

A Mesozoic plateau in the eastern North China Craton revealed by detrital zircons

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The North China Craton (NCC) experienced intense destruction during the Mesozoic. Sporadic observations, including granitic rocks with high La/Yb ratios, regional unconformities, and basalt vesicularity paleoaltimetry, hint at formation of a high elevation plateau that is coeval to NCC destruction. However, exactly when the plateau rose and fell, and how the evolution of this plateau may be related to NCC destruction, are unclear. Here, we assess the existence of a Mesozoic plateau in the eastern NCC using detrital zircon separated from modern river sands and ancient sandstones. Eu anomaly in detrital zircon shows that the crust of NCC thickened to ~60-70 km during the early-middle Jurassic to early Cretaceous, followed by a thinning during the next ~50 Myr. Additionally, we find that the proportion of Mesozoic zircons gradually increases with the deposition age of sandstones in the early-middle Jurassic to late Cretaceous and then decreases rapidly in younger sandstones. This changing proportion of Mesozoic zircons in sandstones is consistent with the rise and fall of a Mesozoic plateau in the eastern NCC. We suggest that the NCC plateau may have formed due to the compression and subduction of the paleo-Pacific plate as well as the Yangtze plate. The Mongol–Okhotsk orogeny in north NCC may have also played a role in the initial thickening of the plateau. At ~130 Ma, significant craton destruction likely occurred due to the rollback of the paleo-Pacific plate, leading to the collapse of the plateau alongside extensive mantle and crustal magmatism.