

GEOCHEMICAL CHARACTERISTICS
OF THE LOWER MESOZOIC
SEDIMENTS IN THE MOUNT
FREELING AREA, NORTHWESTERN
FLINDERS RANGES

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TITLE

Geochemical characteristic of the lower Mesozoic sediments in the Mount Freeling area, northwestern Flinders Ranges.

RUNNING TITLE

Geochemical characteristics of Mount Freeling

ABSTRACT

An increased resource demand is largely due to the exhaustion of mineral deposits that are from predominantly shallow exposed settings, hence, in Australia there is a growing need for exploration techniques that provide an improved understanding of areas of deep transported cover. A case study conducted on lower Mesozoic sediments overlying the Mount Painter Inlier, NW Flinders Ranges (Mount Freeling area), using combined geochemical analysis, detrital zircon provenance data and Hylogger data aims to understand the source and characteristics of the transported cover. The Mount Painter Inlier consists of predominantly Mesoproterozoic sedimentary rocks and granites. Neoproterozoic sedimentary and volcanic sequences of the Adelaide Fold Belt form a cover up to 14km thick, therefore making the overlying lower Mesozoic sediments appropriate for refining the combined exploration techniques. Hylogger core scans conducted on the Recorder Hill, Ludbrook and Trinity Well Type Sections, NW of Mount Painter Inlier, show increases in the degree of crystallisation of kaolinite implying more proximal source regions moving stratigraphically up the profiles. U–Pb dating of detrital zircons shows a maximum depositional age of 122 Ma and 400 Ma for the Ludbrook and Recorder Hill samples respectively with the most influential sources being the Mount Painter Inlier and the Gawler Craton. HyLogger and Zircon data suggest that where there is a higher degree of crystallisation, there is a younger maximum depositional age and vice versa. The geochemical data set shows that when A-CN-K plots are used to plot the degree of feldspar weathering, samples tend to fall into groups and then these sub-groups can be used to recalculate anomalous and background levels for trace elements and major elements. Through the use of geochemistry, HyLogger and detrital zircon studies it has been shown that mineralisation zones can be targeted more cost effectively and efficiently.

KEYWORDS

Geochemical, Flinders Ranges, Mount Freeling, HyLogger, Detrital Zircon, Lower Mesozoic, Regolith, Deep Basin, Geochronology, Sediment Provenance

TABLE OF CONTENTS

Title.....	1
Running title	1
Abstract.....	1
Keywords.....	1
List of Figures and Tables	3
1. Introduction	4
2. Background.....	6
2.1 Geological Setting	7
2.2 Previous Studies	8
3. Methods	11
3.1 U-Pb zircon LA-ICP-MS geochronology.....	11
3.2 Whole rock geochemistry.....	13
3.3 HyLogger Core Scanner.....	13
4. Observations and Results.....	14
4.1 Recorder Hill	16
4.2 Trinity Well	20
4.3 Ludbrook Reference Section	24
5. Discussion.....	28
5.1 Geochemistry.....	28
5.1.1 Recorder Hill	29
5.1.2 Trinity Well	30
5.1.3 Ludbrook	34
5.2 Detrital Zircon Analysis	35
5.2.1 Recorder Hill Sample RH04.....	35
5.2.2 Ludbrook Sample LUD04 (LUDS10).....	36
5.3 HyLogger.....	37
5.3.1 Recorder Hill	37
5.3.2 Trinity Well	38
5.3.3 Ludbrook	39
6. Conclusion.....	40
7. Acknowledgments	41
8. References	42

LIST OF FIGURES AND TABLES

Figure 1: Location map showing the Mount Freeling study area. Modified from Dart and Hill (2012).	6
Figure 2: Stratigraphic logs of the Trinity Well, Recorder Hill and Ludbrook type sections at locations 322689mE 6691559mN, 335465mE 6697106mN and 320944mE 6686841mN respectively. Trinity well sample location 8 was obscured during April field visit and therefore has been left out of stratigraphic log. Samples were taken from each notable horizon change and this is identified as the Sample ID in the column adjacent to each log along with the stratigraphic unit for each sample point.	15
Figure 3: A-CN-K ternary plot of all samples from Recorder Hill type section.....	16
Figure 4: Down hole XY scatter plot of the Recorder Hill type section with depth (m) with respect to a) Fe ₂ O ₃ , b) Al ₂ O ₃ , c) K ₂ O, d) CaO and e) U.	17
Figure 5: a) Recorder Hill type section HyLogger down chip tray interoperation produced via CSRIO The Spectral Geologist 7.0 for the first of two passes showing relative amounts of various minerals with corresponding photo of the sample in the black chip tray. b) All spectral signatures stacked for the first of two passes with corresponding sample ID.....	18
Figure 6: Probability density plot of all 44 within 10% concordant zircon analysis from 98 analysis conducted. Unique ages and age domains highlighted showing a wide spread of ages within sample RH04.	19
Figure 7: Ternary plots of all Trinity Well samples including two duplicate samples. a) A-CN-K ternary plot, b) A-CN-Si ternary plot and c) A-Fe-Si ternary plot.....	21
Figure 8: Down hole XY scatter plot of the Trinity Well type section with depth (m) with respect to a) Fe ₂ O ₃ , b) Al ₂ O ₃ , c) K ₂ O, d) CaO and e) U.	22
Figure 9: Trinity Well Type Section a) HyLogger down chip tray interoperation produced via CSRIO The Spectral Geologist 7.0 for the first of two passes showing relative amounts of various minerals with corresponding photo of the sample in the black chip tray. b) All spectral signatures stacked for the first of two passes with corresponding sample ID and stratigraphic unit labels for each signature.....	23
Figure 10: a) A-CN-K ternary plot for all Ludbrook samples, b) M-CA-K ternary plot for all Ludbrook samples.	25
Figure 11: Down hole XY scatter plot of the Ludbrook type section with depth (m) with respect to a) Fe ₂ O ₃ , b) Al ₂ O ₃ , c) K ₂ O, d) CaO and e) U.	26
Figure 12: a) Ludbrook Reference section HyLogger down chip tray interoperation produced via CSRIO The Spectral Geologist 7.0 for the first of two passes showing relative amounts of various minerals with corresponding photo of the sample in the black chip tray. b) All spectral signatures stacked for the first of two passes with corresponding sample ID.....	27
Figure 13: Probability density plot of all 63 within 10% concordant zircon analysis from 107 analysis conducted. Unique ages and age domains highlighted showing a wide spread of ages within sample LUD04.	28
Table 1: Analytical method and detection limit for elements analysed by Acme Labs.....	13
Table 2: Summary statistics of major elements from the Recorder Hill type section. n=18.....	16
Table 3: Summary statistics of major elements from the Trinity Well type section n=40.....	20
Table 4: Summary statistics of major elements from the Ludbrook type section. n=12.....	24