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 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
# TABLE OF CONTENTS

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

Detrital Geochronology on the P-T boundary of the Sydney Basin

Abstract

Keywords

Table of Contents

List of Figures

List of Supplementary Figures

List of Supplementary Tables

Introduction

Geological Setting

Stratigraphy of the Sydney Basin

Northern Area

Southern Area

Tectonic History of Sediment Source Areas

Australian Sources

New England Fold Belt

Lachlan Fold Belt

New Zealand Sources

Tuhua Orogeny

Antarctic Sources

Ross Orogen

Beardmore Orogeny

Sample Description and Lithology

Methods

Results

NS2014002 (early - late Permian Reids Mistake Formation)

SY2014004 (early - late Permian Wilton Formation)

NS2014008 (late Permian - early Triassic Munmorah Conglomerate)

SY2014010 (late Permian Coalcliff Sandstone)

SY2014013 (late Permian - early Triassic Otford Sandstone Member)
SY2014014 (early Triassic Scarborough Sandstone) ......................................................... 23

Discussion ....................................................................................................................... 24

Provenance Constraints and Sediment Geomorphology in the Late Permian .................... 24

Provenance Constraints and Sediment Geomorphology at the P-T Boundary .................. 30

Provenance Constraints and Sediment Geomorphology into the Early Triassic ............... 32

Conclusions ..................................................................................................................... 33

Acknowledgments ......................................................................................................... 34

References ....................................................................................................................... 35

Appendix A: .................................................................................................................... 40

Methods .......................................................................................................................... 40

Rock Crushing and Mineral Separation ........................................................................ 40

Zircon mounting ............................................................................................................. 41

LA-ICP-MS and Geochronology .................................................................................... 42

Weighted Averages for Provenance Pie Charts ............................................................... 43

NS2014002 – Reids mistake formation ....................................................................... 43

SY2014004 – Wilton Formation .................................................................................... 44

NS2014008 – Munmorah Conglomerate ..................................................................... 44

SY2014010 – Coalcliff Sandstone ................................................................................ 45

SY2014013 – Otford Sandstone Member ..................................................................... 45

SY2014014 – Scarborough Sandstone ........................................................................ 46

Raw Data ........................................................................................................................ 47

SY2014004 ................................................................................................................... 47

Wilton Formation ......................................................................................................... 47

NS2014002 ................................................................................................................... 48

Reid’s Mistake Formation ............................................................................................. 48

NS2014008 ................................................................................................................... 49

Munmorah Conglomerate ............................................................................................. 49

SY2014010 ................................................................................................................... 50

Coalcliff Sandstone ....................................................................................................... 50

SY2014013 ................................................................................................................... 51

Otford Sandstone Member ............................................................................................ 51

SY2014014 ................................................................................................................... 52

Scarborough Sandstone ................................................................................................. 52
LIST OF FIGURES

Figure 1: Generalized geologic structure of southeastern Australia, including sedimentary cover. The Sydney Basin is bound to the North by the New England Orogen and to the west by the Lachlan Orogen. M.B.=Murray Basin, O.B.= Ottoway Basin, N.E.O.=New England Orogen, D.O.=Delamanian Orogen (modified from Sircombe 1999). .............................................................................................................................................. 7

Figure 2: (a) Stratigraphic Log of the northeastern Sydney Basin from the Lake Macquarie/Gosford Area and (b) Stratigraphic Log of the southeastern Sydney Basin from the Wollongong Area. Samples from this study are represented by letters A-F. After (Herbert & Helby 1980; Dehghani 1994; Herbert 1995; Tye et al. 1996; Retallack 1999) ....................................................................................................................................................... 10

Figure 3: Reconstruction of Gondwana showing the Tasman Orogenic System and its relation to other Orogenic Systems across the Margin of Gondwana after. The Lachlan Fold Belt of Eastern Australia was a consequence of the deformation of this large Orogenic System (modified after Rogers 1993). .......................................................................................................................... 13

Figure 4: Geologic map of the Sydney Basin with indication of sample locations based on 1:250 000 (Sydney) geological map (Brunker & Rose 1969). Samples beginning with 'NS' were collected from the North Sydney Basin; samples beginning with 'SY' were collected from the South Sydney Basin. ........................................................................... 17

Figure 5. (a) Stratigraphic Log of the northeastern Sydney Basin from the Swansea Heads Area. (b) Stratigraphic Log of the southeastern Sydney Basin from the Seacliff Bridge Area. Sample positions have been inserted on their respective sedimentary horizon. After (Ward 1972; Crapp & Nolan 1975; Arditto 1991; Dehghani 1994) ....... 18

Figure 6. Zircon U-Pb age-frequency diagram, identifying age populations present in the Wilton and Reids Mistake Formations of the Sydney Basin. The U-Pb age spectra displayed here reveal the difference in provenance between the South and North Sydney Basin during the early-Late Permian. The x-axis represents 206Pb/238U age estimates for ages <1 Ga and 207Pb/-Pb age estimates for ages >1 Ga. (n) is the number of concordant ages within each sample, with a concordance threshold >85%. Each peak records a pulse of magmatism from the sediments’ provenance. .................................................................................................................. 25

Figure 7. U-Pb age spectra for the South and North Sydney Basin during the latest Triassic, just before the P-T boundary (see caption for Figure 6). ....................... 26

Figure 8. U-Pb age spectra for the Late Permian - early Triassic succession of sediments in the South Sydney Basin (see caption in Figure 6) ................................................................................................................. 27

Figure 9: (A) Pie charts displaying the relative contribution of source terranes based on zircon age peaks (B) U-Pb age spectra of Sydney Basin samples coupled with U-Pb spectra of granites from source regions. Grey shaded areas correlate age peaks from source terranes with the U-Pb spectra of sediments from this study. Data for the Source Terrane Calculations and U-Pb spectra can be found in (Appendix A) All zircon data was filtered by a concordance threshold of >85%. New England Orogen data after Landenberger et al. (1995); Lachlan Fold Belt Data after Keay et al. (1999); New Zealand data after Tulloch et al. (2009b). ........................................................................................................................................... 30

LIST OF SUPPLEMENTARY FIGURES

Supplementary Figure 1. Weighted Average Plots of U-Pb ages using the Pb206/U238 age estimates and standard errors (absolute). Bold lines indicate the weighted average of age
estimates that correspond to age peaks of the U-Pb Age Spectra (Figs. 6-8). Weighted averages were used to construct pie charts of relative provenance contribution (Fig. 9). Plots were constructed using Isoplot, after (Ludwig 2012). Weighted average plots of detrital zircons from sample NS2014002 of the early-Late Permian Reids Mistake Formation ................................................................. 43

Supplementary Figure 2. Weighted average plots of detrital zircons from sample SY2014004 of the early-Late Permian Wilton Formation (see caption for Supplementary Figure 1) Note: Beardmore and Ross Orogens were incorporated into ‘others’ on the pie chart seen in figure 9a. ................................................................. 44

Supplementary Figure 3. Weighted average plots of detrital zircons from sample NS2014008 of the Late Permian-Early Triassic Munmorah Conglomerate (see caption for Supplementary Figure 1) ........................................................................................................ 44

Supplementary Figure 4: Weighted average plots of detrital zircons from sample SY2014010 of the Late Permian Coalcliff Sandstone (see caption for Supplementary Figure 1). ........................................................................................................ 45

Supplementary Figure 5: Weighted average plots of detrital zircons from sample SY2014010 of the Late Permian Coalcliff Sandstone (see caption for Supplementary Figure 1). ........................................................................................................ 45

Supplementary Figure 6: Weighted average plots of detrital zircons from sample SY2014014 of the Early Triassic Scarborough Sandstone (see caption for Supplementary Figure 1). ........................................................................................................ 46

LIST OF SUPPLEMENTARY TABLES

Supplementary Table 1: Raw U-Pb data from sample SY2014004. (*)Indicates samples that had a concordance threshold value < 85% ................................................................................. 47

Supplementary Table 2: Raw U-Pb data from sample NS2014002. (*)Indicates samples that had a concordance threshold value < 85% ................................................................................. 48

Supplementary Table 3: Raw U-Pb data from sample NS2014008. (*)Indicates samples that had a concordance threshold value < 85% ................................................................................. 49

Supplementary Table 4: Raw U-Pb data from sample SY2014010. (*)Indicates samples that had a concordance threshold value < 85% ................................................................................. 50

Supplementary Table 5: Raw U-Pb data from sample SY2014013. (*)Indicates samples that had a concordance threshold value < 85% ................................................................................. 51

Supplementary Table 6: Raw U-Pb data from sample SY2014014. (*)Indicates samples that had a concordance threshold value < 85% ................................................................................. 52