

New SHRIMP geochronology for the Western Fold Belt of the Mount Isa Inlier: Developing a 1800-1650 Ma Event Chart

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Introduction

U-Pb zircon geochronology in the Western Fold Belt of the Mount Isa Inlier between 1970 and 1995 focused on dating of regional igneous units.

Recent projects (NABRE and AMIRA P552) integrated SHRIMP U-Pb zircon geochronology of redeposited tuffaceous beds and shallow level intrusives with sequence stratigraphy and facies analysis to:

1. Develop a regional chronostratigraphic framework for sediments of the Isa Superbasin
2. Identify a number of regional supersequences and their bounding unconformities and correlative conformities.

New SHRIMP geochronology in collaboration with the pmdCRC II project has:

1. Produced a temporal framework for the Leichhardt and Calvert Superbasins
2. Used detrital zircons to test the Prize-Gun unconformity at the base of the Isa Superbasin
3. Constrained ages for igneous events in the Western Fold Belt and near Mary Kathleen.

New timeframe for the Leichhardt and Calvert Superbasins

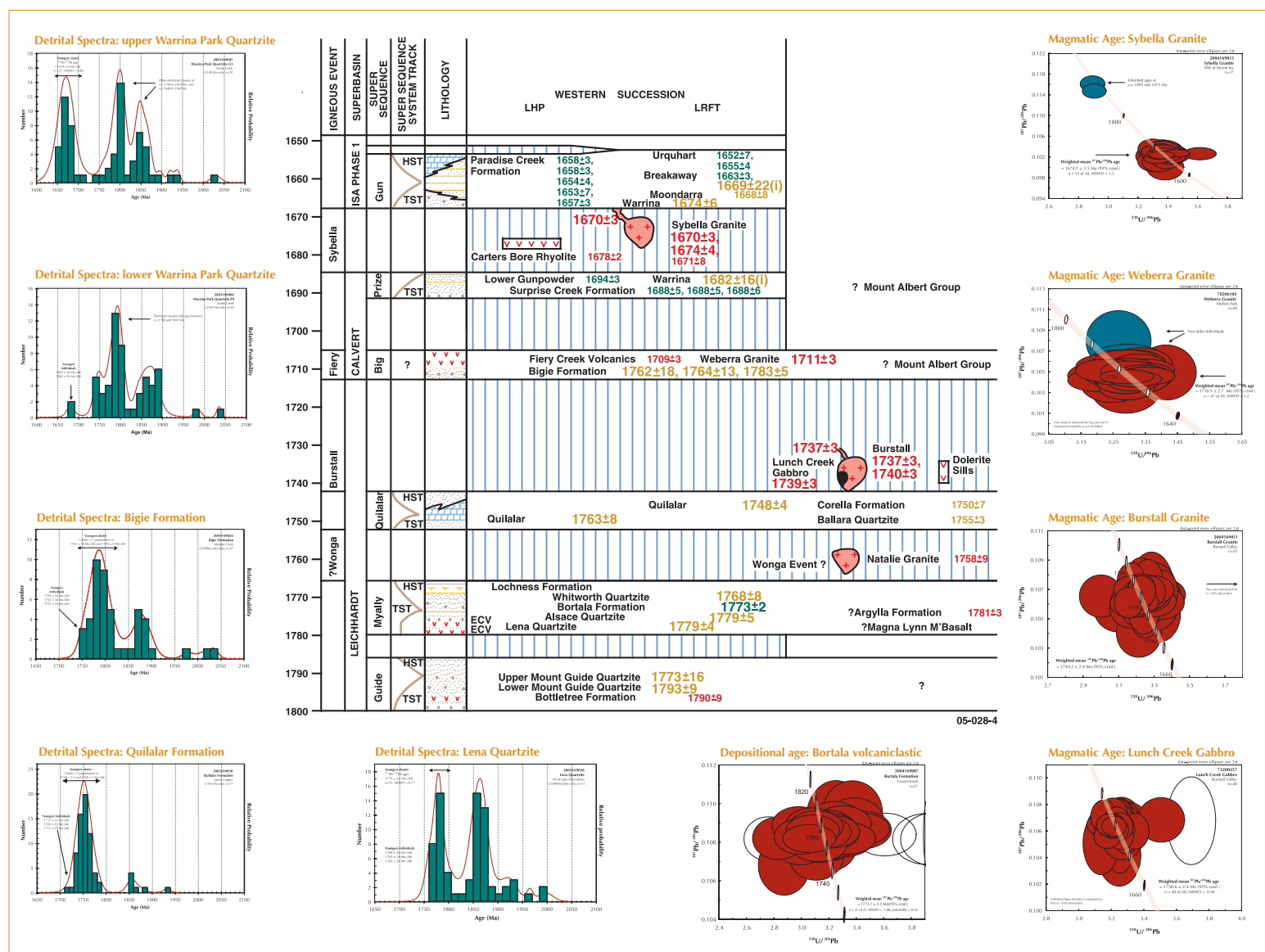
The project has combined regional sequence stratigraphy and structural analysis with geochronology to produce a temporal framework for the Leichhardt and Calvert Superbasins. As there is a limited number of volcanics present within this part of the stratigraphy, geochronology has focused on the analysis of detrital zircons in sedimentary units to define maximum depositional ages.

Approach

- Analysis of all sedimentary units within the stratigraphy from the Lower Mount Guide Quartzite to the Bigie Formation.
- Analysis of main stratigraphic units from one detailed section (Mistake Creek).
- Analysis of stratigraphic units from different parts of the basin to evaluate changes in facies and provenance.

Outcomes

- Identification of five supersequences: the Guide, Myally, Quilalar, Big and Prize Supersequences, each separated by significant time breaks.



Testing the Prize-Gun unconformity at the base of the Isa Superbasin

The regional Prize-Gun unconformity has been temporally constrained by pinkite ages, separating the 1690 Ma Prize and the 1670 Ma Gun Supersequences.

The unconformity incises to different stratigraphic levels, and therefore occurs in different stratigraphic units and is associated with different facies at different locations.

Approach

Sedimentary units were sampled across this unconformity at four locations in the Gunpowder region to determine:

- Whether sedimentary detrital zircon populations permit the identification of an unconformity?
- Which facies provide the best opportunity to identify an unconformity?

Outcomes

- Unconformity very well-defined at Oxide Creek. Small number of younger grains present within upper units at other locations, but less well-defined.
- Geochronology sampling strategies based on litho-stratigraphy may not focus attention toward critical bounding surfaces.

New magmatic ages for igneous events in the Western Fold Belt and Mary Kathleen Zone

Many ages for magmatic units in the Western Fold Belt and Mary Kathleen Zone have been derived from conventional U-Pb zircon methods, which may result in the mixing of different age components in complex multi-aged rocks.

Approach

- Analysis of selected magmatic units which either separate or occur within the Leichhardt, Calvert and Isa Superbasins – Burstall Granite, Lunch Creek Gabbro, Webera Granite and Sybella Granite.

Outcomes

- Refined ages for magmatism: ~1740-1735 Ma for the Burstall Event, ~1710 for the Flery Event and ~1670 for the Sybella Event.

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