

**ARIZONA LASERCHRON CENTER**  
**Zircon Data Reduction Instructions**  
**(12 December 2008)**

**Extraction of data from Isoprobe analysis files**

1. Insert CD with Isoprobe data.
2. Load agecalc in Excel and rename SAMPLEagecalc.xls.
3. Enter the CD drive into Cell D1 of Sheet 1 (e.g., F:, or C:\data if data copied from CD)
4. From Sheet 1, press Ctrl-z to run macro that extracts data from the Isoprobe files. Values are averages and standard deviations (1-sigma) for intensities and Pb ratios. Values for 206/238 and 208/232 are projections back to initial ratios (to remove depth-related fractionation) and standard deviation of the intercepts. Should take 1-2 minutes to execute.

**Data Reduction**

1. Go to column A and press "ORDER" button. This:
  - orders the analyses by serial number (column B)
  - names the standards "std"
  - shades suspect analyses in blue (large error, high discordance, high common Pb)
  - shades primary standards in red
  - pastes in correct calculations
2. Check that the Fraction Correction looks OK on the 206238 and 206207 sheets (208232 not important for zircon). You may want to re-open Isoprobe files/charts for outliers to either find better values or discard bad analyses.
  - Large blue diamonds show measured/known value for the standard analyses.
  - Thick red line shows the "best fit" of sliding window through the standards (average of the closest eight standard analyses, with rejection of the max and min values).
  - Thin red lines show standard error of sliding window standards.
  - Gray bars show 2% error on the best-fit value.
  - Average 206/238 and 206/207 ages for the standards are shown in AR1 & AT1 – these should be approximately 564 Ma for SL standard.
3. Note that analyses with high error or discordance or common Pb are omitted from the sample output columns and a note is inserted in column AA. If you want to include one of these, just type "OK" in column Y and press "ORDER" button again.
4. If you want to change the rejection criteria, enter max 206/238 error (as %) in G1, max 206/207 error (as %) in I1, max discordance (as %) in K1, max reverse discordance (as %) in M1 and press "ORDER" button again. Defaults are 10%, 10%, 30%, and 5%.
5. The BEST AGE column (AI) uses a 206/238 versus 206/207 age cut-off of approximately 1000 Ma. To change this cut-off value, find best cutoff on Concordia diagram (avoid dividing a cluster of ages), enter preferred value in cell Q1 and press "ORDER" button again.
6. Select columns AM-AQ to make a concordia plot of the standards (Ctrl-I, select U-Pb concordia, 1-sigma, percent, Auto-scale, Calculate, and ConcAge ->OK,  $\pm 2$ Sigma->OK,  $\pm 2$ Sigma and w/o decay-const errs->OK). Analyses should be centered on concordia and Concordia Age should be near 564 Ma.
7. Select columns Z-AD to make a concordia diagram of the unknowns (excluding standards and bad analyses).

## Data Analysis

1. To extract data for a final data table, press “Zircon Datatable” in column AE, and data for acceptable analyses are copied to the datatable worksheet.
2. Note that uncertainties shown are only for measurement (random) errors [= only uncertainties from measurement of 206/238, 206/207, and 206/204].
3. To calculate an igneous age from a weighted mean, select the set of best ages from columns AI-AJ (Sheet1) or columns R-S (datatable). Press Ctrl-I to start Isoplot, then select Weighted Average, 1-sigma, absolute, Calculate, and perhaps Reject OK?. The calculated Mean is for the weighted mean, with uncertainty at the 2-sigma level. These errors are only for the measurement error.
4. To factor in systematic errors (from calibration correction, composition of common Pb, decay constants, and uncertainty of standard age), you need to incorporate the value shown in cell S1 (for 206/238 ages) or U1 (for 206/207 ages), which are the averages of all systematic errors for the sample (at 2-sigma). This systematic error is largely independent from the random error, so the two should be added quadratically [=  $\text{SQRT}(\text{SE}*\text{SE}+\text{RE}*\text{RE})$ ] (do this with values in %, not Ma!). This final uncertainty, recalculated to Ma, is what you report for the age, at 2-sigma.
5. To make a probability plot for detrital samples, select the best age and uncertainty (columns AI-AJ or R-S) and press Ctrl-I, Probability Density Plot, 1-sigma, and absolute (select “Include Histograms” if you want bars).