



## **Multiple Hadean crystallization and reworking events preserved in individual Jack Hills zircon grains**

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Five Hadean (>3.9 Ga) aged zircon grains from the Jack Hills metasedimentary belt have been investigated by an improved secondary ion mass spectrometry scanning ion image technique. This technique has the ability to obtain accurate and precise full U-Pb systematics on a scale <math><5 \mu\text{m}</math>, as well as document the spatial distribution of U, Th and Pb. All five of the grains investigated here have complex cathodoluminescence patterns that correlate to different U, Th, and Pb concentration domains. The age determinations for these different chemical zones indicate multiple reworking events that are preserved in each grain and have affected the primary crystallized zircon on the scale of <math><10 \mu\text{m}</math>, smaller than traditional ion microprobe spot analyses. These new scanning ion images and age determinations suggest that roughly half, if not all, previous analyses, including those of trace elements and various isotope systems, could have intersected several domains of unfractured zircon, thus making the interpretation of any trace element, Hf, or O isotopic data tenuous. Lastly, all of the grains analyzed here preserve at least two distinguishable  $^{207}\text{Pb}/^{206}\text{Pb}$  ages. These ages are preserved in core-rim and/or complex internal textural relationships. These secondary events took place during at ca. 4.3, 4.2, 4.1, 4.0, and 3.7 Ga potentially indicating a sequence of magmatic and/or metamorphic events that recycled some volume of early crust during the Hadean and into Paleo- to Mesoarchean several times with an apparent periodicity of ca. 100 Ma.