Hands-on
Bayesian age-model software

OxCal
Bchron
Bacon

Today

09:00 – 11:00 OxCal, Bchron, Bacon

11:30-13:30 Analysis multiple sites

14:30 Excursion + dinner

Tomorrow: discuss potential papers

OxCal

Most popular Bayesian ^{14}C chron builder?

Chron. ordering, outlier analysis

Deposition models

Linking multiple sites

Several ways to enter dates: manual, graphical, code

Important: be careful with the code () “” {} ;

OxCal deposition models

file:///C:/Program%20Files/OxCal/oxcalhelp/hlp_analysis_oper.html#deposit

Trees

Uniform

Sequence

P_Sequence

Running OxCal

Unzip OxCalDistribution.zip

- To C:\Program Files (Windows)
- To /Applications/ (Mac)

Open Firefox

Open OxCal file in Firefox (ctrl+o):

C:\Program Files\OxCal\Index.html (Windows)

File:///Applications/OxCal/Index.html (Mac)

Agree to warning

Perhaps bookmark the file

Running OxCal

Open OxCal.txt in text editor

Copy first lines, D_Sequence() {...};

In OxCal, File → New

Change view with text icon

Replace code with the copied code

File → Save...

Run

View → Plot dates

Running OxCal

Repeat actions for other examples:

In OxCal, File > Open *the previous file*

Replace old code with new code, Run

V_Sequence() {…}; (wiggle-matching)

U_Sequence() {…}; (constant deposition)

P_Sequence(10) {…}; (Poisson model)

P_Sequence(1) {…}; (more flexible)

Writing OxCal code

Open MSB2K.dat in text editor (is in Bacon/Cores/MSB2K)

Change code to run a P_Sequence

Beware of () {} “” ;

Oldest dates first!

Bchron

Haslett and Parnell 2008 (JRSSC, 57: 399-418)
Parnell et al 2008 (QSR, 27: 1872-1885)

BChron

Be connected to the Internet

Open R and type in terminal:

Install.packages('BChron')

Choose a nearby mirror (USA)

Now type: library('Bchron')

Type help(Bchron) and follow install steps

Installation instructions

1. Create a directory on your hard drive called Bchron.

2. Navigate to the R directory and find the Bchron sub-directory within. On windows this will be C:\ program files\R\ R-XXXXX\ library\ BChron\ where XXXXX is the version number of R. On other platforms, this directory can be found by typing .libPaths() at the R command prompt.

3. In this directory, there there should be three subdirectories called Input, Output, and CalCurve. Copy these to the Bchron directory you created in step 1.

Example Bchron run

1. At the command prompt in R, type library(Bchron)
2. Type Bchronmenu() and choose option 1.
3. Locate your Bchron directory, and select IntCal09.bch as your calibration curve and Glendalough.dat as your input file. All other options can be left as default.
4. Choose option 2 to calibrate the ^{14}C dates (standard length).
5. Choose option 3 and 'standard' to run the Bchron model.
6. Choose option 4 to run the prediction stage and create a plot of the data. ….laptop may become hot!!!

Bacon

Unzip Bacon.zip to somewhere nice

Open R and change dir to where Bacon lives

Load the Bacon R code:

source('Bacon.R')

Run the default core + settings (MSB2K):

Bacon()

This will run MSB2K at a default resolution of 5 cm, sample size 1,000

Ghost plots

Previous plot has sub-panels, remove:

Close the graph by mouse or type dev.off()

proxy.ghost(1)

proxy.ghost(2) …. what is happening?

Open MSB2K_proxies.csv in, e.g., Excel

Dealing with outliers

Bacon(“RLGH3”)

Do you agree with the proposed model?

Longer cores

Type: Cores()

Run a much longer core, at lower resolution:

Bacon(“LesEchets”, 100)

How old is the core?

What are those light blue dates?

Greyscale not very visible, re-draw:

Bacon.PlotAgeModels(info, dark=200)

WLM

Bacon('WLM19')

Open WLM19.csv in text editor

- what are all those columns?

If strange extrapolation warnings: remove or correct automatically produced _priors.txt

Effect of resolution, e.g., 2, 5, 10?

Effect of accumulation rate prior?

- Change memory to, e.g., strength 10, mean 0.2 (or 0.95)

Events

AgesOfEvents(yrmin=0, yrmax=1000,
window=100, move=10, info)

Check file WLM19_probs.txt

In case of problems, load and run core anew:

E.g.: source(“Bacon.R”)

Bacon(“WLM21”, 10)

Reload existing runs

Bacon(“MSB2K”, run=F)

Bacon.PlotAgeModels(info)

(to get graph settings right)

Known synchronous events

Open Tephra.txt in text editor

What does this do?

What does the magic = do?

Run this in OxCal (takes time)

Testing for synchronous events

In R, go to the Bacon dir and load Bacon.R

Run the first of three WLM cores, WLM19:

Bacon(“WLM19”)

Open /WLM19/WLM19_events.txt in editor

1's indicate depths with wet-shifts, 0 not

If commas between columns, remove them...

Testing for synchronous events

In R, find the ages of all these events:

AgesOfEvents(yrmin=0, yrmax=1000,
window=100, move=10)

This will write a file ...WLM19_21_probs.txt

Testing for synchronous events

Do the same for cores WLM20 and WLM21

(remove commas in _events.txt file)

Testing for synchronous events

Now we have three times timing of events

Events19 <- read.table(“Cores/WLM19/WLM19_21_probs.txt”)

Events20 <- read.table(“Cores/WLM20/WLM20_10_probs.txt”)

Events21 <- read.table(“Cores/WLM21/WLM21_14_probs.txt”)

plot(Events19, type=”l”)

lines(Events20, col=”red”)

lines(Events21, col=”blue”)

Testing for synchronous events

Prob. of events taking place in the 3 sites between yrmin and yrmax:

- p(WLM19) * p(in WLM20) * p(WLM21)

pr ← Events19[,2] * Events20[,2] * Events21[,2]

lines(Events19[,1], pr, lwd=3, col=”green”)