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# Hadean Earth crust: microanalytical investigation of 4.4 to 4.0 Ga zircons from Western Australia

D. R. NELSON

Geological Survey of Western Australia and Dept. Applied Physics, Curtin Univ. of Tech., GPO Box U1987, Perth, WA, 6001, Australia (d.nelson@info.curtin.edu.au)

The oldest identified Earth remnants are 4.4 to 4.0 Ga zircons found within c. 3.0 Ga sediments (Froude et al., 1983; Compston and Pidgeon, 1986; Wilde et al., 2001; Nelson, 2002) and c. 2.7 Ga orthogneisses (Nelson et al., 2000) of the Yilgarn Craton. Their source rocks have not been identified but their trace-element patterns, euhedral zoning and siliceous inclusions suggest crystallization within granitic *sensu lato* melts. Combined SHRIMP U–Th–Pb isotopic, EMA trace-element microanalysis and BSE/CL imaging indicate a range of $^{207}Pb/^{206}Pb$ dates within each mineral; the oldest provide a minimum age for zircon crystallization, with younger dates not accounted for by zircon rims attributable to radiogenic-Pb loss from μm-scale domains within each grain. Concurrence in $^{207}Pb/^{206}Pb$ dates within and between zircons favors episodic loss of radiogenic Pb during 4404, 4350, 4276, 4185, 4150, 4005, 3978, 3945 and 3874 Ma events rather than continuous loss during a ≤3750 Ma event. As significant Pb diffusion from zircon will only occur at >900˚C, these times may correspond to high-grade thermal metamorphic events related to mantle upwelling or convective overturn episodes.

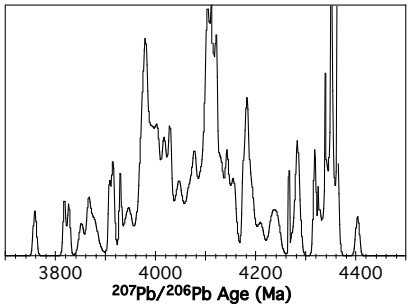


Figure 1. Gaussian summation probability plot for ≥95% concordant SHRIMP $^{207}Pb/^{206}Pb$ dates obtained from ≥4.0 Ga zircons (refs. given below).

## References

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