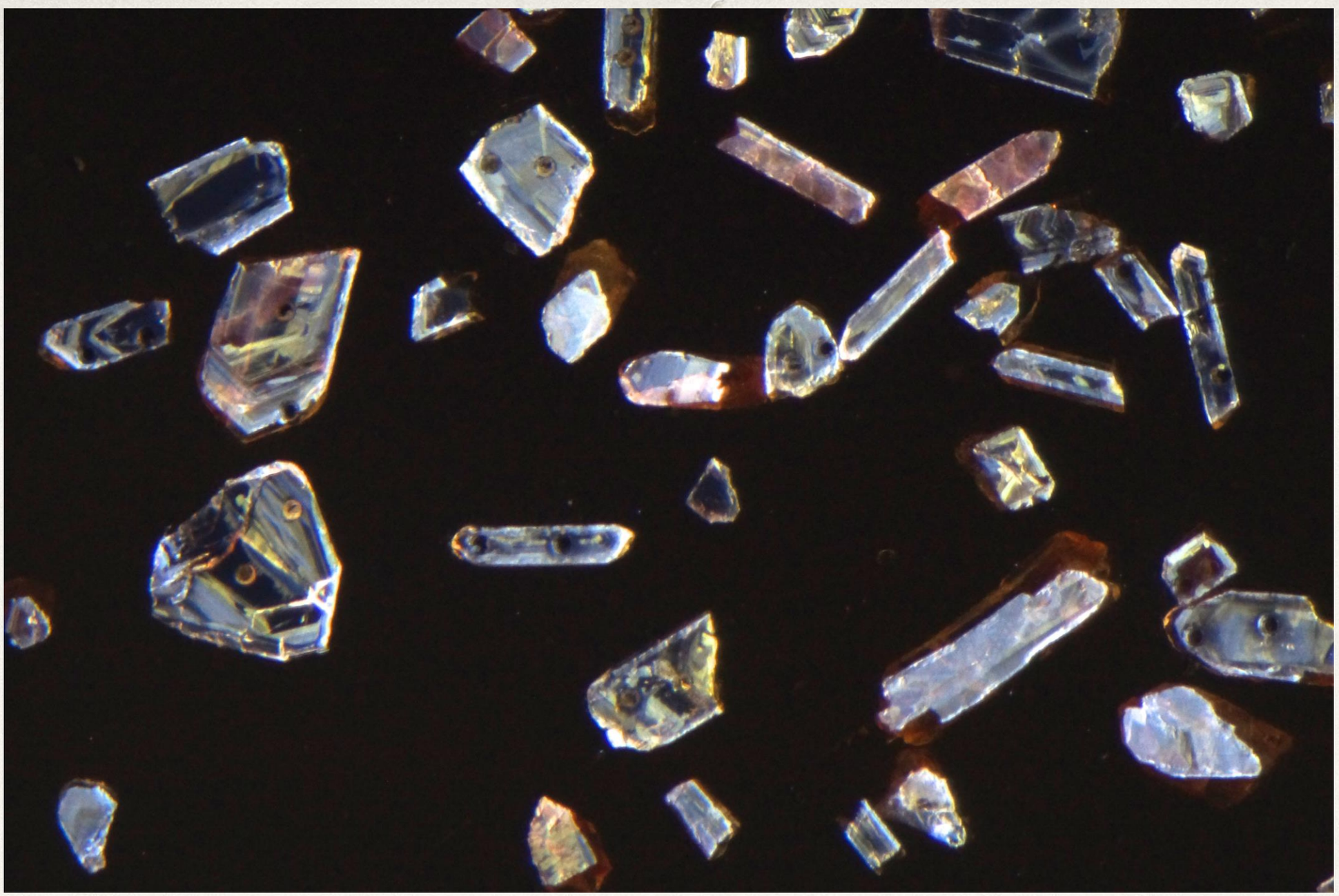

Thermal annealing experiments

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Goldschmidt Workshop, Aug 2015

Objectives

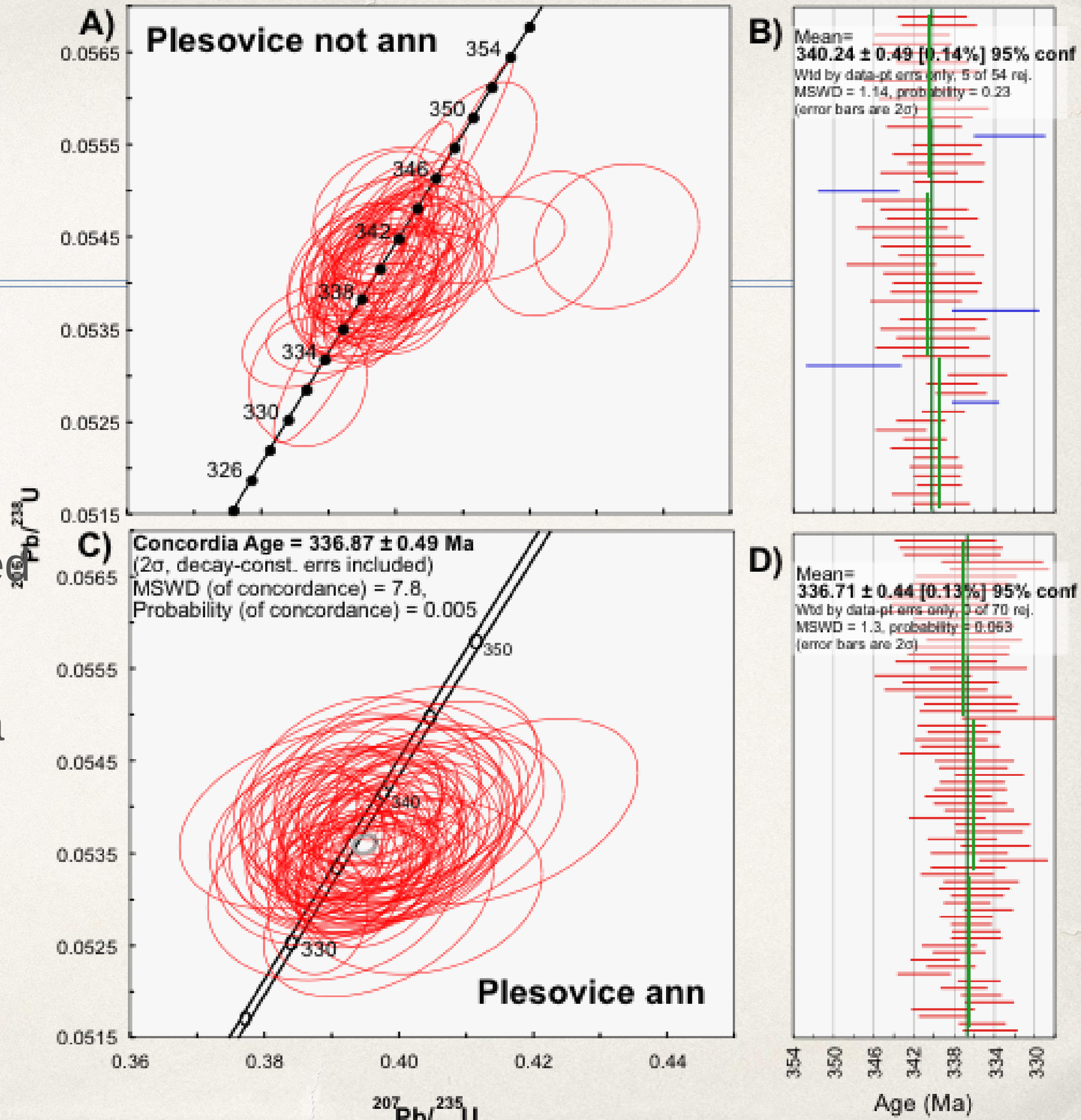
- Try to see whether thermally annealed zircons have less scatter, better age accuracy and precision
- What happens to complex zircons, in terms of age reproducibility of not annealed vs annealed zircons?
- See what happens to trace elements in thermally annealed zircons: do they retain zoning?
- What about Hf isotopes? Are they (and Yb-Lu correction) affected?
- Causes? Just some hint

Methodology

- Zircons separated and split
- One group thermally annealed in a muffle, 48 hrs @ 850ºC
- Both na and thermally annealed (each sample) mounted together in epoxy mount, polished and imaged (CL and SEM)
- Both analysed in the same day, same experiment, same conditions:
  - 32 um spot, 5 Hz, fluence 6 J/cm2 (measured before and after analysis)
  - Resolution M050+Xseries II
  - Si, P, Ti, Y, Nb, REE's, Hf, Pb's, Th, U
  - Data reduced using Iolite (VizualAge+Trace_Elements DRS)
  - 91500 (annealed) internal std; Plesovice (annealed) control std; several samples from 1000 to 12 Ma

PLESOVICE

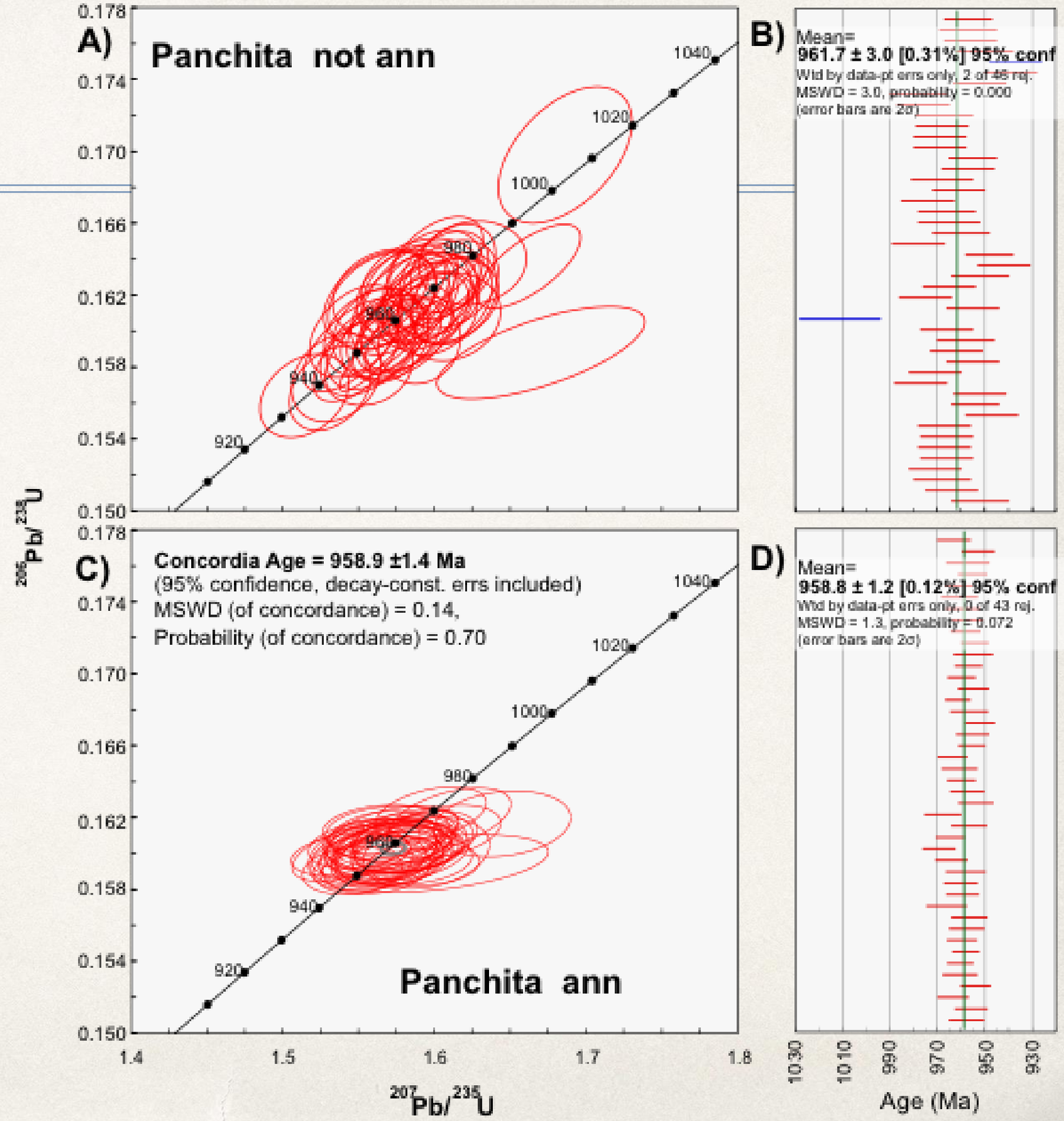
- 91500 ann as standard
- results of three sessions averaged
  - TIMS age is 337.13±0.37 Ma



PANCHITA PEGMATITE

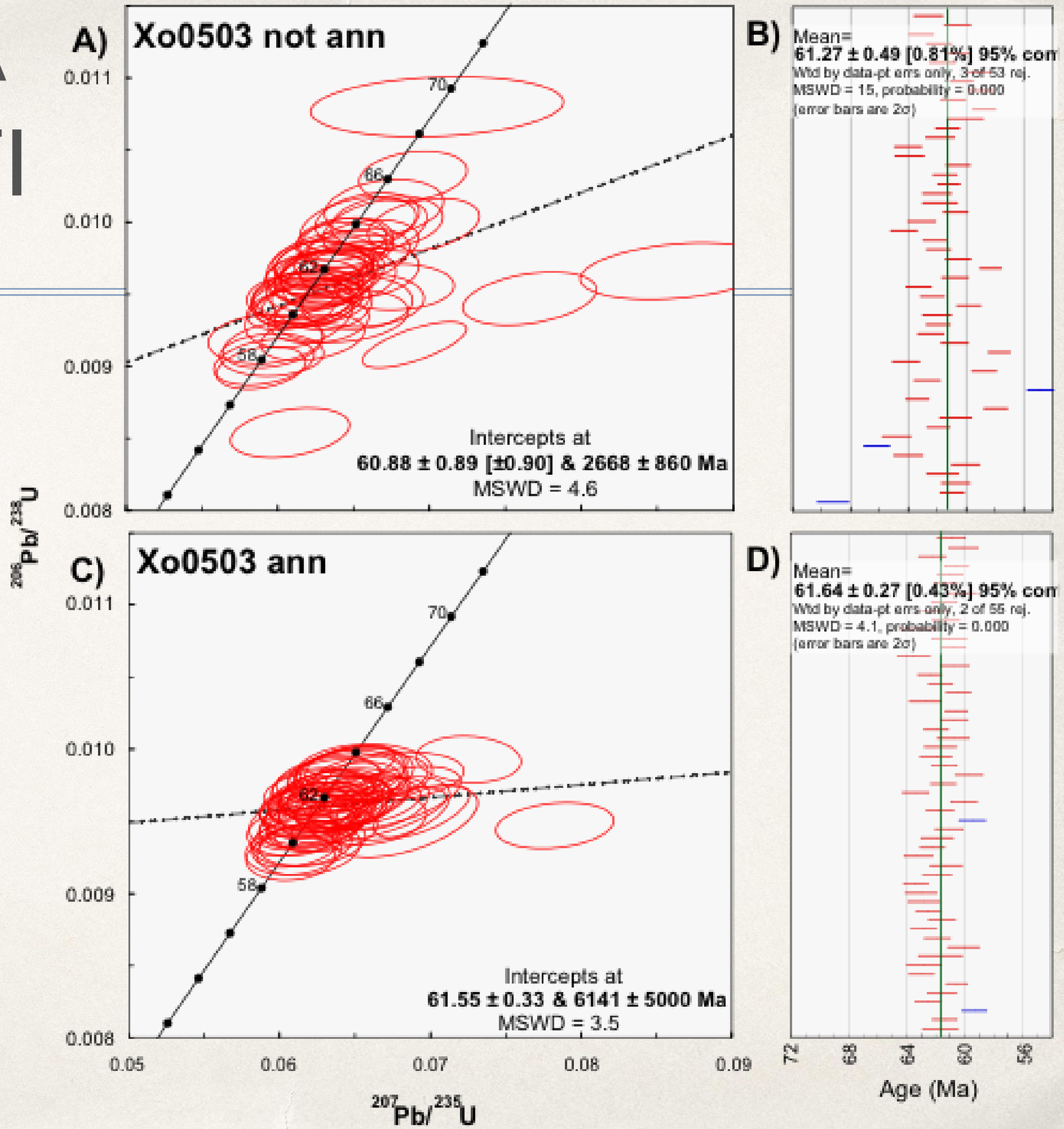
- Fragments of a large (ca. 5 cm) crystal

- TIMS age: 963.7±1.2 (no CA, no abraded, > 1 mg large fragments)



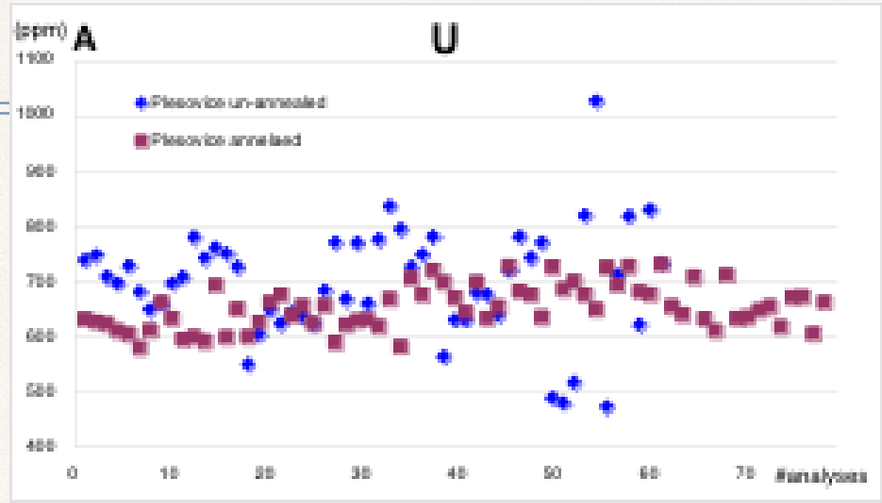
XOLAPA PEGMATITE

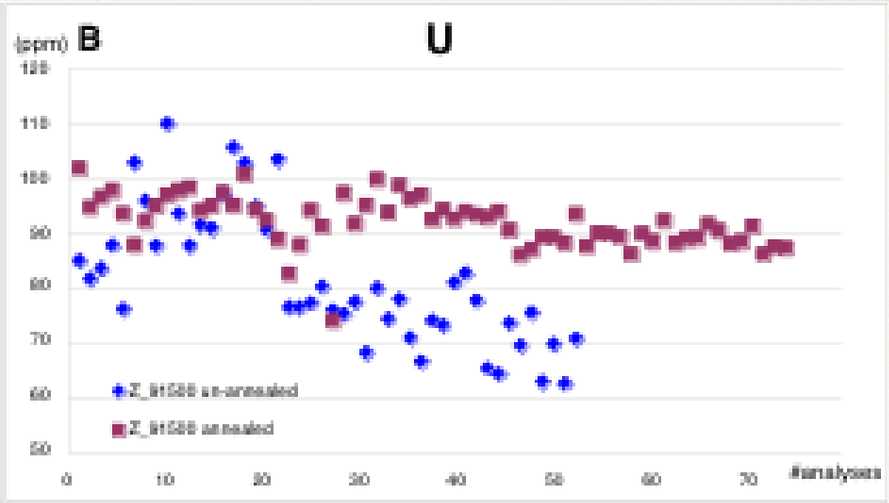
- Age poorly constrained between 129 and 52 Ma.
- Nearby granite stocks are 62-65 Ma

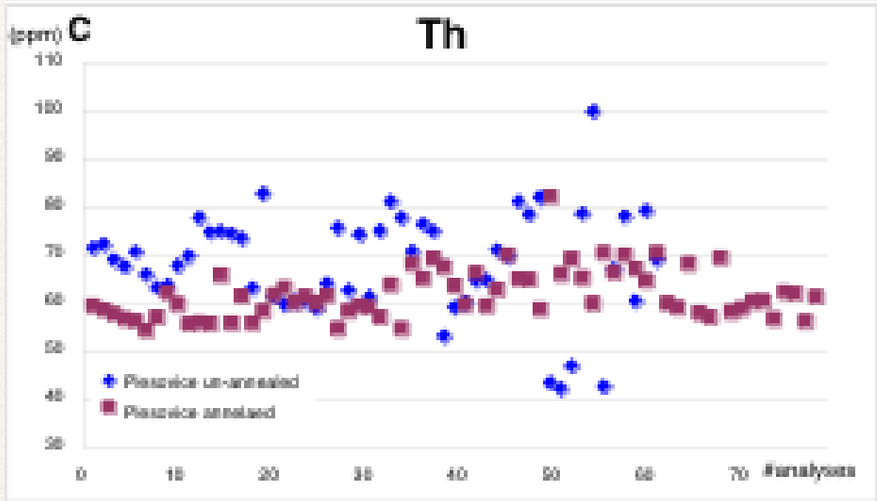


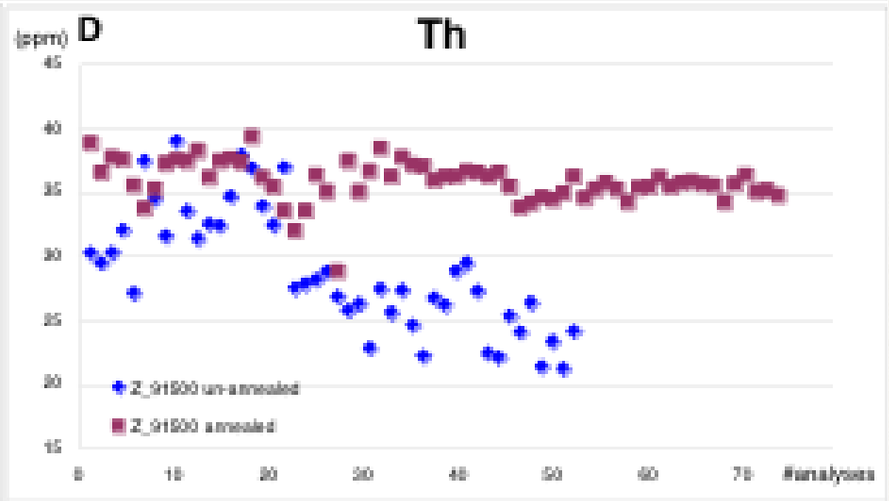
Result #2: trace elements

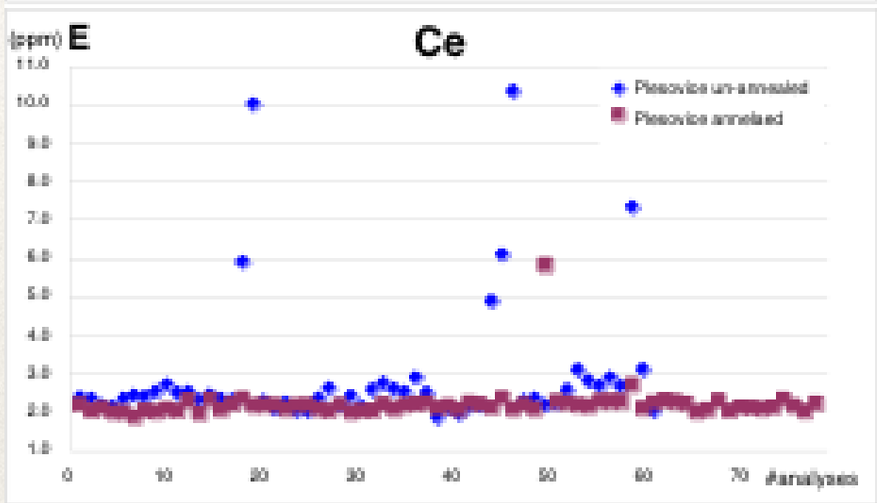
- Examples of Plesovice and 91500
- Annealed zircons are more reproducible and less scatter.
- Precision (±2SE) is the same

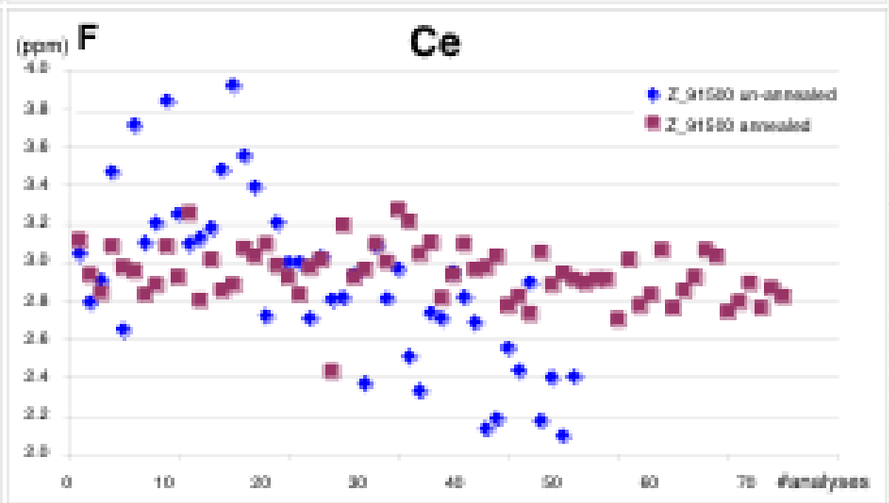






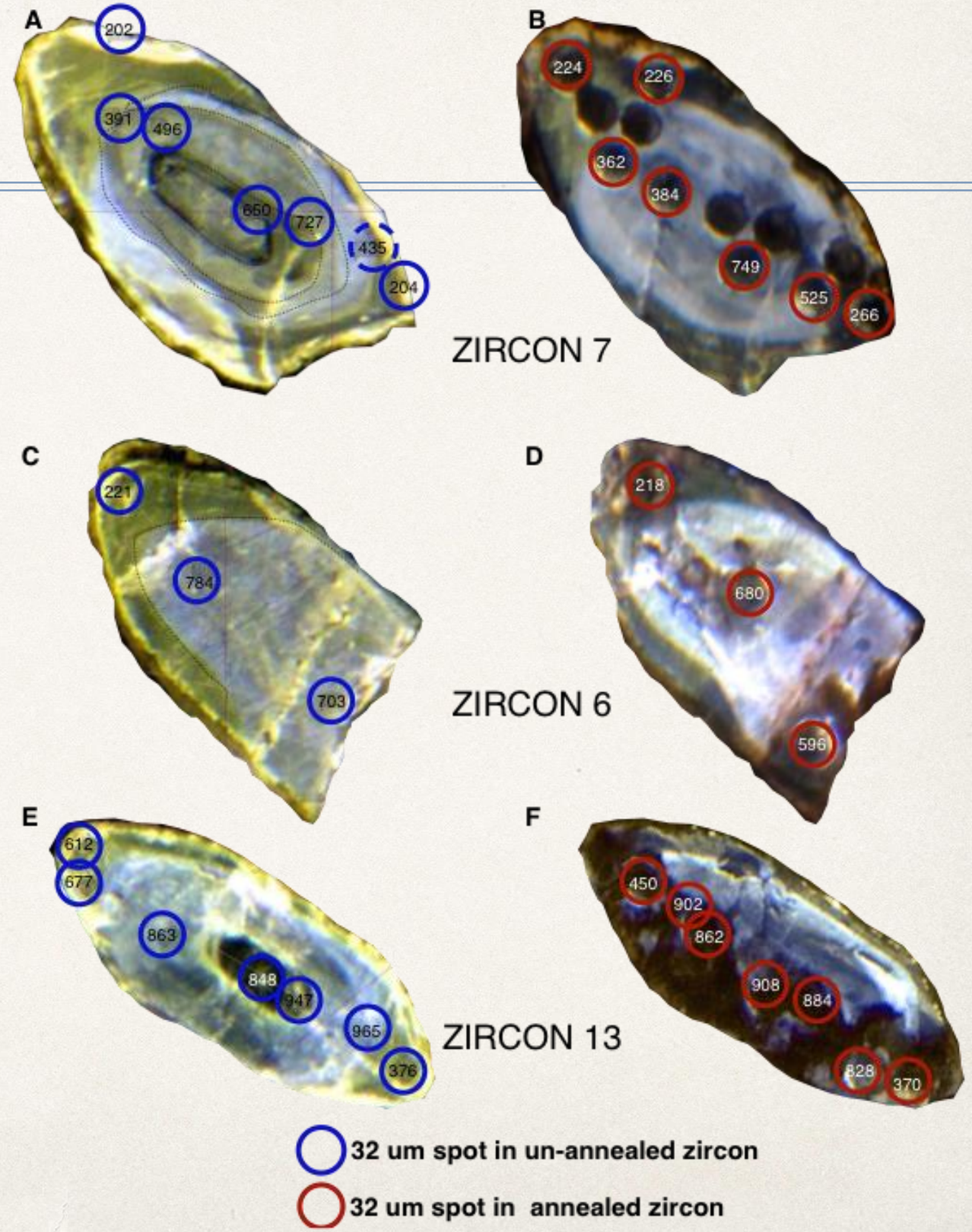




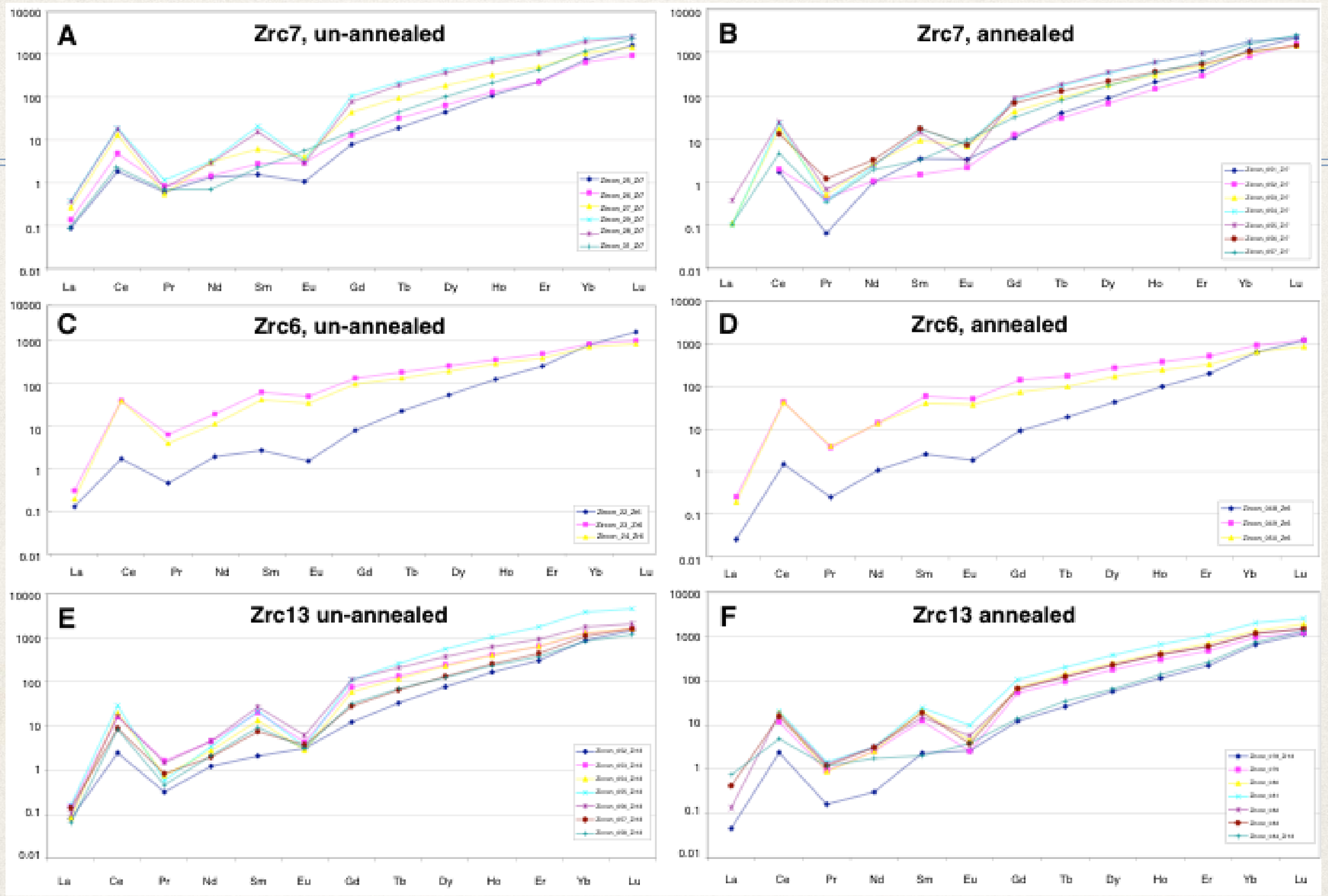


Result #3: complex zircons

- Large and complex zircons with overgrowths
- Differences in age zoning prior to annealing, are preserved

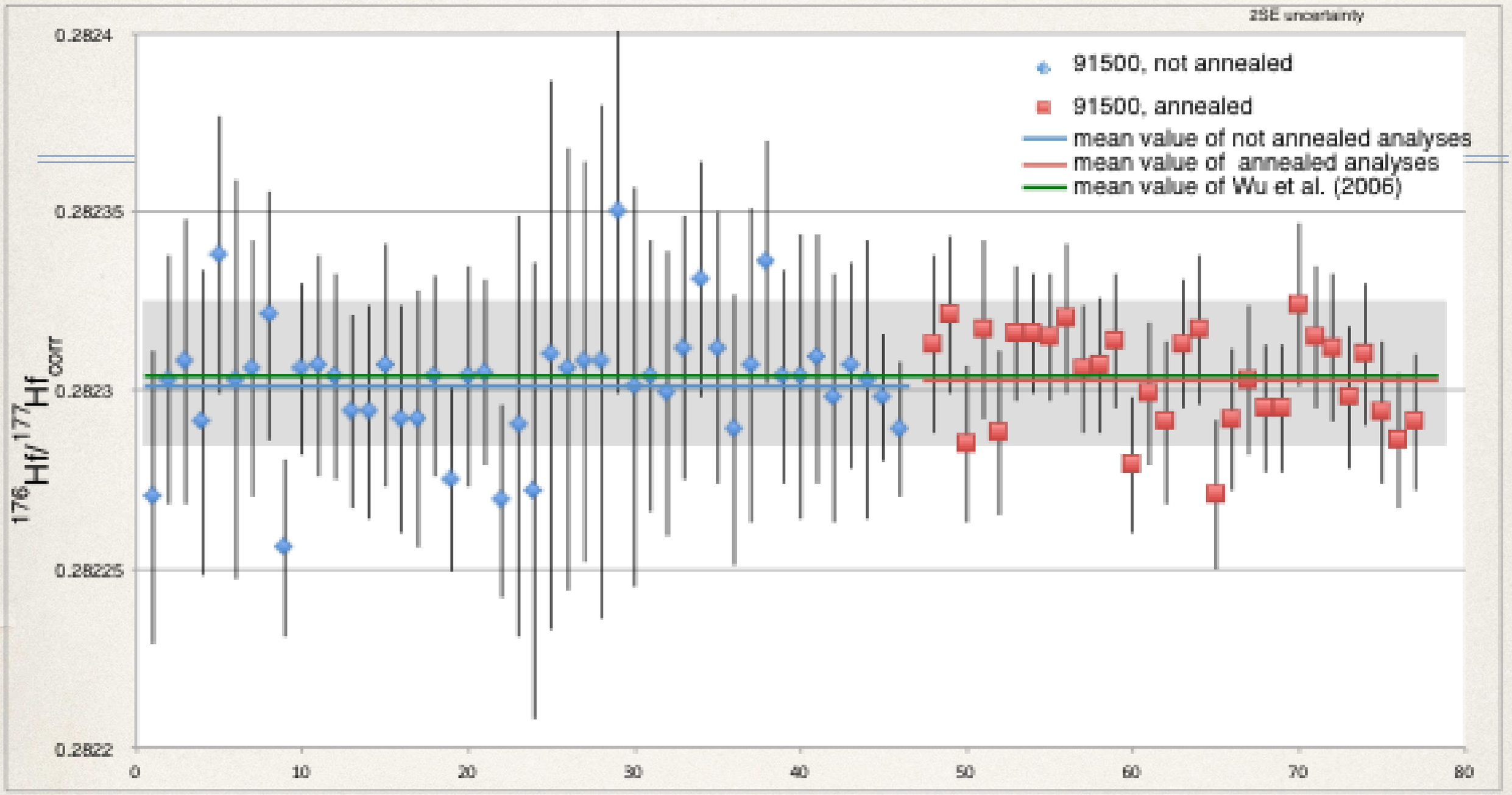


Result #3: complex zircons



Chemical differences are preserved after annealing

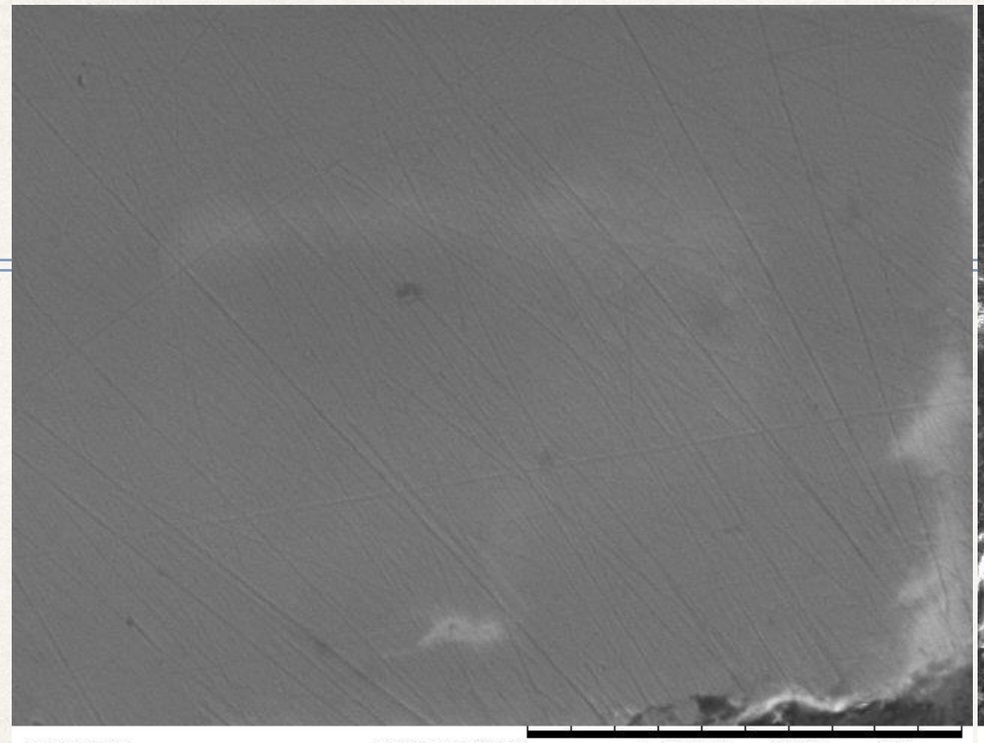
Result #4: Hf isotopes

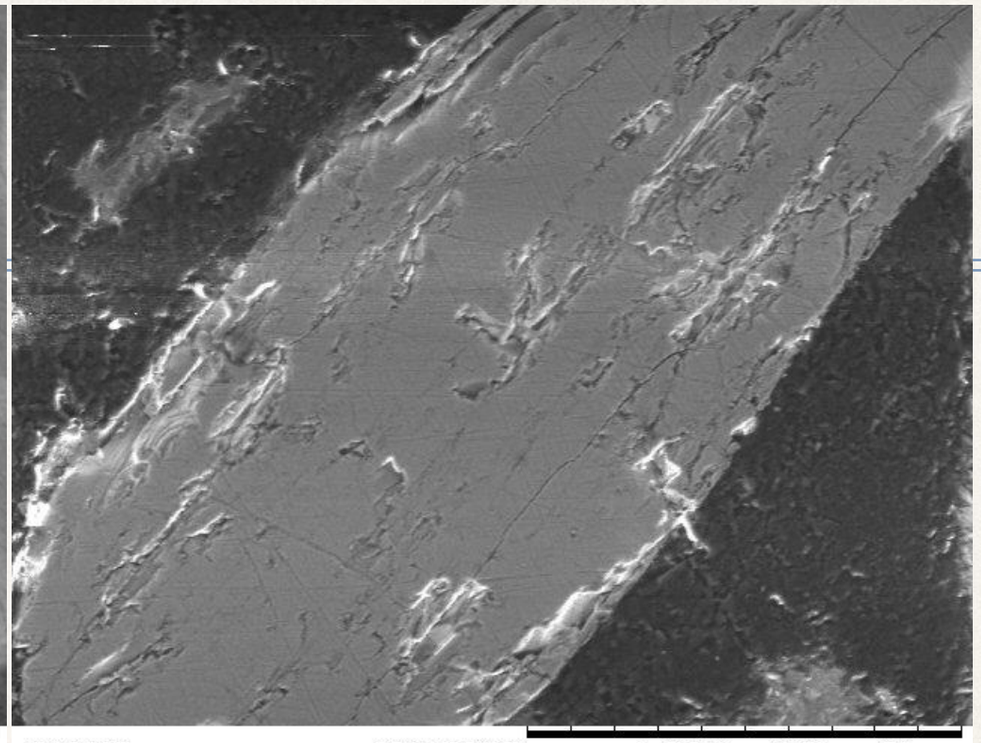


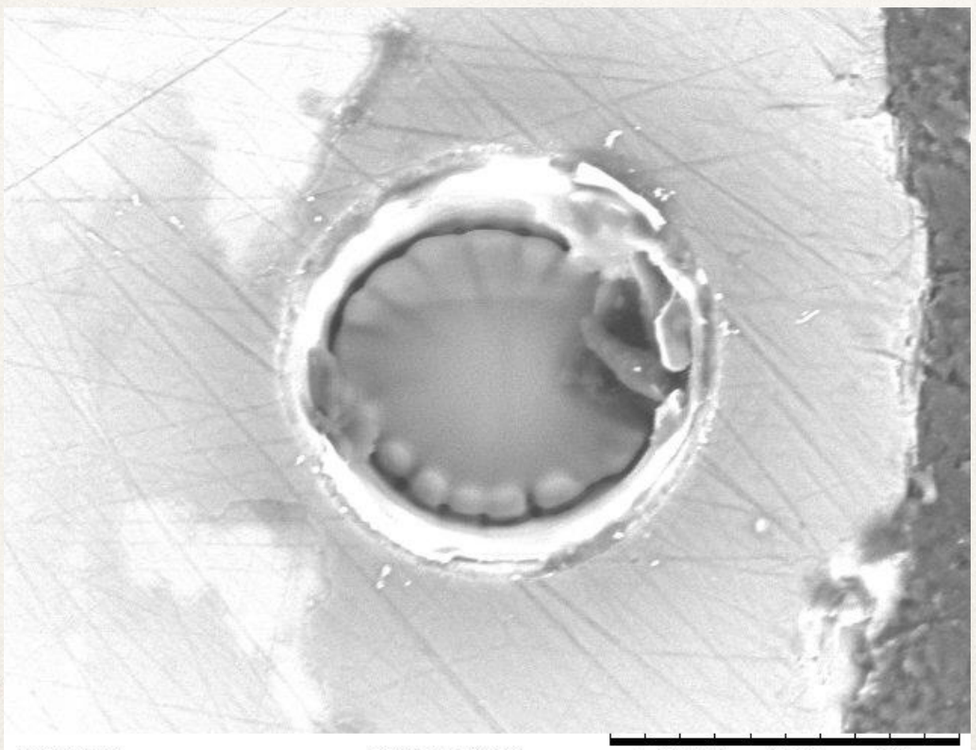
Thermal annealing does not affect accuracy/precision for Hf isotopes

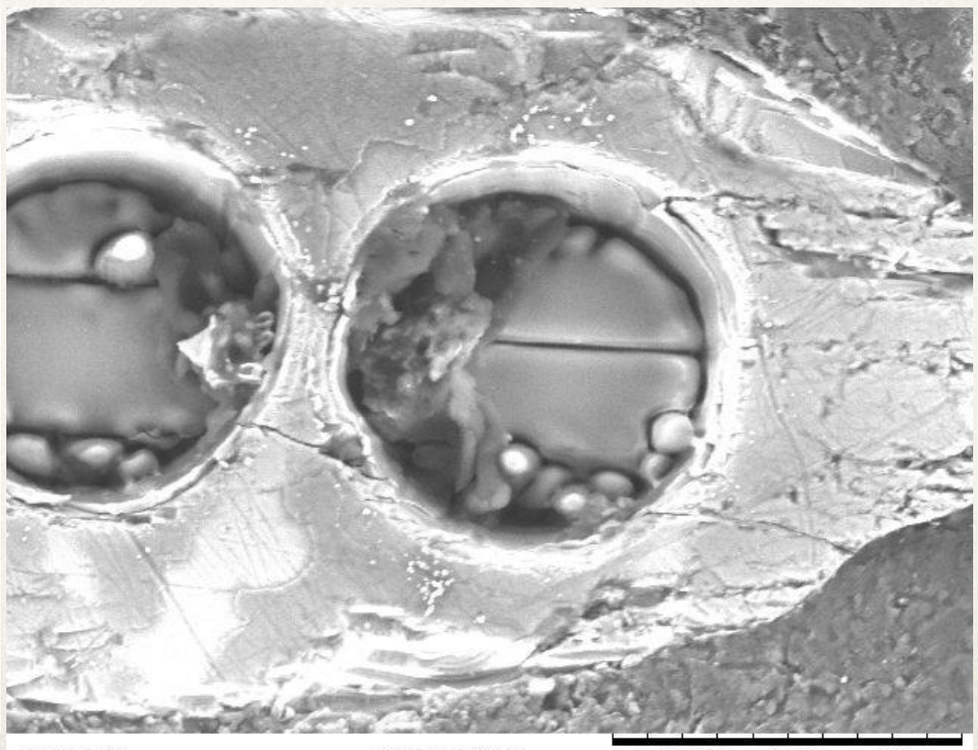
Some hints: SEM images

thermally annealed









not annealed