

Rapid crustal recycling in the New England Orogen, eastern Australia: Magma to mud to magma in < 20Ma

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It has been demonstrated through a zircon U-Pb and O isotopic study of the S-type Bundarra Supersuite in the New England Orogen, eastern Australia [1] that crustal recycling (magmatism, weathering, burial, partial melting, voluminous magma formation and magma mobilisation) can take as little as < ca. 20 Ma. The studied zircon is well characterised: inherited core (IC; from Carboniferous arc magmatism), melt-precipitated core (MC; first melting of the sedimentary source) and melt-precipitated rim (MR; post-emplacement crystallisation), determined based on age, Th/U and $\delta^{18}\text{O}$. The age difference between MC and MR is only ca. 5 Ma, indicating that the magma was produced and emplaced soon after the initiation of partial melting. The MC and MR are only distinguished by their Th/U: MC has a wide range of Th/U but in MR Th/U is consistently low (~ 0.4).

The MC-MR difference in Th/U probably reflects monazite formation (LREE and Th-rich) in the early stage of S-type granite magmatism. As with Th/U, REE in the MC and MR (measured with IMS-1280) also indicate their different source compositions and origins.

MC was found only as cores: no IC-MC-MR zoning was seen in any single grain by CL imaging, probably because the volume of MC is small and the MC between IC and MR is present as a thin layer. NanoSIMS elemental mapping will be carried out to distinguish the three zones, and O isotopes also will be measured with NanoSIMS on the fine MC layers.

[1] H. Jeon, I.S. Williams, B. Chappell, 2012. Magma to mud to magma: Rapid crustal recycling by Periman granite magmatism near the eastern Gondwana margin., *Earth and Planetary Science Letters*, 319-320, 104-117.