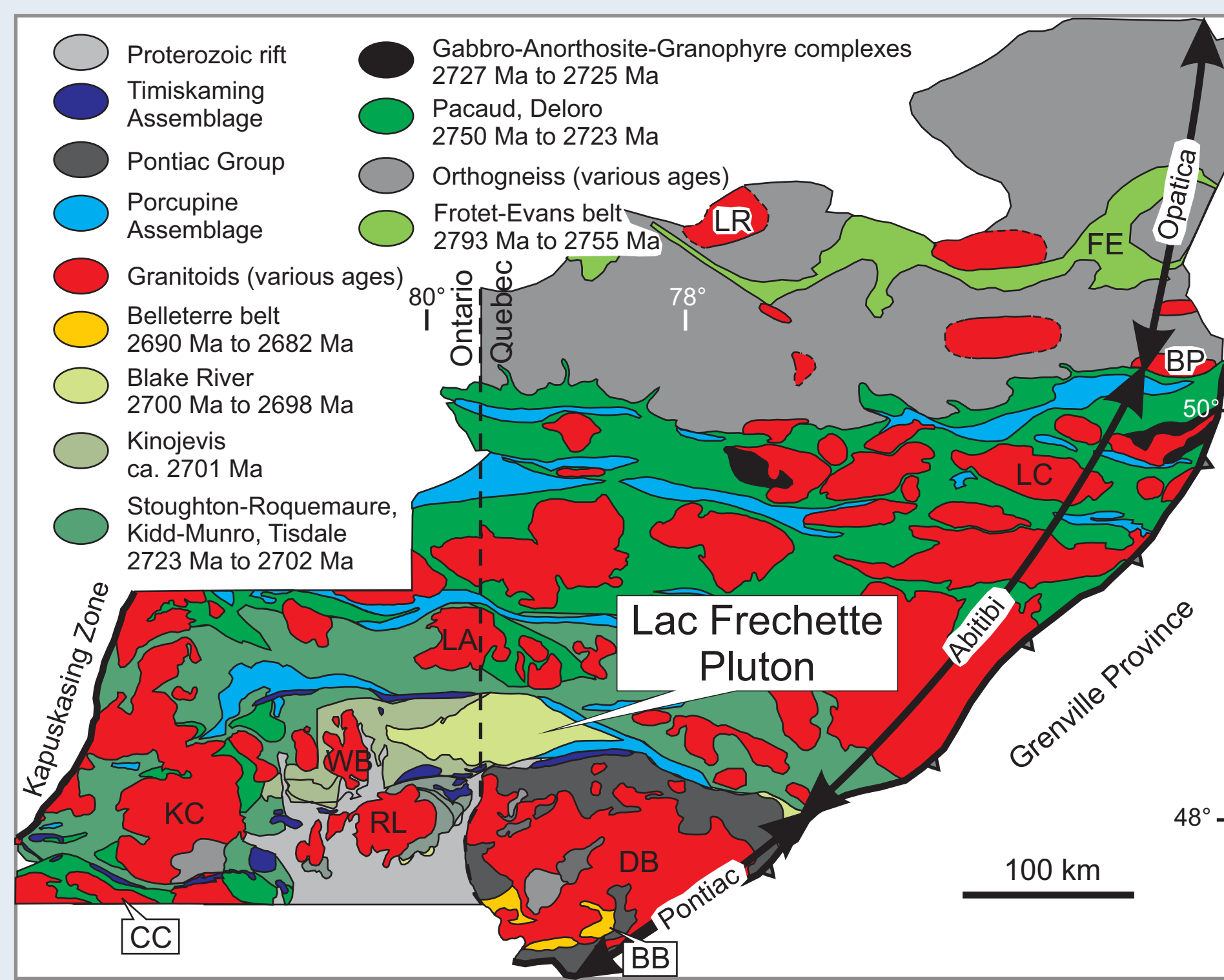


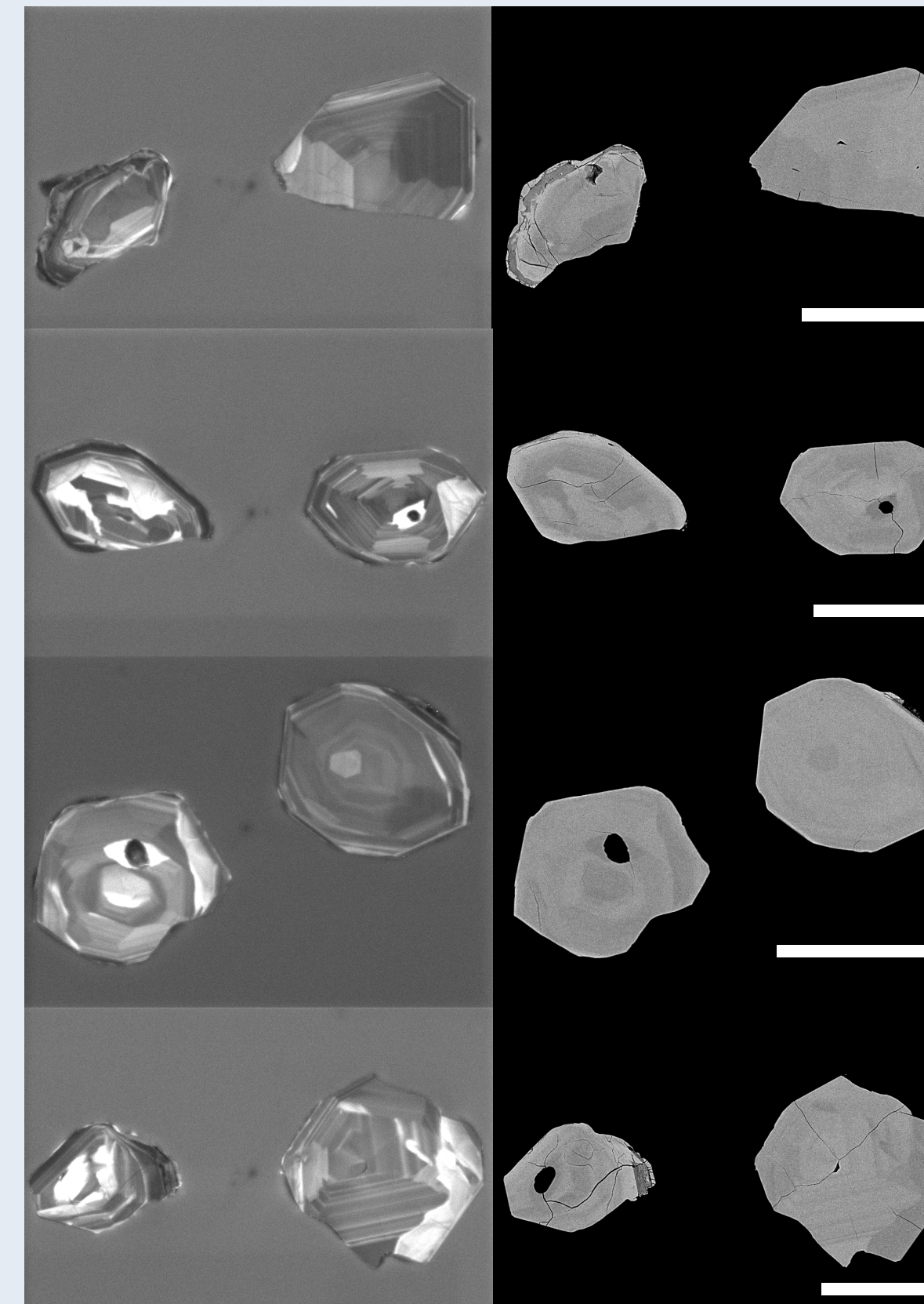
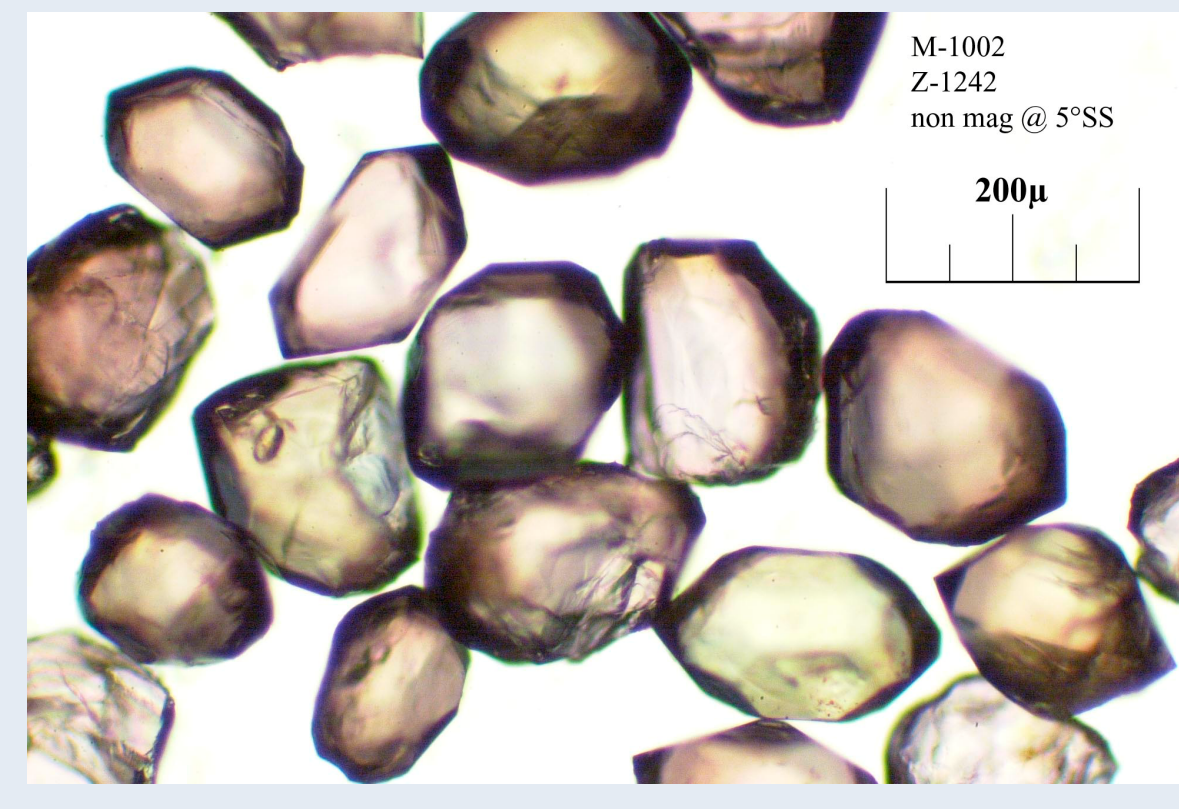
Introduction

Reference zircon z1242 has been routinely analysed as part of each U-Pb analytical session at the Geological Survey of Canada SHRIMP laboratory since 2006. The zircon is from the Lac Frechette pluton in the Pontiac Subprovince of the Superior Province, Canada and was originally collected by Mortensen and Card (1993). They reported an upper intercept ID-TIMS age of $2681 \pm 1.9/-1.4$ Ma. As z1242 is used as a monitor of analytical reproducibility in the GSC isotope-dilution thermal ionisation mass spectrometry lab, over 50 single grain fractions of mechanically abraded zircon have been analysed. These yield a weighted mean ID-TIMS $^{207}\text{Pb}/^{206}\text{Pb}$ age of 2679.8 ± 0.19 Ma (SEM 95% confidence) and a mean $^{206}\text{Pb}/^{238}\text{U}$ age of 2675.4 ± 1.1 Ma.

J. K. Mortensen and K. D. Card. Canadian Journal of Earth Sciences, 1993, 30(9):1970-1980, <https://doi.org/10.1139/e93-173>



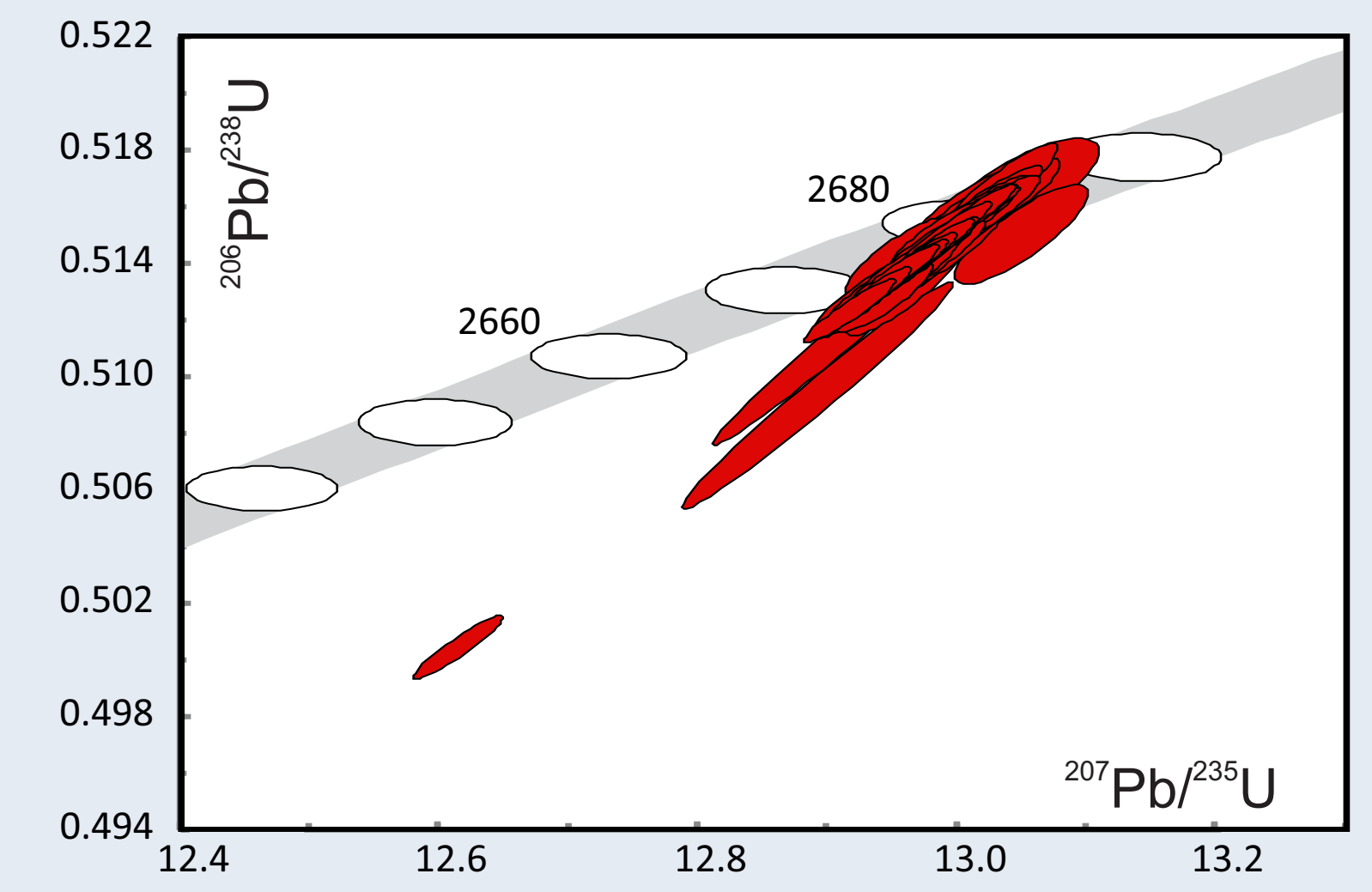
Zircon Images



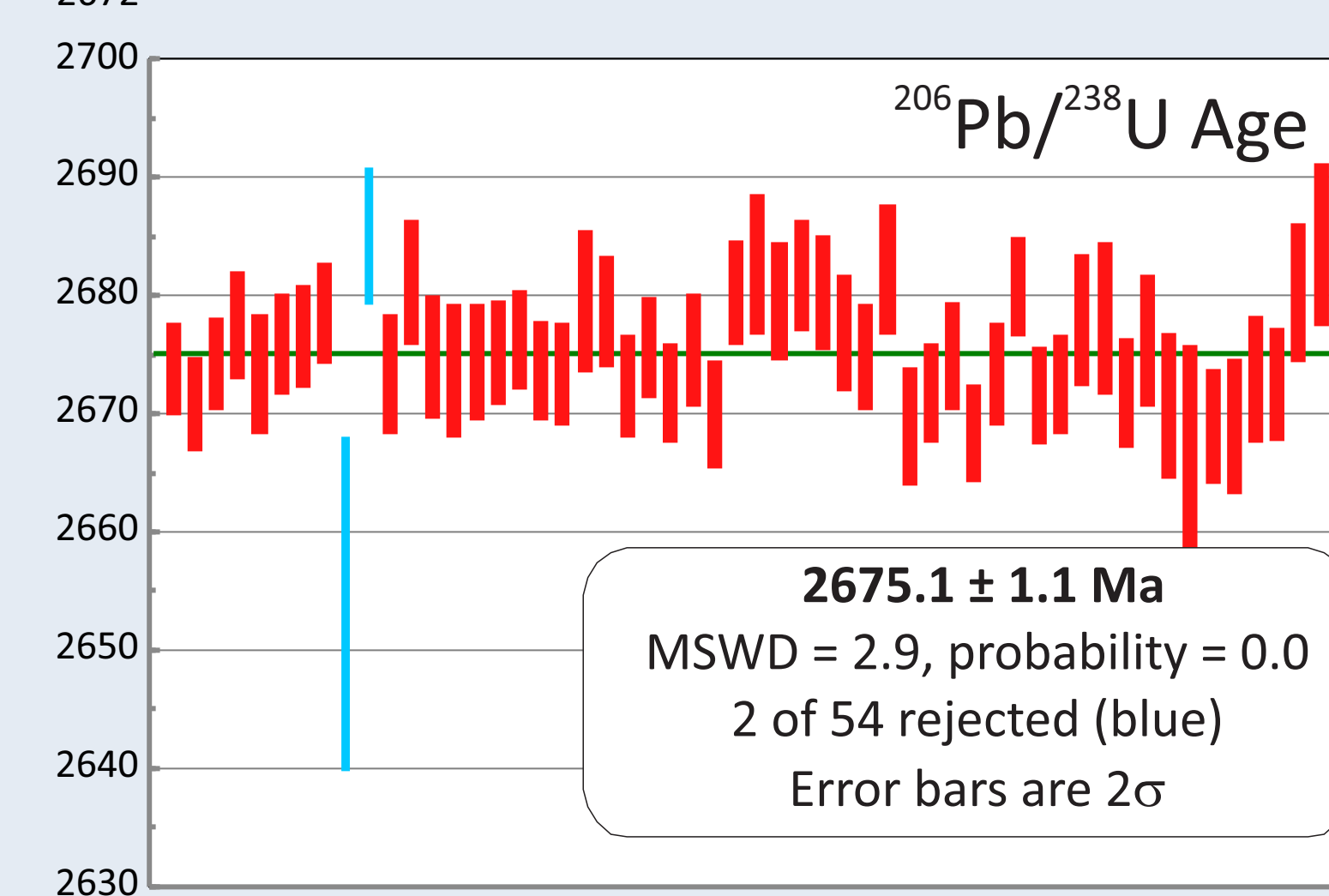
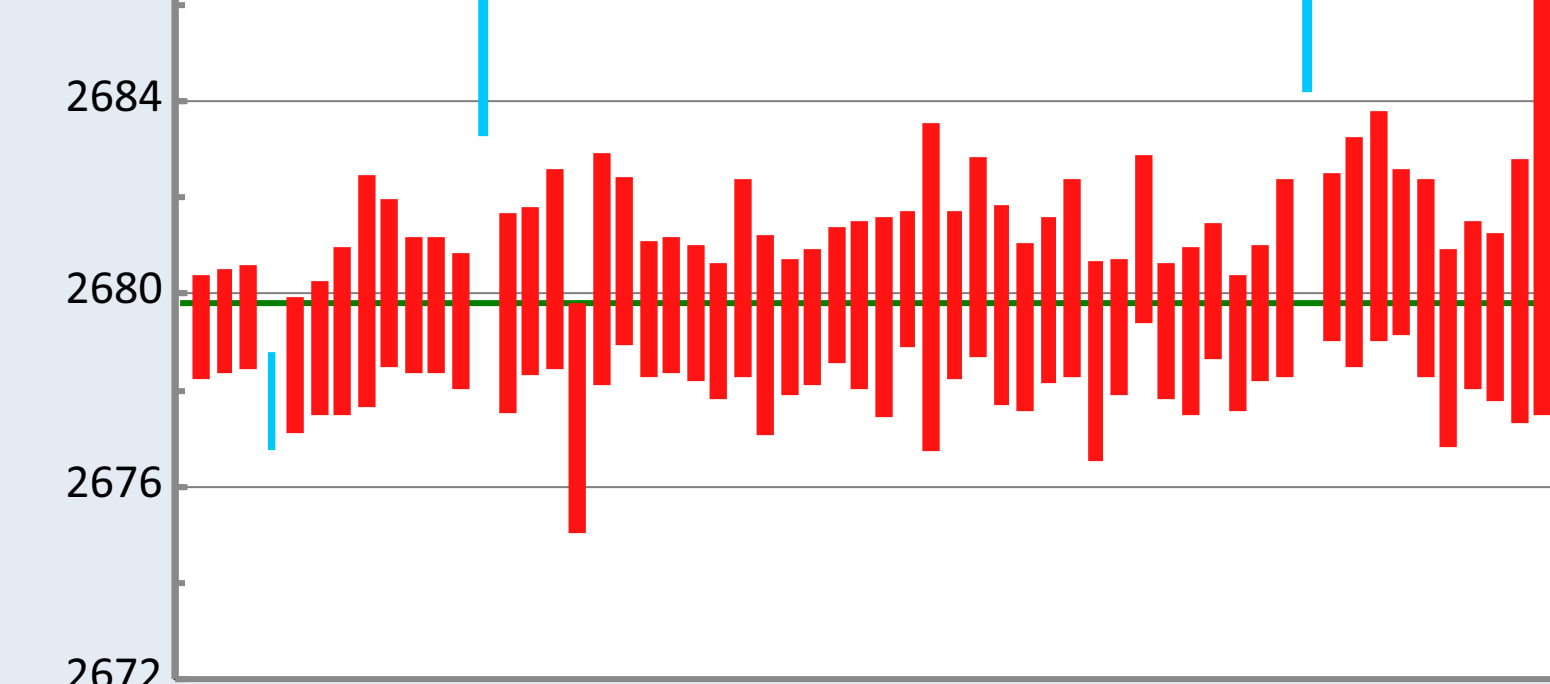
Cathodoluminescence (left) and back-scattered electron (right) images of z1242 zircons. Scale bar is 100 μm.

TIMS Analytical Data

Over 50 isotope dilution thermal ionisation analyses yield mostly concordant ages with a weighted mean age of 2679.8 ± 0.2 Ma.

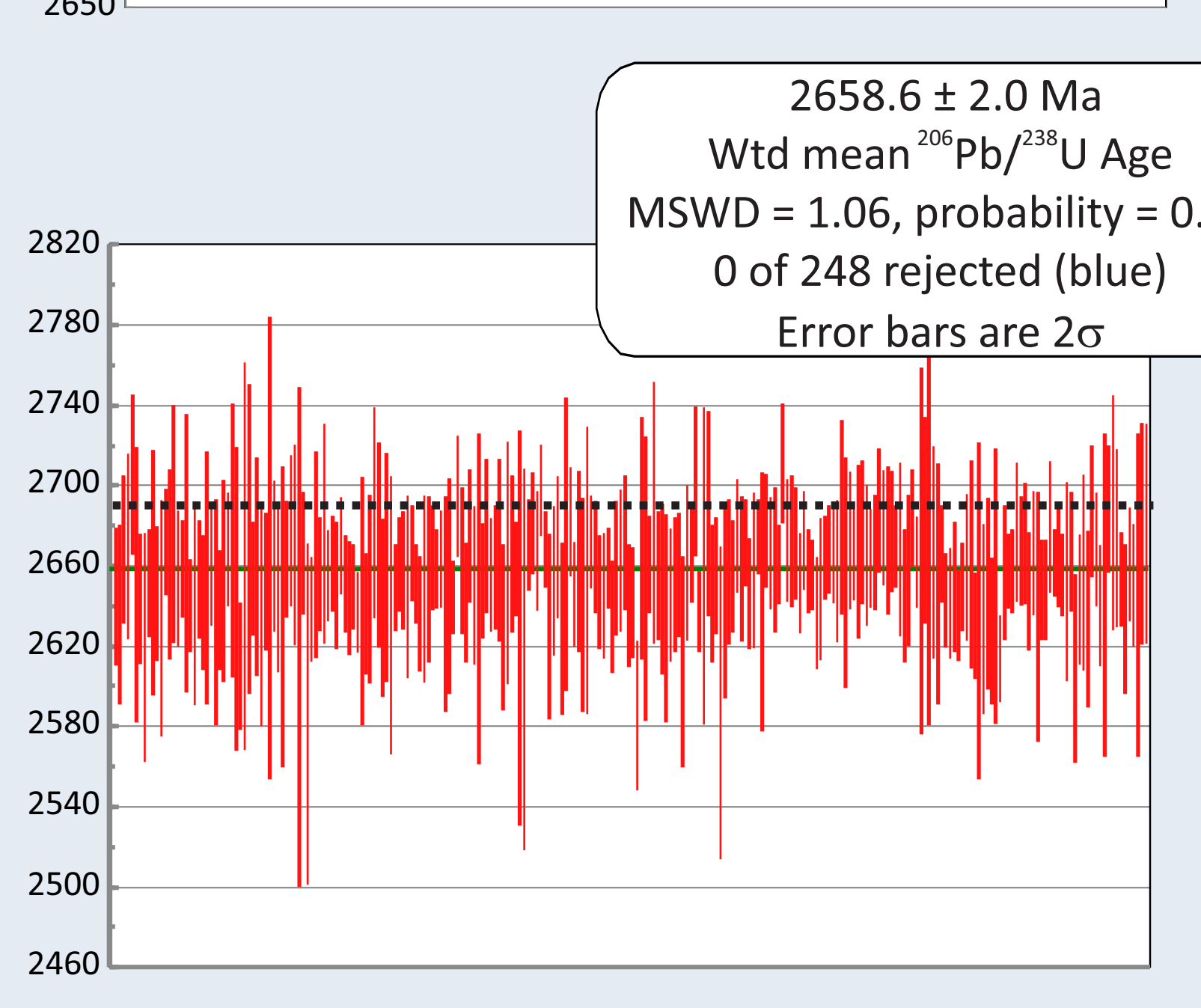
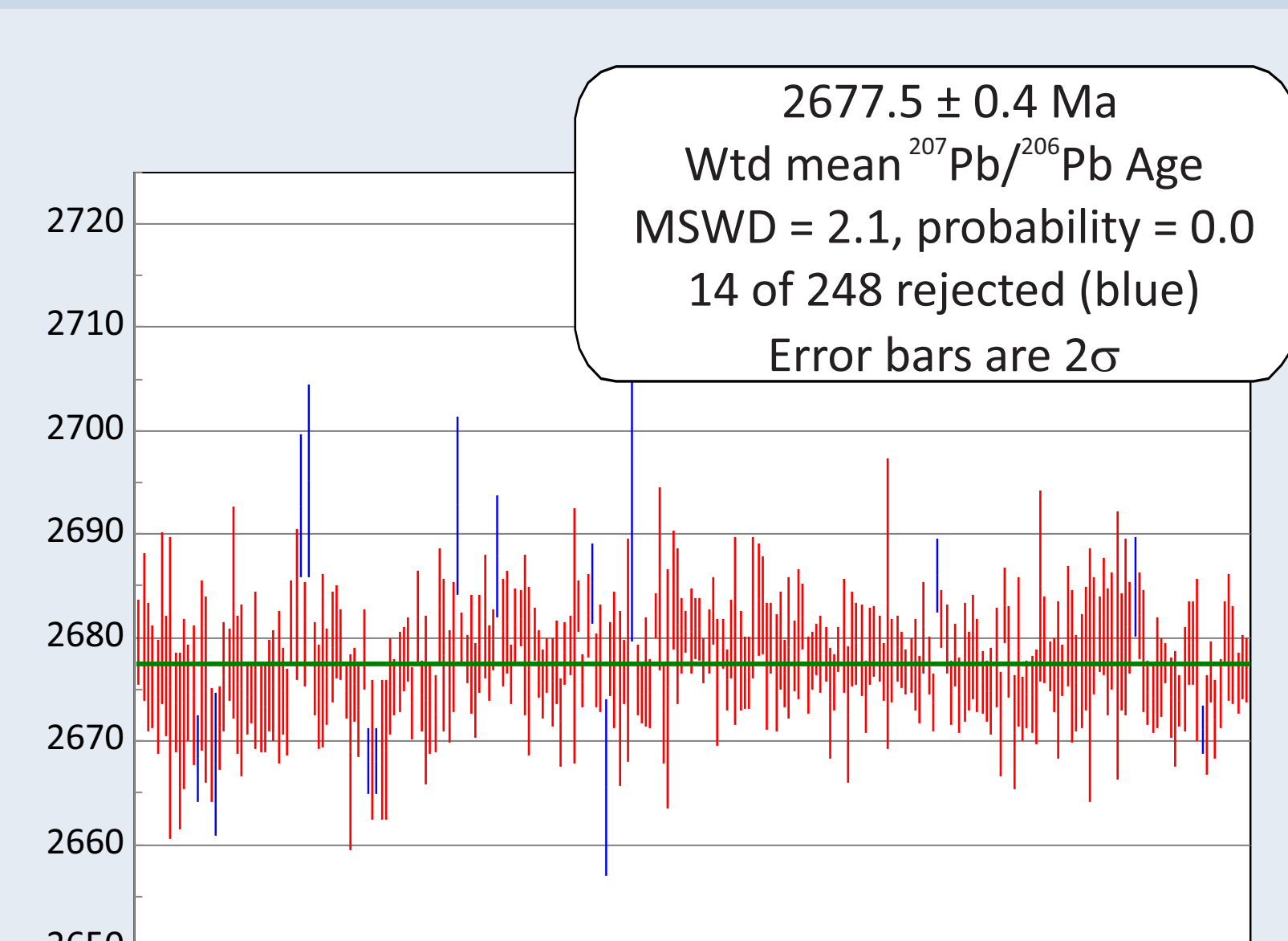
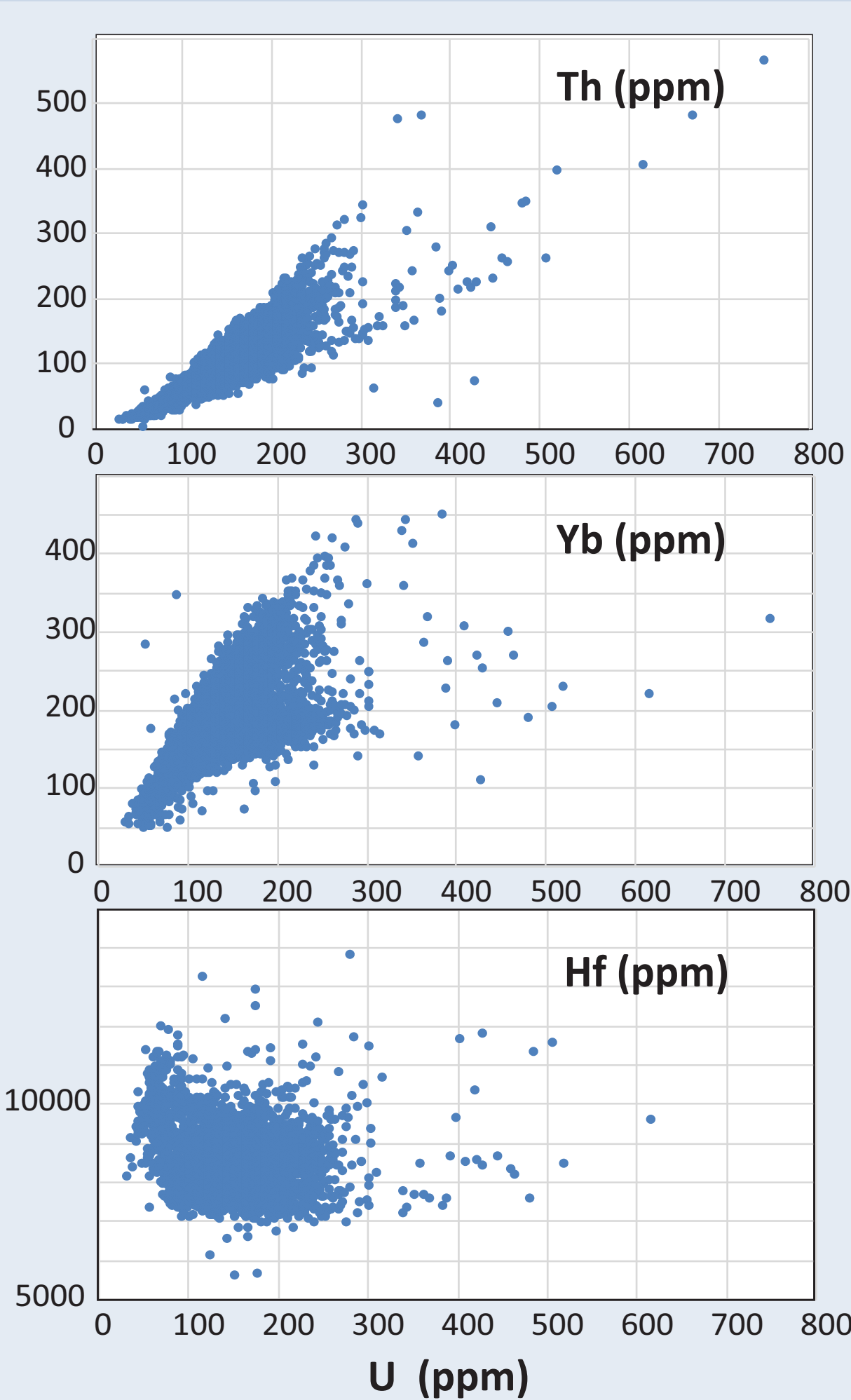


2679.8 ± 0.2 Ma
MSWD = 0.64, probability = 0.98
3 of 58 rejected (blue)
Error bars are 2σ

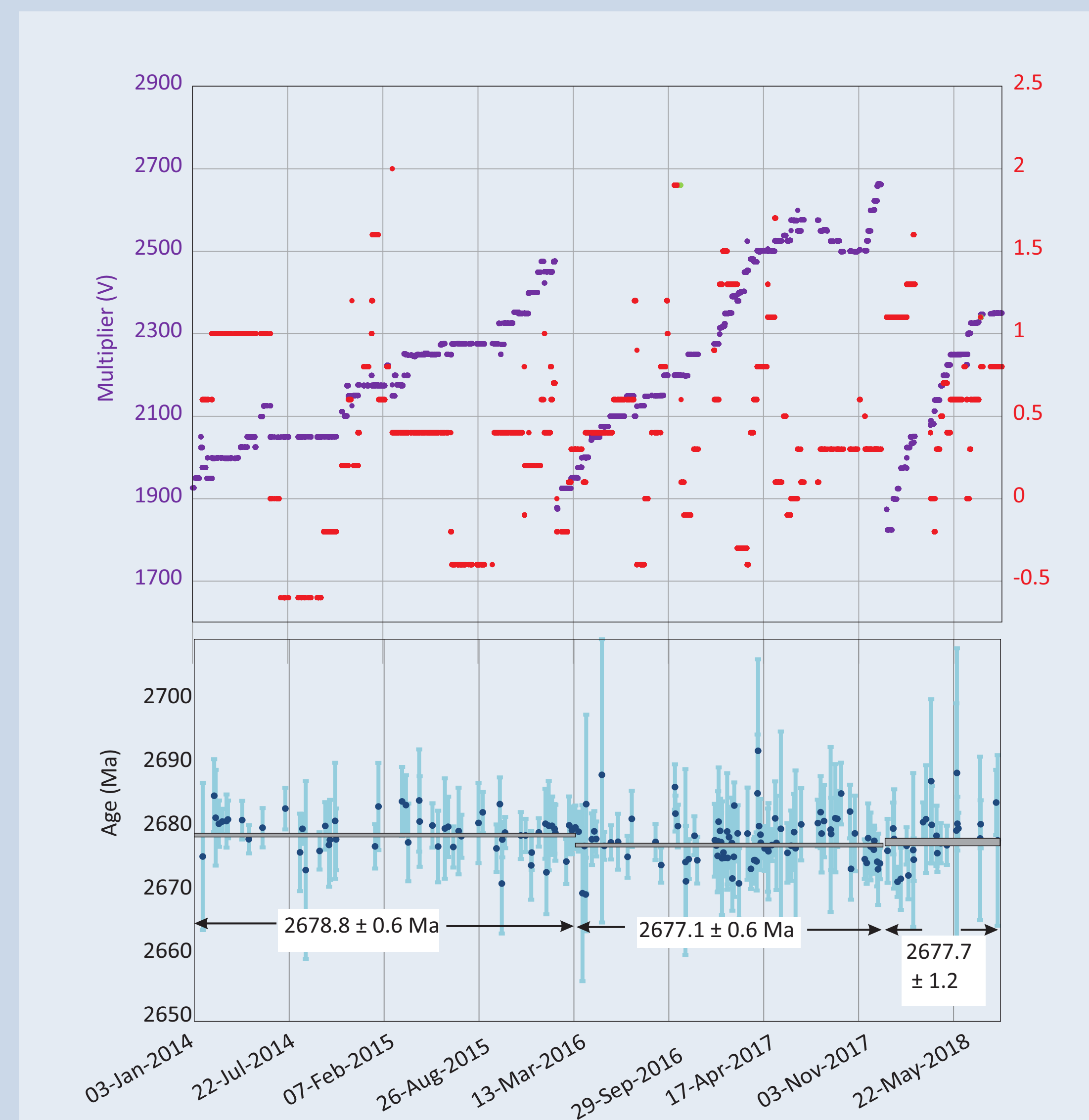


SHRIMP Analytical Data

Data has been collected since 2006, and is analysed as part of each analytical session since 2009. Over 5900 individual analyses in over 300 analytical sessions. Data shown in figures has been filtered to include only analytical sessions with a minimum of 7 analyses



- The measured $^{207}\text{Pb}/^{206}\text{Pb}$ value is not affected by 'ageing' of the electron multiplier.
- Only minor differences observed in weighted mean ages with specific multipliers.
- Significant deviations in measured $^{207}\text{Pb}/^{206}\text{Pb}$ ratio are often related to improperly set multiplier gain voltage or discriminator values.
- Multiplier settings are checked at the beginning of each analytical session.
- A constant discriminator offset of $\sim 1-1.2$ mV is targeted.
- The discriminator setting on the GSC SHRIMP changes unpredictably over short time intervals. The cause of this is not established although it may in part be related to cabling.
- Peak flat and incorrect mass offset of ^{206}Pb and ^{207}Pb can also contribute to inaccurate measurements.



- Zircon 1242 is analysed as an "unknown" as part of each analytical session. In most analytical sessions the value determined is within error of the TIMS accepted value. An instrumental mass fractionation factor may be applied to the data set based on the measured $^{207}\text{Pb}/^{206}\text{Pb}$ ratio.
- Long-term Instrumental Mass Fractionation value of 1.00139 ± 0.00027 .
- Under routine operating conditions the estimate of external reproducibility of $^{207}\text{Pb}/^{206}\text{Pb}$ age is no better than ± 4.4 Ma at 2700 Ma (0.16%).