

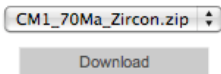
U-Pb Redux Demo (from EARTHTIME IV meeting)

Setting up

Download to your desktop and unzip the two folders available at http://cirdles.cs.cofc.edu/blog/?page_id=21.

Synthetic Datasets

↓ Samples



Each folder contains three sub-folders:

- The “data” subfolder contains the raw data files in the MassLynx .xls format. To see the raw data, go to the “CYCLE” worksheet in any of the .xls files.
- The “Tripoli” subfolder contains Tripoli workfiles for each U and Pb analysis, recording which ratios are used in the measured ratio statistics
- The “Redux” subfolder contains a folder for each aliquot in the sample. The zircon aliquot folder has the .xml files with the exported statistics for each Pb or U analysis.

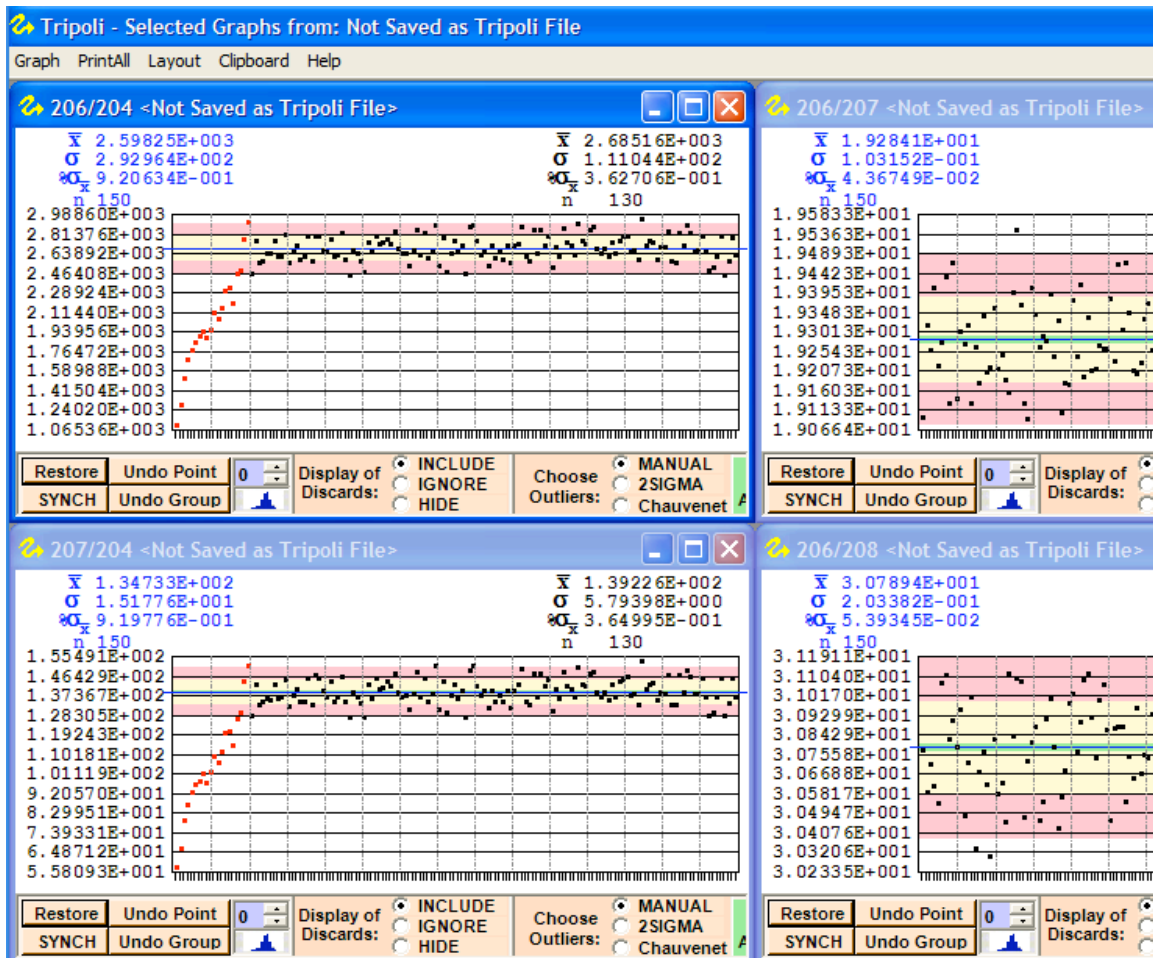
Tripoli

Open Tripoli by double-clicking on the Tripoli icon.

In the DataFile menu, choose the first option: “Read MassLynx Excel DataFile”.

Navigate to “Desktop\CM2\CM2 Data” and select CM2_z15_Pb.xls.

Click the “GRAPH Selected” button on the bottom right of the Tripoli window to see the cycle data for this analysis. Remove the first two blocks of the 206/204, 207/204, 208/204, and 204/205 ratios, since they have been affected by an early elevated baseline. To do this, right-click anywhere in the block (delineated by vertical lines) that you’d like to exclude from the mean statistics. Excluded ratios display as red points; original statistics are in blue on the left of each ratio’s window, and updated statistics are displayed in black at the right:



Check if a set of ratio measurements has any outliers by employing Chauvenet's Criterion. At the lower right of one of the ratio windows, click the ratio button next to Chauvenet.

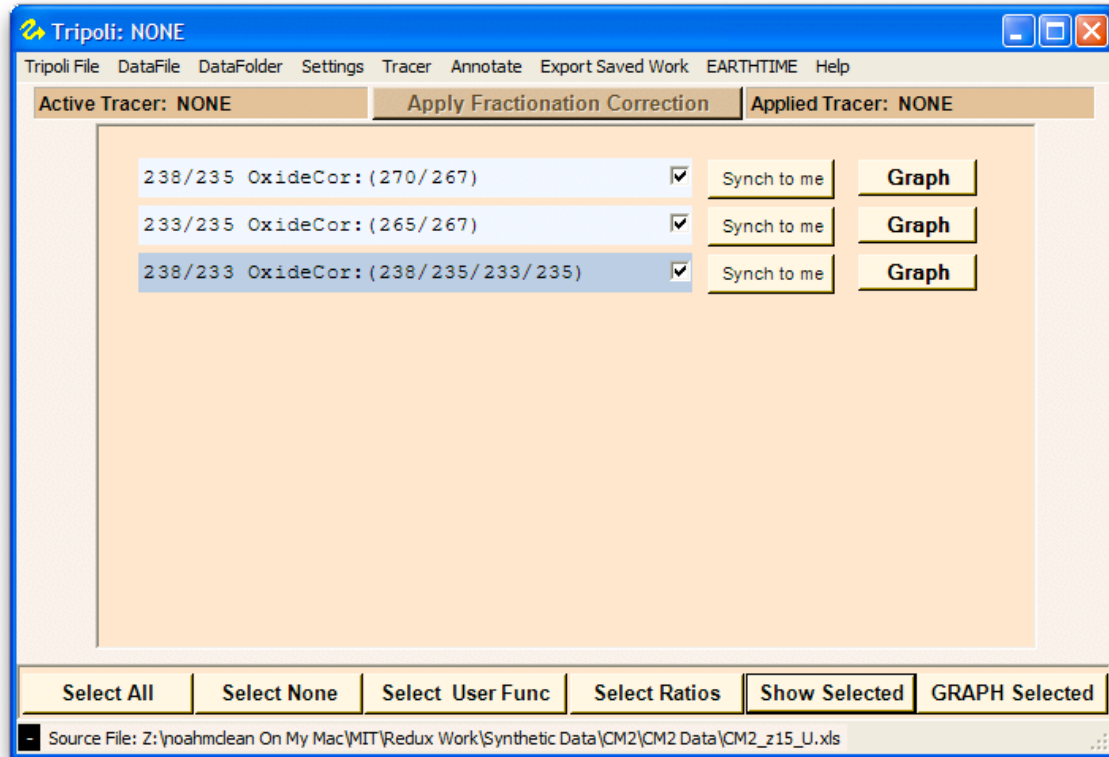
Close the graph window, then save your work by going to the Tripoli File menu item and clicking "SaveAs Tripoli WorkFile."

Navigate up one level (the small icon with the up arrow at the top of the window), then choose the folder "CM2 Tripoli" and save the workfile there.

Export your reduced data in a robust format that Redux can import. Click the "Export Saved Work" menu item and choose "Export Checked Ratios to U-Pb_Redux Import Fraction File." Choose the default sample and aliquot names.

In the save dialog, navigate up one level, choose the "CM2 Redux" folder, then the "zircon" subfolder and save the .xml file there.

Next, open a U datafile by going back to the DataFile menu and clicking on "Read MassLynx Excel DataFile." Navigate up one level, select the CM2 Data folder, and load in "CM2_z15_U.xls". Tripoli will read in 270/267 and 265/267 U-oxide ratios and perform oxide correction, displaying the results in blue:



Inspect the cycle data by pressing the “GRAPH Selected” button, then close the graph window and choose “SaveAs Tripoli WorkFile” from the Tripoli File menu.

Navigate up one level, choose the “CM2 Tripoli” folder, and save the Tripoli file there. Export the saved data by clicking the “Export Saved Work” menu and exporting the .xml file to the CM2 Redux\zircon folder.

Exit Tripoli by closing its window.

U-Pb_Redux – Importing .xml files

In the “U-Pb Sample Files” menu, choose “New Analysis Sample File From...” “ID-TIMS Tripoli-prepared XML files”. You’ll get a window that looks like this:

The screenshot shows a software window titled "ANALYSIS MODE" with a yellow header bar. The window contains the following fields and controls:

- Lab's Local Sample Name:** A text box containing "AUTO-DETECTED".
- SESAR Int'l Geo Sample # (IGSN):** A text box containing "NONE".
- Set Physical Constants Model for this Sample:** A dropdown menu showing "EARTHTIME v.1".
- Choose Data Update Mode:** Two radio buttons: "Automated Data Update (preferred - click OK below)" (selected) and "Manual Data Update (can be converted to automatic later)".
- Source of Fractions:** Three radio buttons: "Fraction folder" (selected), "Selected Fraction(s)", and "Create empty Fractions, count =". Below the last option is a spinner box with the value "1".
- Destination of Fractions:** Two radio buttons: "Existing Aliquot, choose =" (with an empty dropdown menu below it) and "New Aliquot, name =" (with a text box containing "aliquot" below it).
- Notes about this Sample:** A large empty text area.
- File path for this Sample:** A text box containing "null".

At the bottom of the window are two buttons: "OK" and "Cancel".

Keep the “Choose Data Update Mode” radio button on “Automated Data Update” and click “OK” at the bottom of the window. At the prompt for a “Redux Sample Fractions Folder”, go to the desktop, open the CM2 folder, and click once on the “CM2 Redux” folder. Hit “Choose” at the bottom of the window. Save the new .redux file to the desktop, and keep the default name (CM2.redux).

The measured data has now been loaded into Redux. Go to the Lab Data menu item in the Redux window and explore the tabs, which control input models.

Redux Saved Lab Data

File Tracers Help

Laboratory Name:

Choose Tracer: Tracer Type:

Name: Version:

Origin Lab: Date Certified:

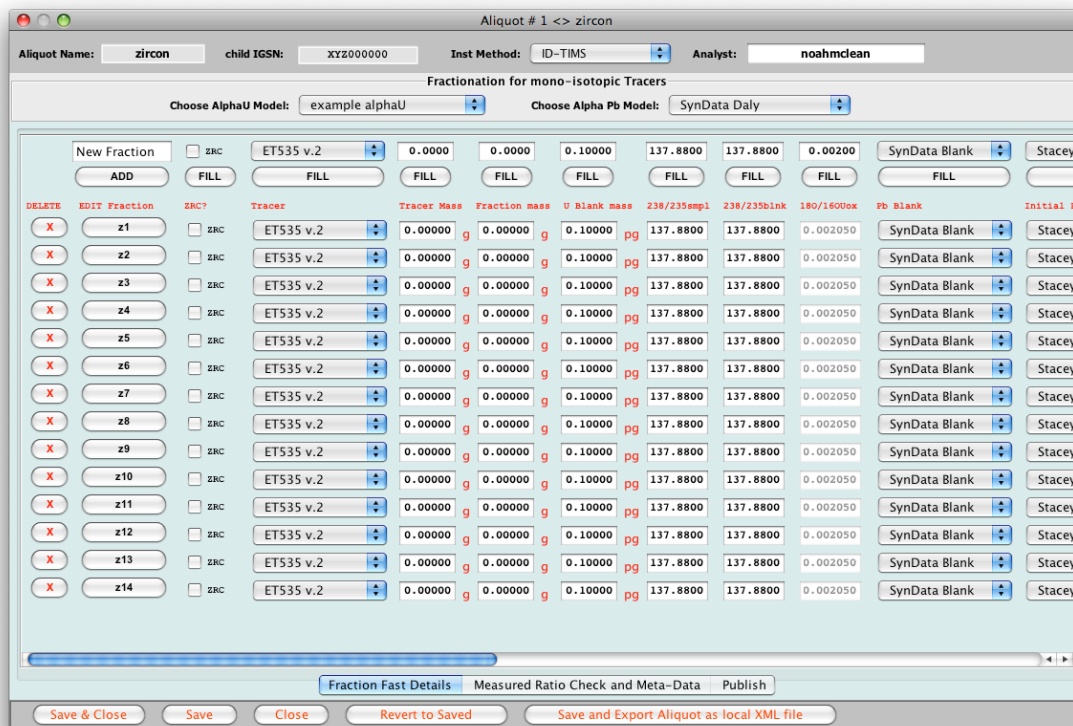
	Ratio	1-sigma pct
206 / 204	3.760400000000000000000000	0.220000000000000000000000
207 / 204	3.0433797345419200000000	0.220000000000000000000000
208 / 204	7.4754984792159500000000	0.210000000000000000000000
207 / 206	0.8093234056328910000000	0.160000000000000000000000
206 / 208	0.503030000000000000000000	0.130000000000000000000000
204 / 205	0.00009148228911817890	0.190000000000000000000000
206 / 205	0.000344010000000000000000	0.100000000000000000000000
207 / 205	0.00027841534477177100	0.190000000000000000000000
208 / 205	0.00068387571317814000	0.160000000000000000000000
202 / 205	0.000000000000000000000000	0.000000000000000000000000
238 / 235	0.003087000000000000000000	0.016000000000000000000000
233 / 235	0.994640000000000000000000	0.016000000000000000000000
238 / 233	0.00310363548620606000	0.016000000000000000000000
233 / 236	0.000000000000000000000000	0.000000000000000000000000
235 / 205	100.18003040709700000000	0.004100000000000000000000
Isotopic Concentration in moles/gram		
[205]	0.00000000000988366856	0.010000000000000000000000
[235]	0.00000000099014621674	0.010000000000000000000000

Tracers Fractionation Pb Blanks Initial Pb Models Physical Constants Mineral Std Models Lab Defaults

OK

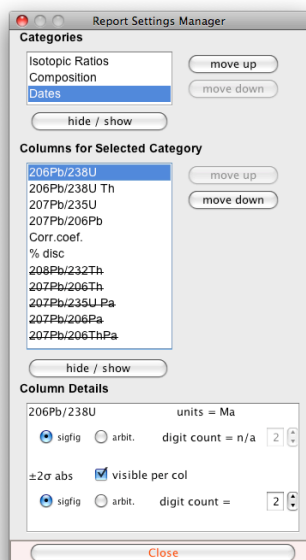
To import the ET535 tracer, navigate to the Tracer tab of this window and select the "Tracers" menu item. Select "Import Tracer from Earth-Time.org," choose "ET535 v.2.xml" in the dialog box, then hit OK. Exit Lab Data by clicking the close button at the top right of the window or clicking the large OK button at the bottom of the window.

Open the aliquot window by clicking on the button labeled "zircon" at the top left of the Redux window. This is the place to enter all input values, models, and uncertainties.



Reduction parameters will be filled with the intended values when you open a pre-made .redux file shortly. Exit this screen by clicking the “Save & Close” window at the bottom left of the aliquot window.

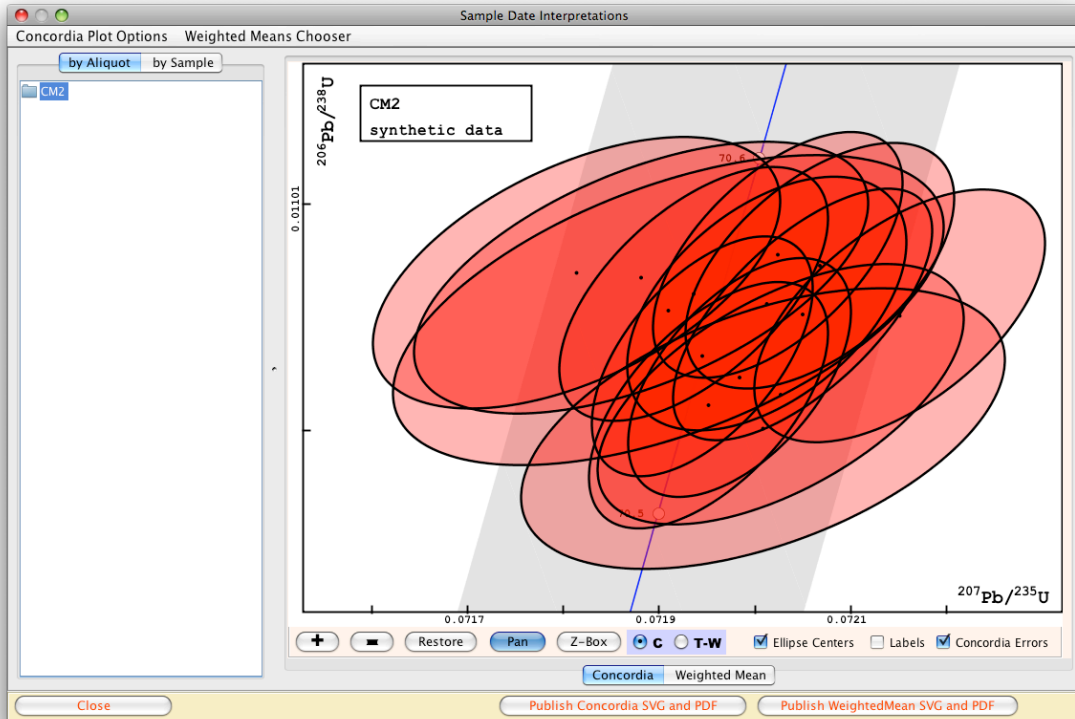
Open a pre-saved Redux file with the same data. In the “U-Pb Sample File” menu, choose the “Open Sample File” option. Navigate to the desktop, open the folder “CM2”, then the subfolder “CM2 Redux”. Double click “CM2_11-2-09.redux” to open the reduced data file.



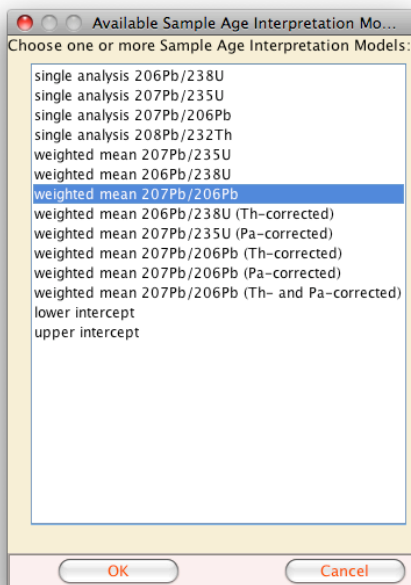
Examine the filled data table, then click the “Reports” menu item and choose “Edit Current Report Settings” to customize the data table setup. The setup window is shown at left. Exit the settings window by clicking the “Close” button at the bottom of the window.

Redux - Date Interpretations

Click the “Sample Date Interpretations” button at the bottom right of the Redux window to bring up the Date Interpretations window. You can pan, zoom, and use a variety of tools to change the concordia plot appearance.



In the Concordia Plot Options menu at the top of the window, click “Sample” to see how you can customize the plot appearance, and “Aliquot” to see how to customize display settings for each aliquot.

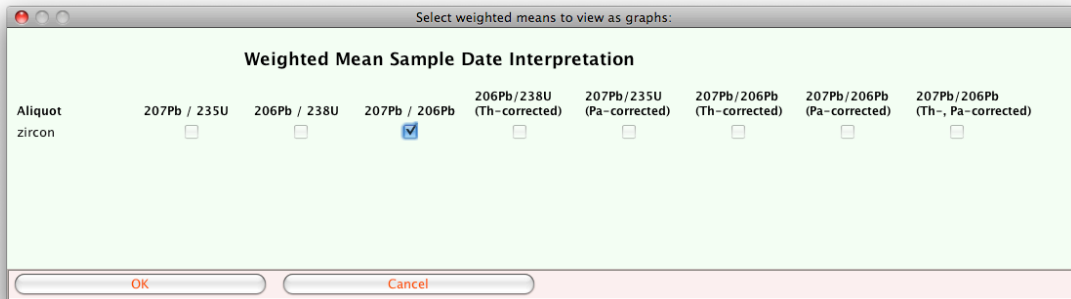


Next, take a weighted mean of the aliquot. In the panel on the left of the Interpretations window, double-click on the folder labeled CM2 to display a list of its aliquots—here, only “zircon”. Right-click on the word “zircon” to create a new date interpretation. Choose the “weighted mean 207/206 date” option, like at left, and click OK.

Click the plus sign next to the new “Fractions” folder to see a list of all the fractions in the aliquot. Right-click the folder and choose “Select All Fractions” to add them all to the weighted mean.

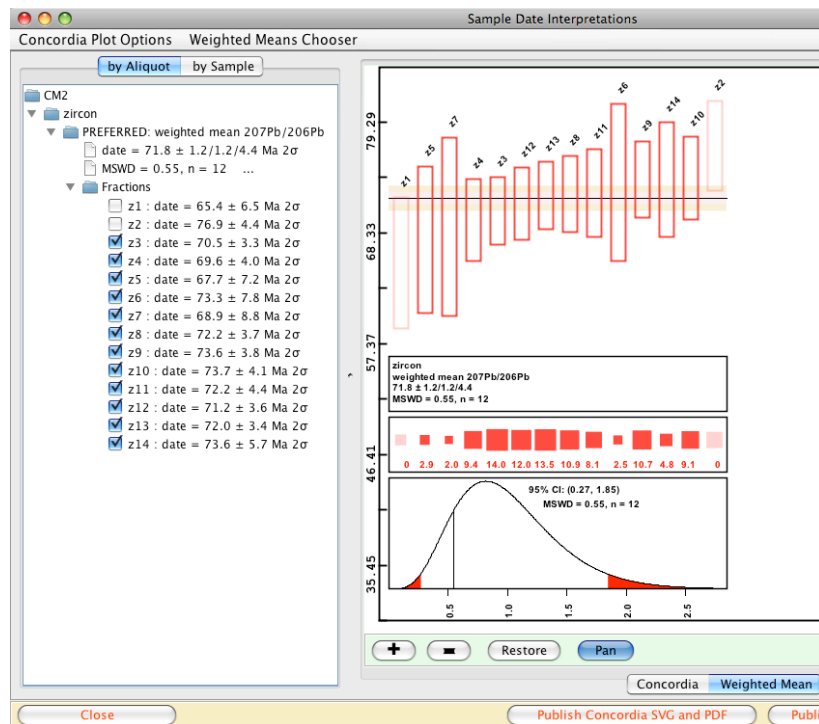
A new text box appears in the concordia window. Drag it to the lower right of the concordia plot, out of the way of the ellipses. Toggle the check-boxes on the left to include or exclude fractions from the weighted mean. The weighted mean statistics change in real time.

Next, display the weighted mean plot for the weighted mean 207/206 date. Click the “Weighted Means Chooser” menu at the top of the screen. A box is highlighted underneath the column “207Pb/206Pb”. Click the box to check it, then click ok.



Beneath the concordia window, click the tab labeled “Weighted Means”.

Explore the display and ordering options for the weighted mean plot. Check and un-check fractions at the left of the window to include or exclude them from the weighted means, and watch the statistics change in real time.



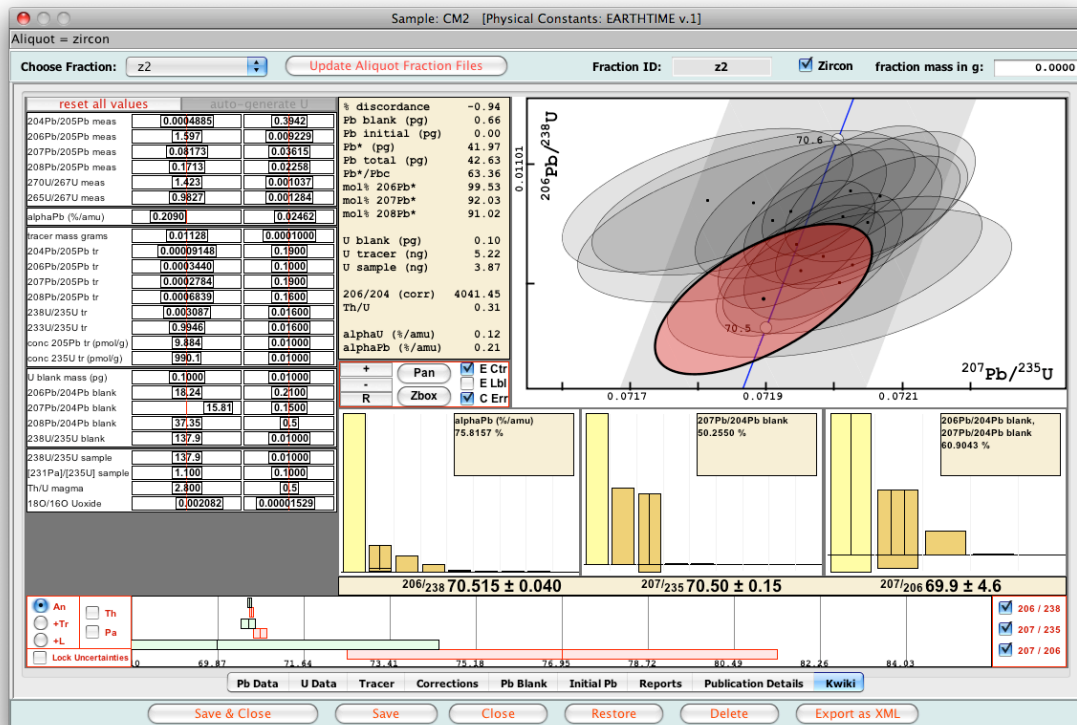
Close the Date Interpretations window with the close button at the bottom left of the window. All work is saved, and will reappear when you re-open the window.

U-Pb Redux – Fraction Inspection and Visualization.

In the main Redux window, click the button labeled 'z2' at the top of the window. This was the fraction with the oldest 207Pb/206Pb date.

Examine the Kwiki window. Click on different bars in the variance breakdown graphs to display their name and contribution. Click and drag sliders (+Tr) or decay constant (+L[ambda]) uncertainties for this fraction at the bottom left of the screen, as well as implementing Th- and Pa-correction by checking their boxes. To reset a single slider, left-click it once. To reset all sliders, press the "Reset All Sliders" button at the top of the slider bank.

To toggle between variance contributions in the bar charts, left-click in the column above each bar. Correlated inputs are displayed together, with the contribution from their covariance displayed above or below the axis if it's positive or negative.



Close the Kwiki window by pressing the "Save & Close" or "Close" buttons on the bottom of the window. None of the input values or uncertainties changed with sliders is saved.

Save the data, reduction parameters, and date interpretations for this aliquot. Click the button labeled "zircon" at the top left of the screen, and click the "Save and Export Aliquot" button at the bottom right of the window. Name the aliquot "CM2.xml" and save it to the Desktop.

Other Ways to Bring Data Into Redux

The following will be presented on the projected screen: Typing measured data in by hand (without Tripoli); typing reduced data in by hand (Legacy Mode), for instance from a published data table. Importing data from the GeoChron database will be demonstrated as part of the next exercise.

Redux – Compilation Mode

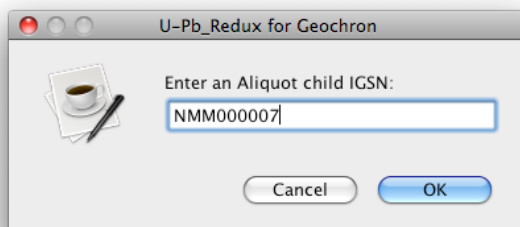
Compilation mode compiles measured data, reduction parameters, and date interpretations from multiple samples for interpretation together.

In the Redux main window, go to the “U-Pb Sample File” menu item and choose “New Compilation of Aliquots into a Super-Sample File”. In the new window, enter the name for this file as “CM Compilation”, leave the radio button for “Source of Aliquots” on “Single Local Aliquot” and click “OK”.

Navigate to the desktop and double-click the CM2.xml file you exported earlier. When prompted, save the compilation file on the desktop as “CM Compilation.redux”.

All of the saved CM2 data has been brought in. Import another aliquot by clicking the “U-Pb Sample File” menu and choosing the “Manage Sample Model” option. Leave the radio button on “Single Local Aliquot” and click OK. Navigate to the desktop and choose CM1.xml. Go to “Manage Sample Model” again and do the same for “CM_Legacy.xml”.

Go to “Manage Sample Model” one more time, and this time choose the “Import Single Aliquot from Geochron Database” option. Click OK. In the prompt for the “aliquot child IGSN”, enter “NMM000007” (five zeros) and press OK.



Scroll to the bottom of the data table to confirm that it imported successfully.

Click the Sample Date Interpretations window to see all of the samples plotted together. Notice that the aliquot date interpretations saved in CM2.xml have been imported as well.

Right-click the new aliquot CM3 on the left panel, and add the 206/238 weighted mean date. Right-click the fractions folder and choose “Select all” to add all the fractions to the weighted mean.

Do the same for CM2—add the 206/238 weighted mean data and add all fractions. Click the weighted means chooser in the menu at the top of the window, and select the boxes underneath 206Pb/238U for the rows CM2 and CM3. Click OK.

Click the weighted means tab beneath the concordia plot to show the weighted mean plots for both and compare the two.

