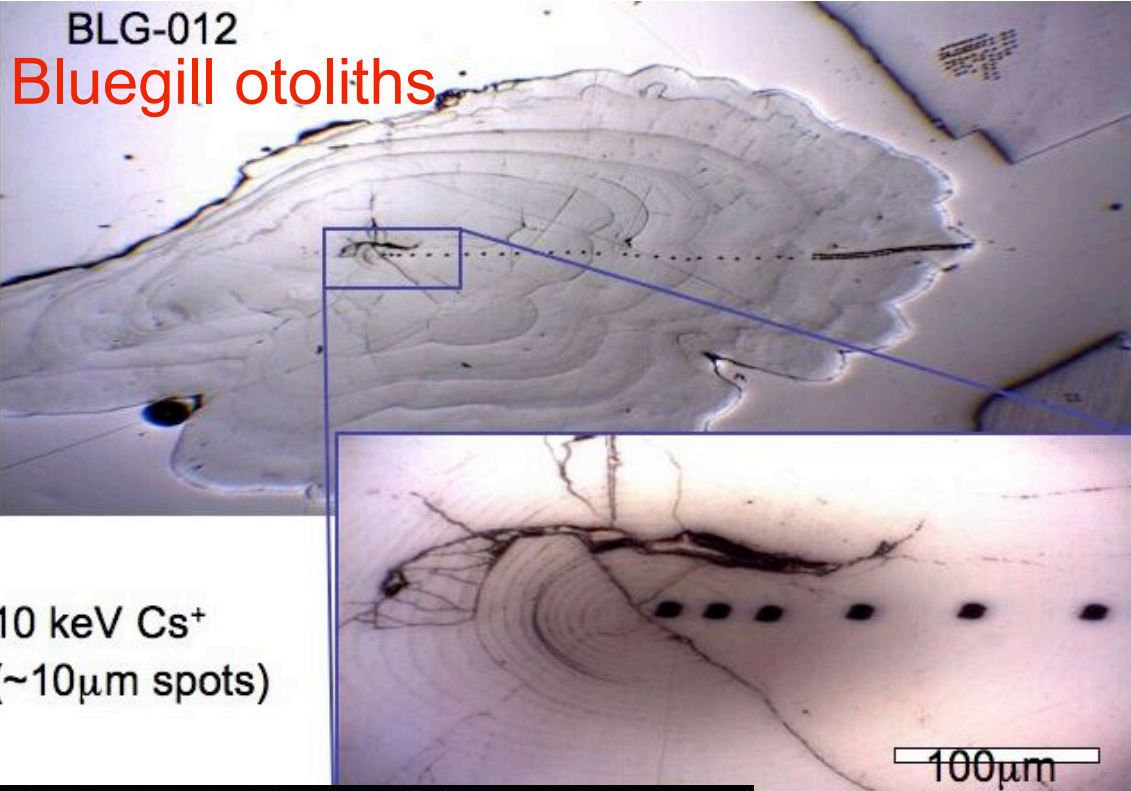
ALH84001

■ Published data

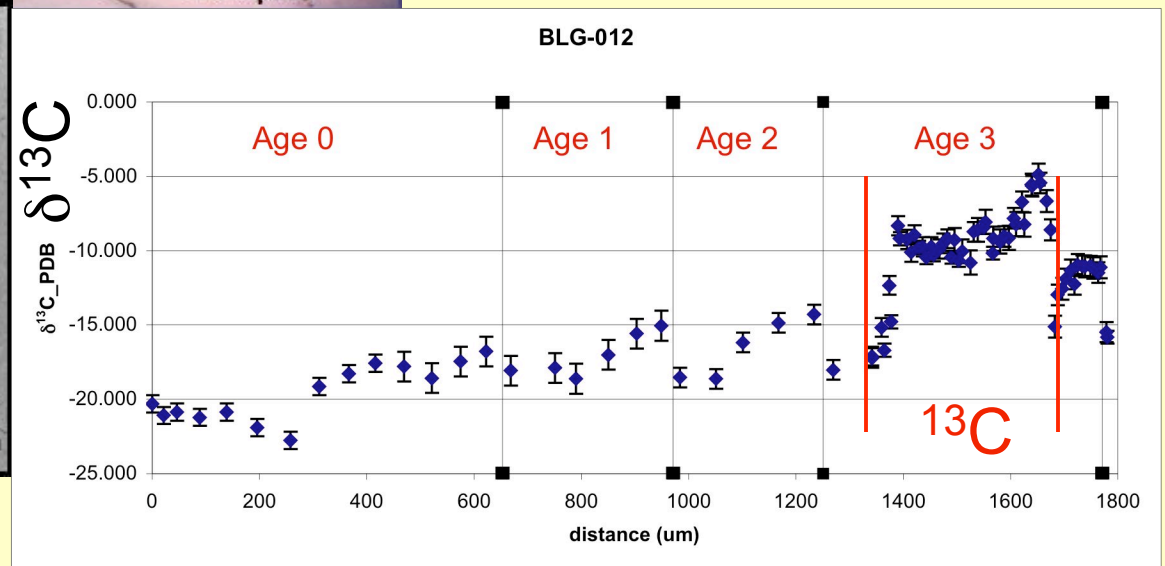
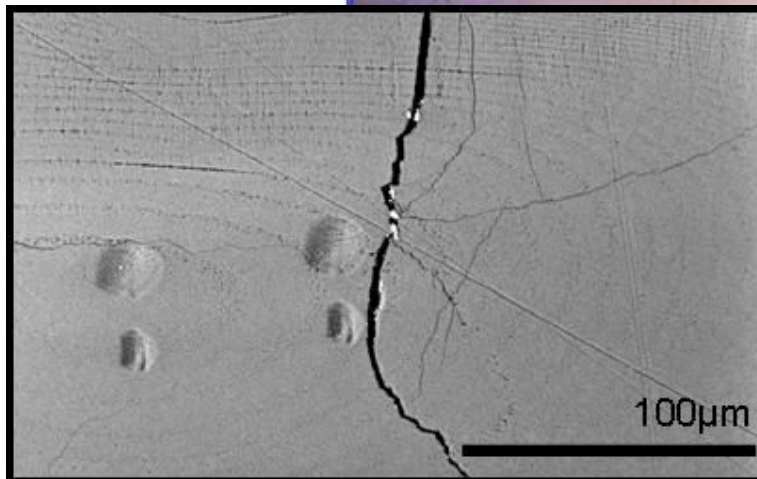
■ Wisc-SIMS

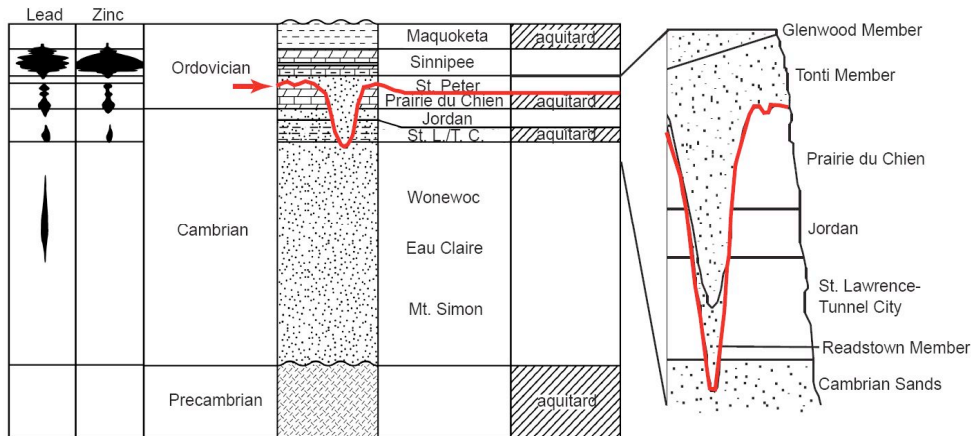


1 cm
 2.5 Ga Dales Gorge BIF-4

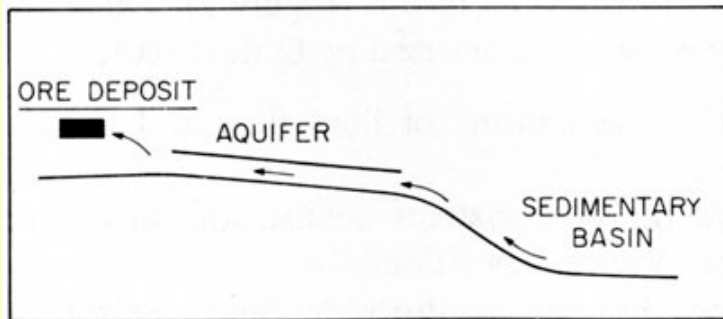


¹³C Addition Crampton Lake, Wisc.

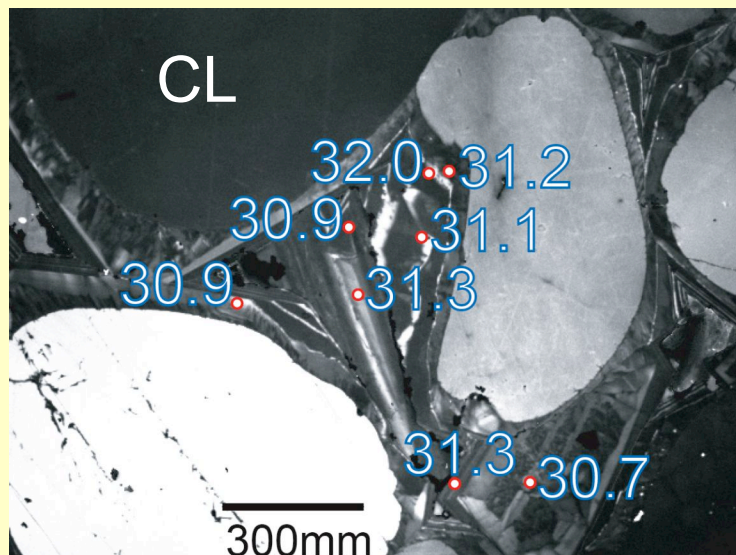




Kelly et al. 2007 GCA



Valley 2008
BGSW5
Madison, WI



Quartz Overgrowths St Peter sandstone, Wisc.

