New evidence for ~4.45 Ga terrestrial crust from zircon xenocrysts in Ordovician ignimbrite in the North Qinling Orogenic Belt, China

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Evidence for the earliest known terrestrial crust comes predominantly from Jack Hills in Western Australia, where hafnium isotopic results from >3.8 Ga detrital zircons indicate crustal precursors as old as ~4.4-4.5 Ga. We present evidence from magmatic cores in >3.9 Ga xenocrystic zircons (Fig. 1a) from a felsic volcanic rock in the North Qinling Orogenic Belt, China, of similar Hf crustal model ages up to 4.45 Ga (Fig. 1b). These lie on the same Lu/Hf trajectory as the least disturbed Jack Hills and Apollo 14 zircons (Fig. 1b) therefore providing the second example of the earliest known generation of continental crust on Earth. In addition, the rims of two zircon grains record later growth at 3.7 Ga and, when combined with the fact that the grains are incorporated in Paleozoic volcanic rocks, imply long-lived crustal residence within the basement of the North China Craton. These results therefore establish the wider distribution and survival of the most ancient crustal material on the Earth and highlight the possibility for the further discovery of ancient crustal remnants.

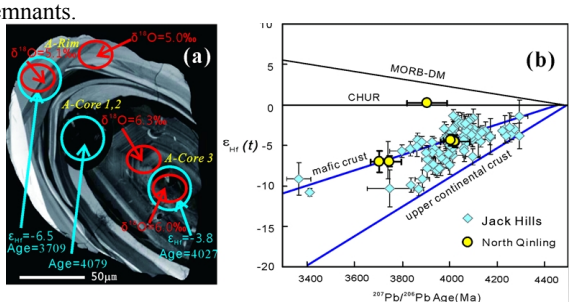

Fig. 1. Hadean zircon cathodoluminescence image (a) and plot of εHf(*t*) versus age (b).