

A.

BayClump: Bayesian methods for clumped isotope paleothermometry

**Calibrations**

**Calibration Plots**

**Reconstructions**

**User Manual**

**BayWatch**

**Citations**

**Manuscript**

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**Contacts**

**Step 1: Calibration Options**

**Select calibration set**

☐ Román-Palacios et al. - Model 1

☐ Román-Palacios et al. - Model 2

☐ Use Román-Palacios et al. - Models 1 & 2

☐ Upload my own calibration data

☐ Use all

**Download calibration data template**

**Select calibration data file**

Browse... No file selected

**Reference frame**

☒ Use the interarch carbon dioxide equilibrium scale at 30°C (8-CDS 98)

☐ I am using my own calibration data in a different reference frame

**Miscellaneous options**

☐ Scale data

**Step 2: Select Models**

For help choosing an appropriate number of bootstrap replicates or the temperature range for CI estimation, see the User Manual

**Number of bootstrap replicates for non-Bayesian models**

100

**Temperature range to use for CI estimation (10<sup>3</sup>/°C)**

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

**Iterations to keep for Bayesian models**

3000

**Number of observations per bootstrap sample (max. recommended: 41)**

41

**Bayesian priors**

Informative

☒ Linear model

☒ Inverse weighted linear model

☒ York regression

☒ Deming regression

☒ Bayesian linear models

**Total samples** **Unique samples** **Total replicates** **Materials**

41 41 361 2

**QC Run selected models**

Model comparison in too

elpt\_diff se\_diff

BLM\_ME 0.9 0.0

BLM\_I -0.802 1 501.0

BLM\_E -0.537 4 980.1

**Step 3: Calibration Output**

Truncated output from each selected model

**Linear model**

Mean SE

alpha 0.1569 9.16e-04

beta 0.0389 8.62e-05

**Inverse weighted linear model**

Mean SE

alpha 0.1551 0.000921

beta 0.0381 0.000837

**York regression**

Mean SE

alpha 0.1552 0.000866

beta 0.0389 0.000764

**Deming regression**

Mean SE

alpha 0.1591 0.001089

beta 0.0387 0.000872

**Bayesian simple linear model - no errors**

mean se\_mean

alpha 0.153180 0.001765

beta 0.0384867 0.0006169

**Bayesian simple linear model - with errors**

mean se\_mean

alpha 0.162728 0.01e-05

beta 0.0384425 9.88e-06

**Bayesian mixed model - with errors**

mean se\_mean

alpha[1] 0.1549784 0.0001509

alpha[2] 0.1507599 0.0003391

beta[1] 0.0355186 0.000432

beta[2] 0.0394277 0.000145

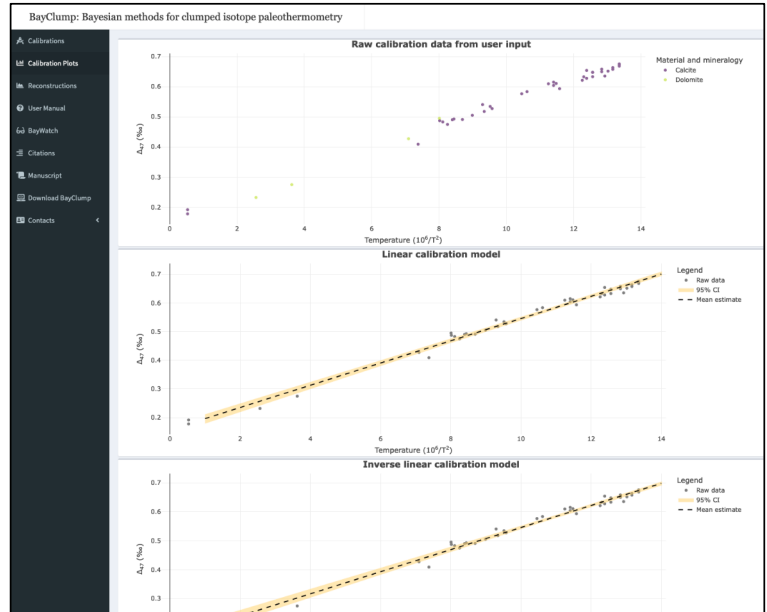
**Download full calibration output**

**Download raw results for Bayesian models**

**Download posterior one Bayesian replicate**

**Download priors**

B.



C.

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**Step 1: Reconstruction setup**

Parameters for the selected models are automatically transferred from the Calibration tab to this tab.

**Download reconstruction data template**

**Select reconstruction data file**

Browse... BayClump\_reconstruction\_template[2].csv

Upload results

**Unique samples** **Total replicates** **Materials**

1 6 1

**Models to run**

☒ Linear model

☒ Inverse weighted linear model

☒ York regression

☒ Deming regression

☒ Bayesian linear models

**Inversion interval:**

☐ Simple inverse prediction interval (PI)

**QC Run reconstructions**

[1] Linear reconstruction complete

[2] Inverse weighted linear reconstruction complete

[3] York reconstruction complete

[4] Deming reconstruction complete

[5] Bayesian linear reconstructions complete

**Download reconstruction output**

**Download posterior reconstruction output**

**Download priors**

**Step 2: Temperature reconstructions**

Truncated output from each selected model

**Linear model**

Sample	$\Delta_{47}$ (‰)	$\Delta_{47}$ (‰) error	Temperature (°C)	LM, 95% CI	Up, 95% CI
Ab-1	0.768	0.0060	-21.0	-26.365	-15.170
Ab-1	0.766	0.0038	-20.6	-26.008	-14.762

**Inverse weighted linear model**

Sample	$\Delta_{47}$ (‰)	$\Delta_{47}$ (‰) error	Temperature (°C)	LM, 95% CI	Up, 95% CI
Ab-1	0.768	0.0060	-21.9	-27.429	-15.504
Ab-1	0.766	0.0038	-21.5	-27.069	-15.510

**York regression**

Sample	$\Delta_{47}$ (‰)	$\Delta_{47}$ (‰) error	Temperature (°C)	LM, 95% CI	Up, 95% CI
Ab-1	0.768	0.0060	-20.9	-26.261	-15.068
Ab-1	0.766	0.0038	-20.5	-25.904	-14.660

**Deming regression**

Sample	$\Delta_{47}$ (‰)	$\Delta_{47}$ (‰) error	Temperature (°C)	LM, 95% CI	Up, 95% CI
Ab-1	0.768	0.0060	-21.1	-26.501	-15.268
Ab-1	0.766	0.0038	-20.7	-26.143	-14.858

**Bayesian predictions (BLM without errors)**

Sample	$\Delta_{47}$ (‰)	$\Delta_{47}$ (‰) error	Temperature (°C)	LM, 95% CI	Up, 95% CI
Ab-1	0.768	0.0060	-21.2	-26.711	-15.315
Ab-1	0.766	0.0038	-20.8	-26.359	-14.899

**Bayesian predictions (BLM, errors)**

Sample	$\Delta_{47}$ (‰)	$\Delta_{47}$ (‰) error	Temperature (°C)	LM, 95% CI	Up, 95% CI
Ab-1	0.768	0.0060	-21.2	-26.702	-15.321
Ab-1	0.766	0.0038	-20.8	-26.349	-14.910

**Bayesian predictions under a Bayesian linear mixed model**

Sample	$\Delta_{47}$ (‰)	$\Delta_{47}$ (‰) error	Temperature (°C)	LM, 95% CI	Up, 95% CI
Ab-1	0.768	0.0060	-21.2	-26.711	-15.315