

Resolving the past: high precision ^{14}C ages in the Younger Dryas

Adam Sookdeo
PhD candidate



Overview

Radiocarbon & the Younger
Dryas



Sample preparation



Quality check

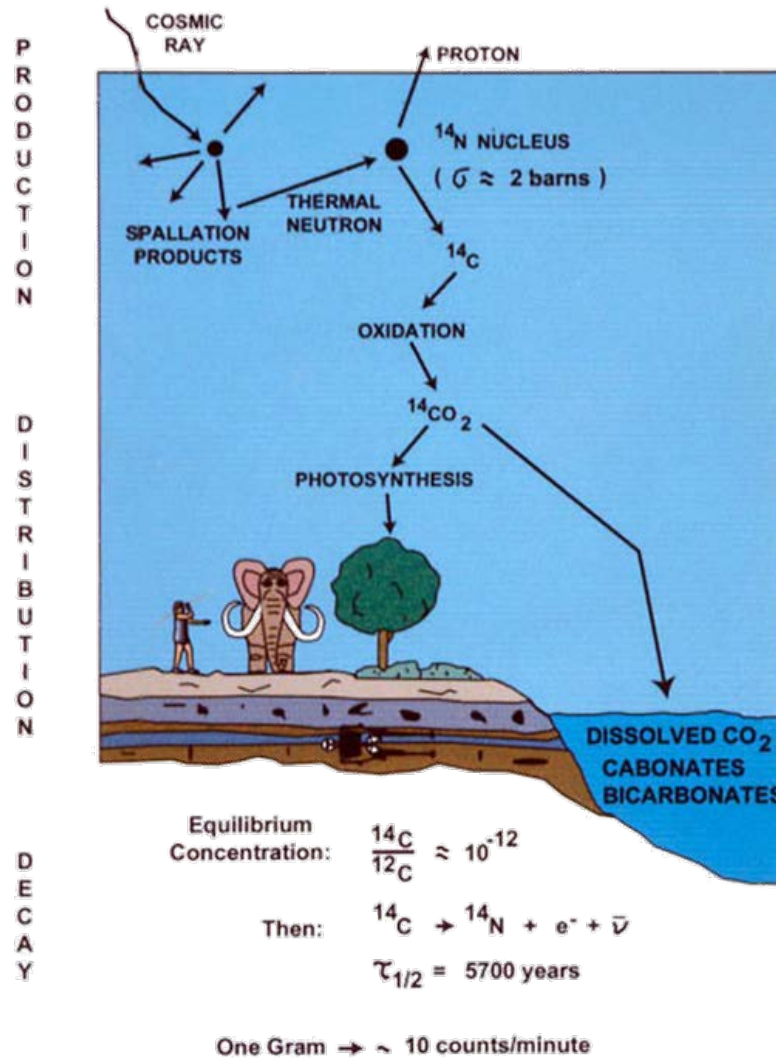


Results



Summary

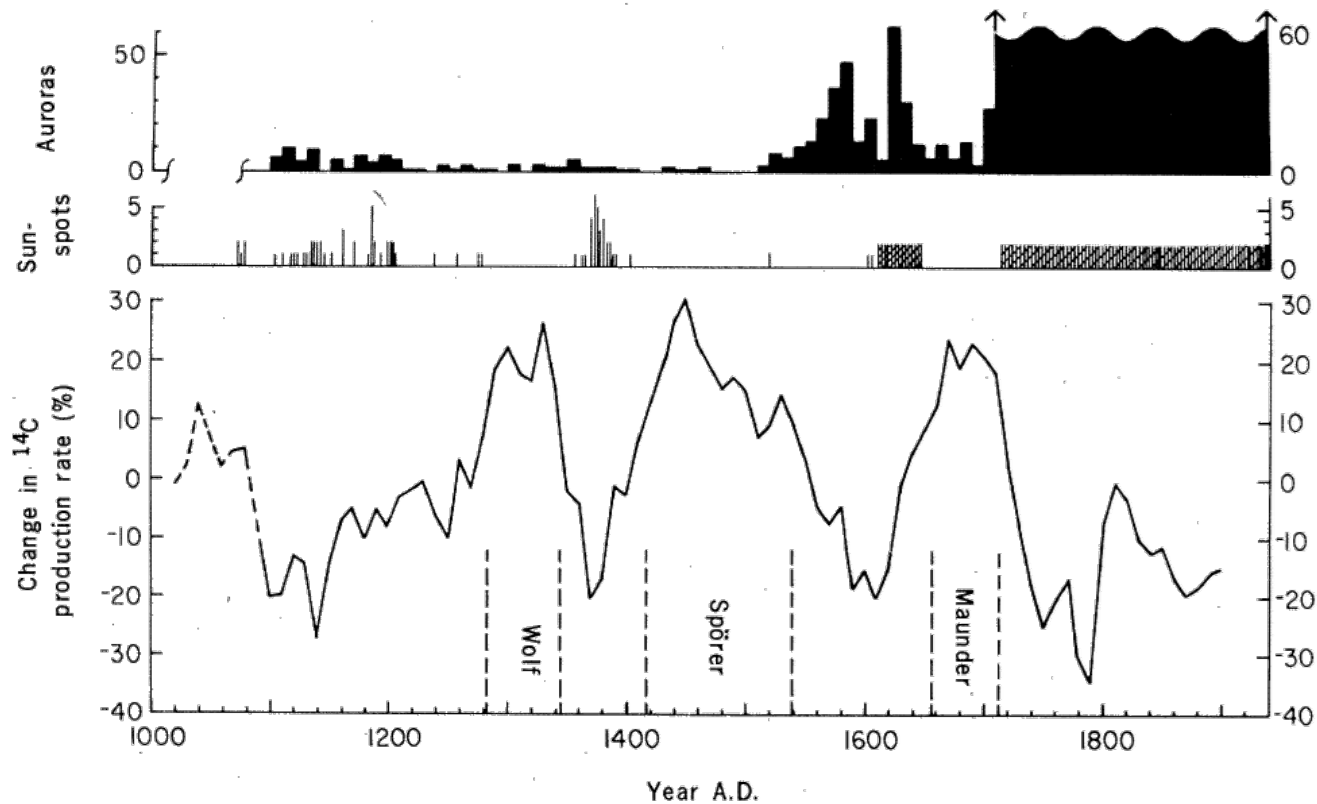
Radiocarbon



http://www.physics.arizona.edu/ams/Images/Scan_003.jpg

Changes in Radiocarbon

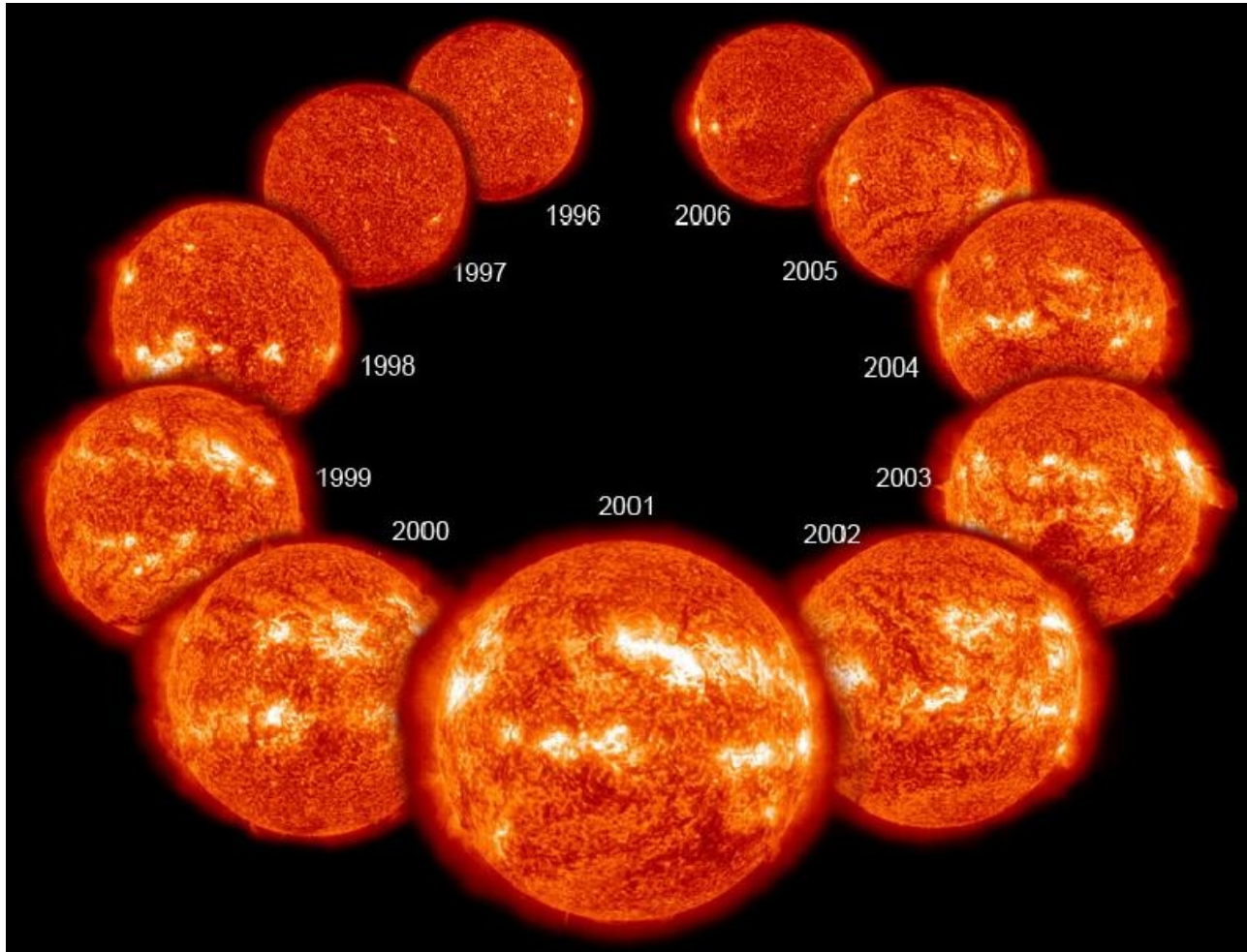
■ Solar Variations



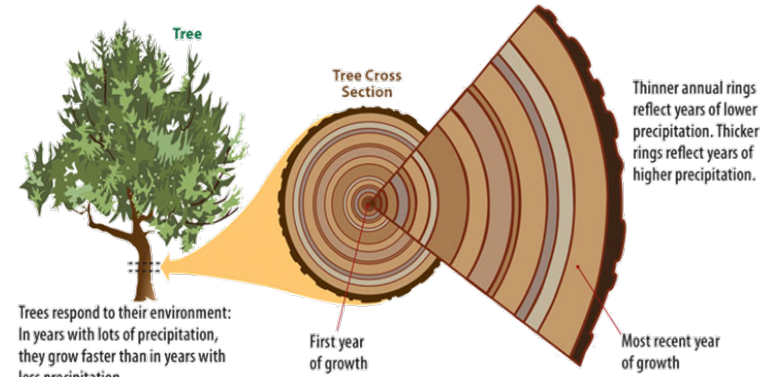
Stuiver and Quay 1980.

Source: https://www.nasa.gov/images/content/506263main_sorce1.jpg
accessed 2018

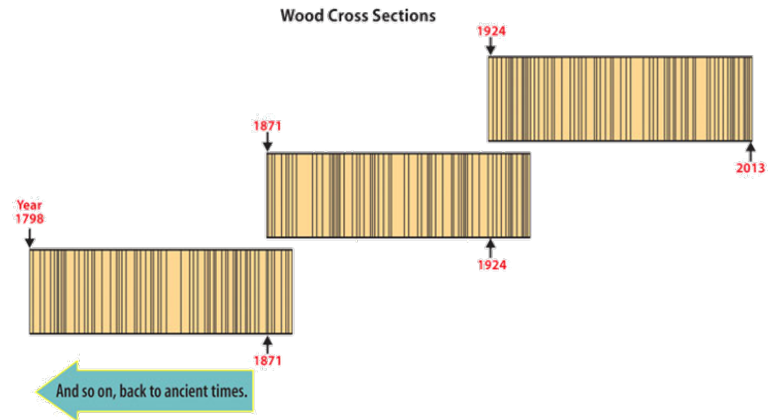
Changes in Radiocarbon



Dating of Trees

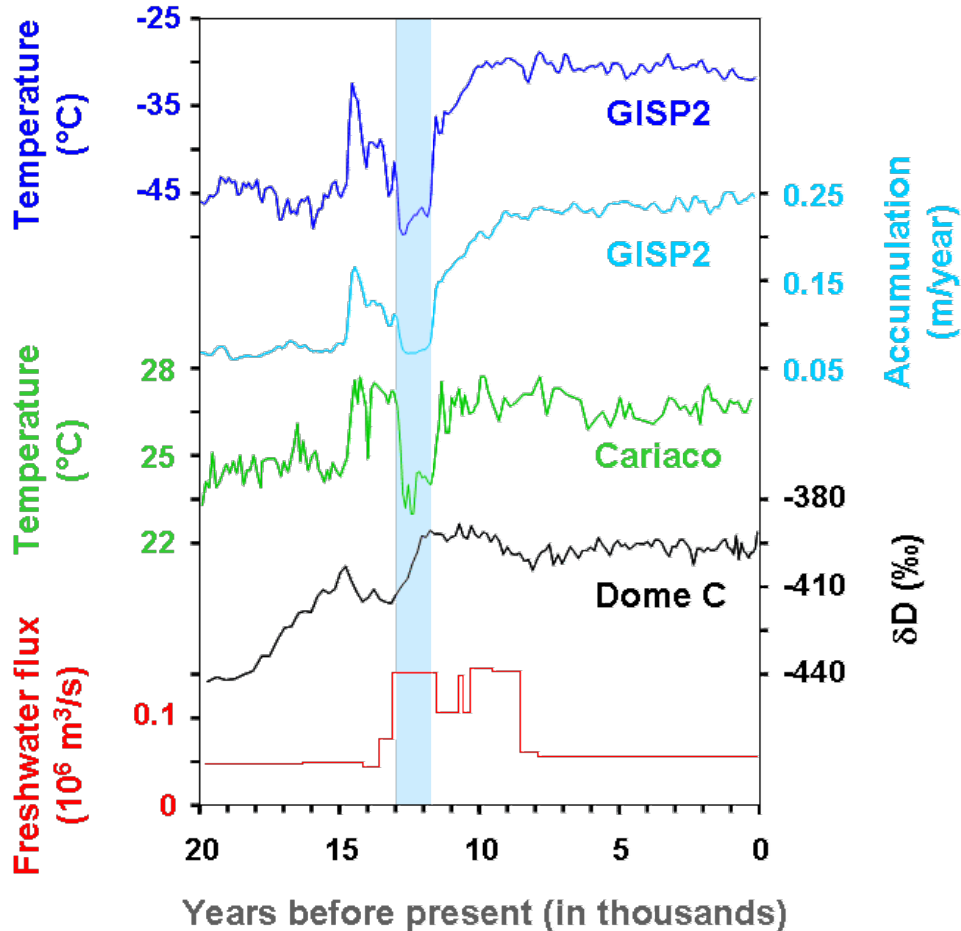


Scientists build tree-ring chronologies by starting with living trees and then finding progressively older specimens—including archaeological wood—whose outer rings overlap with the inner rings of more-recent specimens.



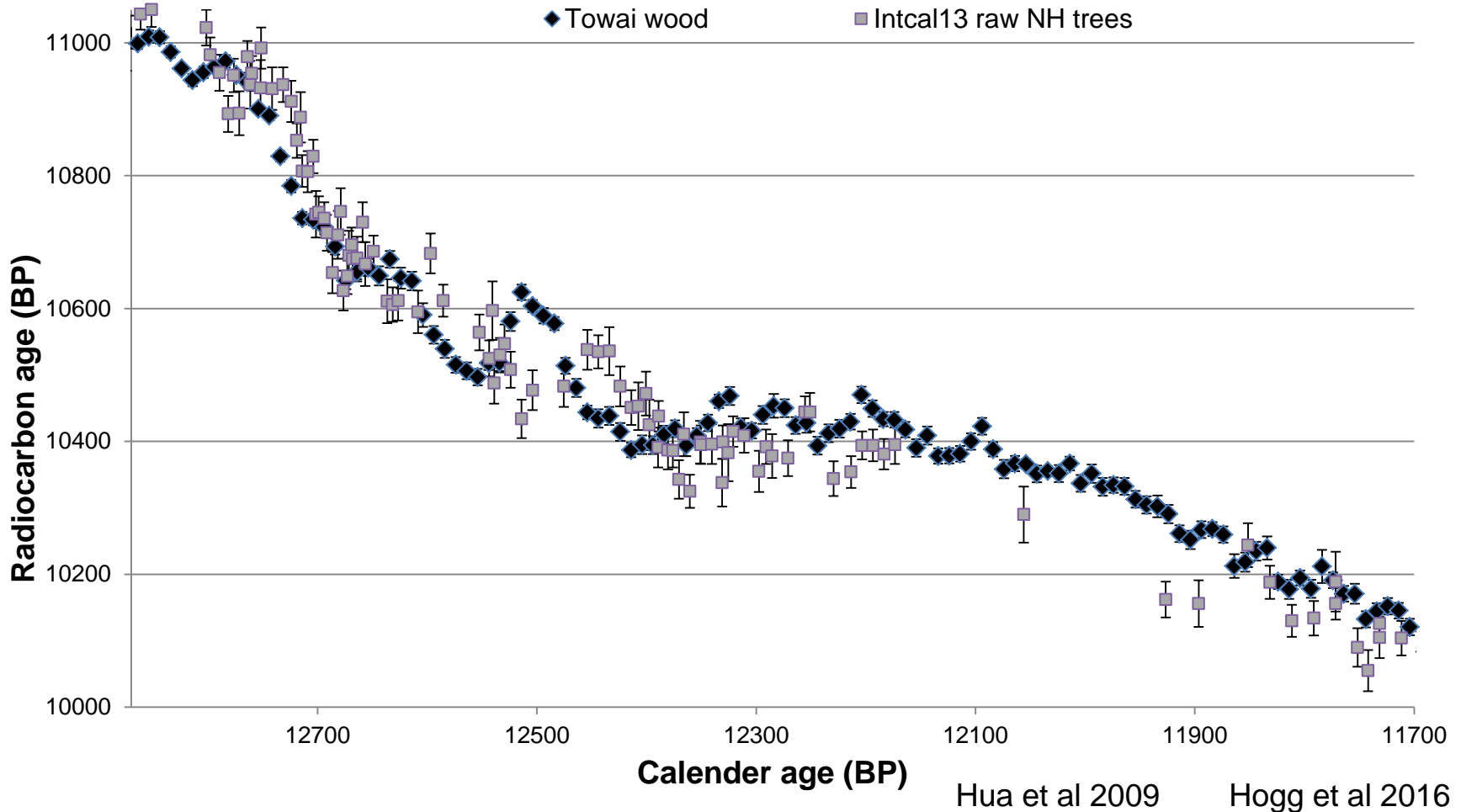
<https://www.crowcanyon.org/index.php/dendrochronology>

The Younger Dryas (YD)

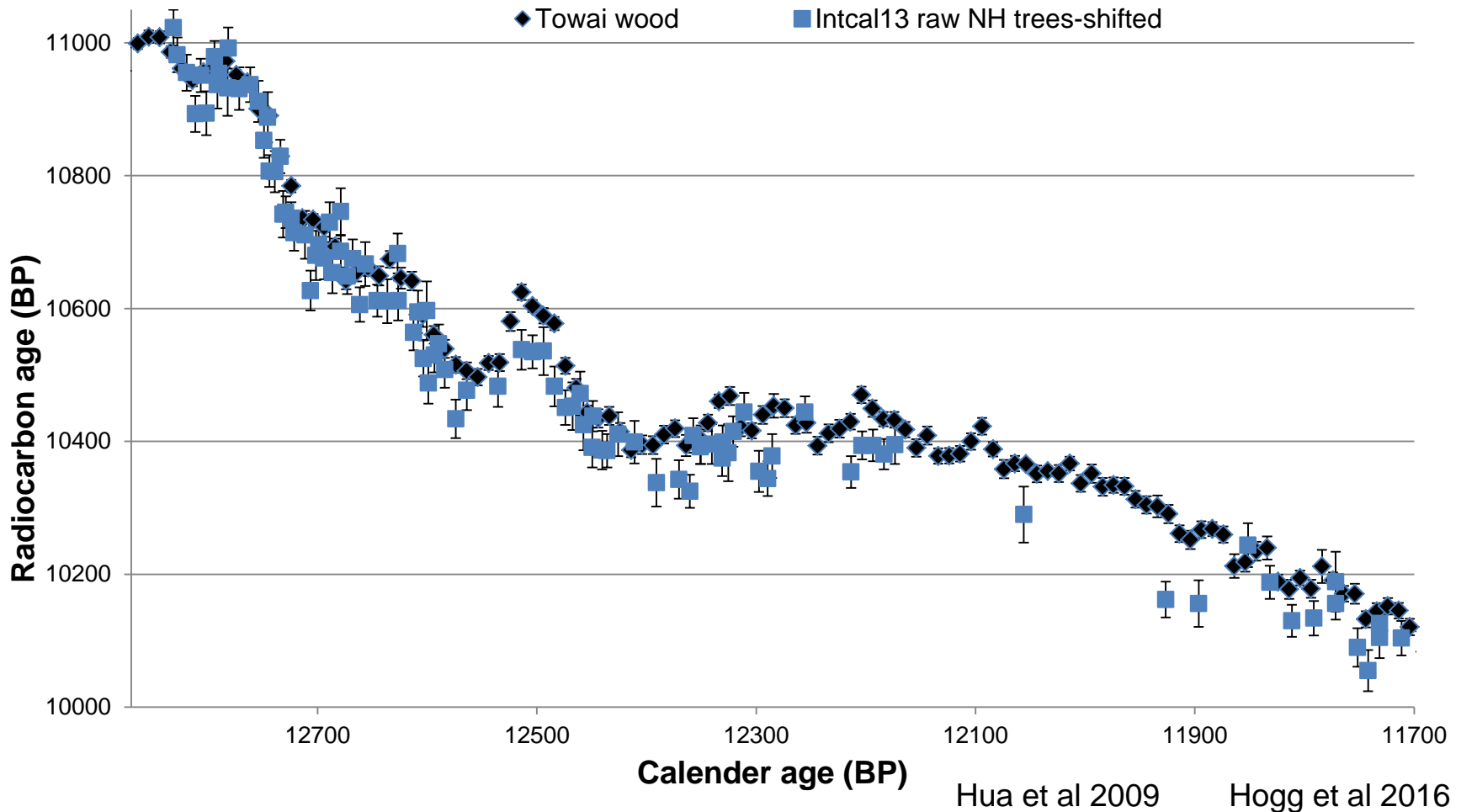


<http://www.ncdc.noaa.gov/paleo/abrupt/data4.html>

Published ^{14}C record during YD



Published ^{14}C record during YD



Binz working group

254 late glacial pines

Multidisciplinary

Create globally
longest absolute
chronology



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Sample preparation and measurement

4% NaOH

4% HCl

4% NaOH

5% NaClO₂

Graphitization



<http://www.ionplus.ch/products/Micadas>

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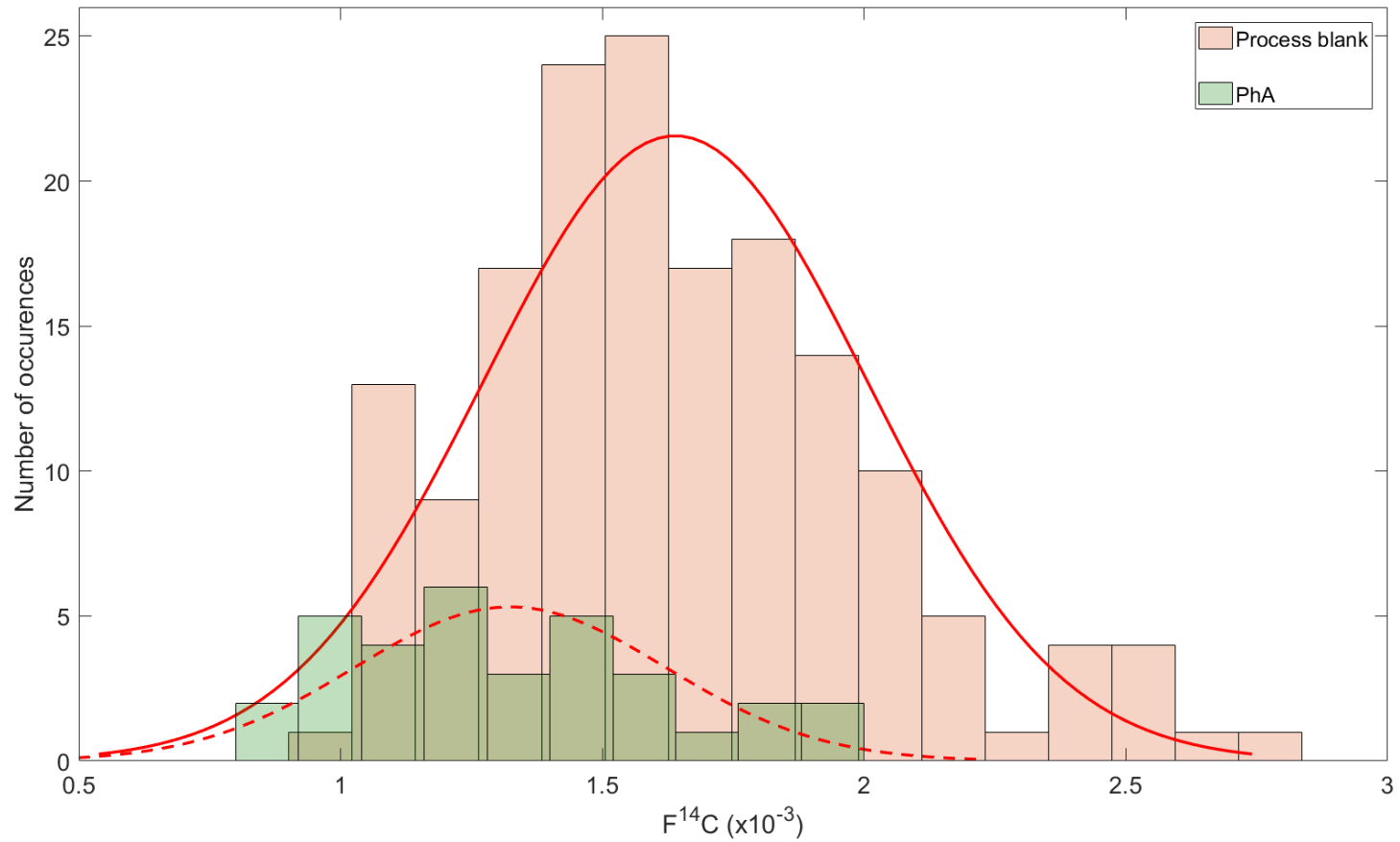


Results

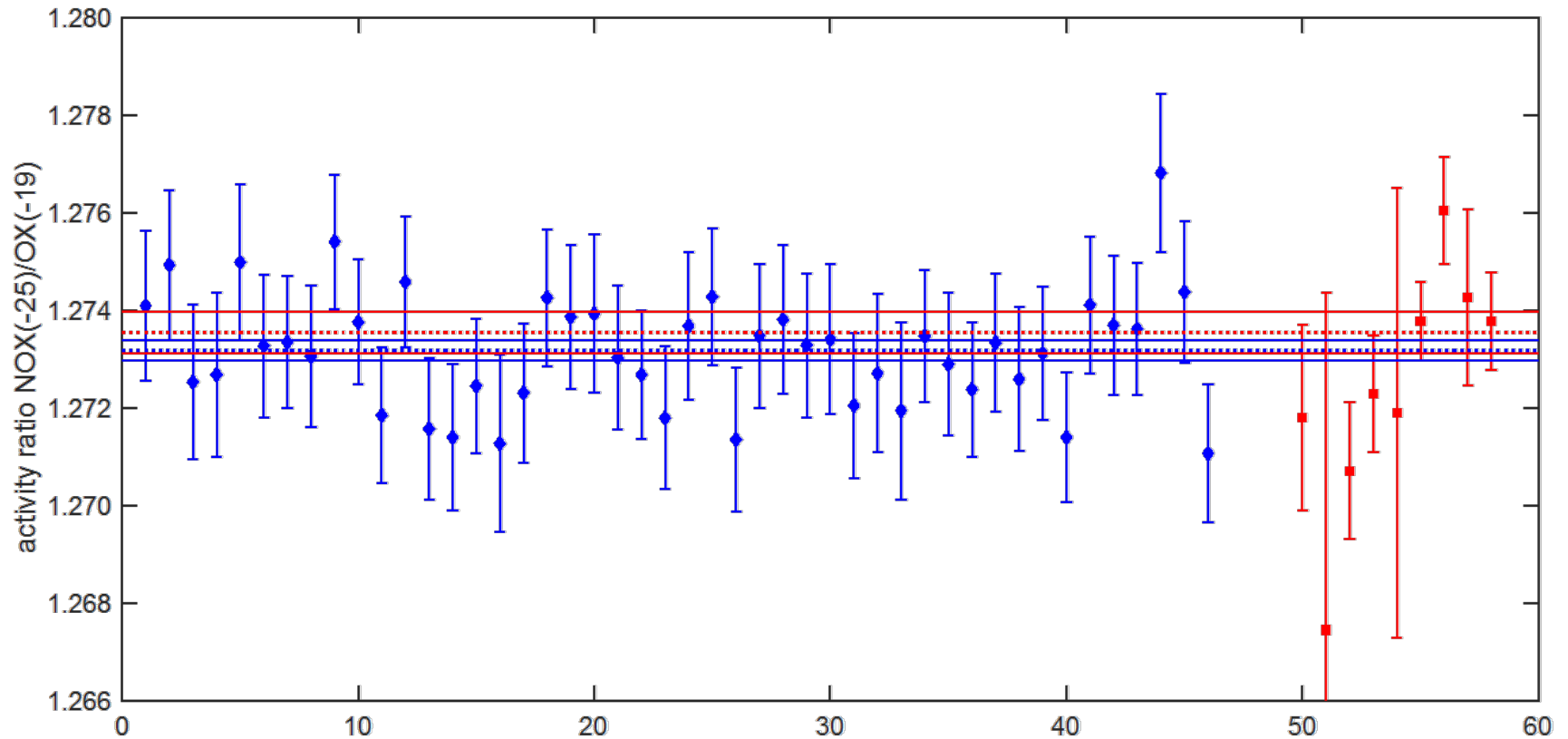


Summary

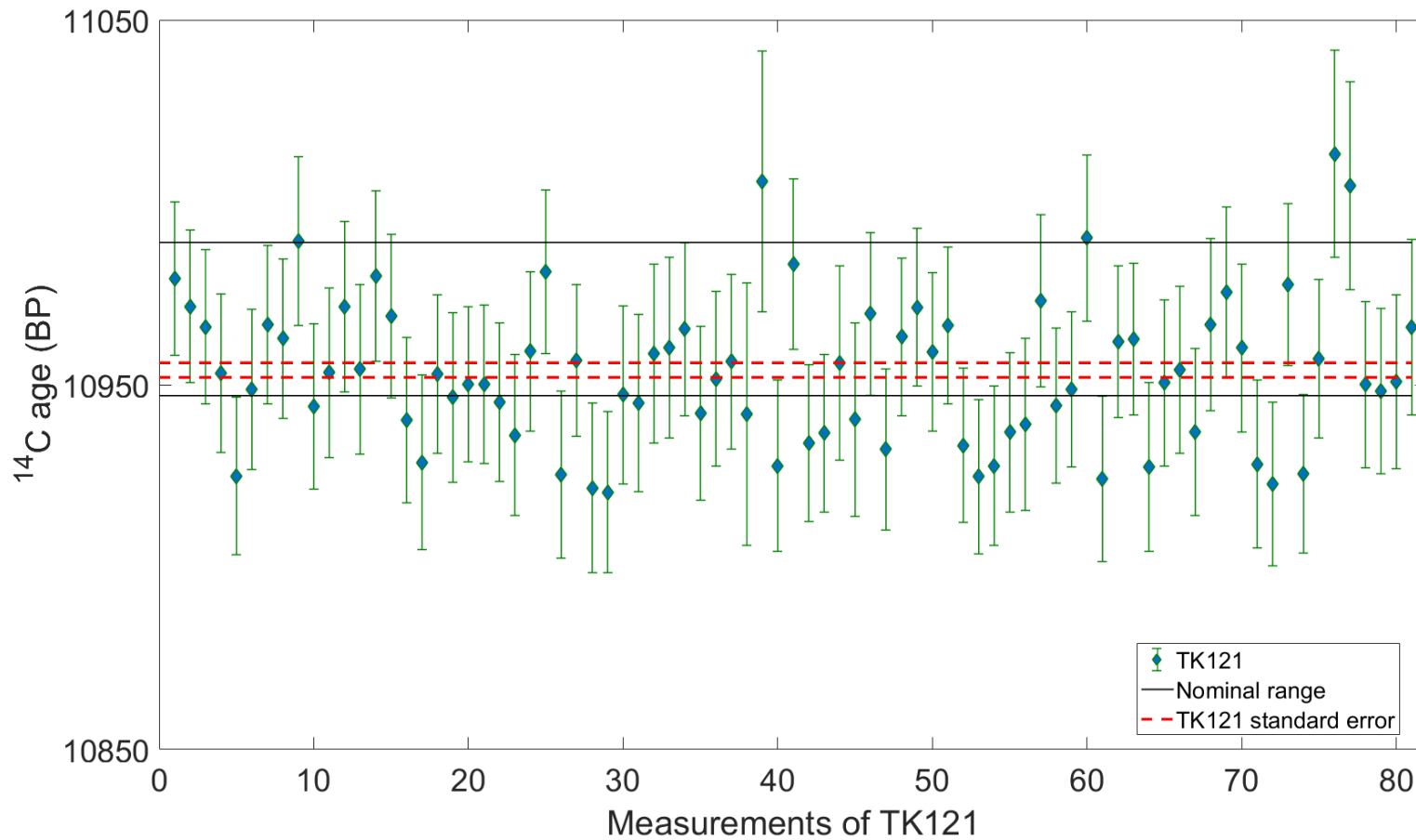
Blanks



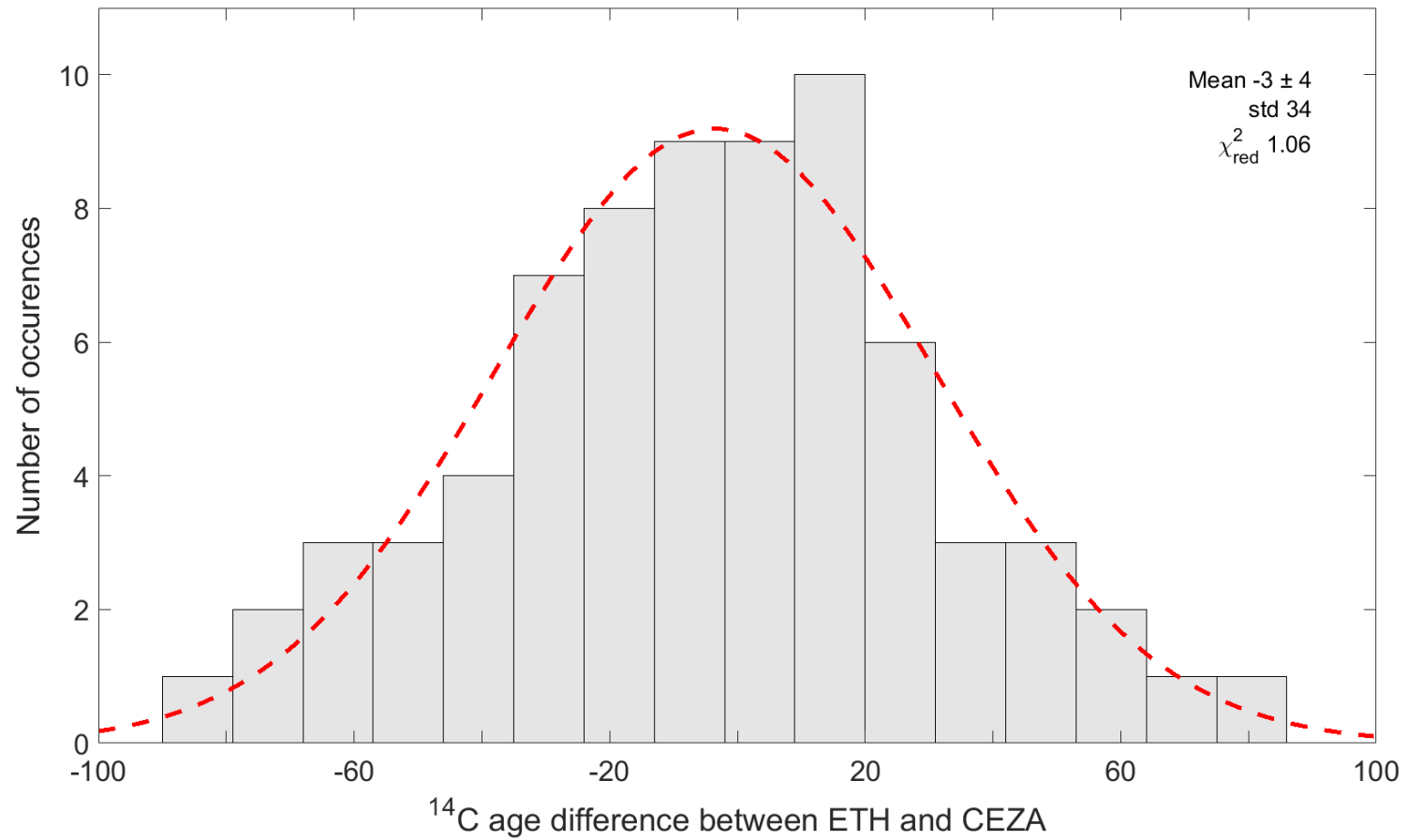
Standard (NOX)



Reference material (TK121)



Intercomparison



Overview

Radiocarbon & the Younger
Dryas



Sample preparation



Quality check

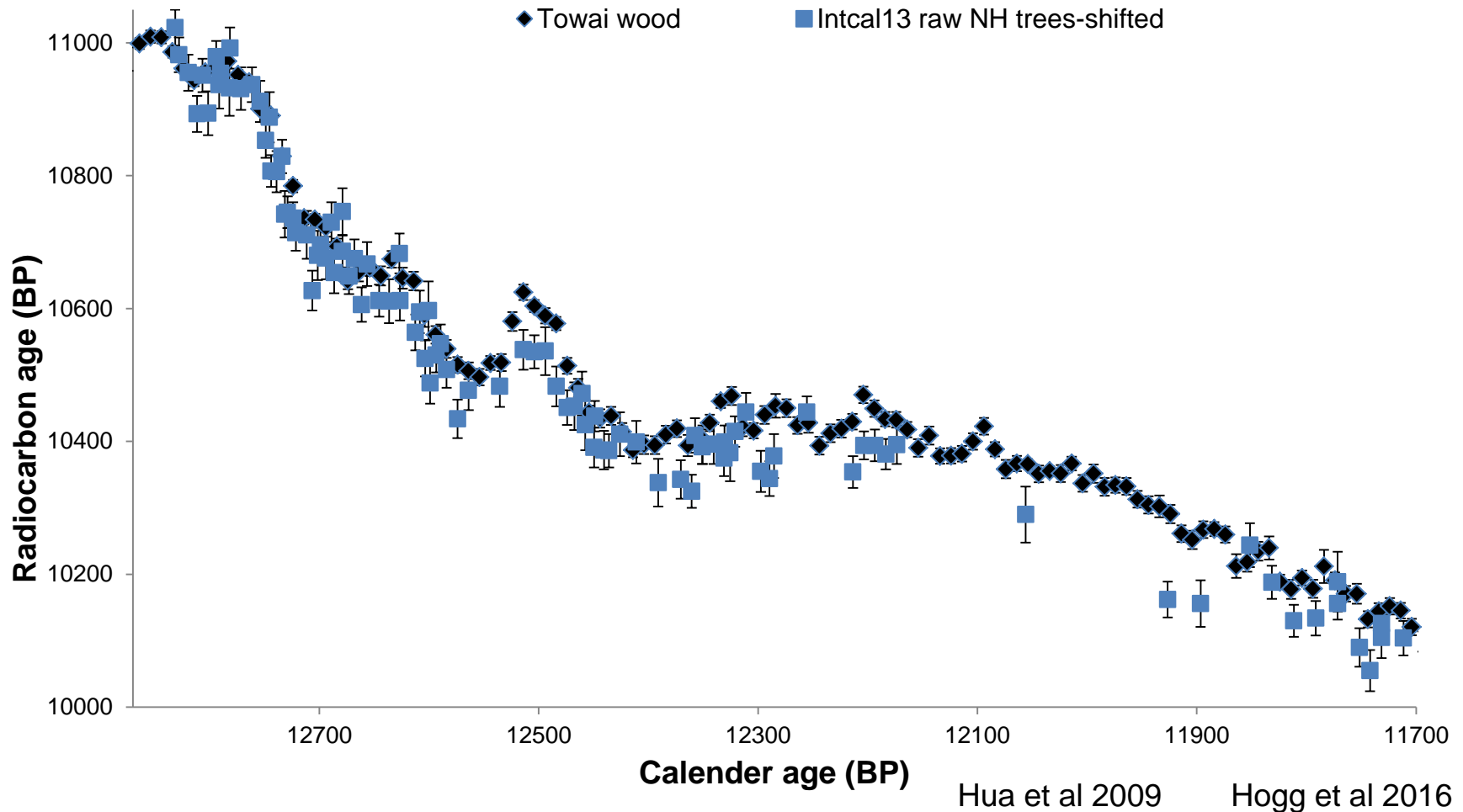


Results

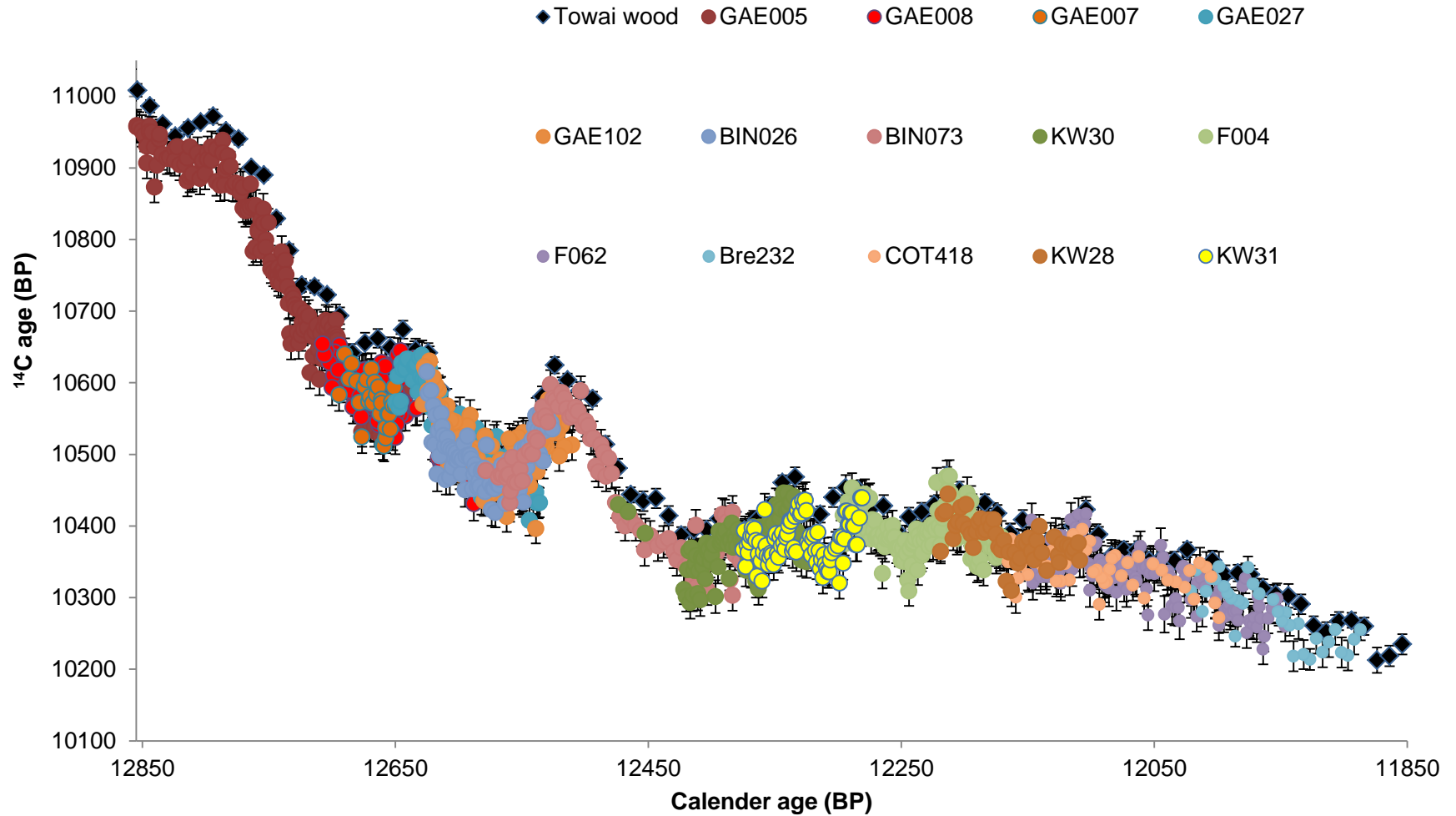


Summary

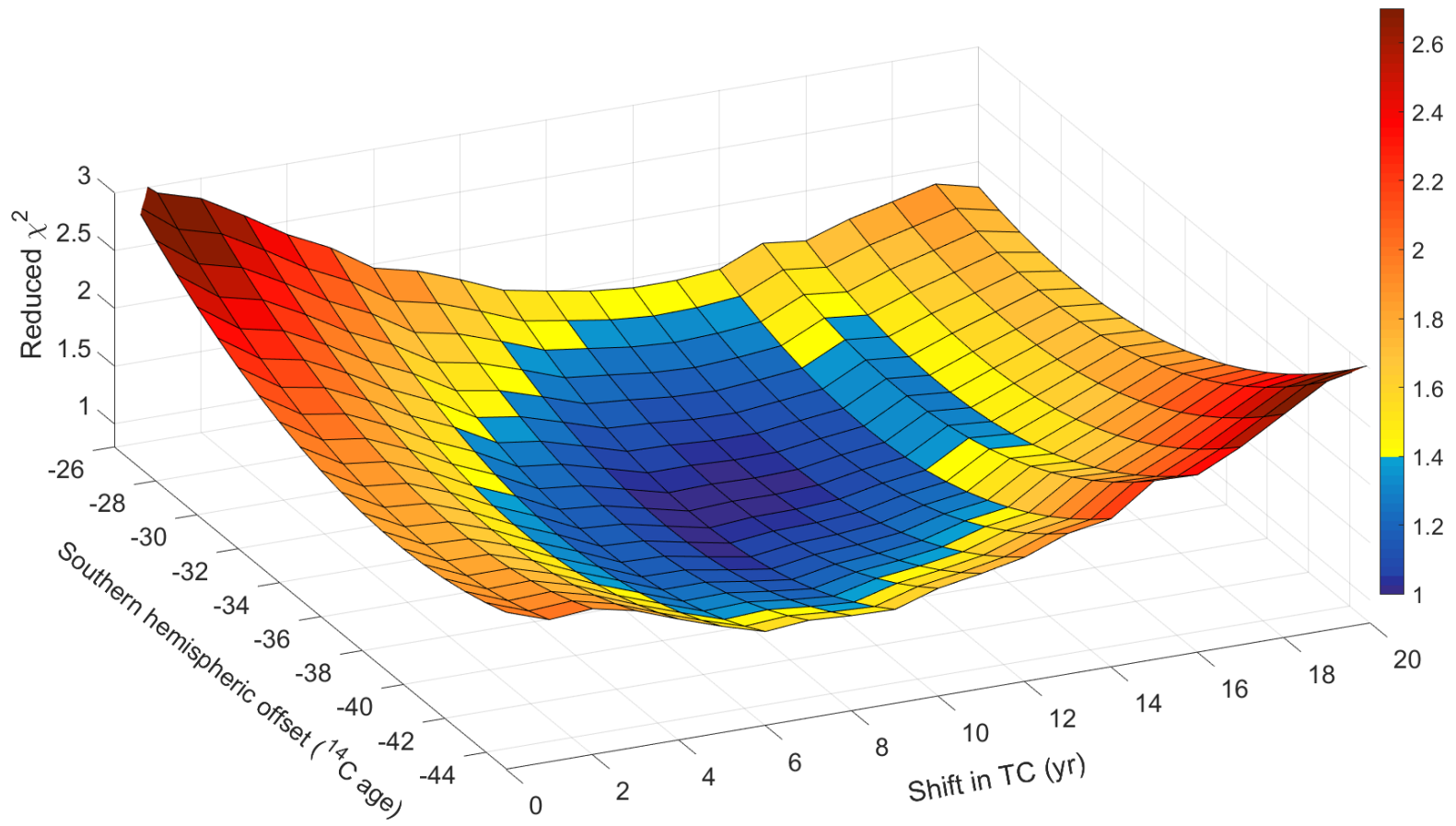
Published ^{14}C record



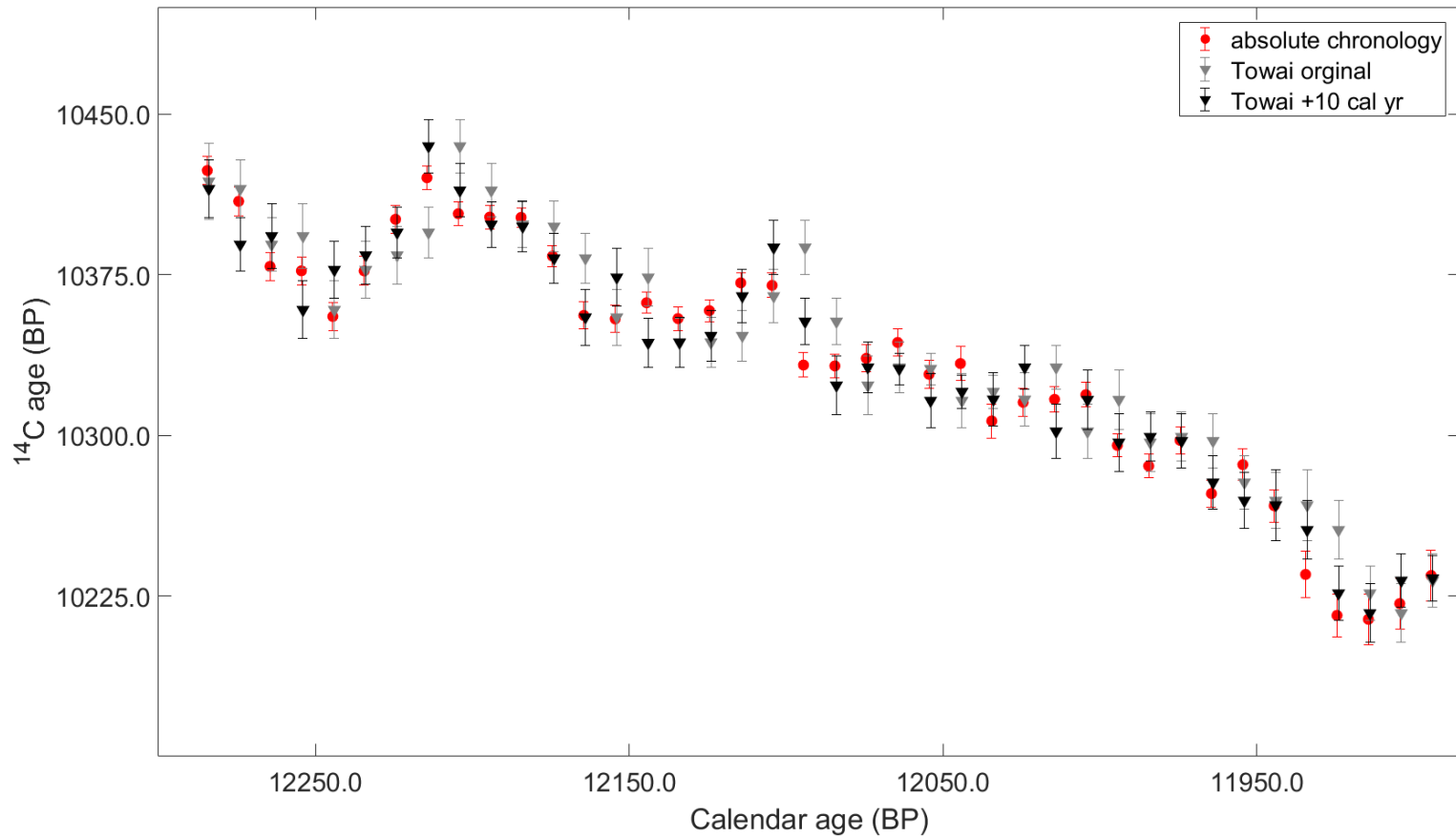
Results



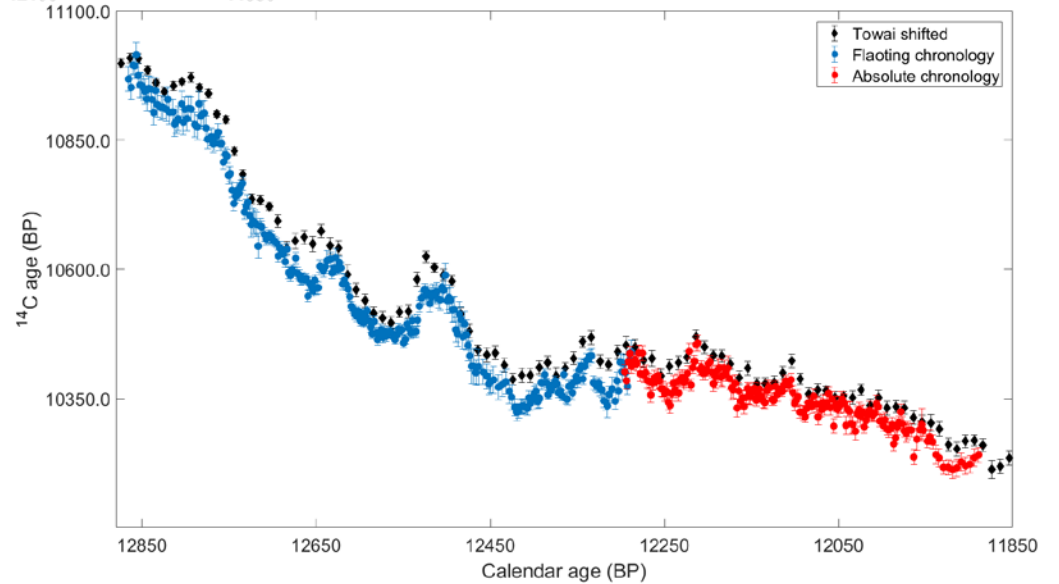
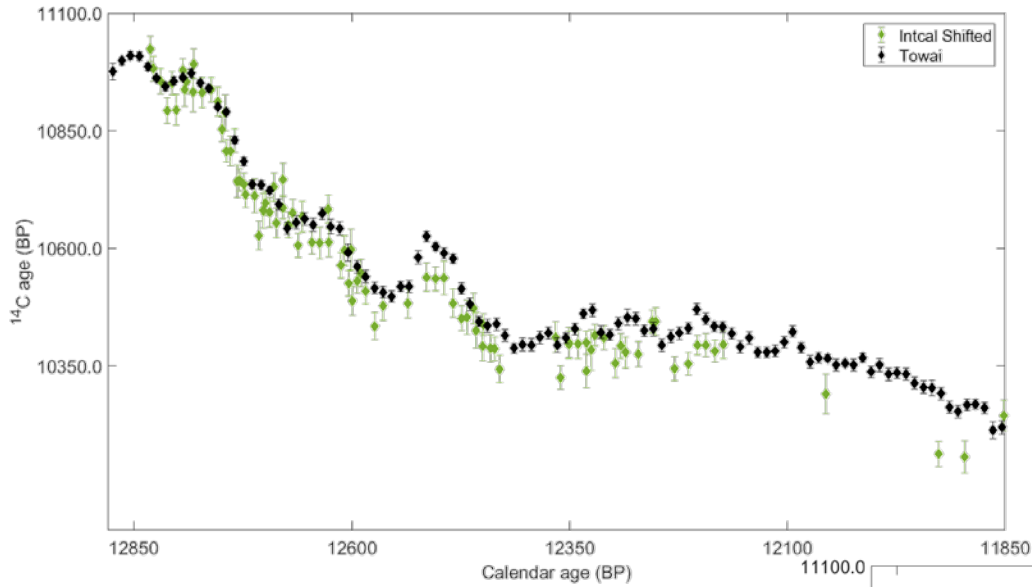
Results: χ^2_{red} model



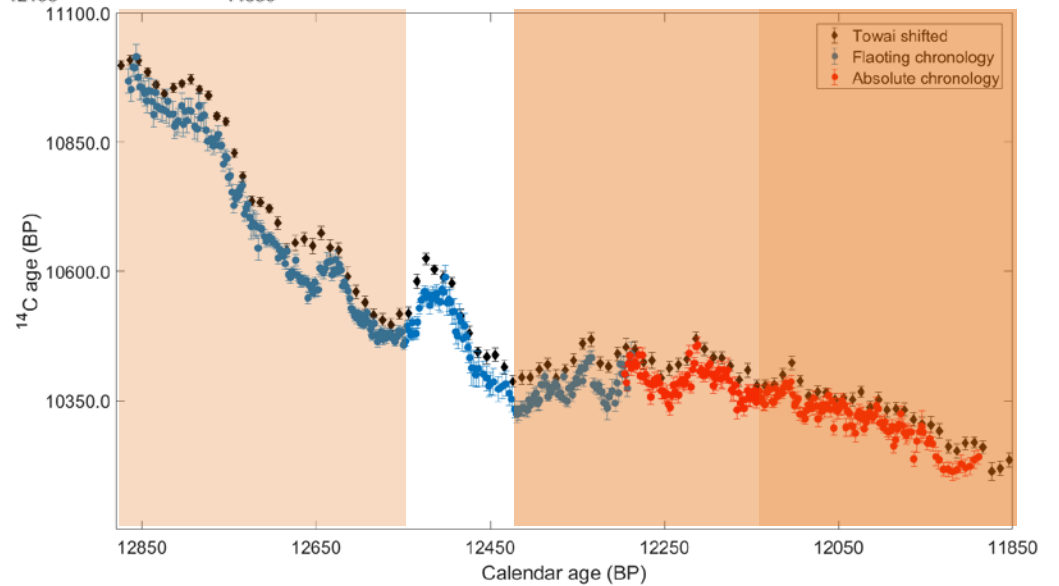
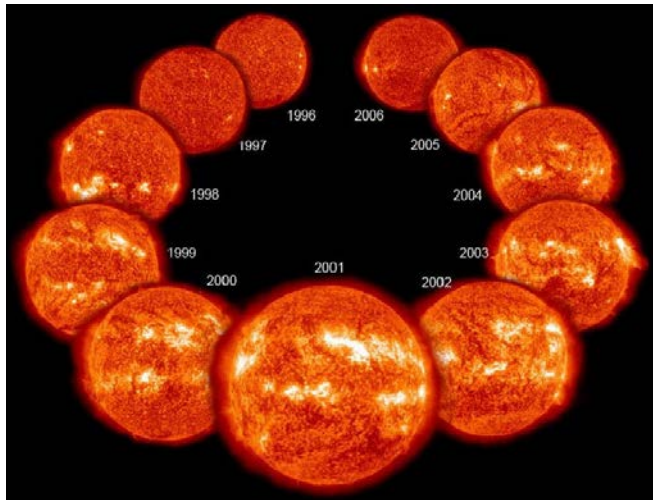
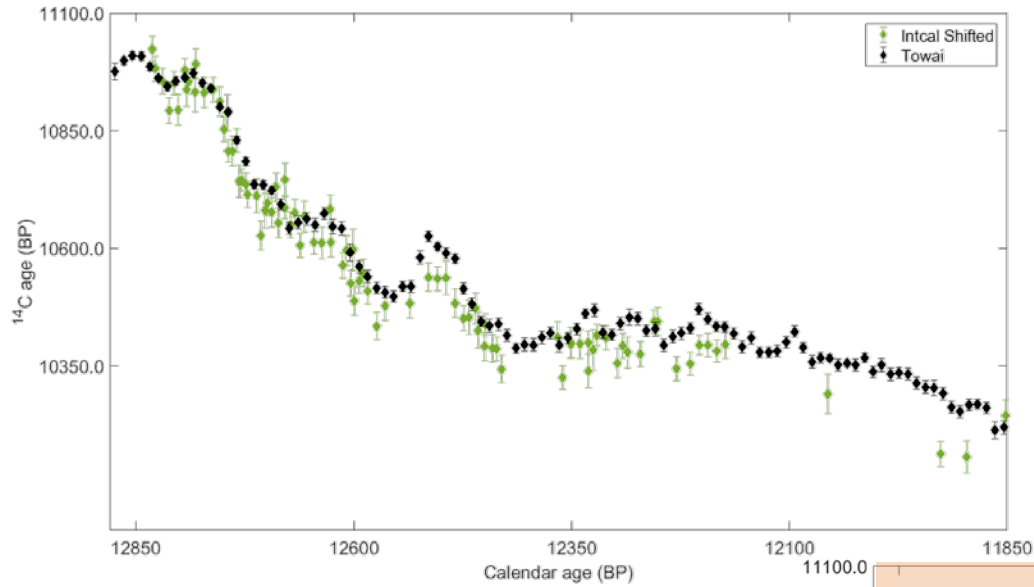
Results: Towai shift



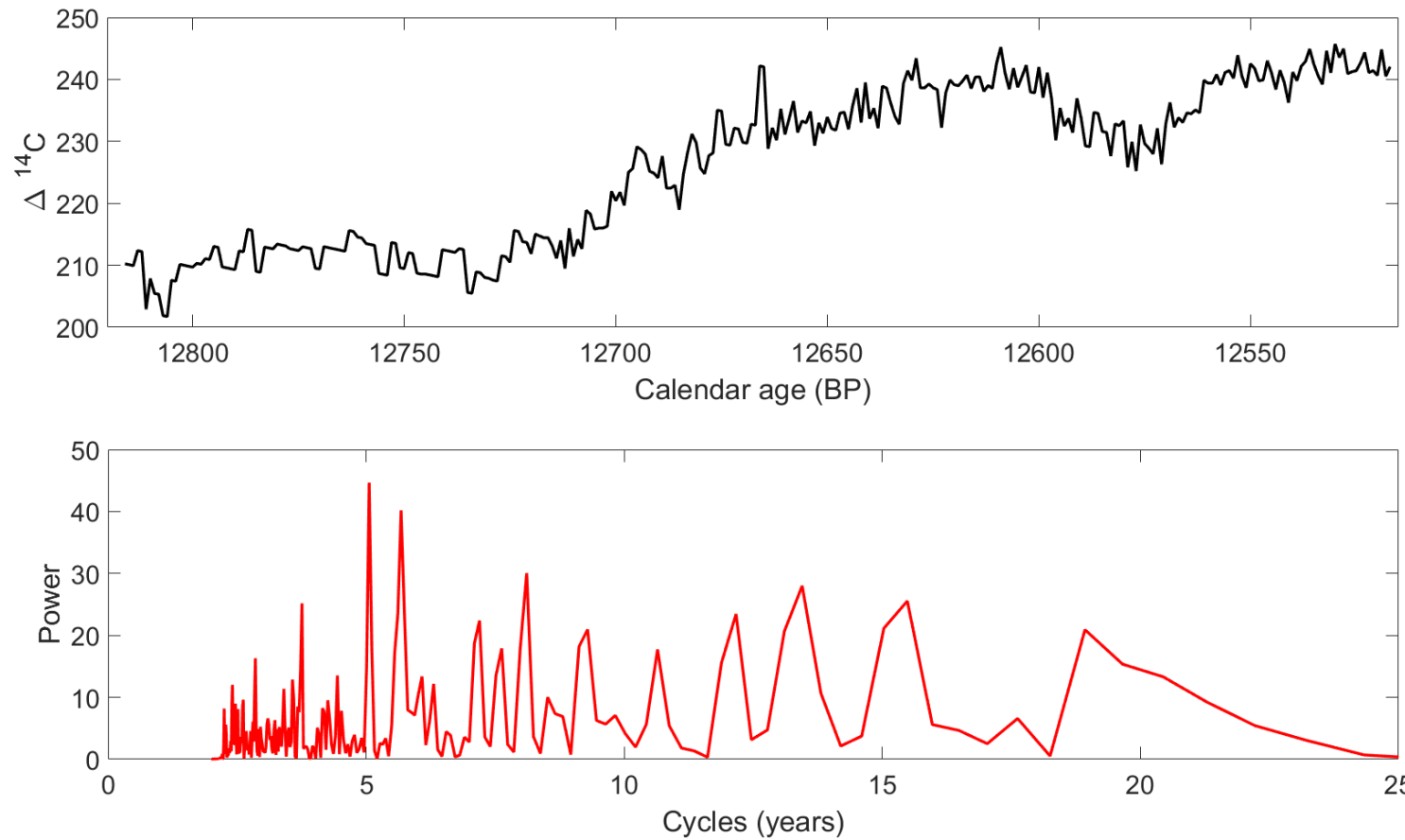
Resolving the past



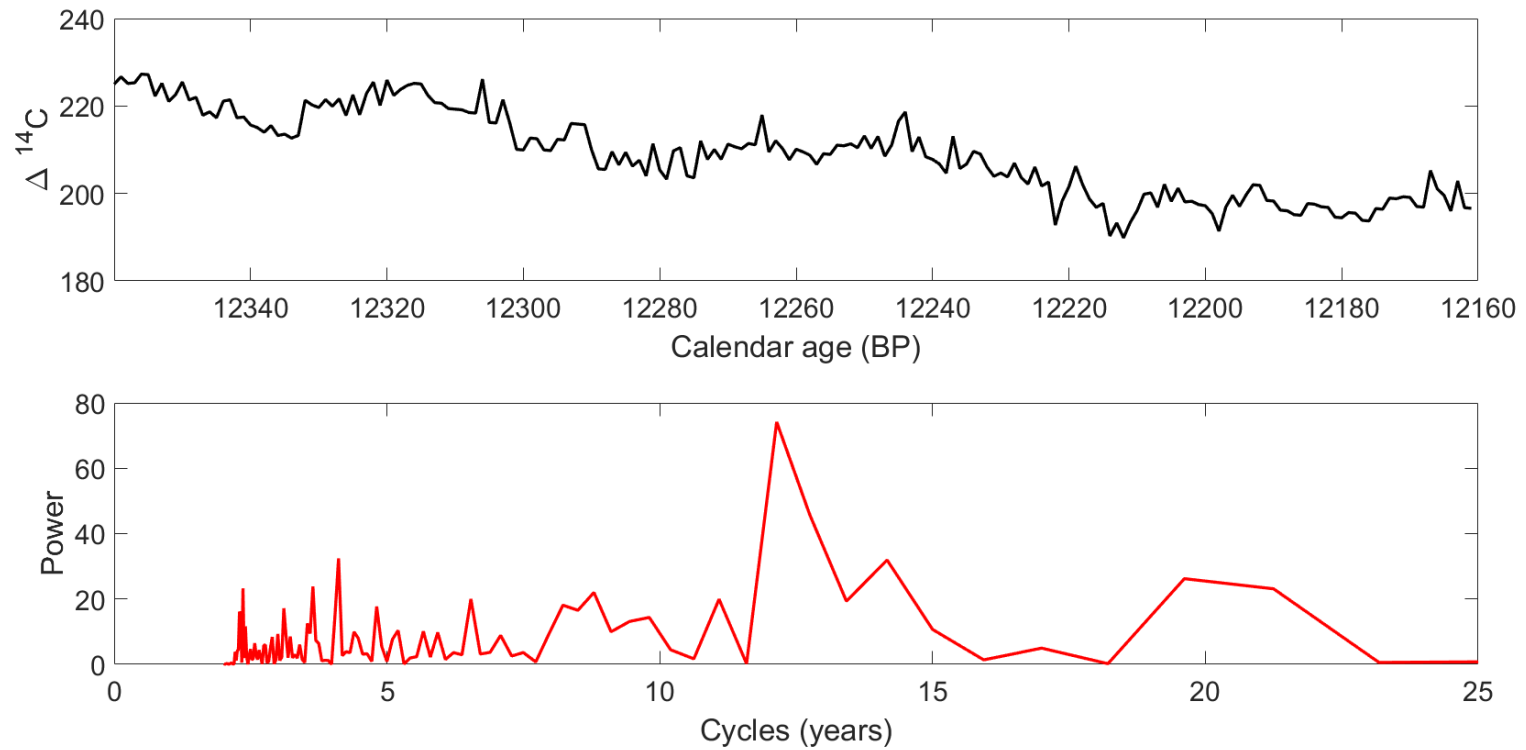
Resolving the past



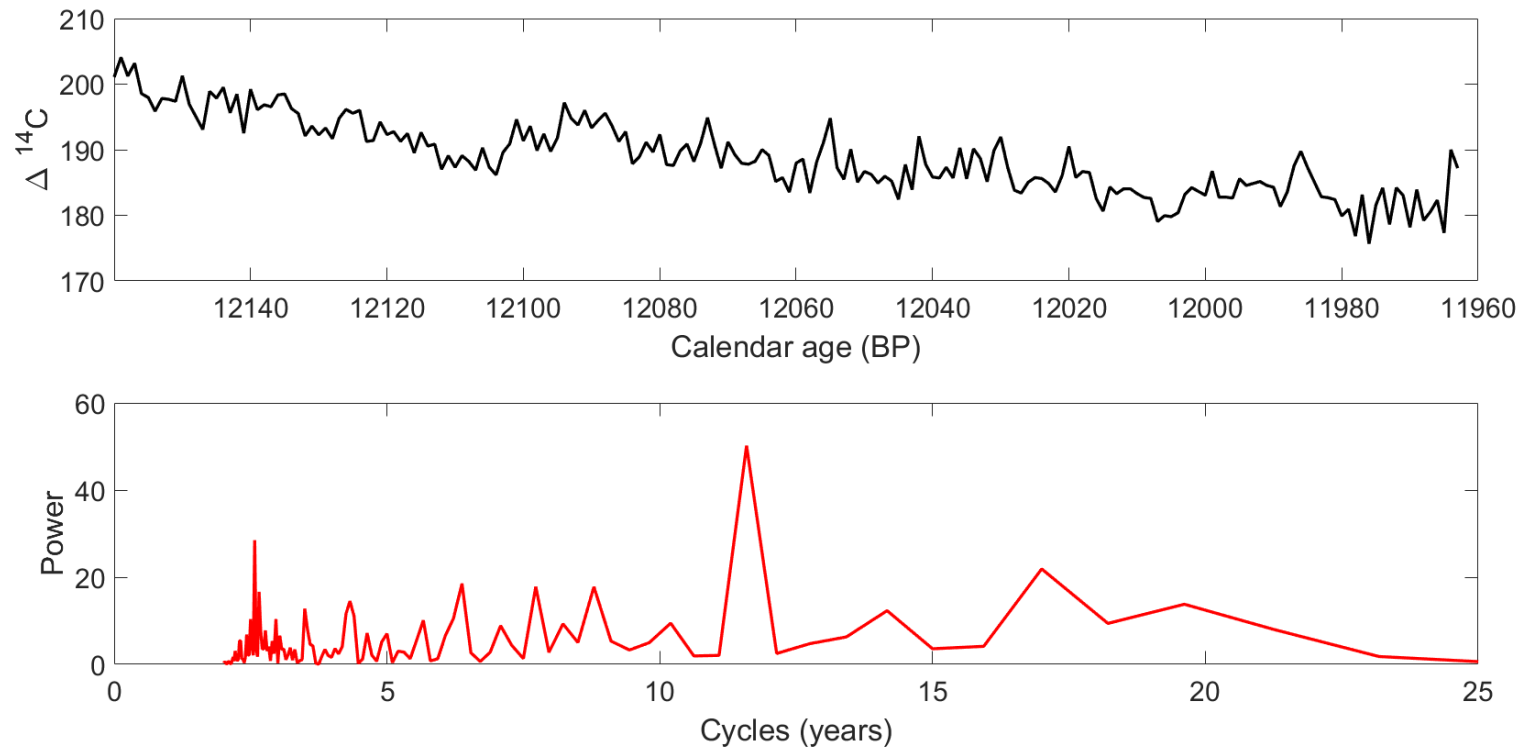
Solar cycles



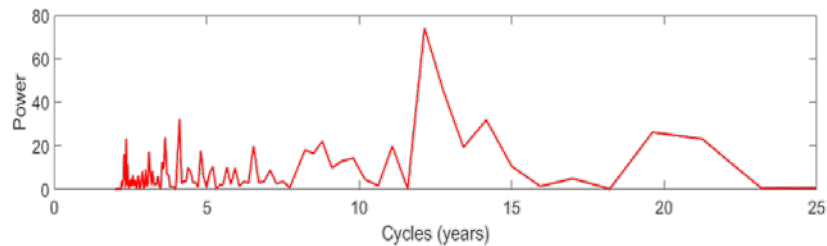
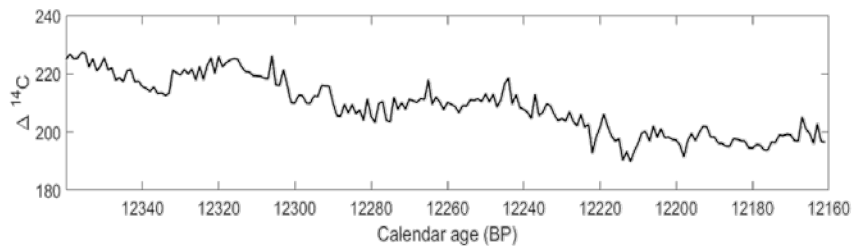
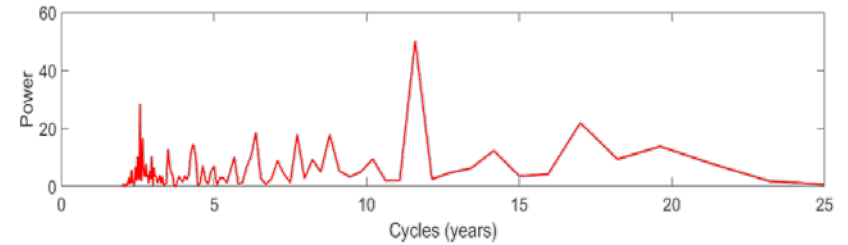
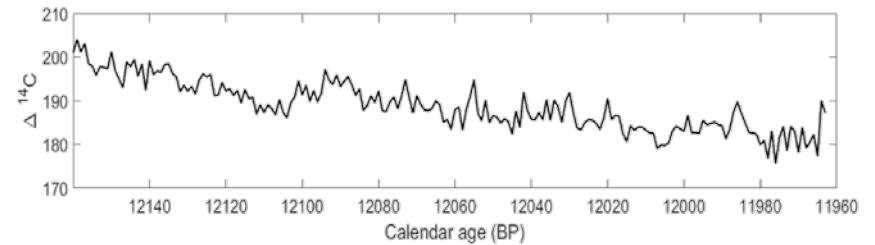
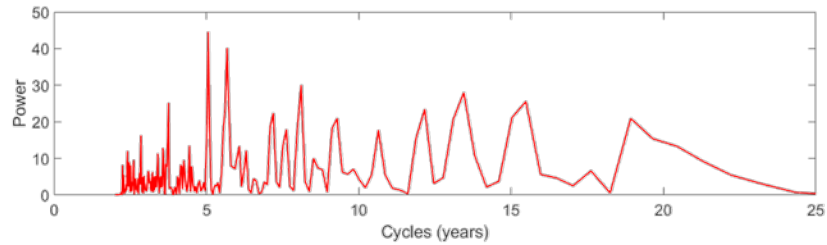
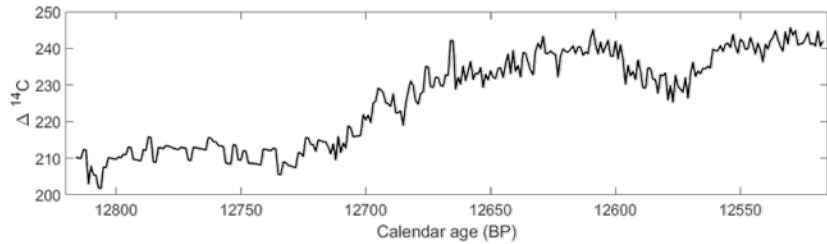
Solar cycles



Solar cycles



Solar cycles



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Summary

High precision ^{14}C ages



Resolved the past



^{14}C ages indicate changing
solar cycles

Acknowledgments

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- Raimund Muscheler
- Jürg Beer
- Ulf Büntgen
- Gerd Helle
- Timothy Eglinton



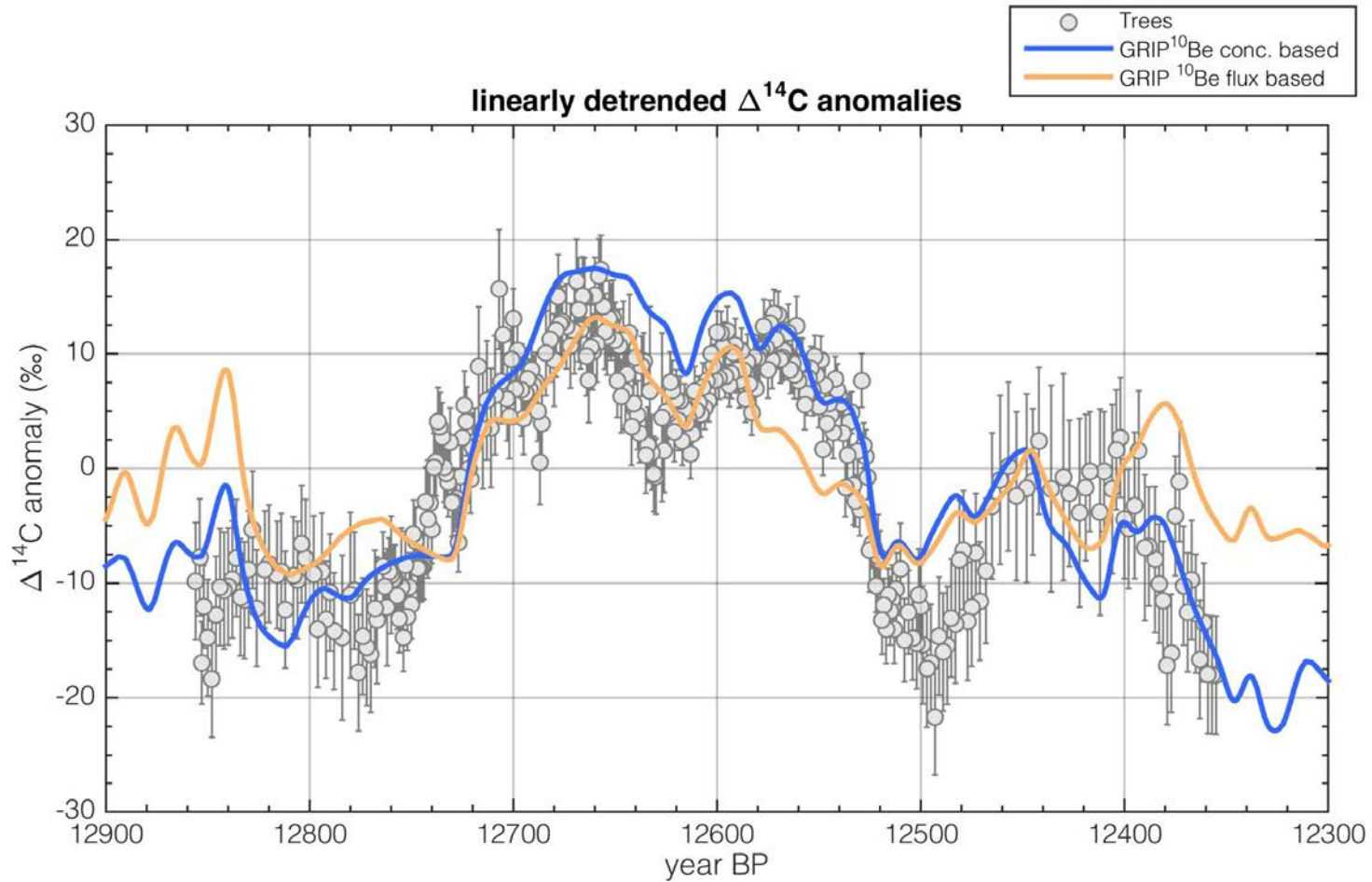
**FONDS NATIONAL SUISSE
SCHWEIZERISCHER NATIONALFONDS
FONDO NAZIONALE SVIZZERO
SWISS NATIONAL SCIENCE FOUNDATION**

Thank you

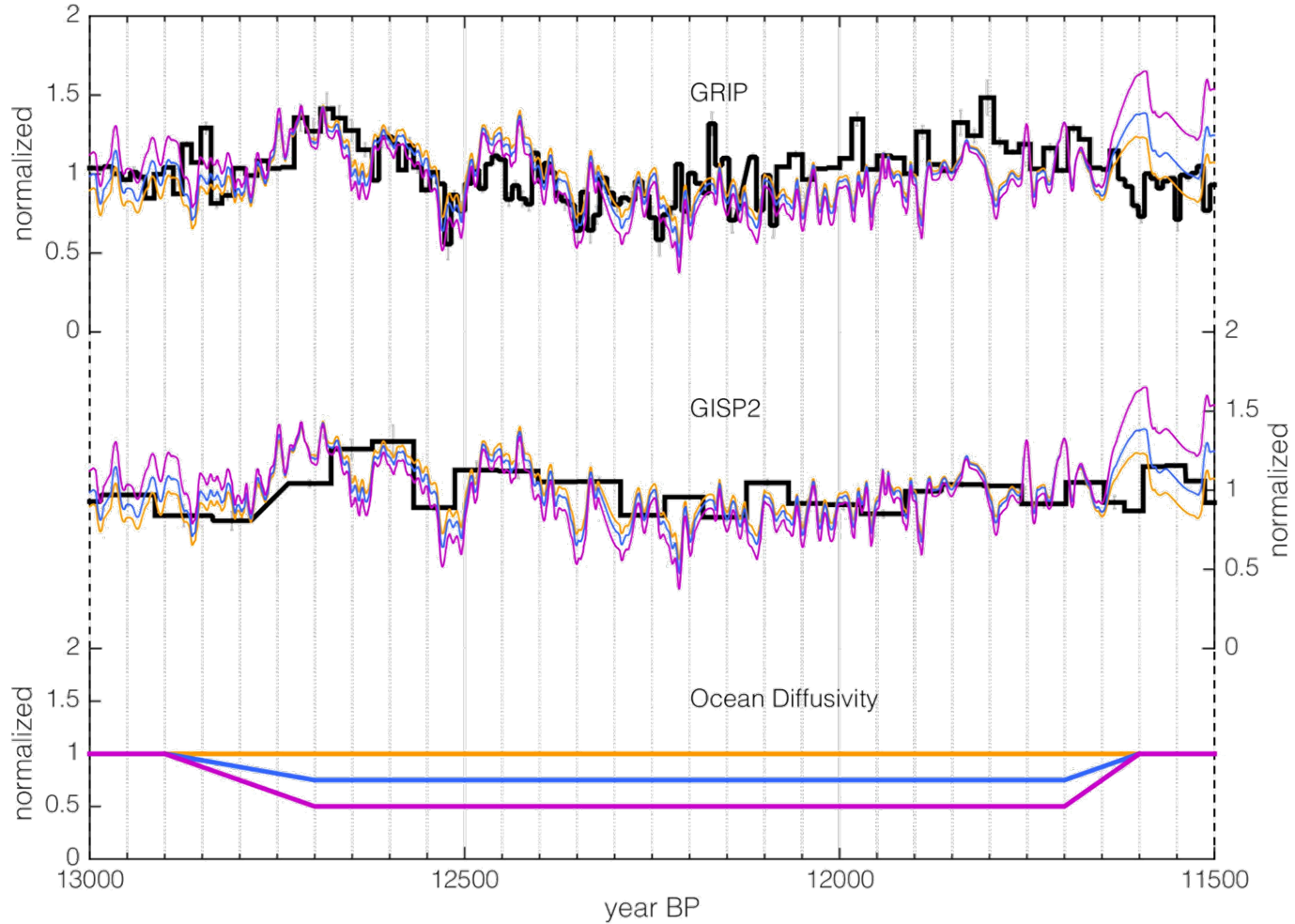


Questions?

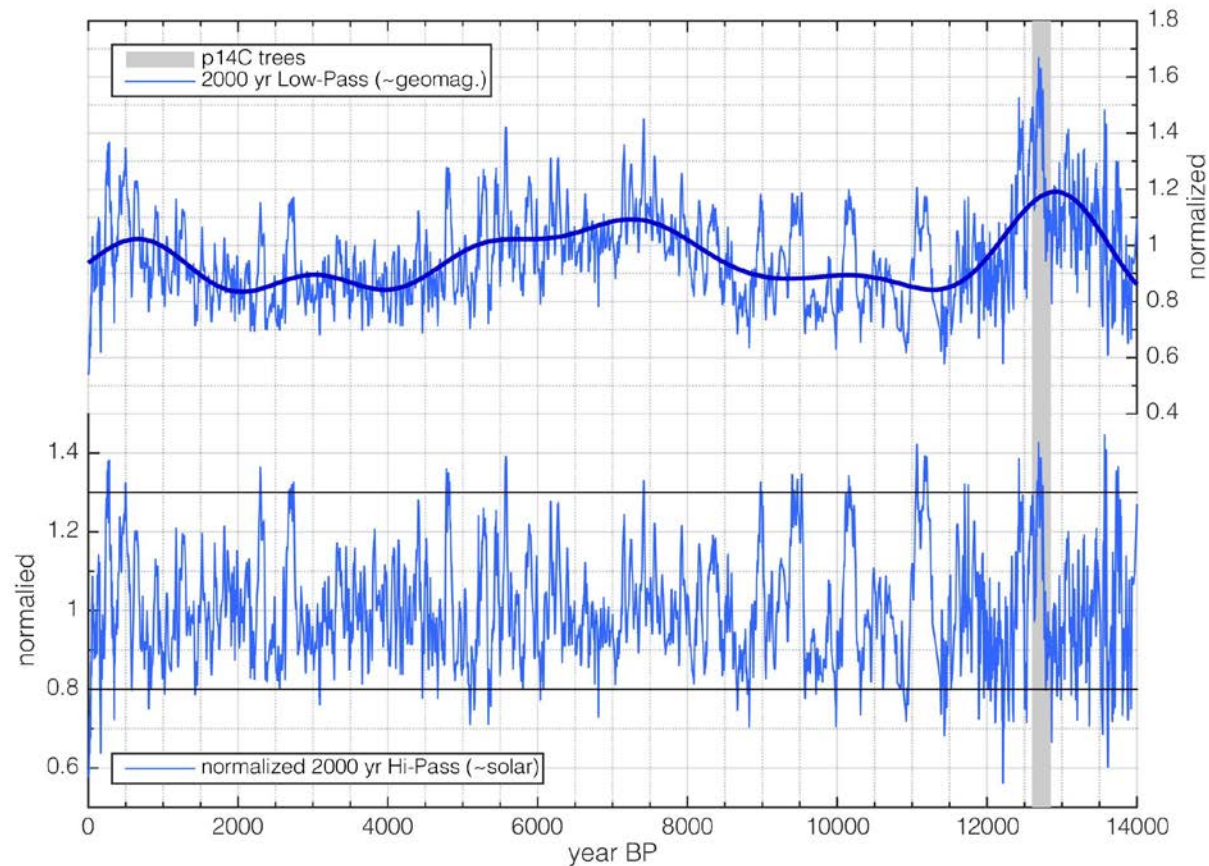
Turning to ^{10}Be



Turning to ^{10}Be



Looking for similar structures



Wavelets

