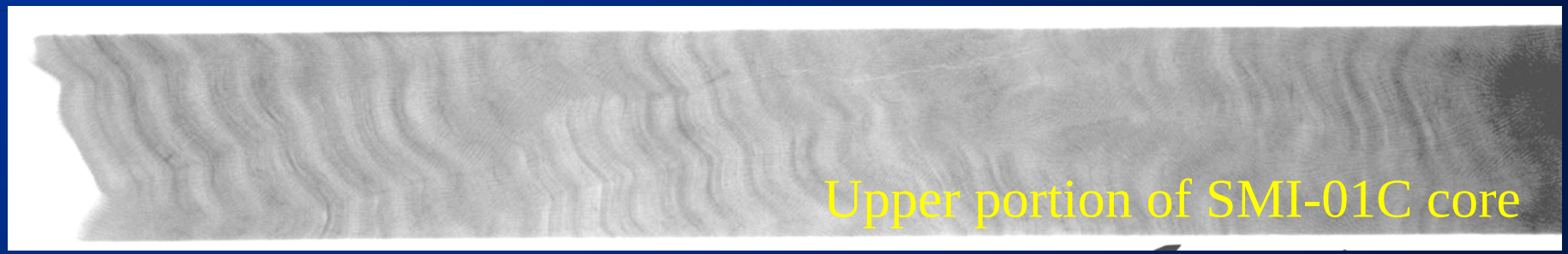
Summary of MTSRF Project 1.1.4

- One honours project finished (Jill Quaintance)
- Two Ph.D recruited (Jez Roff and Cameron Pietsch)
- One paper submitted to *Quaternary International*
- Four topics (financially supported by Project 1.1.4) studied:

1. Testing U-Th age against independent growth band-counting age (by Lawrence, Yu, Zhao)
2. Community structure analysis and U-Th dating of death assemblage from Swain reef (Jill's Honours project)
3. Community structure analysis and U-Th dating of coral rubbles from cores in Double Cone Island, Whitsunday (Jez's Ph.D project)
4. U-Th dating of cyclone-transported reef blocks on Heron & Wistari reefs (by Zhao, Neil, Feng, Yu & Pandolfi)

U-series ages vs coral growth band-counting ages

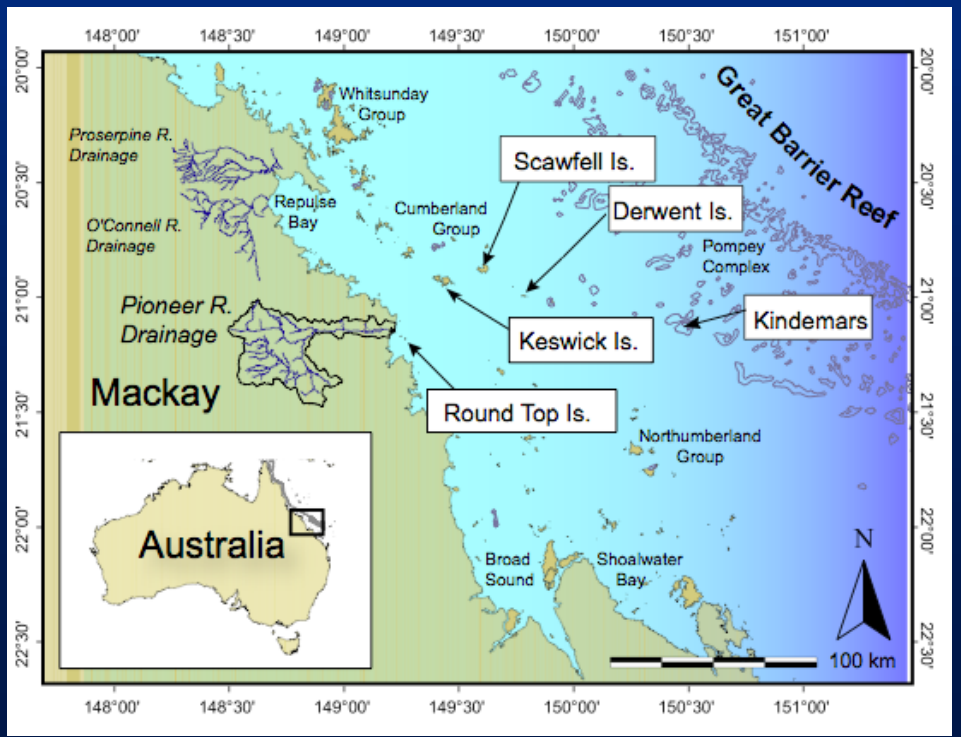
(For Lawrence's Ph.D thesis, ages determined by Yu & Zhao)



- Five U-Th ages determined: 1981 ± 1, 1942 ± 1, 1842 ± 3, 1843 ± 6, and 1798 ± 5 AD
- 1st and 2nd ages perfectly match with band-counting ages
- The 3rd and 4th ages identify an off-axis section with the growth layer nearly parallel to the sampling traverse (agree with unpublished AIMS UV luminescence chronology by Dr Lough)
- the 5th age defines the age of a broken section with floating chronology
- Overall, the U-Th ages agree with band-counting ages very well.

Honour's student Jill Quaintance's Thesis Project

Coral community structure in life and death assemblages from the Swain Reefs, Great Barrier Reef, Australia



- 5-135 km from Mackay
- European settlement (1865)
  - –Cattle farming
  - –Sugar mills
- Pioneer river (1,570 sq km catchment area)

Methods

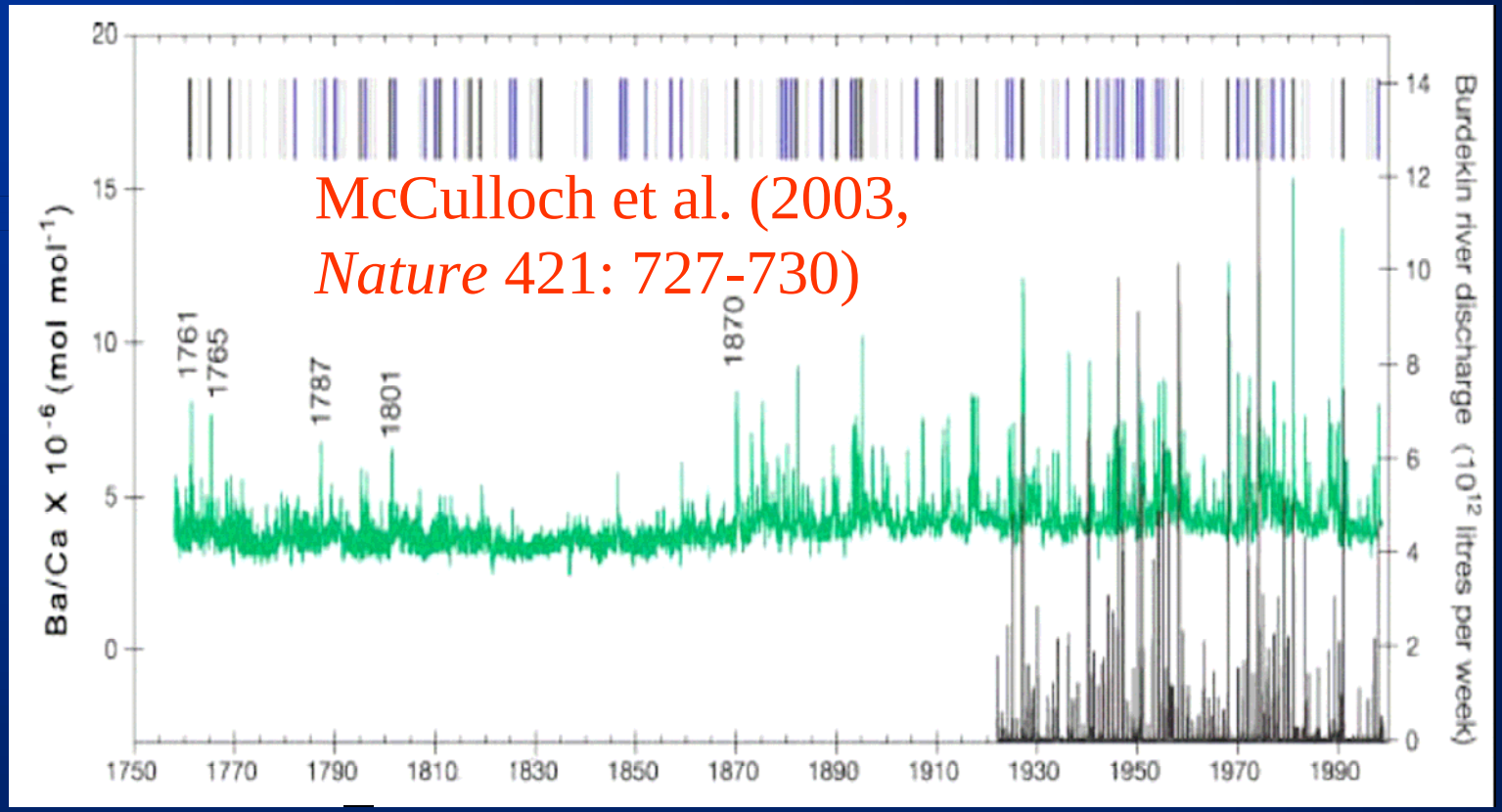
- 6 reefs
- 2 sites at each reef
- 2 transects at each site
- 50 m transects
- Death Assemblages
  - Loose coral rubble
  - 6 ~1 liter volume samples from each transect
    - weight of colonies per taxonomic group
    - Number of colonies per taxonomic group
  - U-series dating of coral colonies from Keswick Island
- Life Assemblages
  - 0.25 m^2 quadrats every other meter

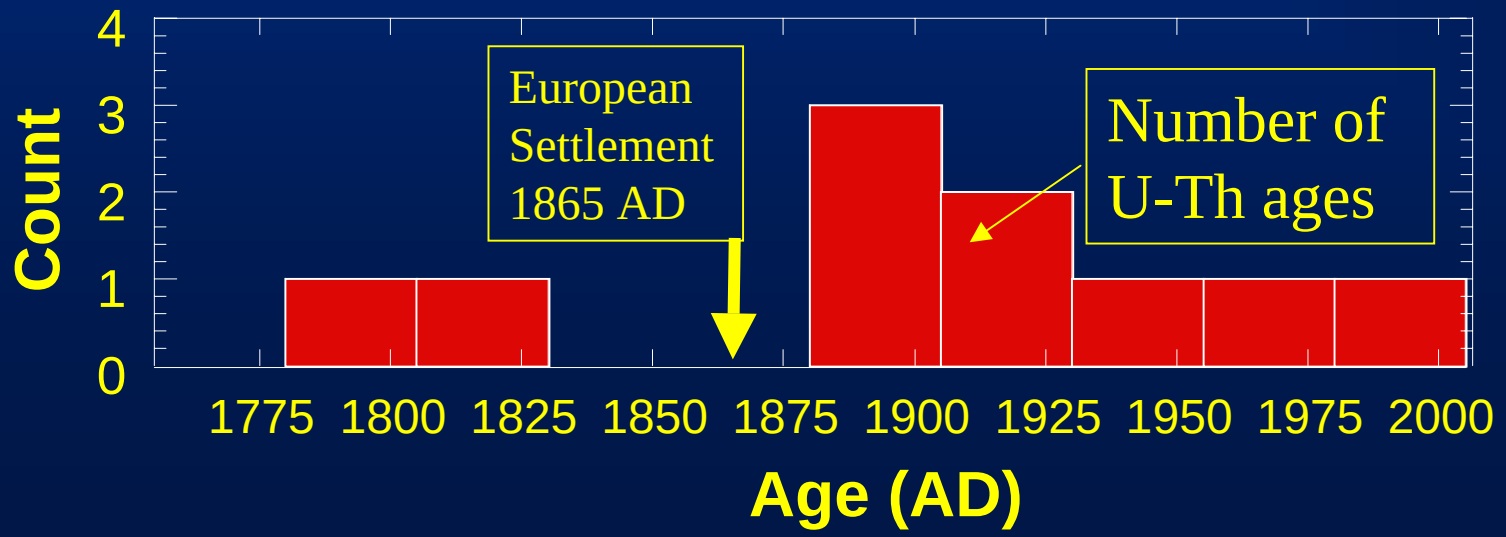
Results

- Significant difference between life and death assemblage, by all methods
- Death assemblage relatively modern <250 years

Question

- What might have influenced these changes?





Jian-xin Zhao:

10 branching coral rubbles were chosen for U-Th dating. The results display an age population peak at 1890 AD which declined toward present time. If branching coral population had not changed, we would expect younger coral rubbles outnumber older ones due to decreasing survival probability with age as a result of erosion. Our working hypothesis for the age distribution pattern is that branching coral coverage started to decrease following European settlement and cattle farming from 1865 AD in the region. Ba/Ca proxy data of McCulloch et al. (2003) for a coral in the region suggest that sediment flux into the GBR increased since 1870, coinciding with farming in the Pioneer River catchment. It is likely progressive farming has had an accumulative effect on the more vulnerable branching coral species, resulting in progressive stress and reduction in branching coral coverage.

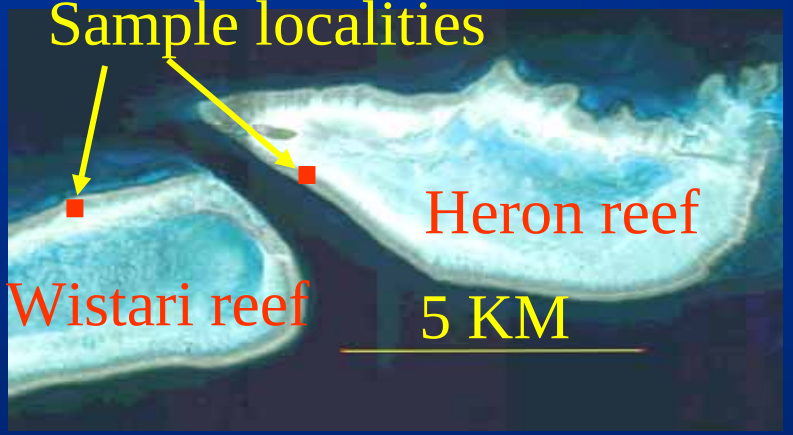
This working hypothesis needs to be tested by far more dating. We plan to increase the age population by 5-10 time to assess whether this is the case.

Ph.D student Jez Roff's Project

- 15 cores extracted from Double Cone Island, Whitsunday
- 6 cores with coral ID to species or genus levels
- Core DCI26 (left) – 180 cm long
- Top-base ages determined using two coral fragments –
  1. 0-5 cm, 8 ± 5 yrs old
  2. 175-180 cm, 1184 ± 68 yrs old
- Age errors due to correction for impurities in corals

U-Th dating of cyclone-transported coral reef blocks

(by Zhao, Neil, Feng, Yu & Pandolfi)



Sample name	mortality age (AD)
HR-1	1970±4
HR-2	1907±1
HR-3	1944±1
HR-4	1914±3
HR-5	1734±4
WRW-3	1943±3