AgeCalcML

AgeCalcML is a MATLAB-based graphical user interface (GUI) developed at the Arizona LaserChron Center. This program is used for reducing, visualizing, and reporting single mineral U-Th-Pb, Lu-Hf, and trace element data generated by single-collector and multi-collector LA-ICP-MS. The open-source code and standalone GUI incorporates the same community established protocols developed developed for the original Excel-based AgeCalc (Gehrels et al., 2008; Horstwood et al., 2016) and can be adapted to other LA-ICP-MS laboratories with laboratory-specific protocols. AgeCalcML is capable of real-time data reduction and visualization during analytical sessions and serves as an interactive teaching tool for students and researchers. Exported data can be seamlessly uploaded to Geochron.org, the Interdisciplinary Earth Data Alliance (IEDA) global geochronology database. An interface is currently being developed between AgeCalcML and Sparrow, a lightweight laboratory-management system that will organize and contextualize the Arizona LaserChron Center data archive as a whole. AgeCalcML is an ongoing project incorporating community engagement and support; interested parties are encouraged to participate in its FAIR use (findable, accessible, interoperable, reusable; Wilkinson et al., 2016) and development.

**The source code and latest releases can be found on GitHub:
github.com/kurtsundell/AgeCalcML**

For a detailed description of the U-Pb data reduction methods implemented in AgeCalcML for multi-collector laser ablation ICP-MS using time-resolved analysis please see the following paper:

Sundell, K.E., Gehrels, G., Pecha, M. (2020), Rapid U-Pb geochronology by laser ablation multi-collector ICP-MS, *Geostandards and Geoanalytical Research*.

We are currently writing a manuscript that outlines the complete capabilities of *AgeCalcML*.

AgeCalcML can be run in MATLAB directly from the source code or outside of MATLAB and without a MATLAB license. Detailed instructions for downloading can be found here:
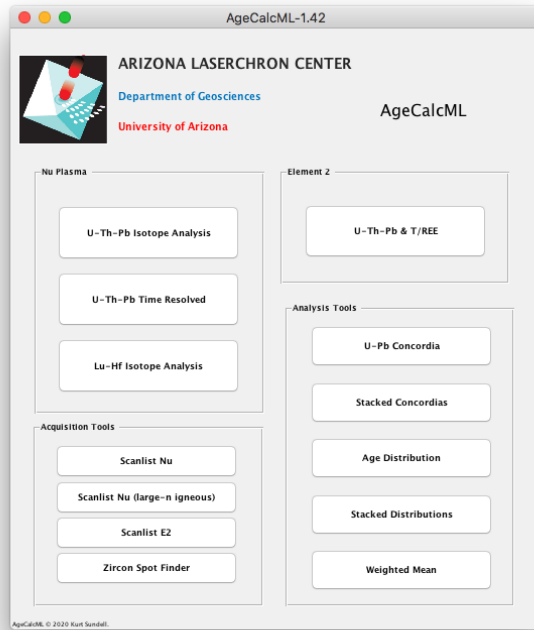
Downloading and running with MATLAB
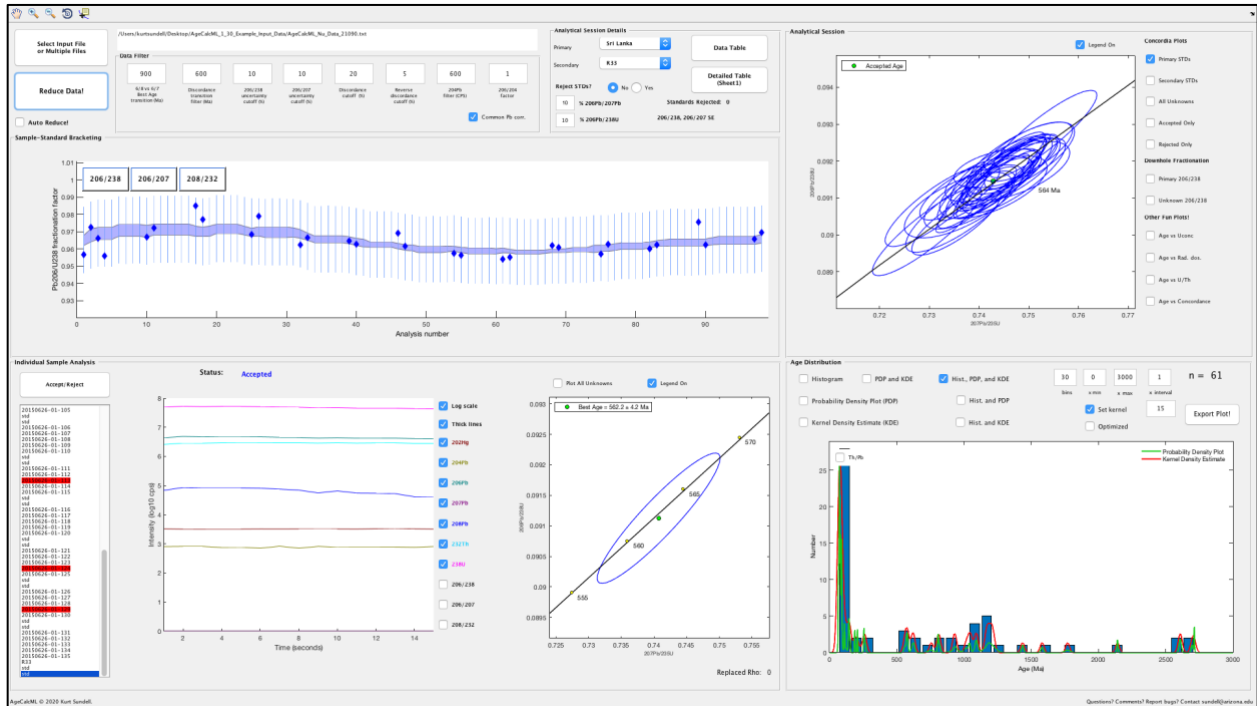
Downloading and running without MATLAB

If you have comments/questions about any of the files, please contact Kurt Sundell at sundell@arizona.edu or kurtsundell@gmail.com.
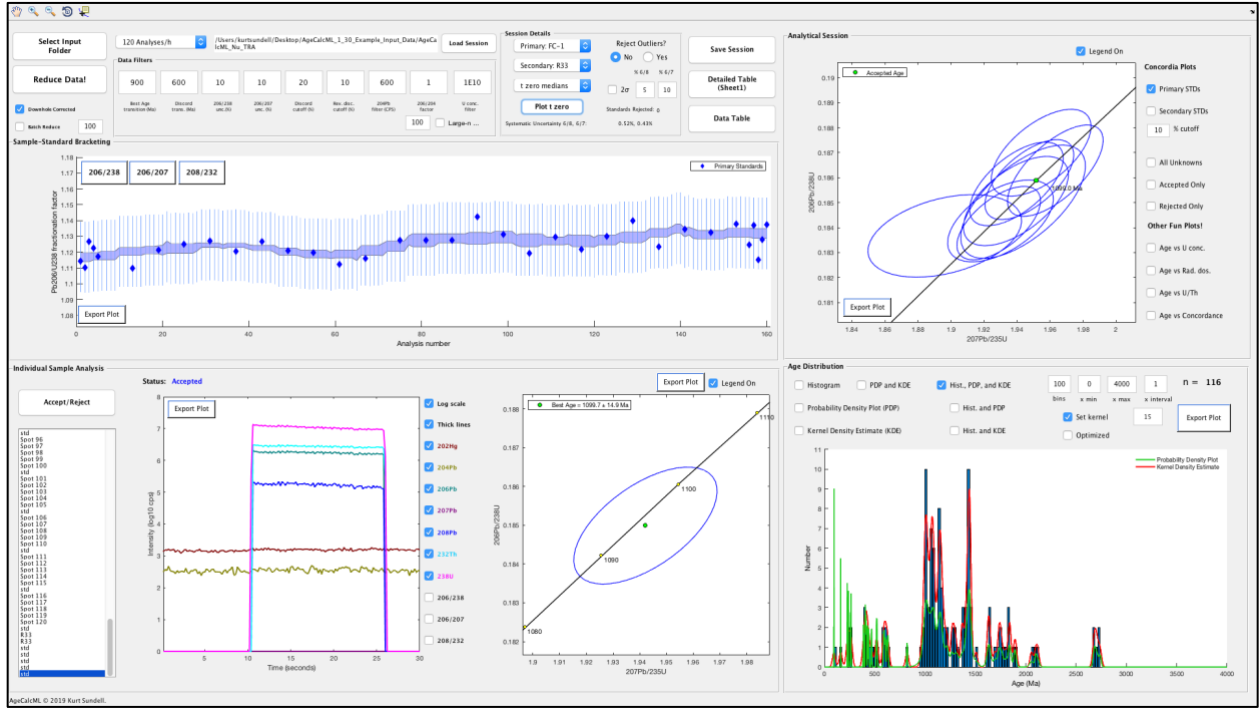
Examples

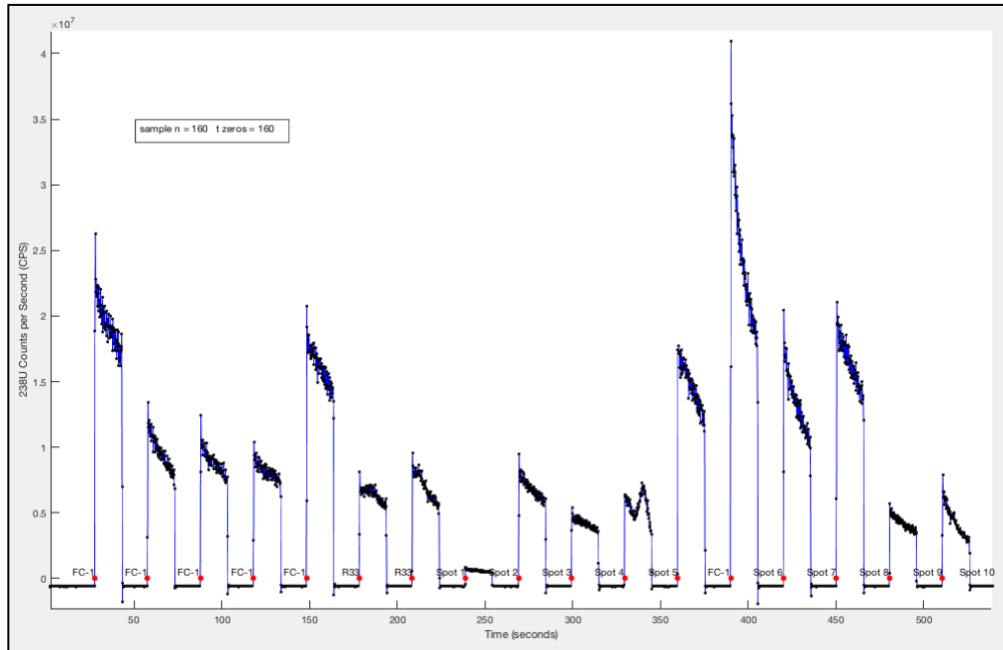## *AgeCalcML* home screen

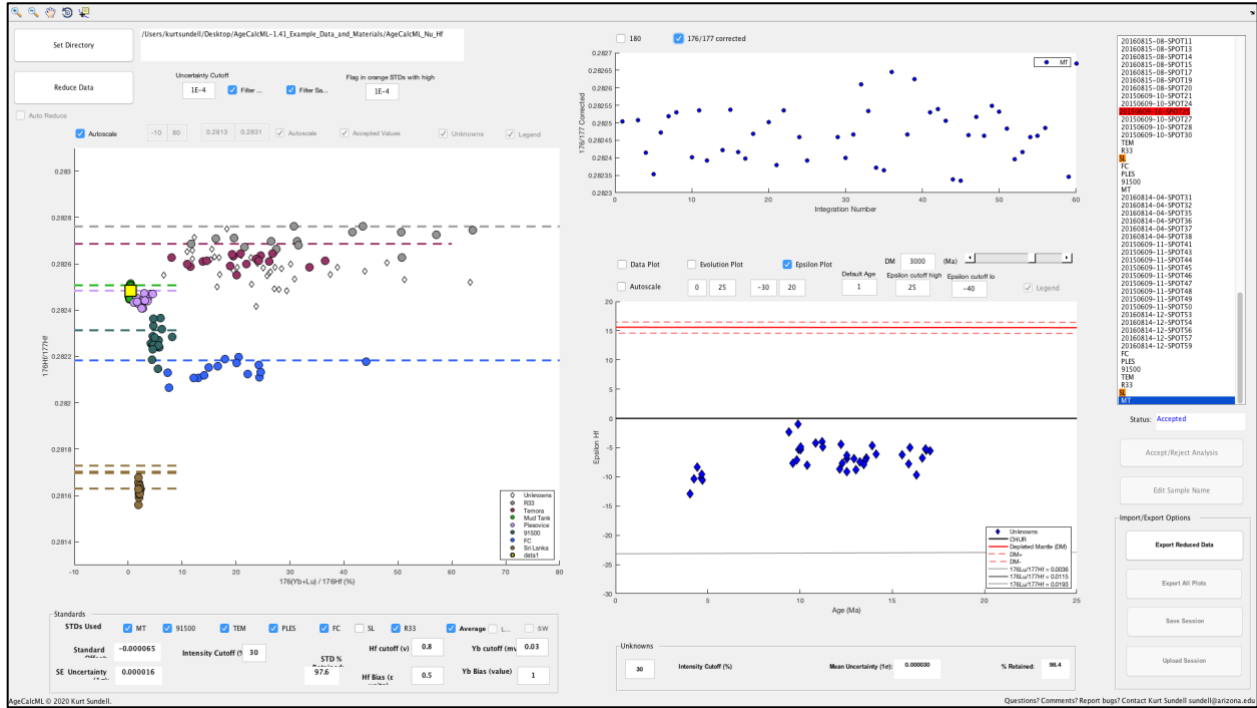## *AgeCalcML* U-Pb geochronology Nu multicollector isotope analysis mode

AgeCalcML zircon U-Pb geochronology with Nu multicollector time-resolved analysis
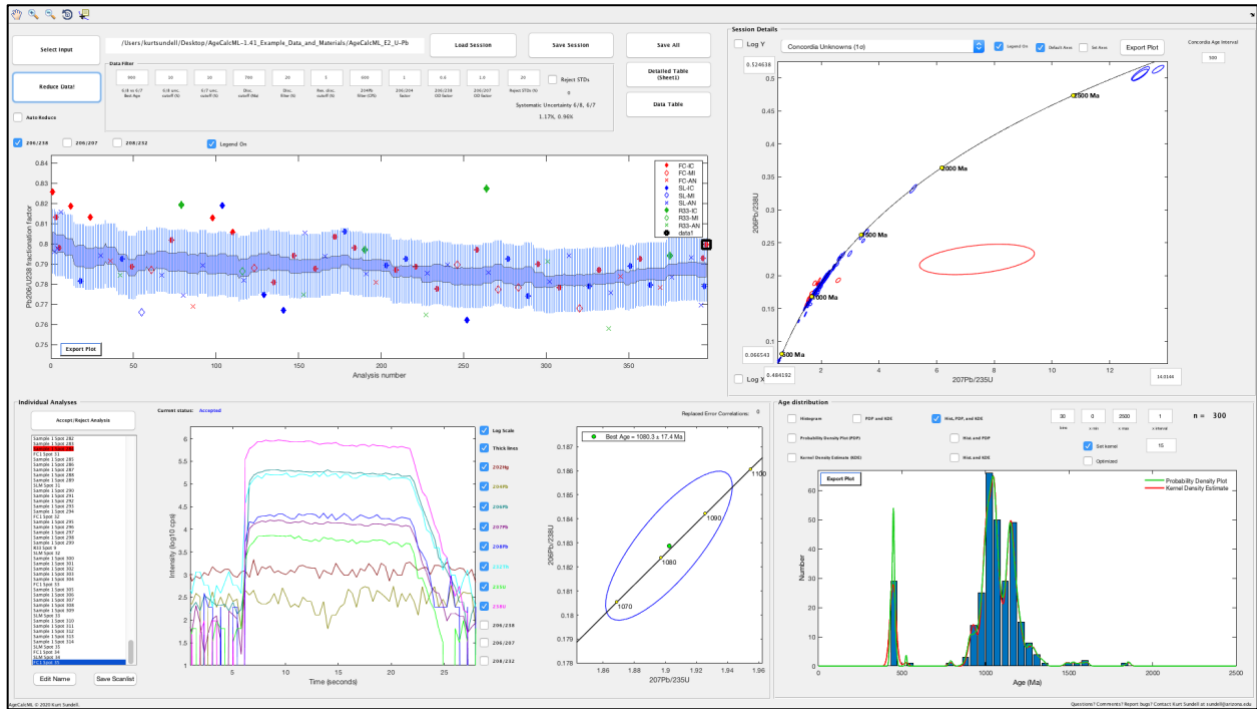

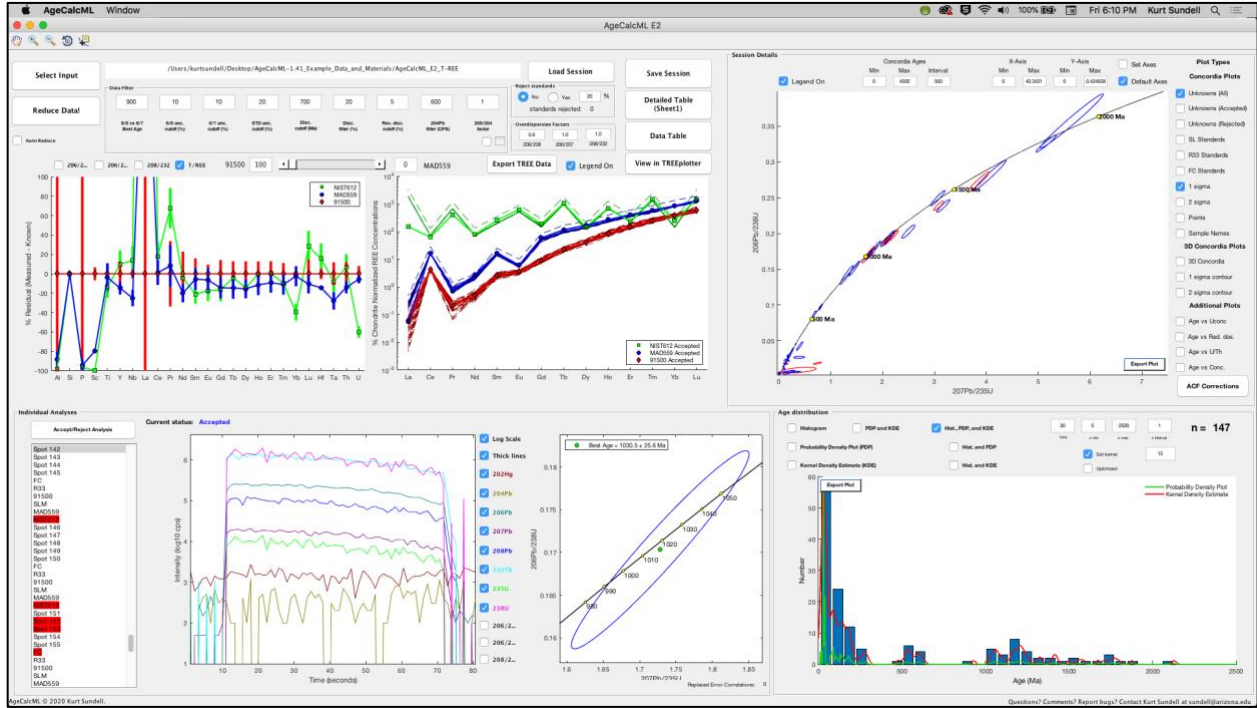# Finding the start of ablation (t zero) with ^{238}U threshold

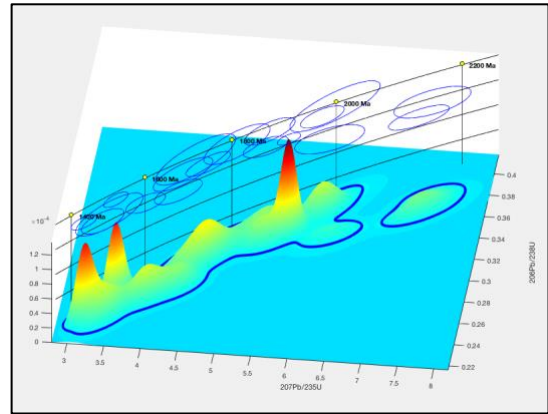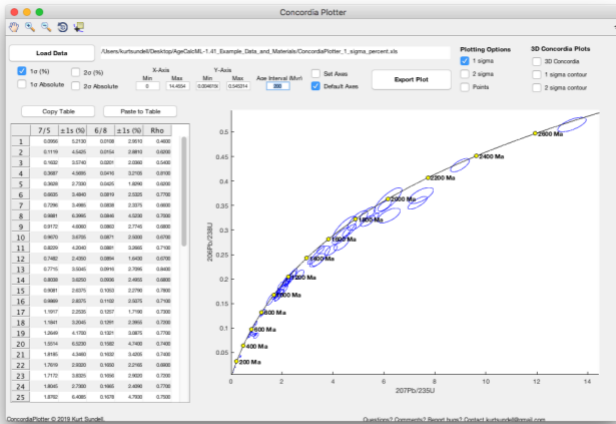## *AgeCalcML* zircon Lu-Hf geochemistry with Nu multicollector

AgeCalcML zircon U-Pb geochronology with Element 2 single-collector
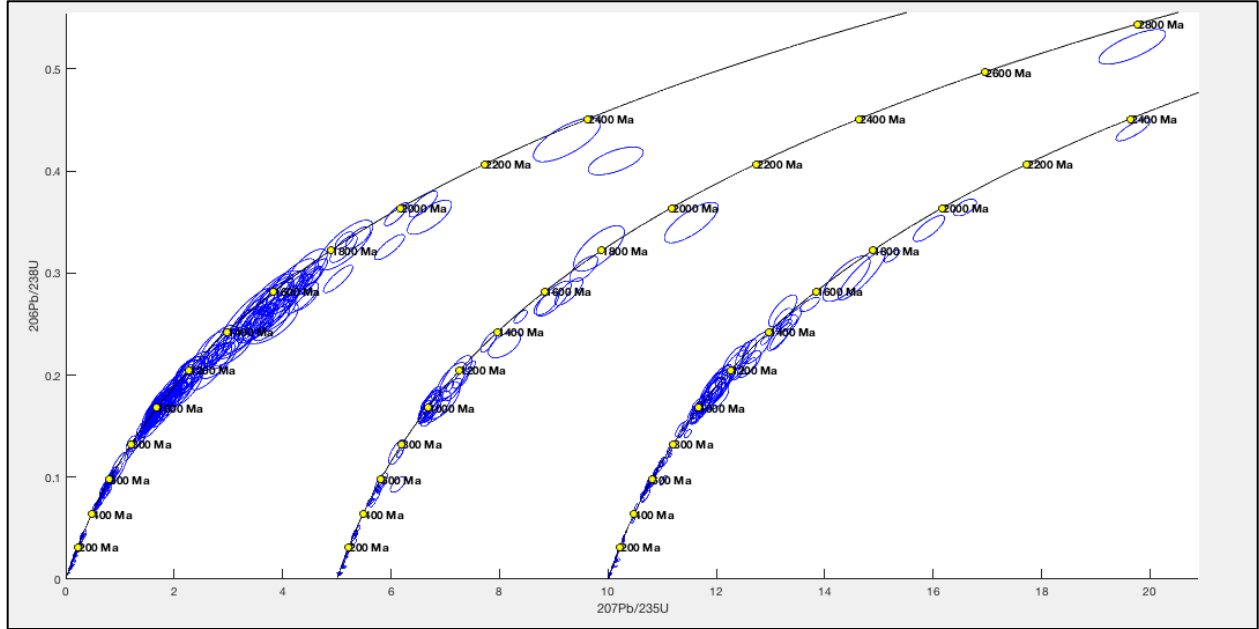
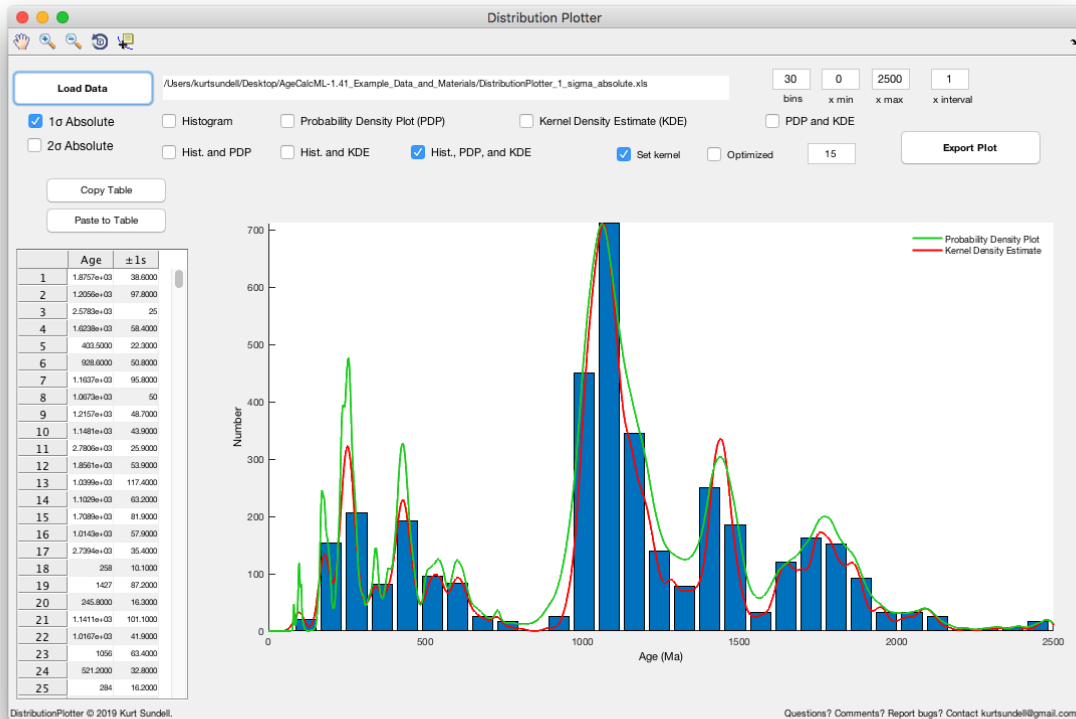# *AgeCalcML* zircon trace and rare-Earth element geochemistry with Element 2 single-collector
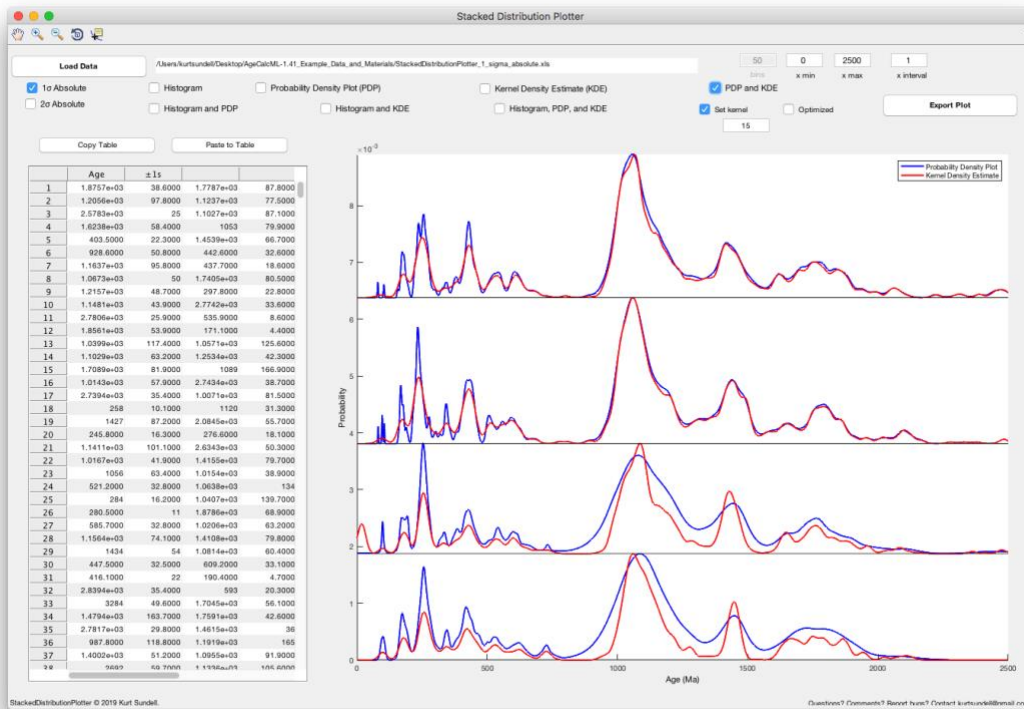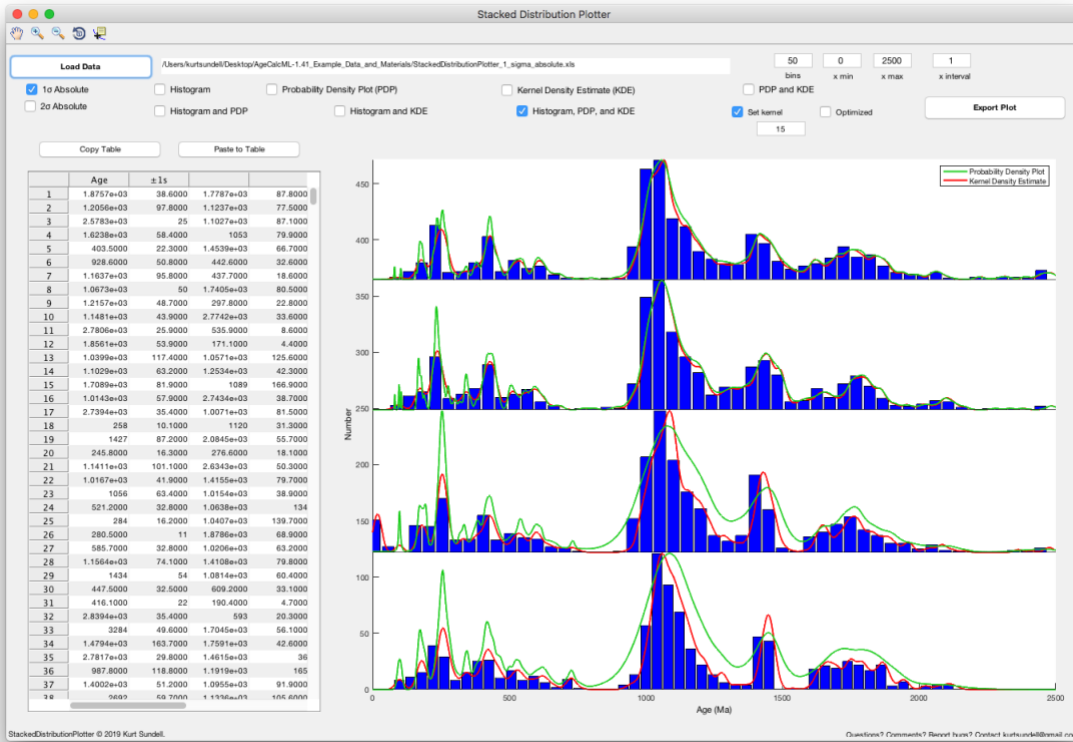

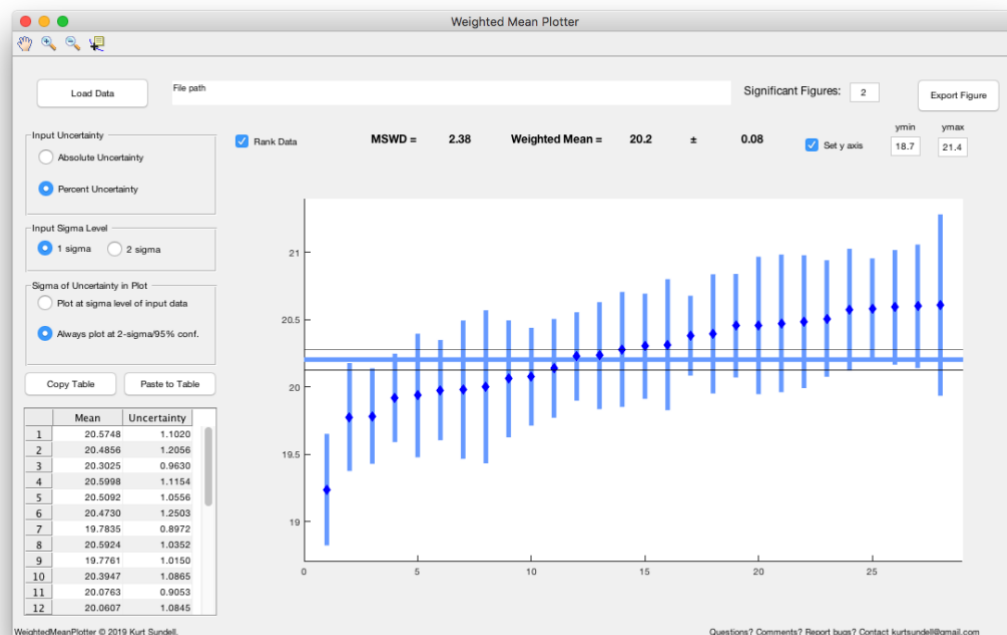# U-Pb Concordia

Horizontally Stacked U-Pb Concordia

Age Distributions

Vertically Stacked Age Distributions

Weighted Mean

References

Gehrels, G.E., Valencia, V.A. and Ruiz, J., 2008. Enhanced precision, accuracy, efficiency, and spatial resolution of U-Pb ages by laser ablation–multicollector–inductively coupled plasma–mass spectrometry. *Geochemistry, Geophysics, Geosystems*, *9*(3).

Horstwood, M.S., Košler, J., Gehrels, G., Jackson, S.E., McLean, N.M., Paton, C., Pearson, N.J., Sircombe, K., Sylvester, P., Vermeesch, P. and Bowring, J.F., 2016. Community-derived standards for LA-ICP-MS U-(Th-) Pb geochronology–Uncertainty propagation, age interpretation and data reporting. *Geostandards and Geoanalytical Research*, *40*(3), pp.311-332.

Sundell, K.E., Gehrels, G.E. and Pecha, M.E., Rapid U-Pb Geochronology by Laser Ablation Multi-collector ICP-MS. *Geostandards and Geoanalytical Research*.