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¹⁴C DATING OF MOLECULAR BIOMARKERS

RECENT DEVELOPMENTS AT LSCE AND APPLICATION TO ARCHAEOLOGICAL BUTTERS



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Introduction

- Compound-specific ¹⁴C dating
-> Source control
-> Reduction of contaminations
- Low amounts of C -> ECHO-MICADAS
- Applications : Archaeology, Carbon cycle, Palaeoenvironnements, Environnement, Forensics
- No standard
- Intercomparison exercise on standards
Lead by Bristol University

Materials

- Two archaeological butters preserved in Irish peats:
-> IB33 : 3777 ± 4 yrs BP
-> IB38 : 338 ± 3 yrsBP
- A mix of these two butters in unknown proportions
- A present day butter
- Bulk and C₁₆ et C₁₈ fatty acids dating
- Only results for IB33 et IB38 are presented

museum
National Museum of Ireland
Ard-Mhúsaem na hÉireann

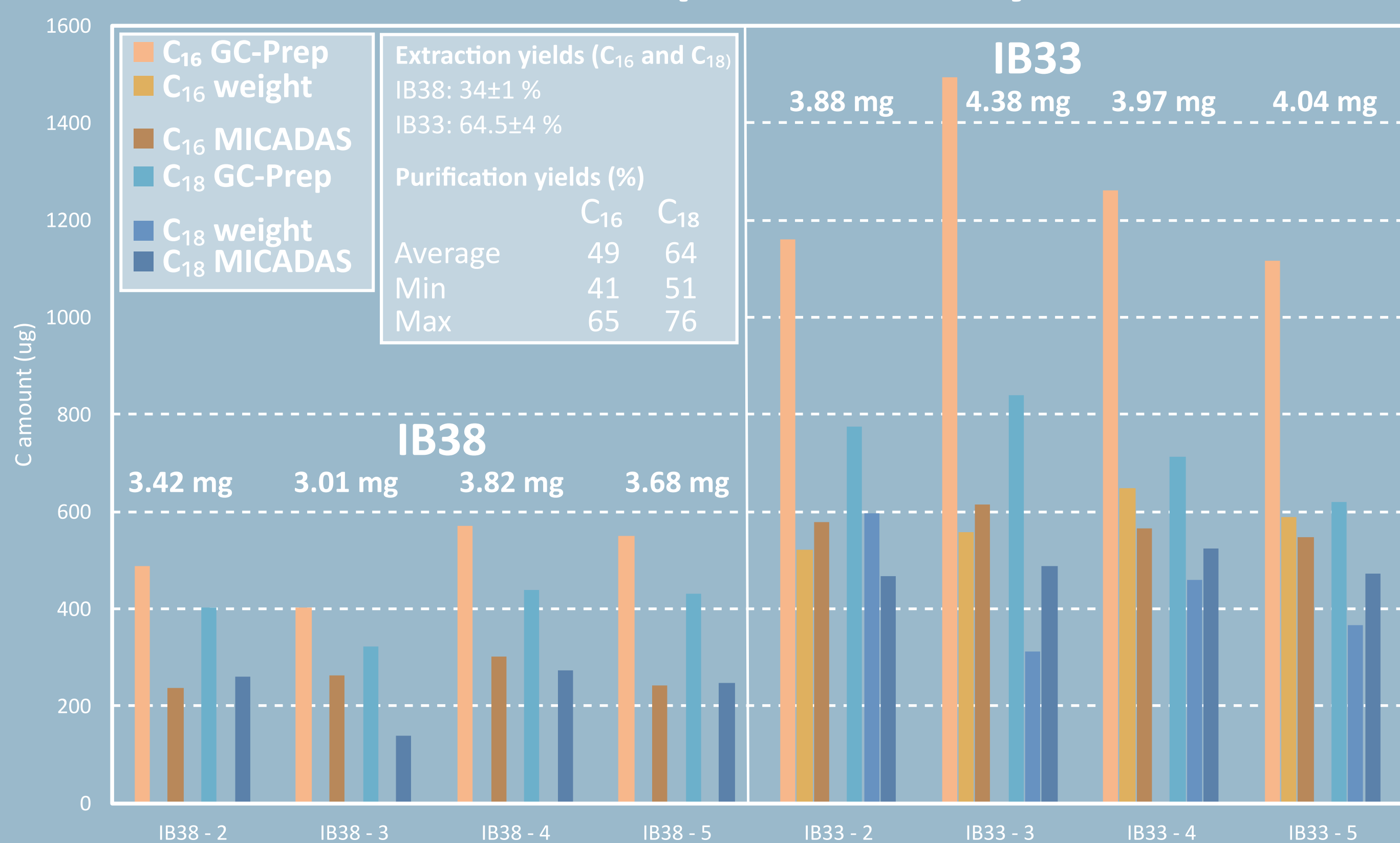


Methods

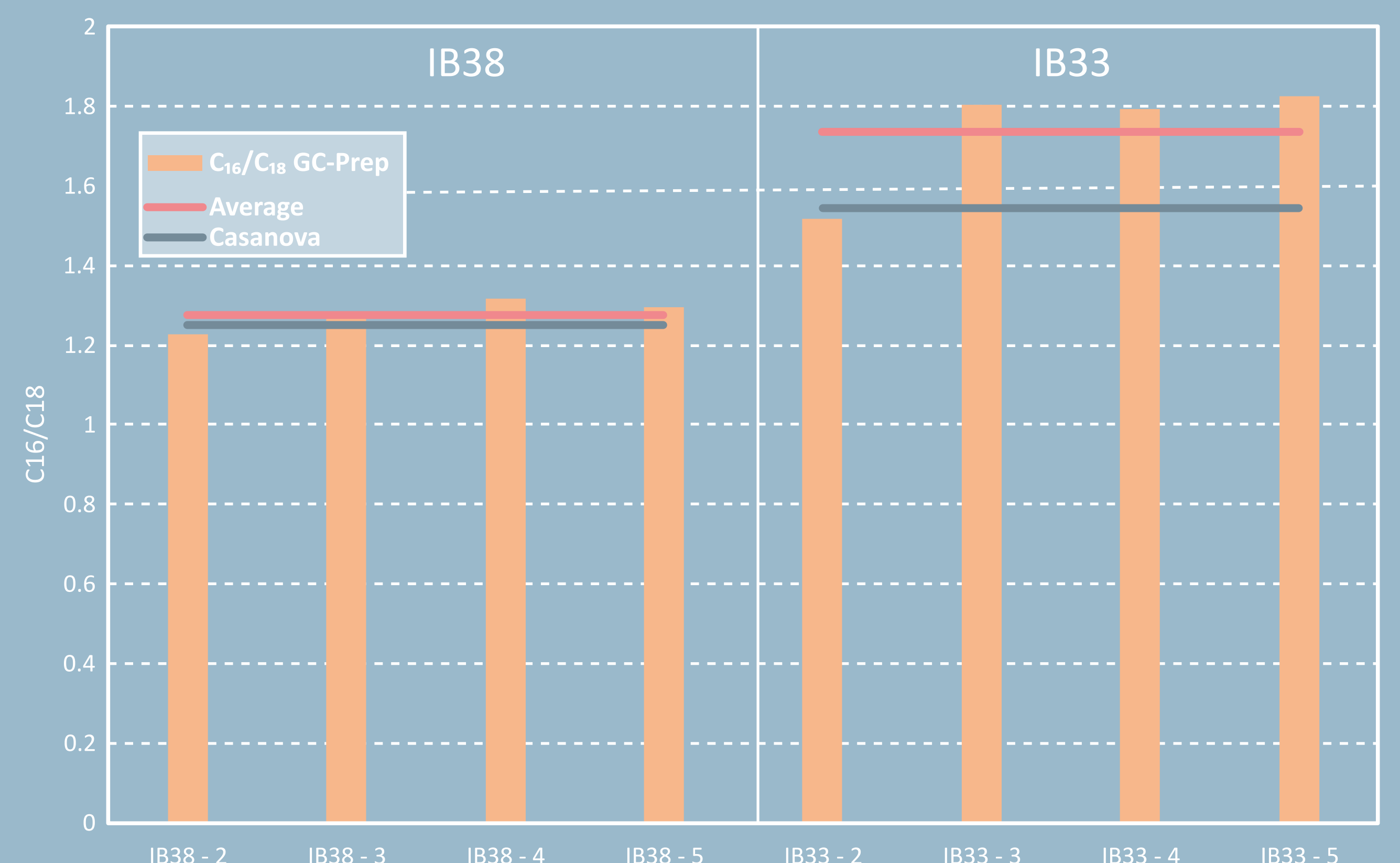
- **Extraction/esterification**
-> Casanova et al. (2018)
- **Purification of C₁₆ and C₁₈**
-> Casanova et al. (2018)
- **Dating by ECHO-MICADAS**
 - C > 200 µg
-> graphitization
 - C < 200 µg
-> gas source

Results

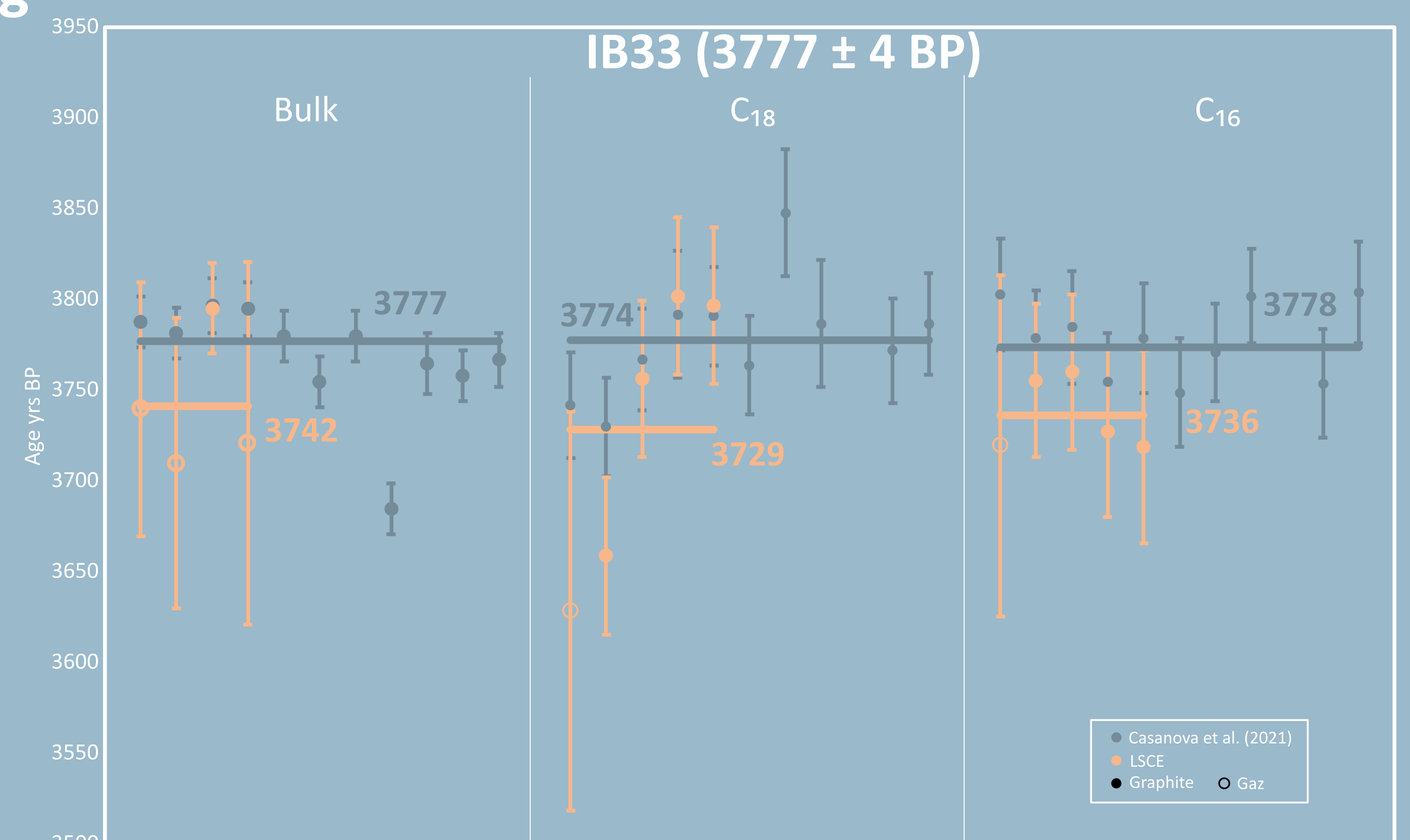
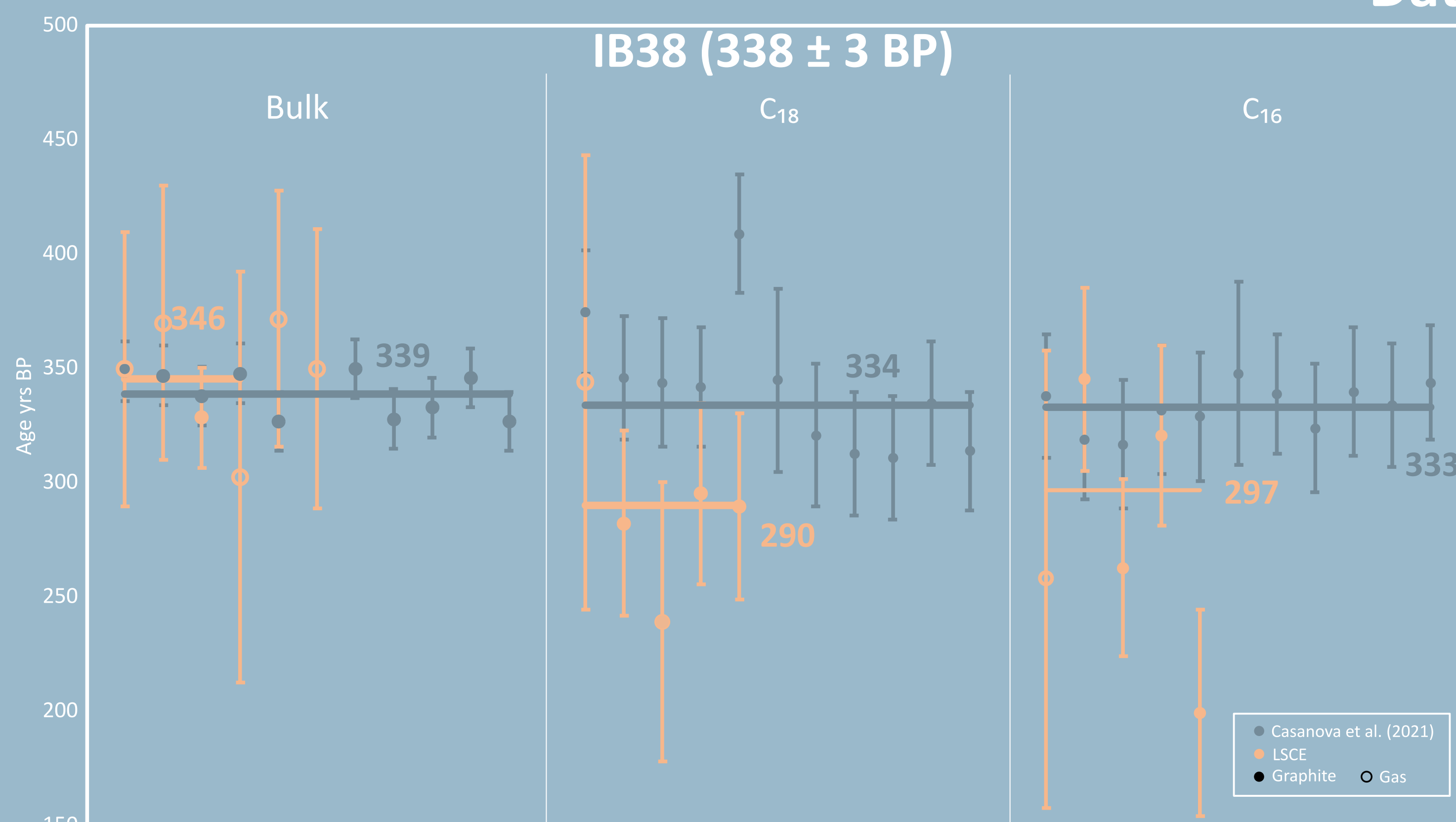
Extraction and purification yields



C₁₆/C₁₈

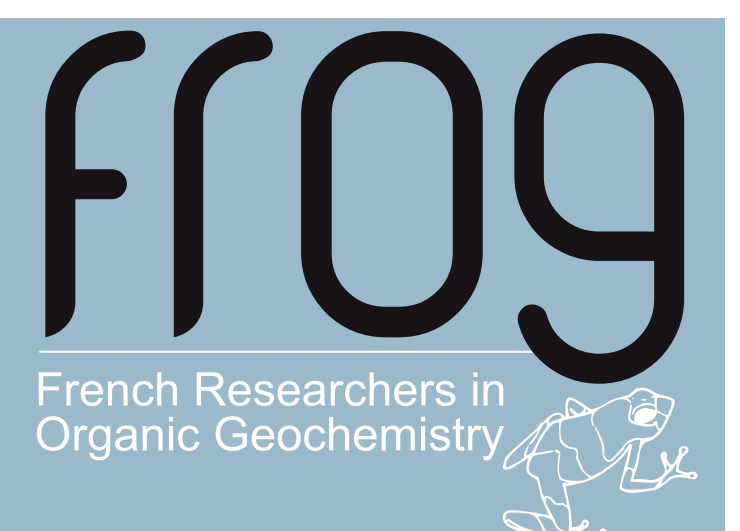


Dating



Conclusions

- Agreement with previous results (~40 yrs). C₁₆ and C₁₈ younger than Casanova et al. (2021)
- Current developments:
 - Improvement of purification yields (achieved - oncolumn injection)
 - Estimation of contamination (estimated at 3 µgC (C₁₆) - 1 µgC (C₁₈) by GC-prep)



Casanova et al. (2021). Generation of two new radiocarbon standards for compound-specific radiocarbon analyses of fatty acids from bog butter finds. Radiocarbon, doi:10.1017/RDC.2021.15

Casanova et al. (2018). Practical considerations in high-precision compound-specific radiocarbon analyses: eliminating the effects of solvent and sample cross-contamination on accuracy and precision. Anal. Chem. 90, 11025-11032.