

PolyChron: FAIR data for post-excavation analysis

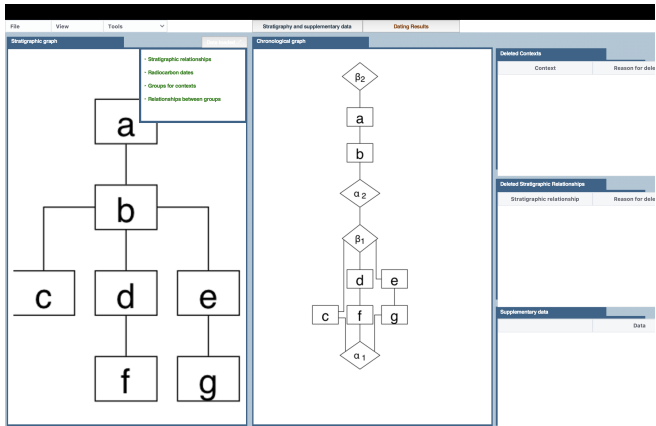
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What is PolyChron?

A software to help archaeologists process, calibrate, and interpret their findings efficiently.



Radiocarbon calibration: data & why it matters

Radiocarbon dating produces a ^{14}C **age**, expressed in radiocarbon years.

Ages are reported as **BP** (Before Present), where “Present” is defined as AD 1950.

Cal BP refers to *calibrated years before 1950*, giving an estimate in true calendar years relative to that fixed baseline.

This convention allows researchers worldwide to compare results consistently.

CAL BP, 14C age, Sigma, Delta 14C, Sigma

55000,50100,1024,528.5,193.9
54980,50081,1018,528.3,192.7
54960,50063,1013,527.9,191.7
54940,50043,1007,527.8,190.6
54920,50027,1003,527.0,189.5
54900,50009,997,526.6,188.4
54880,49992,991,526.0,187.1
54860,49976,987,525.3,186.2
54840,49959,982,524.7,185.0
54820,49943,976,523.9,184.0
54800,49928,971,522.9,182.7
54780,49913,966,521.9,181.6
54760,49897,960,521.1,180.4
54740,49884,955,520.0,179.3

Calendar_year	Carbon_year	Carbon_error
55000	50100.0	193.9
54999	50099.05	193.84
54998	50098.1	193.78
54997	50097.15	193.72
54996	50096.2	193.66
54995	50095.25	193.6
54994	50094.3	193.54
54993	50093.35	193.48
54992	50092.4	193.42
54991	50091.45	193.36000000
54990	50090.5	193.30000000
54989	50089.55	193.24

Extending the software

Calibration curves translate radiocarbon years into calendar years.

Different curves exist:

Northern Hemisphere (IntCal20)

Southern Hemisphere (SHCal20)

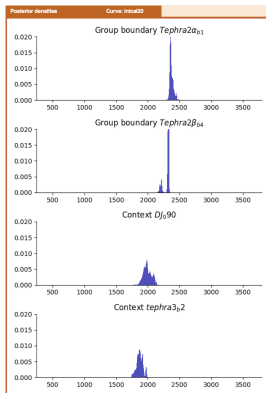
Marine (Marine20)

Atmospheric and oceanic processes cause real differences in ^{14}C levels.

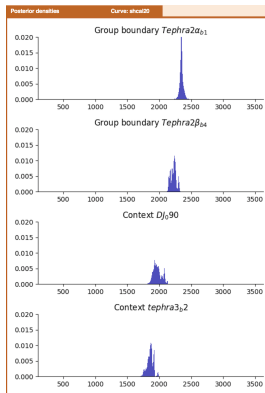
Using the wrong curve can shift dates significantly.

IntCal vs SHCal vs Marine

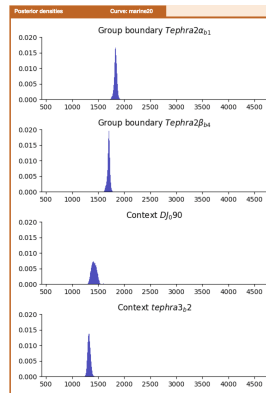
Choosing the right curve matters: using the wrong one can shift age estimates a lot.



IntCal20



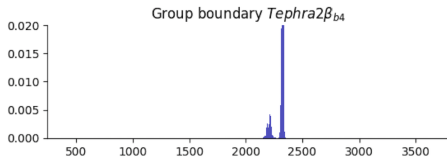
SHCal20



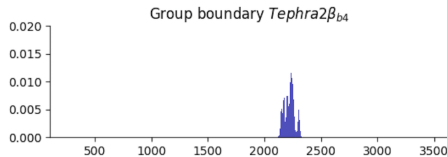
Marine20

Comparing individual contexts

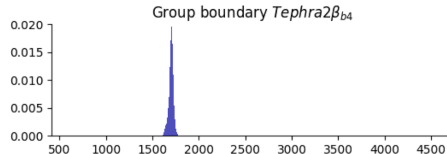
IntCal20



SHCal20



Marine20



Conclusion & acknowledgements

What I learned during this project:

Gained experience working in a **multi-file Python project**, where changes in one module affected others.

Learned how to extend and adapt a **Tkinter interface**, connecting the front-end with underlying code.

Improved at **debugging and refactoring**: fixing errors and cleaning code to make it easier to maintain.

Developed a deeper understanding of **radiocarbon calibration curves** and why the choice of curve matters for archaeological dating.

Thank you to **Dr Bryony Moody** and **Dr Peter Heywood**.

Project repo: <https://github.com/bryonymoody/PolyChron>