U–Pb SIMS

Required in manuscript

- Name of laboratory providing analytical data.
- Description of minerals or materials analysed.
- Description of imaging techniques, such as CL, BSE, etc., if used.
- Reference to source of decay constant values. We recommend Steiger & Jäger (1977).
- Name of U/Pb calibration reference, age used for Pb/U calibration (specify whether this is based on $^{207}Pb^*/^{206}Pb^*$ or $^{206}Pb^*/^{238}U$ age), resultant external uncertainty on the calibration and reference to source of primary calibration or intercalibration data.
- Explicitly stated confidence level for all uncertainties.
  - Recommendation 1: 2σ for all uncertainties quoted in body of text.
  - Recommendation 2: Explicit restatement of confidence level used in associated tables, appendices or repository items containing data.

Required in data table

- Sample and analysis identifier (as used in main body of text).
- State confidence level for all uncertainties and whether fractional or absolute values.
- Concentration of U, Pb (total or radiogenic) in ppm; Th in ppm or Th/U ratio (optional).
- Measured $^{204}Pb/^{206}Pb$ and/or calculated fraction of common ^{206}Pb (f_{206}).
- Composition assumed for common Pb, presented explicitly as $^{207}Pb/^{206}Pb$ and $^{206}Pb/^{204}Pb$ OR with reference to a model composition of specified age, e.g. -Stacey & Kramers (1975).
- Isotopic ratios plus uncertainty for common Pb corrected $^{206}Pb^*/^{238}U$, $^{207}Pb^*/^{235}U$, and optional $^{207}Pb^*/^{206}Pb^*$, together with error correlation (ρ) when plotting conventional (Wetherill concordia) or $^{206}Pb^*/^{238}U$ and $^{207}Pb^*/^{206}Pb^*$ when plotting inverse (Tera–Wasserburg) concordia.
- Calculated age and uncertainty for common Pb corrected $^{206}Pb^*/^{238}U$, optional $^{207}Pb^*/^{235}U$, and $^{207}Pb^*/^{206}Pb^*$.
- Optional parameters: % discordance, $^{208}Pb^*/^{206}Pb^*$ (with uncertainties), calculated common Pb content.

Required in either the methodology section, an appendix, or as footnotes to the data table

- Description of data reduction methodology, either explicitly or by reference, including:
  - basis of data reduction and associated statistical methods.
  - basis for assumption of common Pb composition.
  - basis for estimation of mass fractionation (if applied).
- Description of mineral or material preparation, either explicitly or by reference, including:
  - methodology for concentration of analysed material.
  - selection criteria for analysed material
  - any modification to material, such as annealing or chemical abrasion.
  - mount preparation procedures and description of any electroconductive coating applied to mount.
- Description of instrumentation and its analytical protocols, either explicitly or by reference, including:
  - primary ion beam type and size
  - isotopes/species measured
  - mass resolution
  - detection settings (e.g. mono- or multi-collection).

U–Pb LA-ICPMS

Required in manuscript

- Name of laboratory providing analytical data.
- Description of mineral or materials analysed.
- Description of imaging techniques, such as CL, BSE, etc., if used.
- Reference to source of decay constant values. We recommend Steiger & Jäger (1977).
- Explicitly stated confidence level for all uncertainties.
  -Recommendation 1: 2σ for all uncertainties quoted in body of text.
  -Recommendation 2: Explicit restatement of confidence level used in associated tables, appendices or repository items containing data.

Required in data table

- Sample and analysis identifier (as used in main body of text).
- State confidence level for all uncertainties and whether fractional or absolute values.
- Concentration of U (Th), Pb (total or radiogenic) in ppm (optional).
- Isotopic ratios: (common Pb corrected if relevant) $^{206}Pb^*/^{238}U$, $^{207}Pb^*/^{235}U$, ($^{208}Pb^*/^{232}Th$), $^{207}Pb^*/^{206}Pb^*$ and uncertainties together with explanation of or with reference to error correlation method.
- Calculated age and uncertainty derived from common Pb corrected $^{206}Pb^*/^{238}U$, $^{207}Pb^*/^{235}U$, ($^{208}Pb^*/^{232}Th$), $^{207}Pb^*/^{206}Pb^*$.
- Optional parameters: % discordance (explaned or reference to % discordance calculation formula), $^{208}Pb^*/^{206}Pb^*$ (with uncertainties), calculated common Pb content.

Required in either the methodology section, an appendix, or as footnotes to the data table

- Description of data reduction methodology and age calculation procedure, either explicitly or by reference, including:
  - basis of data reduction, including all corrections applied to the raw data (blank, laser-induced fractionation, mass discrimination, interference, common Pb, basis for assumption of common Pb composition if relevant).
  - calibration strategy, calibration standards, and their $^{206}Pb^*/^{238}U$ and $^{207}Pb^*/^{235}U$ ($^{208}Pb^*/^{232}Th$) ages and associated uncertainties.
- Description of instrumentation and analytical protocols, either explicitly or by reference, including:
  - type of laser and ICPMS used.
  - laser parameters (wavelength, fluence, spot size, repetition rate, sampling mode, laser sample gas).
  - ICPMS parameters (plasma power, plasma gas flows, type of detector, sequential or simultaneous detection mode, isotopes/species measured, measurement dwell and settling times, number of measurements/readings per analysis, length of blank/sample measurements).
- Stated confidence level for all uncertainties, either explicitly or by reference, including:
  - basis of uncertainty calculation.
  - sources of uncertainties included in the estimate of isotopic ratio/ages.
  - estimate of precision and accuracy (e.g., based on analysis of reference sample).
- Description of U/Pb (Th/Pb) reference sample, including:
  - name and source, U (Th) and Pb contents, $^{206}Pb^*/^{238}U$ and $^{207}Pb^*/^{235}U$ ($^{208}Pb^*/^{232}Th$) ages and associated uncertainties, results achieved by repeat measurement of the reference sample and their uncertainties.

U–Pb ID-TIMS

Required in manuscript

- Name of laboratory providing analytical data.
- Description of minerals or materials analysed.
- Description of imaging techniques, such as CL, BSE, etc., if used.
- Reference to source of decay constant values. We recommend Steiger & Jäger (1977).
- Explicitly stated confidence level for all uncertainties.
  - Recommendation 1: 2σ for all uncertainties quoted in body of text.
  - Recommendation 2: Explicit restatement of confidence level used in associated tables, appendices or repository items containing data.

Required in data table

- Sample and fraction identifier (as used in main body of text).
- State confidence level for all uncertainties and whether fractional or absolute values.
- Fraction weight in micrograms and number of grains analysed (optional).
- Concentration of radiogenic U and Pb in ppm.
- Measured $^{206}Pb/^{204}Pb$ corrected for spike and fractionation.
- $^{208}Pb^*/^{206}Pb^*$ or model Th/U, plus uncertainty (optional)
- Isotopic ratios $^{206}Pb^*/^{238}U$, $^{207}Pb^*/^{235}U$ and uncertainties.
- Isotopic ratio $^{207}Pb^*/^{206}Pb^*$ and uncertainty **OR** associated correlation coefficient.
  - Recommendation: explicit uncertainty.
- Calculated age and uncertainty derived from each: $^{206}Pb^*/^{238}U$, $^{207}Pb^*/^{235}U$, and $^{207}Pb^*/^{206}Pb^*$.
- Optional parameters: percent discordance, calculated common Pb.

Required in either the methodology section, an appendix, or as footnotes to the data table

- Description of data reduction methodology, either explicitly or by reference, including:
  - basis of data reduction and associated statistical methods.
  - basis for calculation of blanks or of mass discrimination.
- Description of mineral or material preparation, either explicitly or by reference, including:
  - methodology for concentration of analysed material.
  - selection criteria for analysed material.
  - any modification to material, such as air or chemical abrasion.
- Description of chemical preparation techniques, either explicitly or by reference.
- Spike composition and uncertainty on calibration of main isotopic U/Pb ratio, e.g.- $^{235}U/^{205}Pb$.
- Description of instrumentation and its analytical protocols, either explicitly or by reference.
- Value and uncertainties of applied common $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$ and $^{208}Pb/^{204}Pb$ corrections, along with methodology of determination, either explicitly or by reference.
- Blank levels for Pb and U (in pg) (measured range of blanks may be given if the variability is reasonably low).
- Pb isotopic composition of blank with uncertainty stated as $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$ and $^{208}Pb/^{204}Pb$.

Table 1. Example: U-Pb data table from zircon determined by SIMS.

	Concentration (ppm)					Radiogenic (corrected) ratio				Calculated age ± σ (Ma)		
Sample ID	**U**	**Pb**	**Th/U**	**$^{206}Pb/^{204}Pb$**	**f_{206} (%)[1]**	**$^{206}Pb/^{238}U$ ± σ (%)**		**$^{207}Pb/^{206}Pb$ ± σ (%)**		**$^{207}Pb/^{206}Pb$**	**$^{206}Pb/^{238}U$**	**Conc (%)[2]**
grain 1	180	33	0.65	13900	0.13	0.1478	0.95	0.06859	0.75	886 ± 15	889 ± 8	100.3
grain 2	140	25	0.67	1000	1.86	0.1370	0.97	0.0661	2.0	809 ± 41	828 ± 8	102.4
OG1-2193	170	190	0.86	198000	0.01	0.7031	1.4	0.29913	0.20	3466 ± 3	3432 ± 38	98.8
M257-2913	870	90	0.28	147000	0.01	0.0904	1.2	0.05868	0.52	555 ± 11	558 ± 6	100.5

(1) f_{206} is the percentage of common Pb estimated from ^{204}Pb counts.
(2) Concordance in %.

Additional columns:

Total (common Pb uncorrected) ratios; mandatory if regressing uncorrected data

$^{207}Pb/^{235}U$ ratio, error correlation and age; mandatory if plotting data on Wetherill concordia

$^{208}Pb/^{232}Th$ ratio, error correlation and age if measured and discussed in manuscript

"207-corrected" ages if used

Optional but useful - grain descirption summary column

A note on uncertainties and significant figures

As a general rule, uncertainties should be given to 2 significant figures, either in % or absolute. This will determine the least significant digit incorporated into a ratio.