DZmix

Sundell and Saylor (2017)

DZmix is a program used for unmixing detrital zircon U-Pb age distributions developed by Kurt Sundell and Joel Saylor while at the University of Houston, Department of Earth and Atmospheric Sciences. DZmix determines the percent contribution to a single target (e.g., basin sink) sample from a group of potential source samples using an inverse Monte Carlo approach. Specifically, potential sources are scaled by a set of randomly generated percent contributions (that sum to one), the randomly scaled distributions are summed together to make a single 'model' distribution, then that model distribution is quantitatively compared to the target sample using Cross-correlation (Saylor et al., 2012) for probability density plots (PDPs) or kernel density estimates (KDEs) and the Kolmogorov-Smirnov (KS) Test D statistic (Massey, 1951) and Kuiper Test V statistic (Kuiper, 1960) for cumulative distribution functions (CDFs). This process is repeated a user-defined number of times (typically 10,000 or more) and a range of top model fits (typically the top 1%) is used to estimate the mixture of potential source distributions that best represents the target age distribution. The user has the option to determine a single best age distribution through forward optimization of the inverse Monte Carlo results.

For a detailed description of the methods implemented in DZmix, and for proper citation, please reference the following paper:

Sundell, Kurt E., and Joel E. Saylor. "Unmixing detrital geochronology age distributions." Geochemistry, Geophysics, Geosystems 18, no. 8 (2017): 2872-2886.

Note that this program requires the MATLAB Runtime. The Runtime is free and only needs to be installed once. Following installation and upon running DZmix, the Runtime will automatically be accessed; there is no need to open the Runtime directly. If you have comments/questions about any of the files, please contact Kurt Sundell (kurtsundell@gmail.com) or Joel Saylor (joelsaylor@gmail.com).

Following are links to the latest version of DZmix, example data sets, user manual, and a PDF of Sundell and Saylor (2017), and MATLAB Runtime:

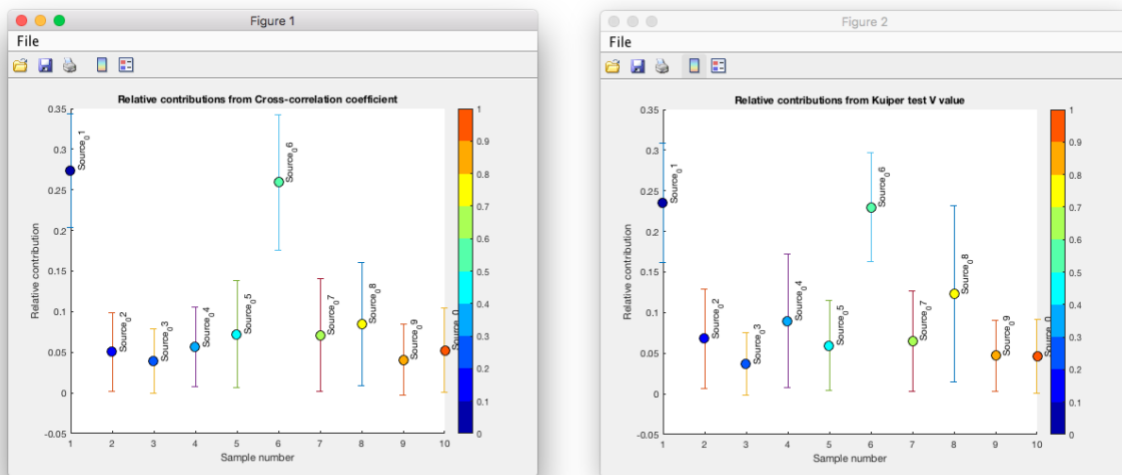[DZmix for Windows and macOS, example data, user manual, publication](#)

[MATLAB Runtime Compiler for Windows (free, and required to run DZmix)](#)

[MATLAB Runtime Compiler for macOS (free, and required to run DZmix)](#)

Example: Unmixing a distribution based on 10 potential sources
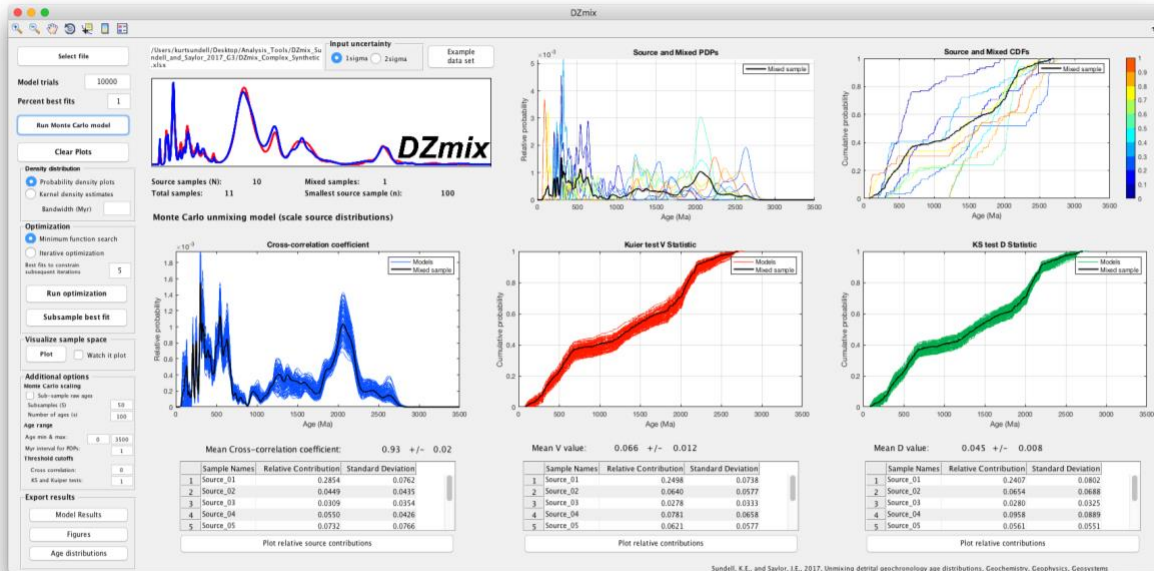
Estimated percent contributions

References

Kuiper, Nicolaas H. "Tests concerning random points on a circle." In Nederl. Akad. Wetensch. Proc. Ser. A, vol. 63, no. 1, pp. 38-47. 1960.

Massey Jr, Frank J. "The Kolmogorov-Smirnov test for goodness of fit." Journal of the American statistical Association 46, no. 253 (1951): 68-78.

Saylor, Joel E., Brian K. Horton, Daniel F. Stockli, Andrés Mora, and Jaime Corredor. "Structural and thermochronological evidence for Paleogene basement-involved shortening in the axial Eastern Cordillera, Colombia." Journal of South American Earth Sciences 39 (2012): 202-215.

Sundell, Kurt E., and Joel E. Saylor. "Unmixing detrital geochronology age distributions." Geochemistry, Geophysics, Geosystems 18, no. 8 (2017): 2872-2886.