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

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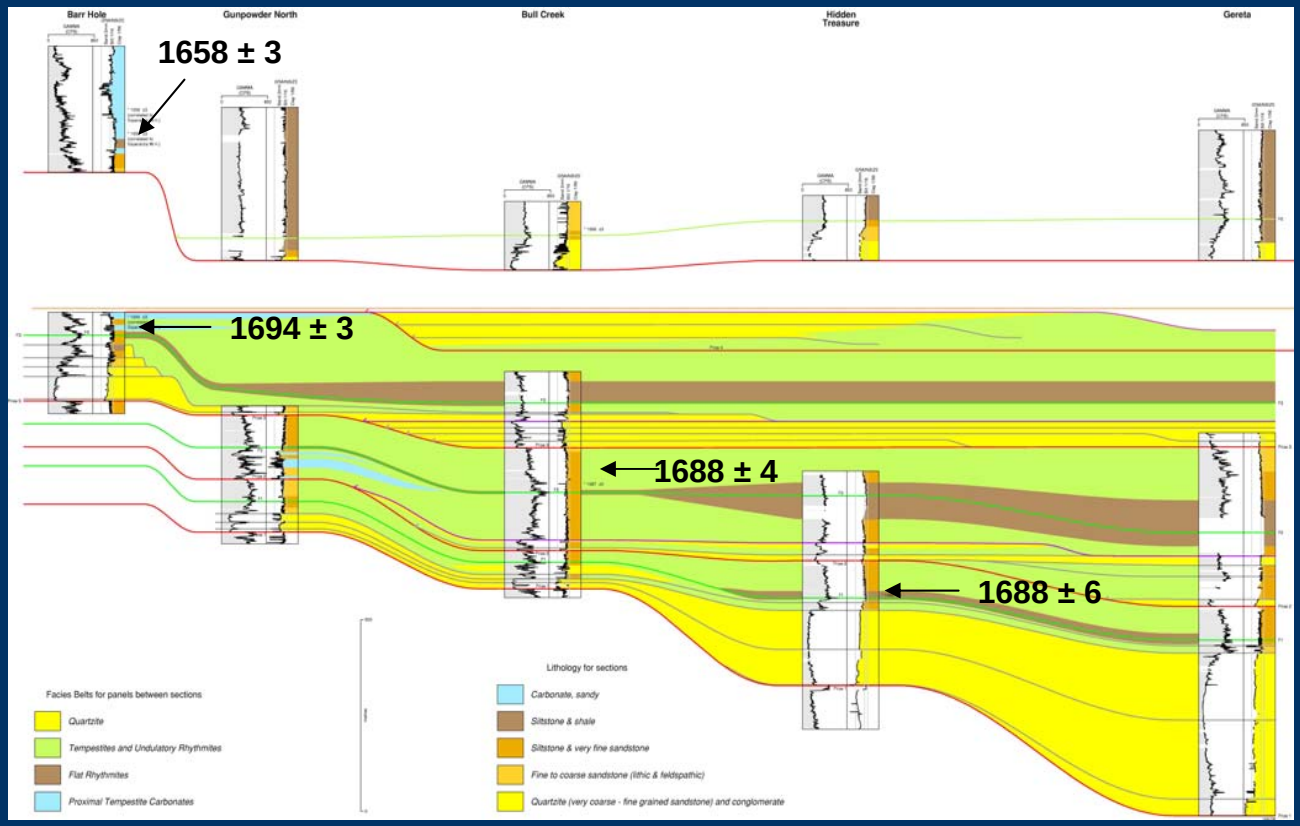
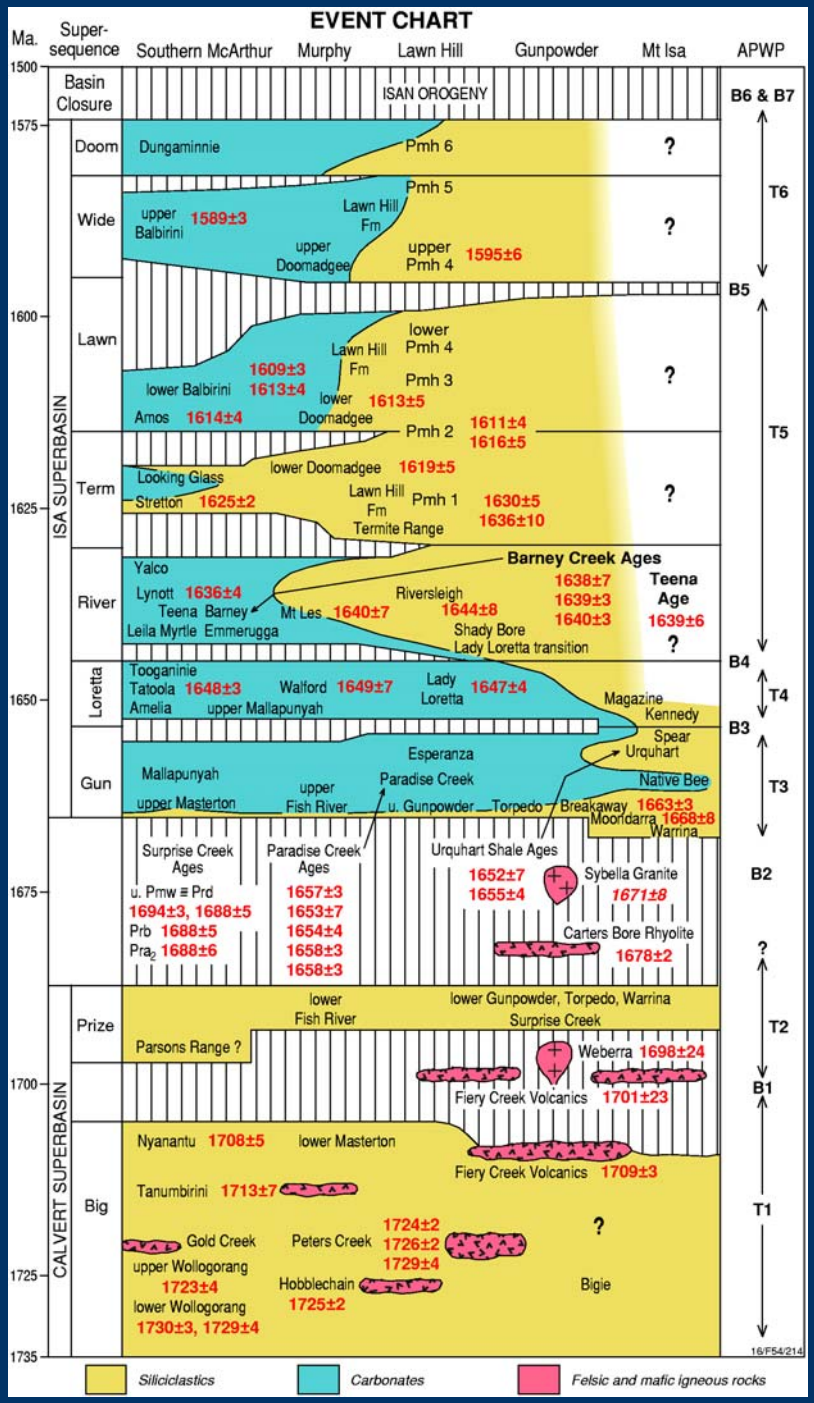
Previous geochronology in the Western Fold Belt



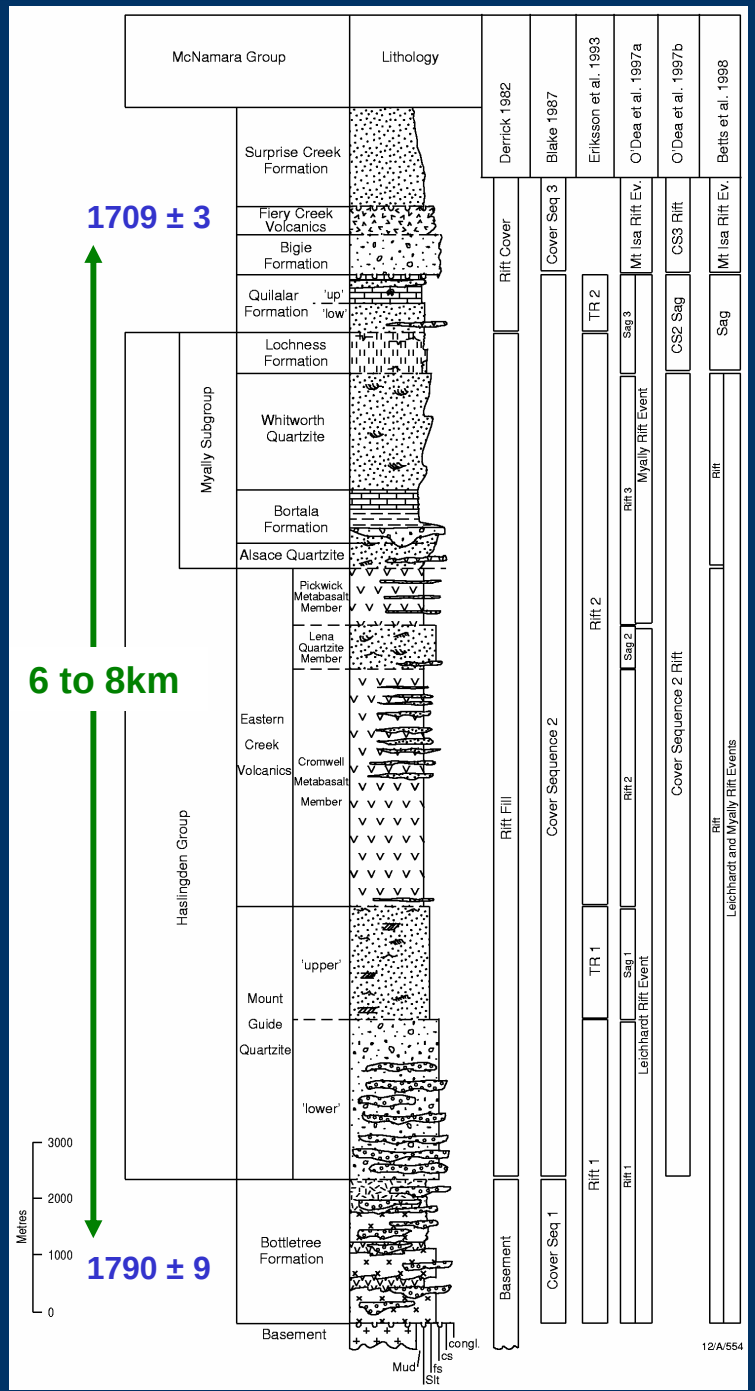
- Geochronology between 1970 & 1995 focused on dating of regional igneous units.
- From the mid-1990's, NABRE and AMIRA P552 projects integrated SHRIMP U-Pb zircon geochronology with sequence stratigraphy and facies analysis for the Isa Superbasin

  - focused on the dating of redeposited tuffaceous beds and shallow level intrusives



Event chart for the Isa Superbasin

- Development of a regional chronostratigraphic framework for sedimentary packages.
- Identification of a number of regional supersequences which are bounded by unconformities.
- Strong focus on the Isa Superbasin



Leichhardt and Calvert Superbasins

Only age constraints:

- **Base = U-Pb conventional age = 1790 ± 9 Ma**
- **Top = SHRIMP age = 1709 ± 3 Ma**

6 to 8 km of stratigraphy over 80 My with no time constraints – can it be divided into supersequences bounded by unconformities ?

Very few felsic volcanics within sequence to date – have to rely on maximum depositional ages from detritals in sedimentary samples

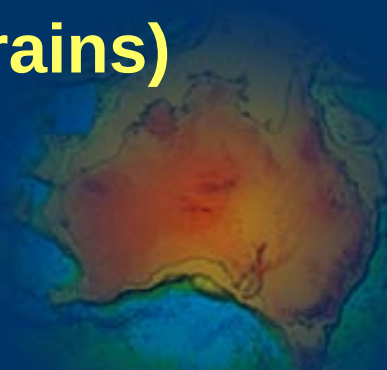
U-Pb zircon dating – ages & interpretations

- **Intrusive rocks = magmatic age**

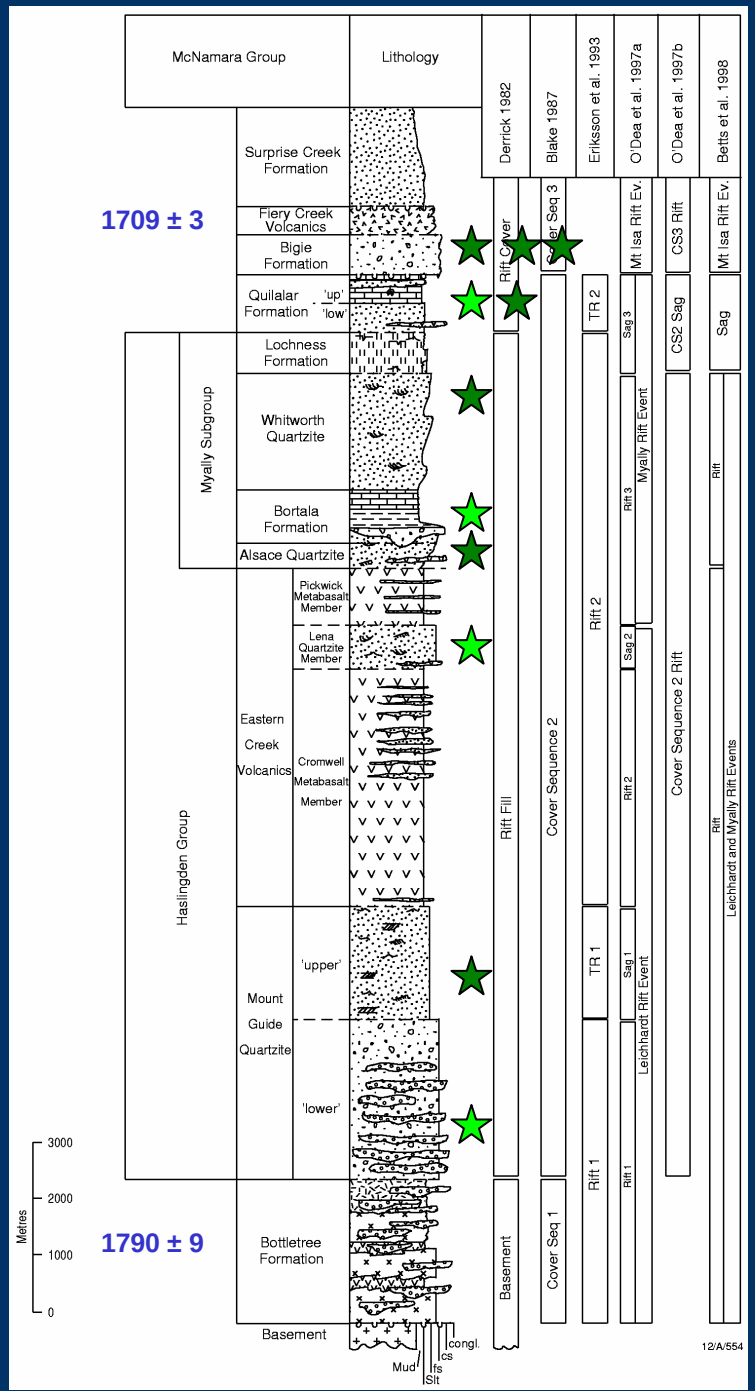
  Also identify inheritance and/or later metamorphism

- **Tuffs, volcaniclastics, peperites, pinkites = magmatic age + age of sediment deposition**
  Field relationship interpretations important

- **Sedimentary rocks = constraints on the maximum age of deposition (youngest grains)**
  Also provenance age spectra



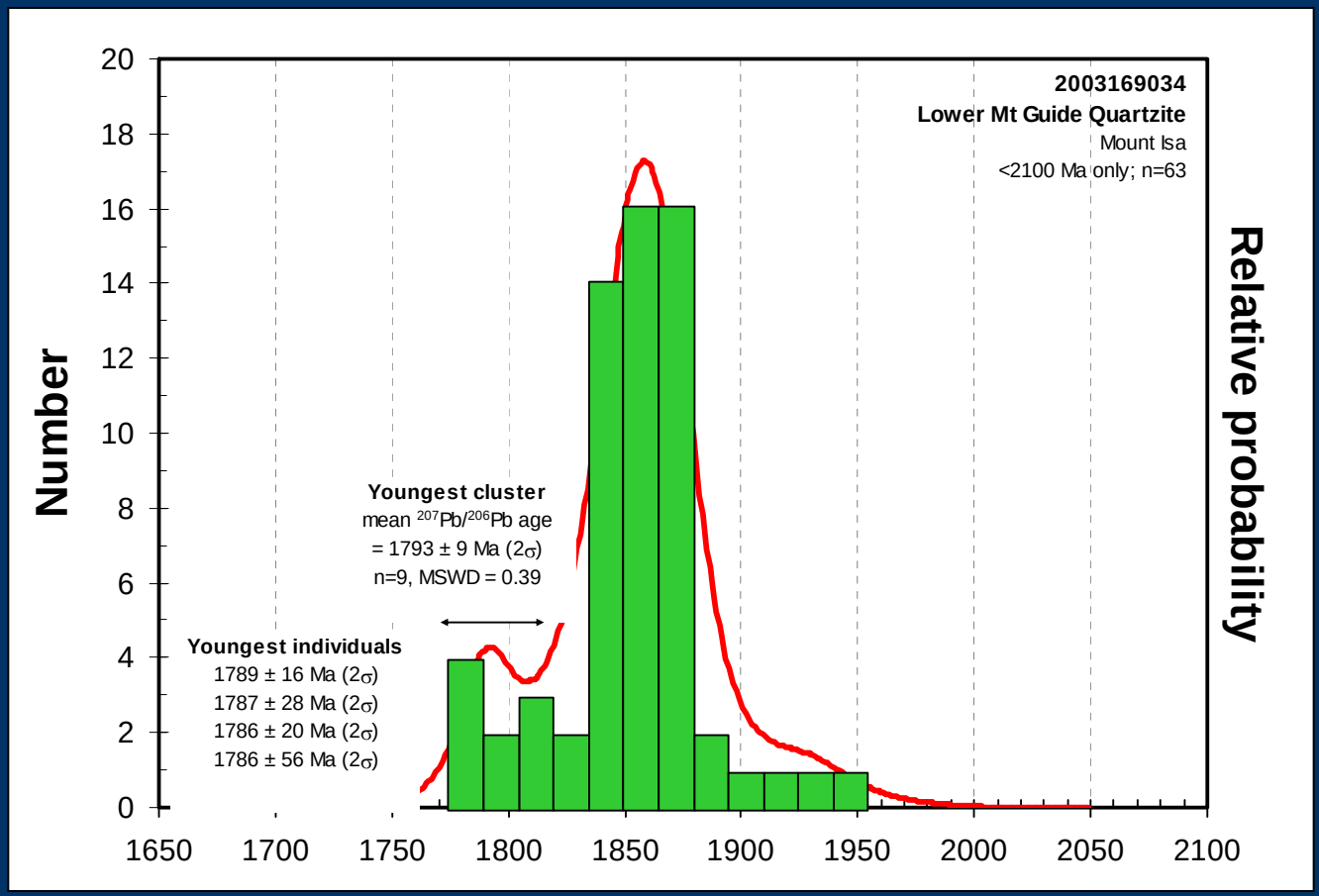
Geochronology in the Leichhardt and Calvert Superbasins



- Analysis of all sedimentary units within the stratigraphy
- 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

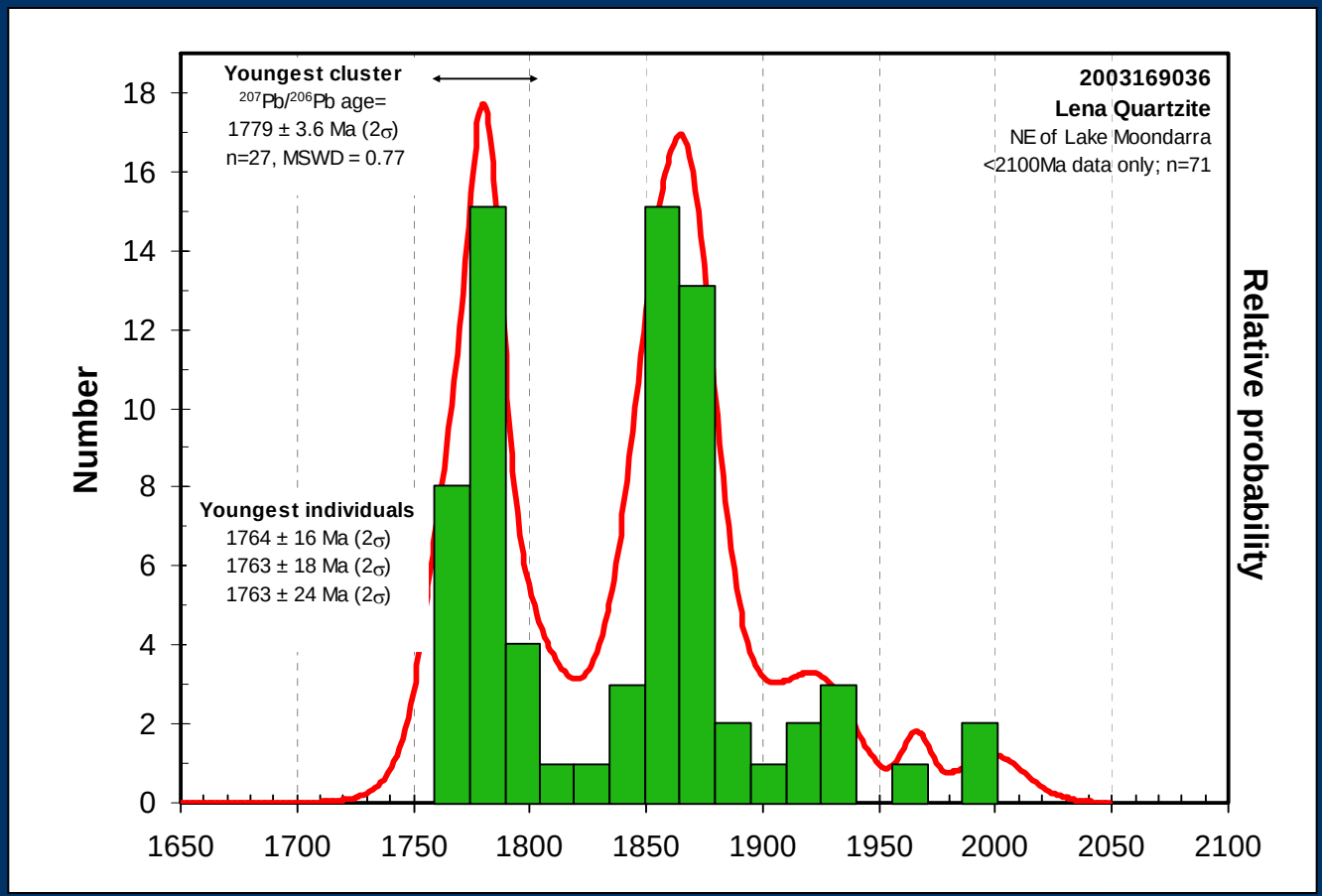
10 new SHRIMP detrital samples and 1 new SHRIMP volcanic age

Lower Mount Guide Quartzite



- **Detrital spectra = clusters at ~1790 and ~1860 Ma plus three Archaean ages**
- **Maximum depositional age defined by youngest cluster = 1793 ± 9 Ma**

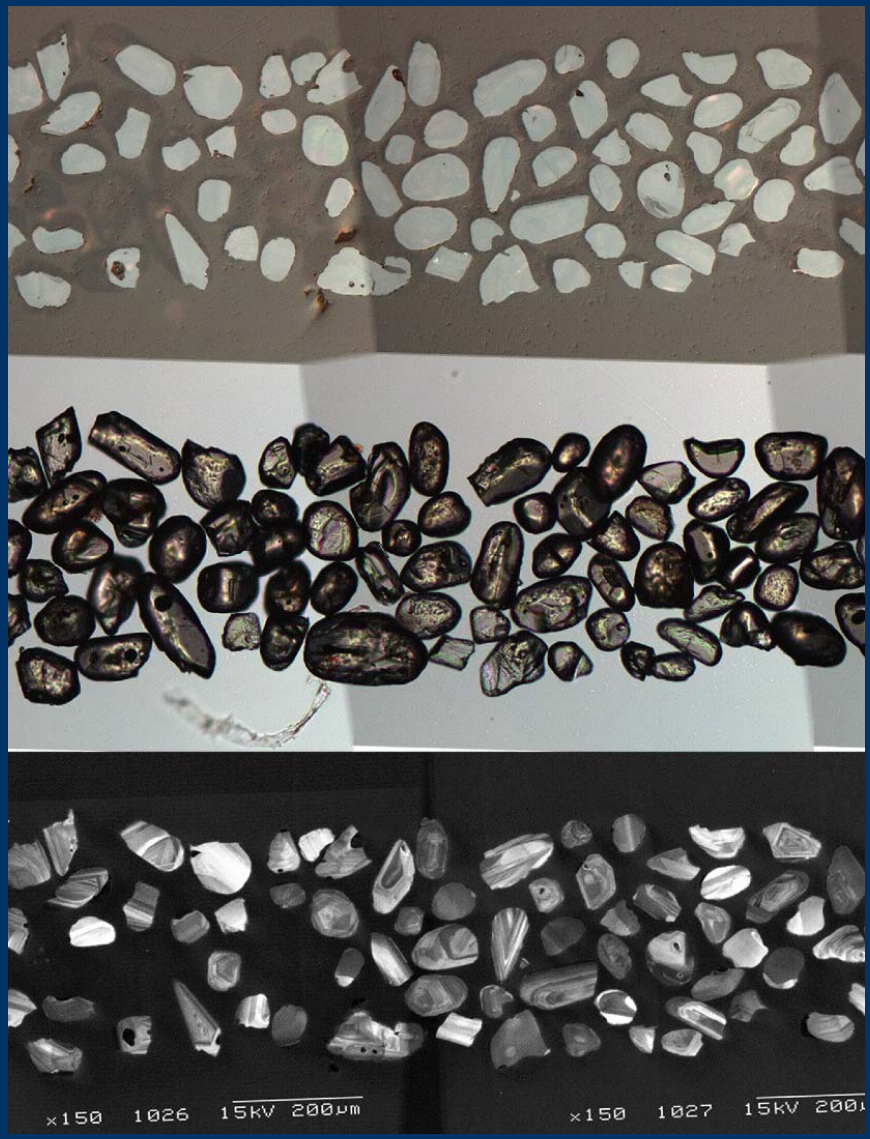
Lena Quartzite

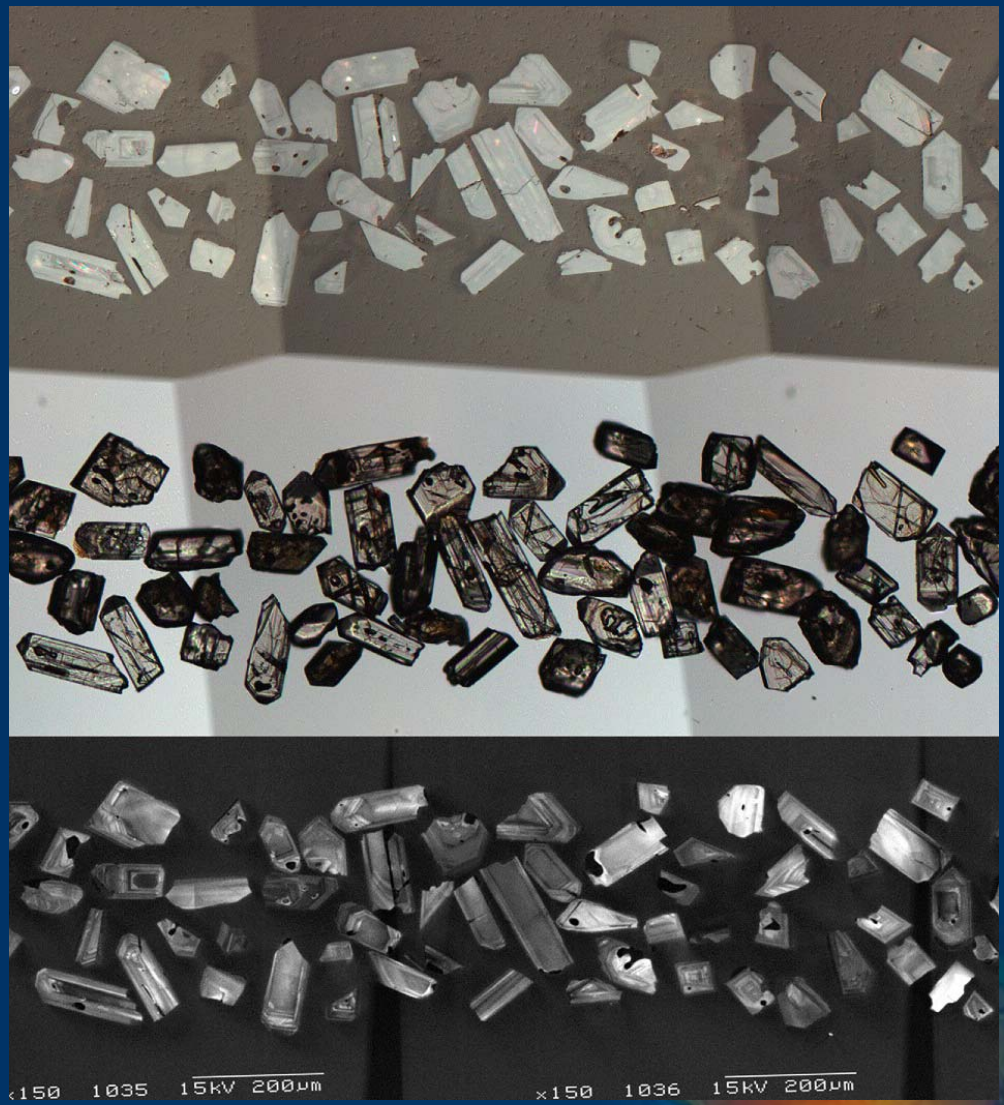


- **Detrital spectra = clusters at ~1780 and ~1870 Ma plus older individuals to 2820 Ma**
- **Maximum depositional age defined by youngest cluster = 1779 ± 4 Ma**

Bortala Formation – field relationships

Bortala Formation - zircons

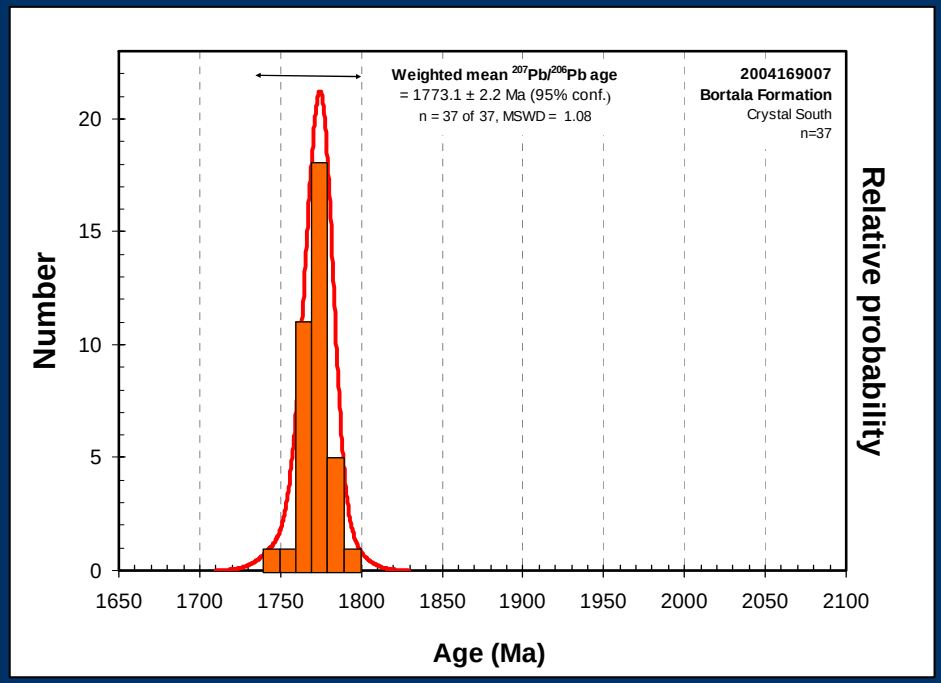


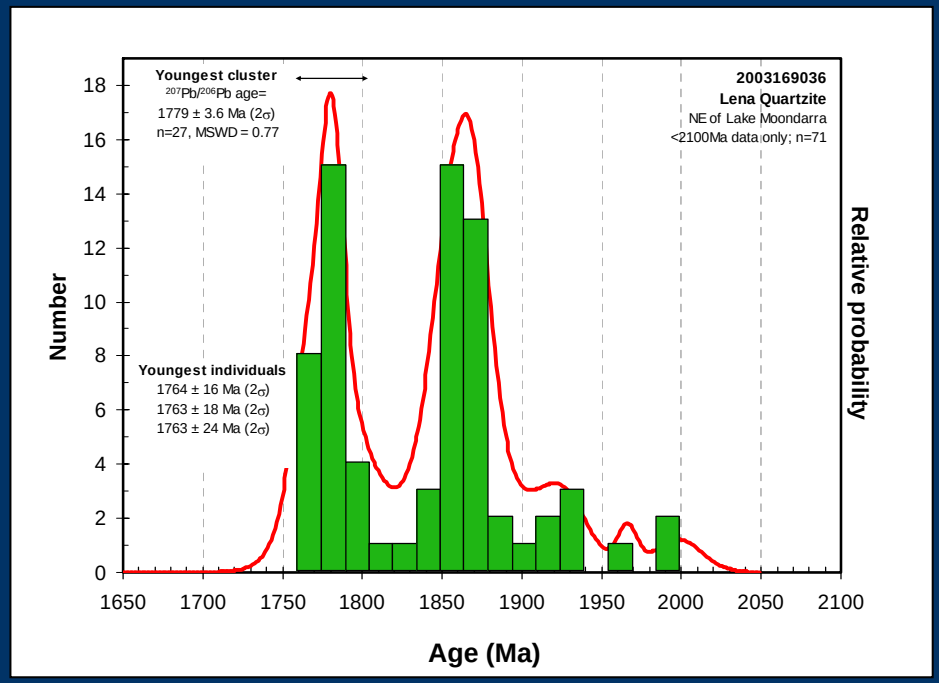


Bortala sediment zircons

Bortala volcaniclastic zircons

Bortala Formation volcaniclastic

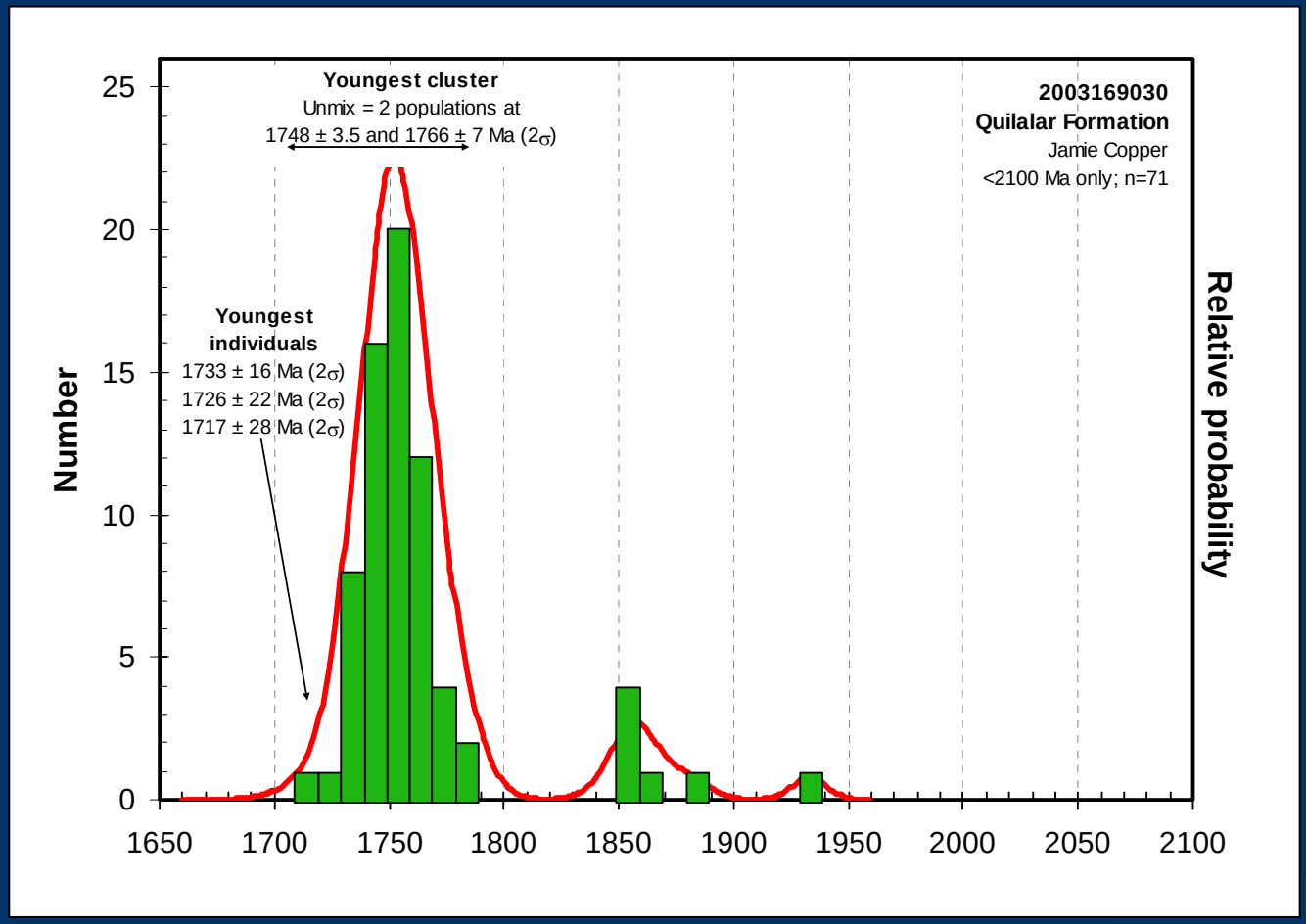




- **Single age = 1773 ± 2 Ma**
  = depositional age for Bortala Formation
- **Best age constraint for the Myally supersequence**

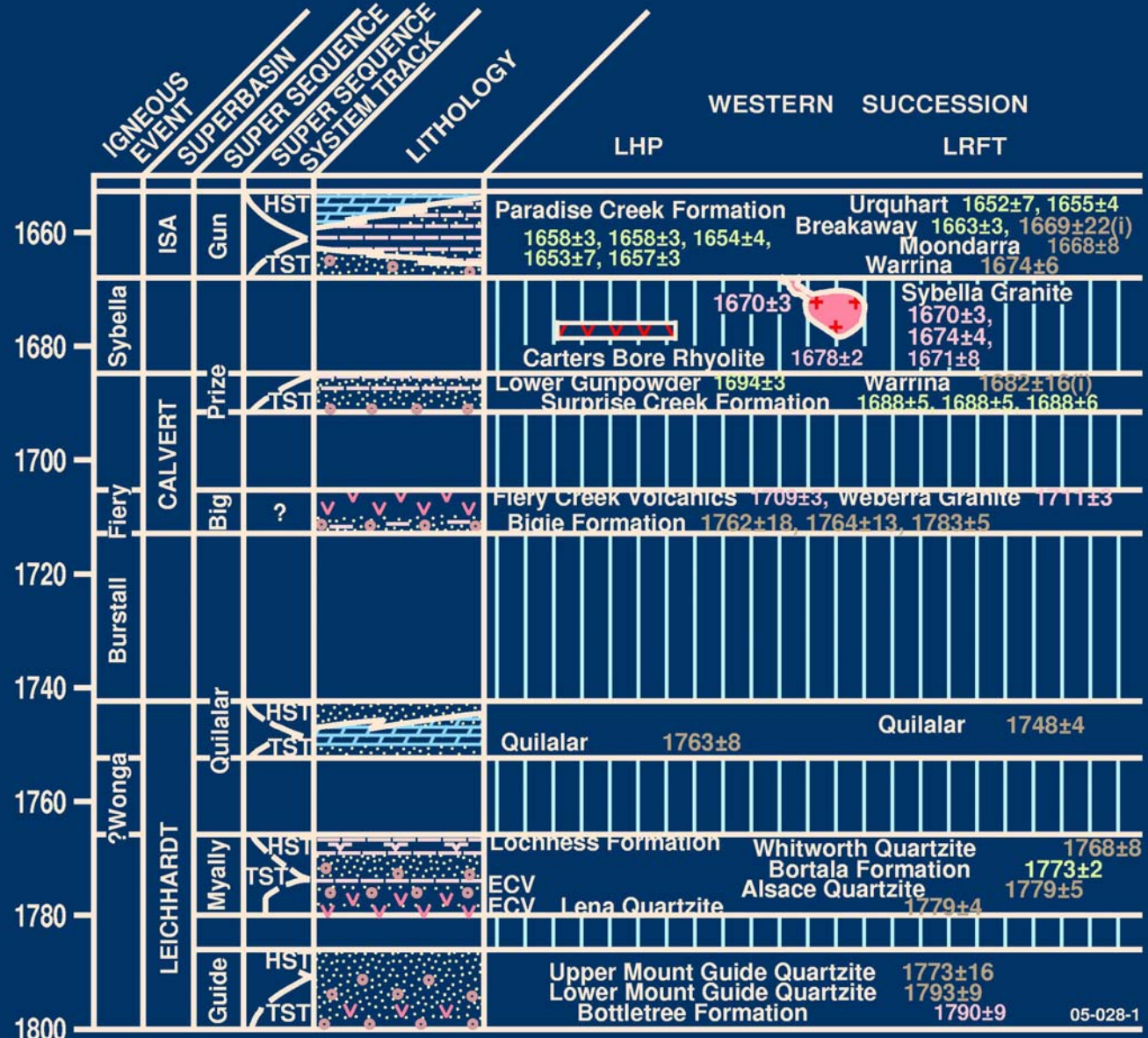
*** Compare with maximum depositional age of 1779 ± 4 Ma for Lena Quartzite – also part of the Myally supersequence**

Quilalar Formation



- Detrital spectra = one dominant cluster at ~1750 Ma plus older individuals to 2625 Ma
- Maximum depositional age defined by youngest cluster = 1748 ± 4 Ma
- Best age constraint for the Quilalar Supersequence

New WFB event chart for 1800-1650 Ma basins



Can divide the Leichhardt and Calvert Superbasins into five sedimentary superseqeunces:

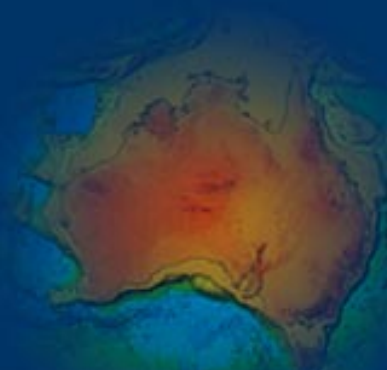
- **Guide**
- **Myally**
- **Quilalar**
- **Big**
- **Prize**

Temporal relationships between basin formation and magmatism ?

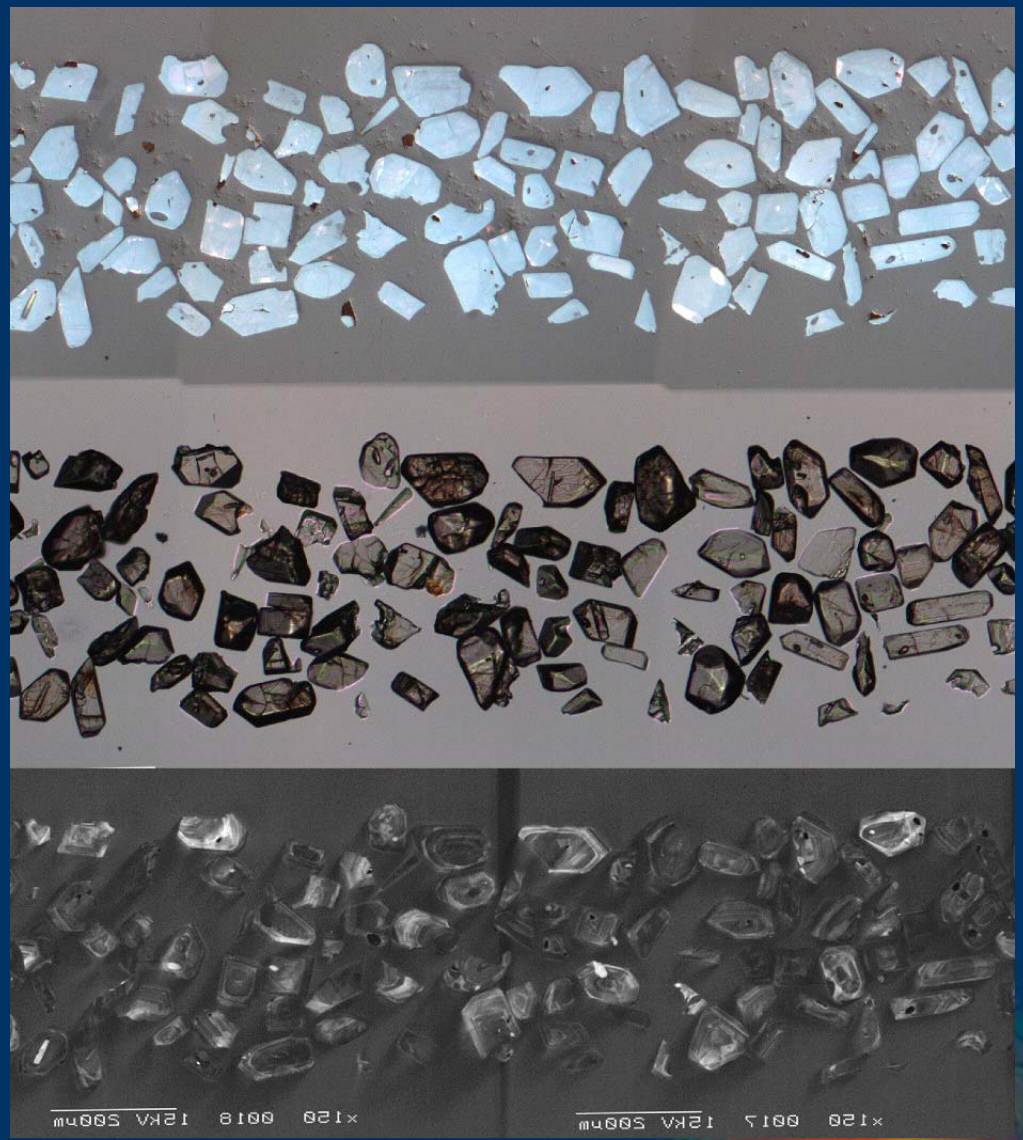
Many ages for magmatic units in the WFB and MKZ derived from conventional U-Pb zircon methods – potential for 'mixed ages' in complex multi-aged rocks, often resulting in large errors

8 new SHRIMP ages for selected magmatic units which either separate or occur within the Leichhardt, Calvert and Isa Superbasins :

- **Burstall Granite**
- **Lunch Creek Gabbro**
- **Weberra Granite**
- **Sybella Granite**

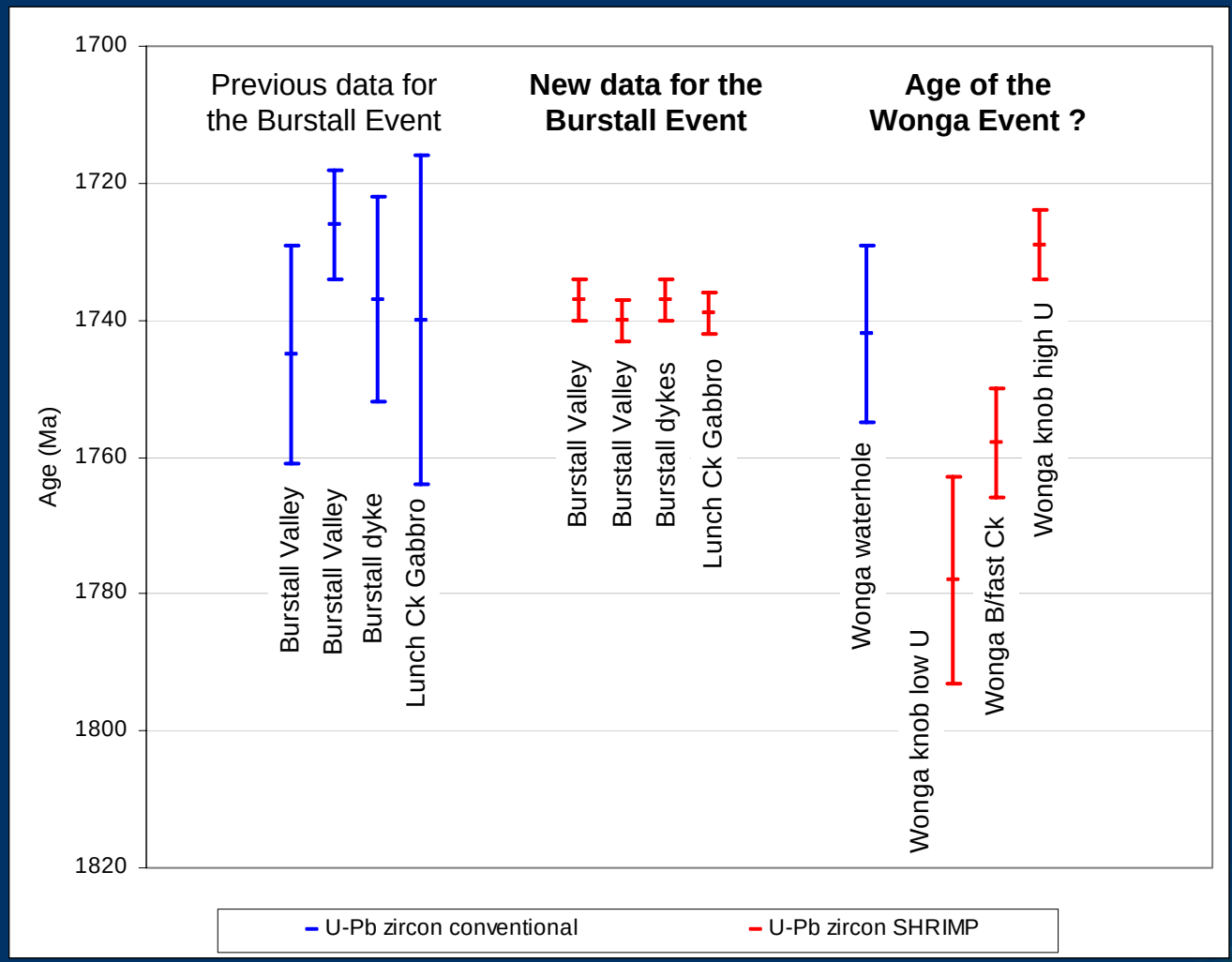


Burstall Granite and Lunch Creek Gabbro

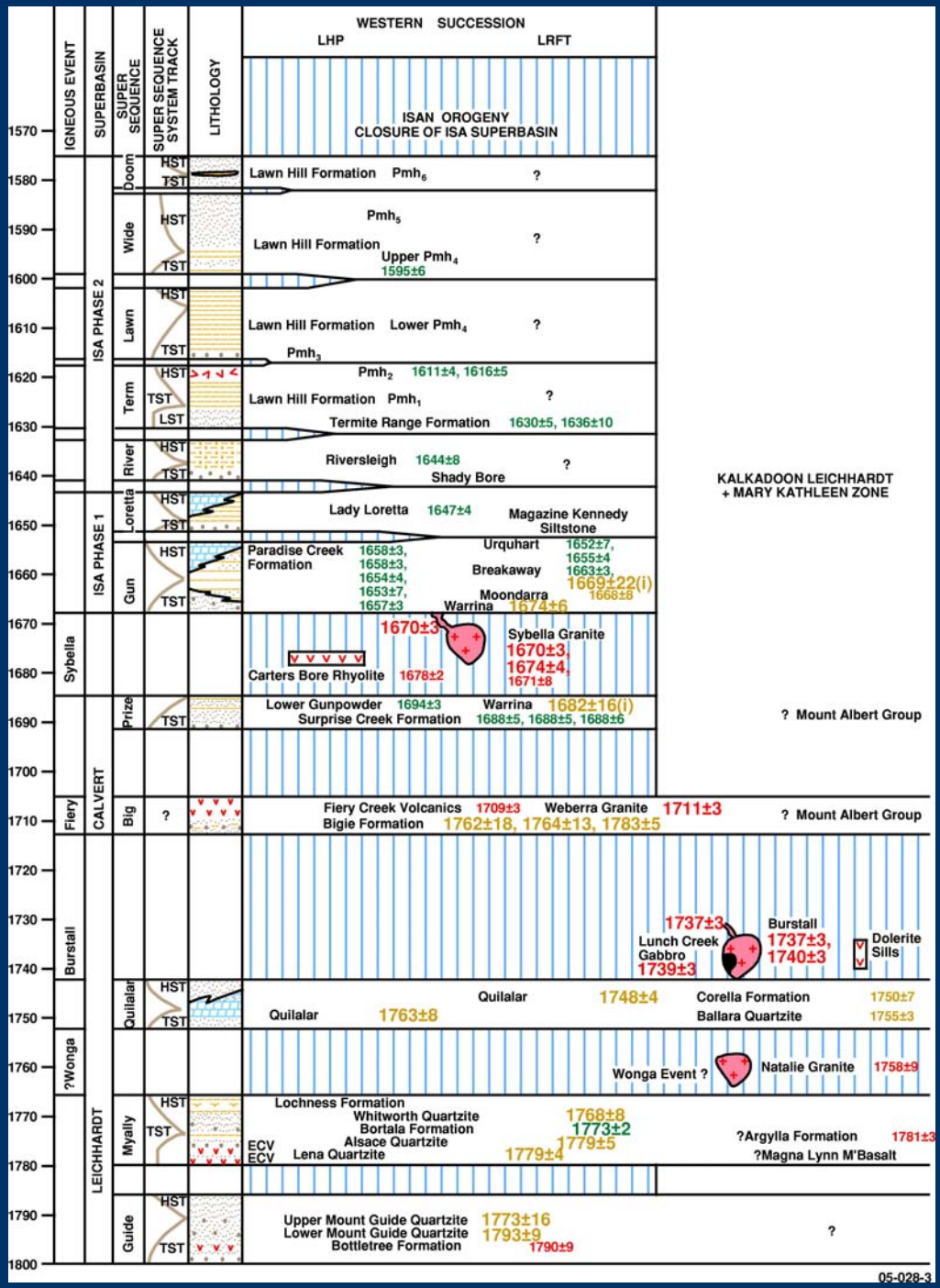


***Co-magmatic mafic and felsic event**

New ages for the Burstall Granite and Lunch Creek Gabbro



Burstall Event refined to 1740-1735 Ma



New event chart for the Western Fold Belt

- **Refined ages for:**
  Burstall event ~1740 Ma
  Fiery event ~1710 Ma
  Sybella event ~1670 Ma
  ? Wonga event

- **Detailed stratigraphic event chart for the 'post-basement' record in the Western Fold Belt**