### Archiving new U-Pb data and re-use of legacy data

#### **Issues:**

- Lots (100,000's) of DZ ages published already
- Each data set is large (hundreds to thousands of analyses)
- Increasing number of data sets generated per year
- No existing database formatted appropriately for DZ data, with global coverage
- Need community agreement on data interpretation & reporting

## **Opportunities:**

- Global database for DZ ages would be a powerful research tool!
- Provide platform for developing new tools for data analysis/interpretation

## "Geochron" = Detrital Zircon Database in development

- Jim Bowring = College of Charleston (Cirdles: programming)
- Doug Walker & Jason Ash = University of Kansas (EarthChem)
- **Sam Bowring and Noah McLean** = MIT (EARTHTIME)
- George Gehrels & Clare Tochilin = University of Arizona (NU multicollector)
- Geochronology Working Group (Matt Horstwood, Norm Pearson, Jan Kosler, Paul Sylvester, Jackson, Chad Paton)
- Jeff Vervoort = Washington State University (Element Hi Res single-collector)
- **Tom Lapen** = University of Houston (Varian quadrupole)

Funding from US National Science Foundation & ExxonMobil

Phase 1: Build database to handle legacy DZ data

Phase 2:

- Develop math for rigorous data reduction (EARTHTIME/Working-group protocols)
- Develop software for data reduction/analysis tools
- Enable labs to connect to Geochron for real-time reduction/analysis/archival
- Platform for developing new tools to display, analyze, and compare data sets

## **Geologic Metadata**

## **Legacy Samples:**

Sample name Location (Lat/Long or UTM) Source/publication Info

## **New Samples:**

Sample name IGSN(?) identifier Location (Lat/Long or UTM & elevation) Unit Name (e.g., Eureka Formation) Rock Type (e.g., sandstone, conglomerate, quartzite) Type of Analysis (Provenance, Max Depo Age, etc.) Name of Collector Source of Data (Publication info) Stratigraphic age (Period/Epoch) Minimum stratigraphic age (Ma) Maximum stratigraphic age (Ma) Size of sample Sample notes Name & Type of Physiographic Feature **Location Description** Locality (City, County, State, Country) **Field Program Collection Date** Curation of Sample (current and original)

## **Analytical Data**

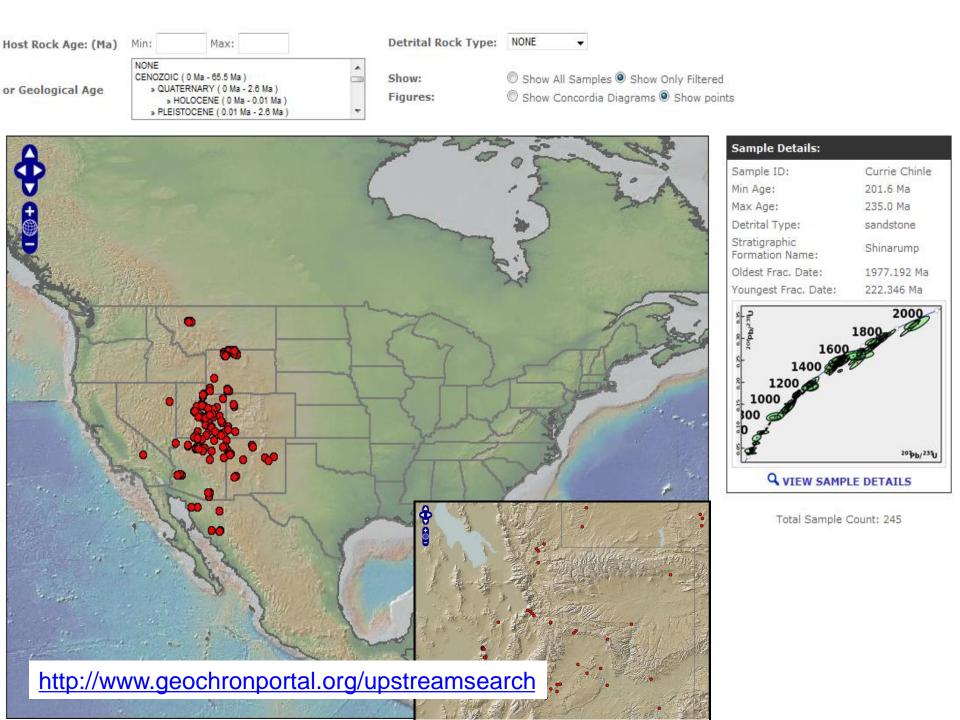
Legacy Data: Sample Name/Fraction 206/238 ratio and uncertainty 207/235 ratio and uncertainty rho 206/238-207/235 206/238 age and uncertainty 207/235 age and uncertainty 206/207 age and uncertainty Preferred age and uncertainty 206/204 and uncertainty Concordance (%) Uconc U/Th

Submitted as xls (csv) file

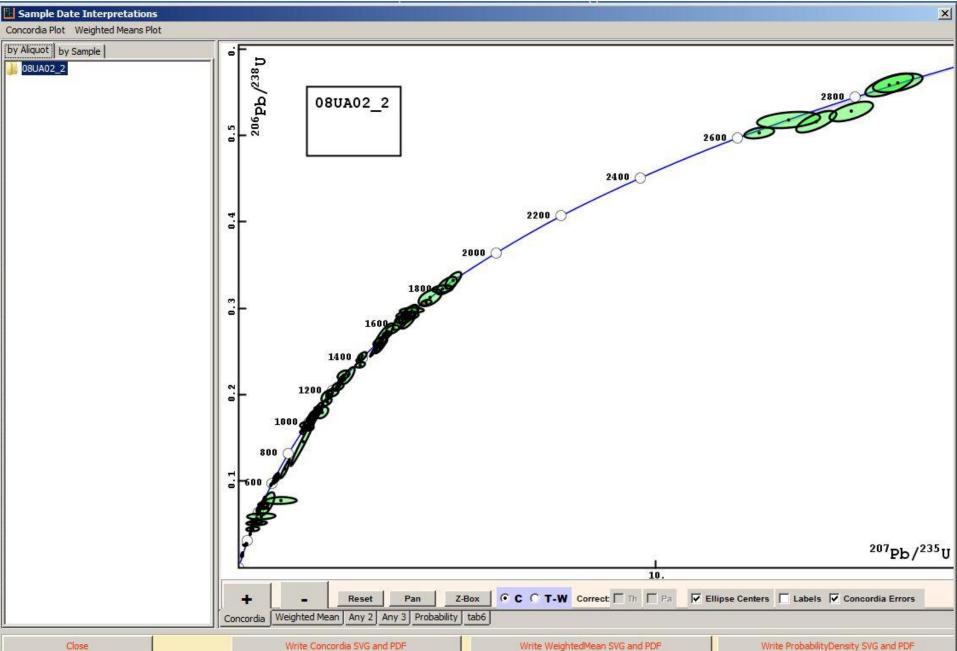
#### **New Data:**

Sample info (4 cells) Lab info (16 cells) Constants (12 cells) Blank Info (11 cells) Initial Pb info (6 cells) Standard Info (11 cells) Analysis info (14 cells) Counts and Ratios (48 cells) Ages & Uncertainties (10 cells)

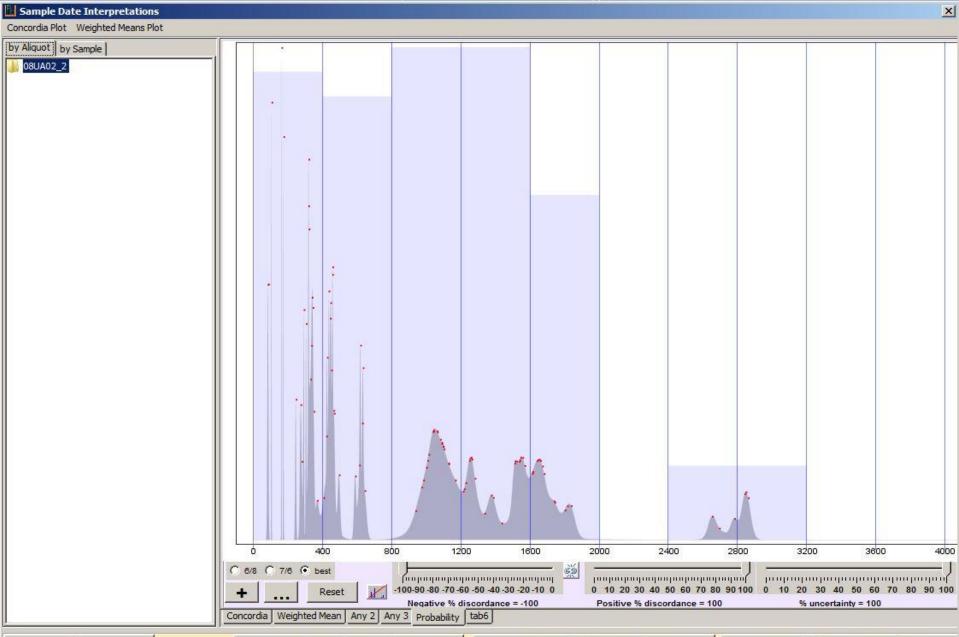
Submitted automatically with each analysis Keyed to unique GrainID



## **Concordia Plot**



## **Probability Plot**



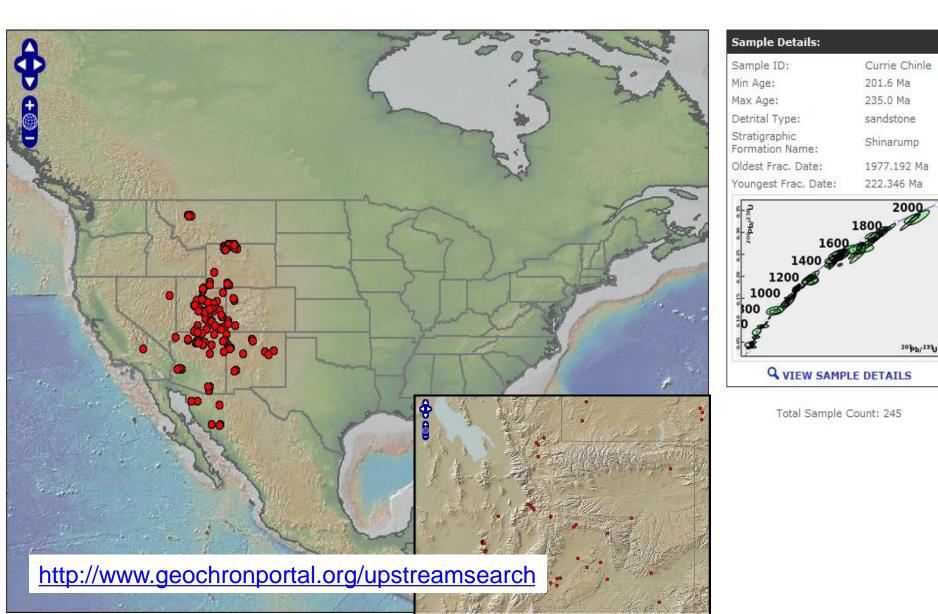
Write Concordia SVG and PDF

Write ProbabilityDensity SVG and PDF

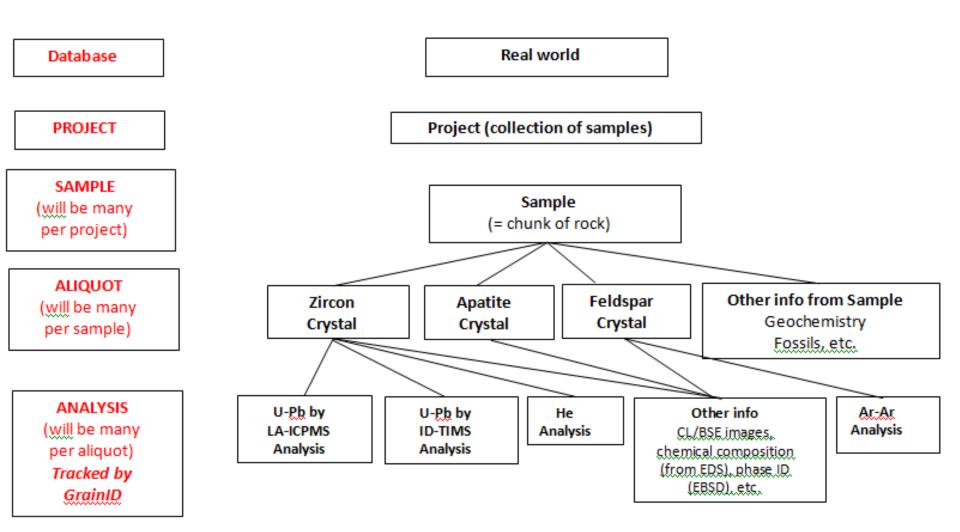
# **U-Pb Table (selectable)**

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08UA02_13	188.636	0.54	Calif. 1997. 1	0615	4.1	0.876	4.2	0.1033	1.1	0.260	633.8	6.6	639	20	658	88	3.61	633.8	6.6	08UA02_13	
08UA02_14	252.237	1.01		1063	2.5	4.49	2.7	0.3066	1.1	0.402	1724	16	1730	20	1737	45	0.78		45	08UA02_14 08UA02_15	
08UA02_15	409.888	0.72	S. C.	0508	20	0.093	21	0.01334	7.4	0.355	85.4	6.3	91	18	232	450	63.19	85.4	6.3	08UA02_16	
08UA02_17	339.638	0.52			7.0	0.175	7.1	0.02569	1.0	0.142	163.5	1.6	164	11	173	160	5.57	163.5	1.6	08UA02_17	
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# Database ready to go – anywhere in the world! Contact Jim Bowring bowring@gmail.com



### Structure of Database for New Data

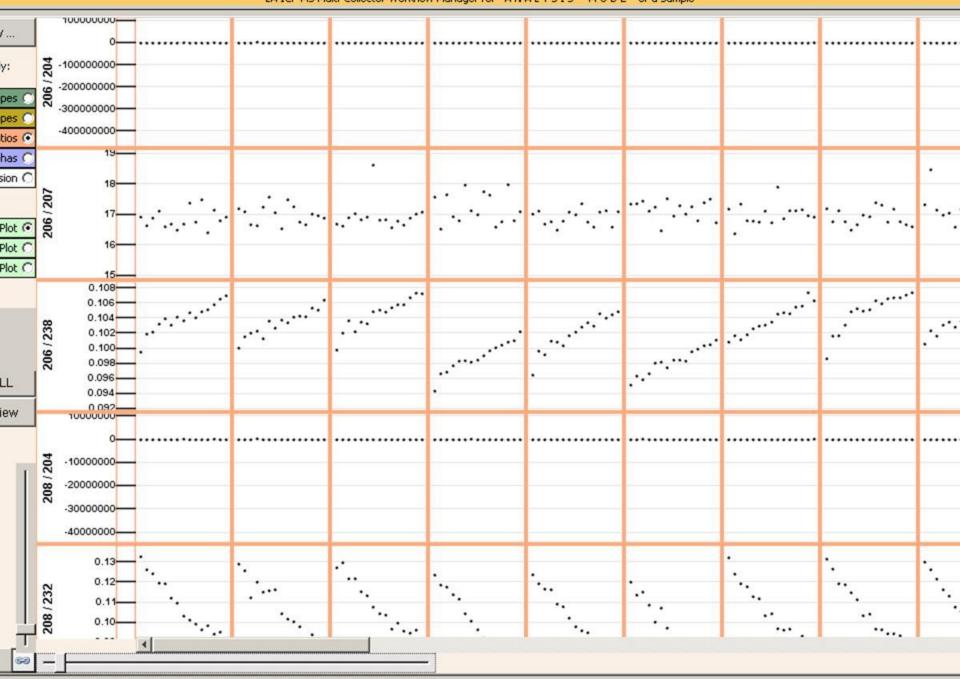


## Workflow for New data:

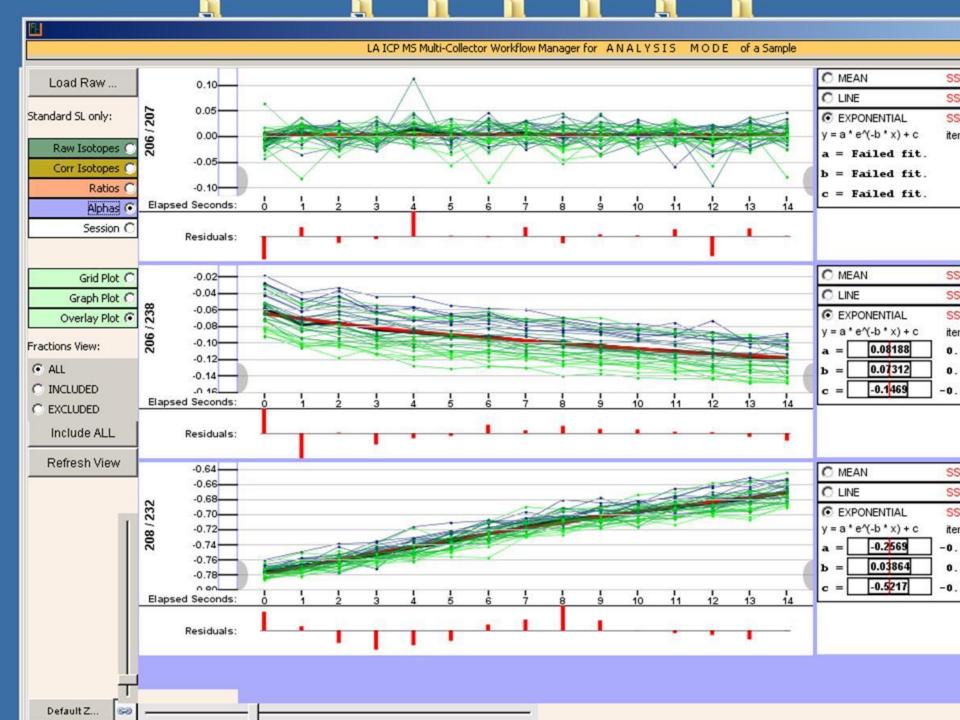
Mass spec feeds raw data directly to Geochron **MIT-TIMS** NU HR ICPMS (Arizona) Element HR Single-Collector (Jeff Vervoort) Varian Quadrupole (Tom Lapen) Data matched in Geochron with Parameters/Protocols for specific lab Data matched with geological metadata for sample Operator evaluates intensities & ratios using graphical output (real-time) Intensities & ratios used to calculate ages (real-time) Concordia, Log-Concordia, & T-W Concordia plots updated real-time Graphs and Tables can be saved (Publication quality) Tools available for comparing with other samples and other types of data Probability Plots, Histograms, etc

Information remains private until released

LA ICP MS Multi-Collector Workhow Manager for A N A L Y S I S M O D E of a Sample



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## Workflow for New data:

Mass spec feeds raw data directly to Geochron

- MIT-TIMS
- NU HR ICPMS (Arizona)
- Element HR Single-Collector (Jeff Vervoort)
- Varian Quadrupole (Tom Lapen)

Data matched in Geochron with Parameters/Protocols for specific lab Data matched with geological metadata for sample Operator evaluates intensities & ratios using graphical output (real-time) Intensities & ratios used to calculate ages (real-time) Concordia, Log-Concordia, & T-W Concordia plots updated real-time Graphs and Tables can be saved (Publication quality) Tools available for comparing with other samples and other types of data Norm Prob Plot, Cum Prob Plot, Histograms, etc

Information remains private until released

New tools welcomed!

## **Issues for Current (Legacy) Database:**

Quality control during input? From labs that have not described analytical methods? Accept all types of data (e.g., not common Pb corrected)? How deal with multiple analyses per grain? How deal with samples with small N?