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# Evolution and growth rate of the European continental crust

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Combined U-Pb, O and Lu-Hf isotopic measurements of detrital zircons from fifteen river sand samples in Europe have been carried out to better understand the evolutionary history of the European continental crust. The histogram of 2403 zircon U-Pb ages, analysed for this study, shows five major periods of zircon crystallization: 3.00-2.50, 1.95-1.35, 1.25-0.85, 0.65-0.40 and 0.40-0.25 Ga, which correspond with the timing of the supercontinent assemblies. The correlation can be explained by either intense granitoid magmatism and zircon growth during the supercontinent amalgamation, or greater preservation potential of zircons from collisional settings than those from extensional zones. Detrital zircons that crystallised during the supercontinent assemblies show wide variations in $\delta^{18}O$ and εHf(t) values, with the majority of zircons displaying non-mantle-like isotopic signatures. This is because granitoid generation during continental collisions was largely due to reworking of old continental crust.

Arc mantle Hf model ages of detrital zircons were calculated to estimate the time elapsed since the crustal source region was extracted from the mantle. Model age errors were estimated using the bootstrap method, considering three sources of error: (i) uncertainty in the Hf isotopic composition of the arc mantle reservoir, (ii) uncertainty in the $^{176}Lu/^{177}Hf$ ratios for the crustal source region, which are constrained by zircon $\delta^{18}O$ values, and (iii) analytical errors in the measurements of zircon U-Pb age, $^{176}Hf/^{177}Hf$, $^{176}Lu/^{177}Hf$, and $\delta^{18}O$ values. The distribution of Hf model ages for all the anlaysed zircons shows major juvenile extraction events at ~ 2.1, 1.8, 1.5 and 1.2 Ga. These principal growth periods in the European crust contrast with those identified in the African, Russian and Mississippi river basins, showing that the major periods of crustal growth may differ from continent to continent.