

Detrital zircon geochronology of  
Permian – Triassic fluvial sediments  
of the Sydney Basin: Provenance  
analysis and Geomorphological effects  
of the Permian –Triassic Extinction

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**DETRITAL ZIRCON GEOCHRONOLOGY OF PERMIAN – TRIASSIC FLUVIAL  
SEDIMENTS OF THE SYDNEY BASIN: PROVENANCE ANALYSIS AND  
GEOMORPHOLOGICAL EFFECTS OF THE PERMIAN – TRIASSIC EXTINCTION**

**DETRITAL GEOCHONOLGY ON THE P-T BOUNDARY OF THE SYDNEY BASIN**

**ABSTRACT**

Detrital zircons from Permian and Triassic sediments of the Sydney Basin were analysed for U-Pb geochronology to determine their provenance and to evaluate potential geomorphological effects for the Permian-Triassic mass-extinction event. Five major age peaks were obtained for the zircon U-Pb age distribution diagrams:

Cryogenian (~700-620 Ma); Cambrian (~540-490 Ma); Silurian - Devonian (~440-390 Ma); Carboniferous (~360-300 Ma) and Permian - Triassic (~280-240 Ma). These age peaks reflect pulses of significant magmatism within sediment source regions. Most detrital zircons in the analysed Sydney Basin sediments are late Palaeozoic in age and are thought to be derived from the New England Fold Belt that underwent deformation during the Hunter-Bowen Orogeny at that time. The Precambrian detrital zircons were likely derived from the Beardmore micro-continent that accreted to the margin of Gondwana in the Cryogenian. Other zircon contributions can be associated with Cambrian aged basement uplifts of the Ross Orogenic Belt and Silurian – Devonian aged basement uplifts of the Lachlan Fold Belt.

The U-Pb age results from this study furthermore highlight a significant shift in provenance during the Late Permian and into the early Triassic sediments with the disappearance of Pre-Carboniferous zircon contributions in the latest Permian. This shift in provenance is thought to reflect changing river dynamics from meandering river systems to braided rivers systems with different sediment calibre transportation

properties. This change is associated with the mass dying of deep-rooted vegetation during the Permian-Triassic mass extinction event.

**KEYWORDS**

Sydney Basin, Provenance, Permian-Triassic Boundary, Extinction event, U-Pb Geochronology, Fluvial

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