# Time-lapse analysis of detrital zircon U-Pb ages

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To constrain the timing of the growth of the continental crust, a large database of detrital zircon U-Pb ages is examined [1]. The data are subdivided by continent and by the age of the sediment in which the zircons were found. For each area-age subdivision, the peaks in the U-Pb age distribution were identified and compared.

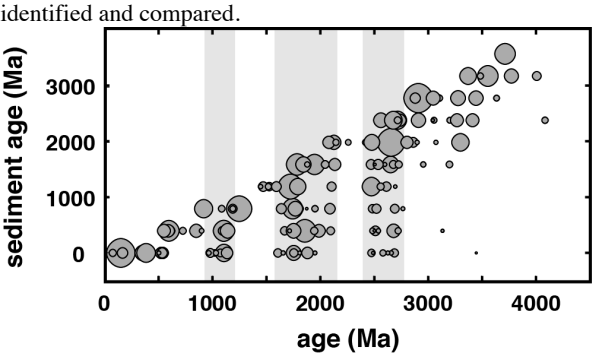


**Figure 1.** Peaks in the distribution of detrital zircon U-Pb ages (circles) as a function the age of the sediment they are found in. The vertical bands of data (gray fields) indicate the continental crust formed episodically.

As Figure 1 shows, there are few/no age peaks between 2.2 and 2.4 Ga or between 1.2 and 1.5 Ga in any sediment of any age on any continent (note - size of circle is proportional to the size of the peak and number of zircons in the subdivision). The key point is that even sediments formed during these times, or soon after, did not preserve peaks with these ages (vertical bands with no circles). Certainly there are detrital zircons and continental volumes with these ages, but they are low in abundance.

In contrast, age peaks between ~2.5 and 2.7 are abundant and immediately recorded in sediments. Those age peaks persist in subsequent sedimentary records from all continents. The same is true for the age ranges 1.6 to 2.1 Ga and 0.9 to 1.2 Ga. In detail, the size of the peaks decreases (size of circle) with time, suggesting that crustal erosion and reworking decreased the volume of older continental crust.

Overall, the time-lapse analysis of the detrital zircon U-Pb database indicates that the continental crust formed in a fundamentally episodic manner. Whether the episodicity was due to varying crustal production or preservation is less clear. However, comparison with the Re-Os age distribution of depleted mantle suggests that production is the primary control [2].

[1] Voice *et al*. (2011) J Geology **119**, 109-126. [2] Pearson *et al*. (2007) Nature **449**, 202-205.