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## <sup>14</sup>C dating of molecular biomarkers. Recent developments at LSCE and application to archaeological butters

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## <sup>14</sup>C DATING OF MOLECULAR BIOMARKERS

### RECENT DEVELOPMENTS AT LSCE AND APPLICATION TO ARCHAEOLOGICAL BUTTERS




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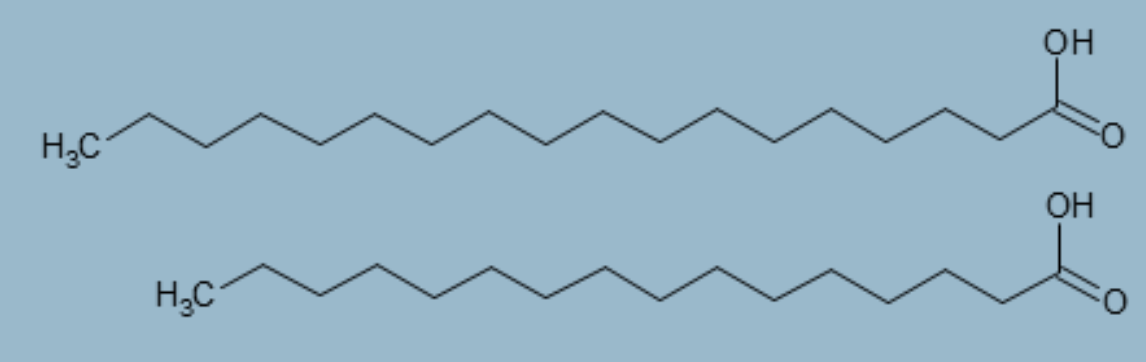
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#### Introduction

- Compound-specific <sup>14</sup>C 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 C<sub>16</sub> et C<sub>18</sub> fatty acids dating 
- Only results for IB33 et IB38 are presented

**museum**  
National Museum of Ireland  
Ard-Mhúsaem na hÉireann

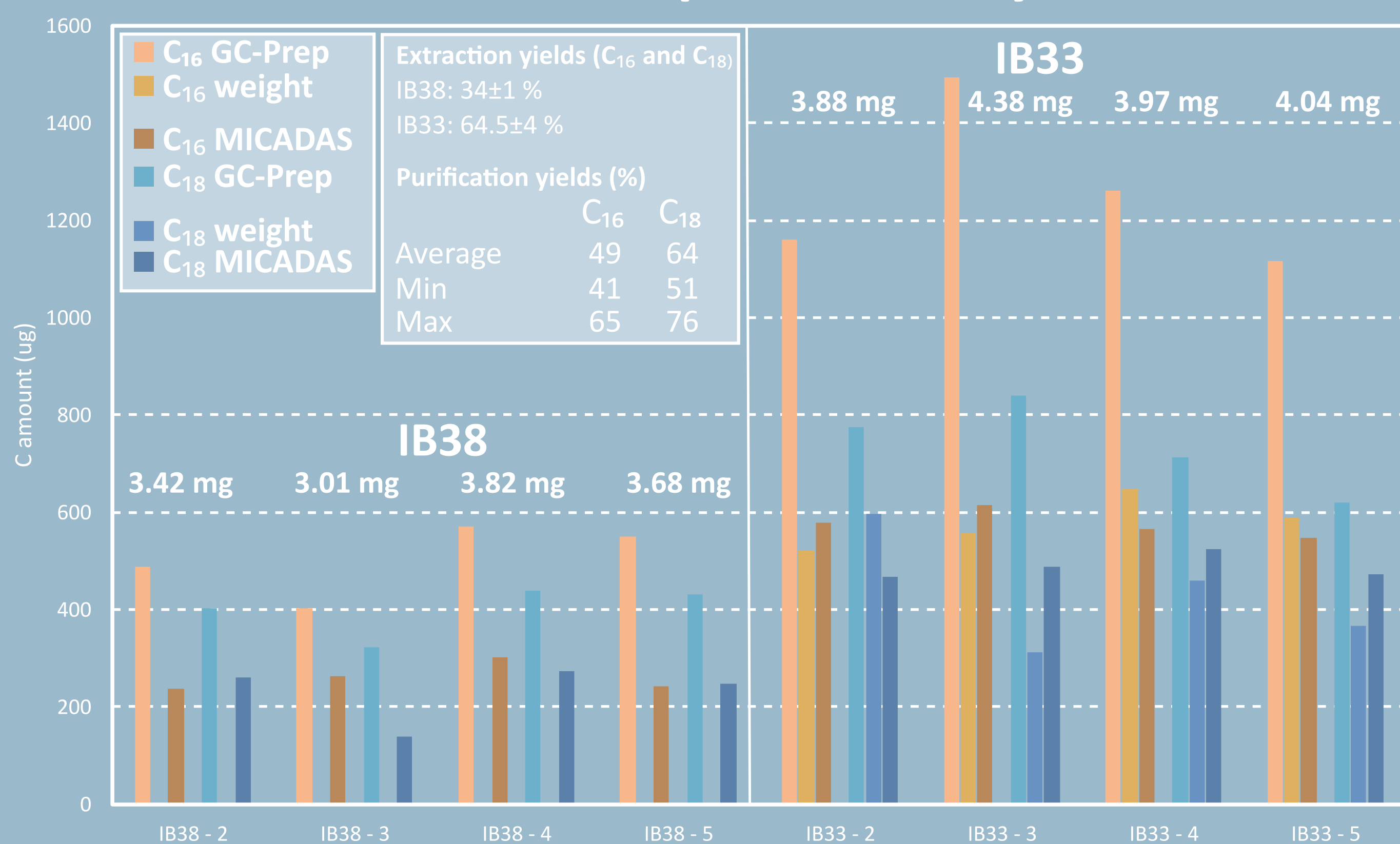


#### Methods

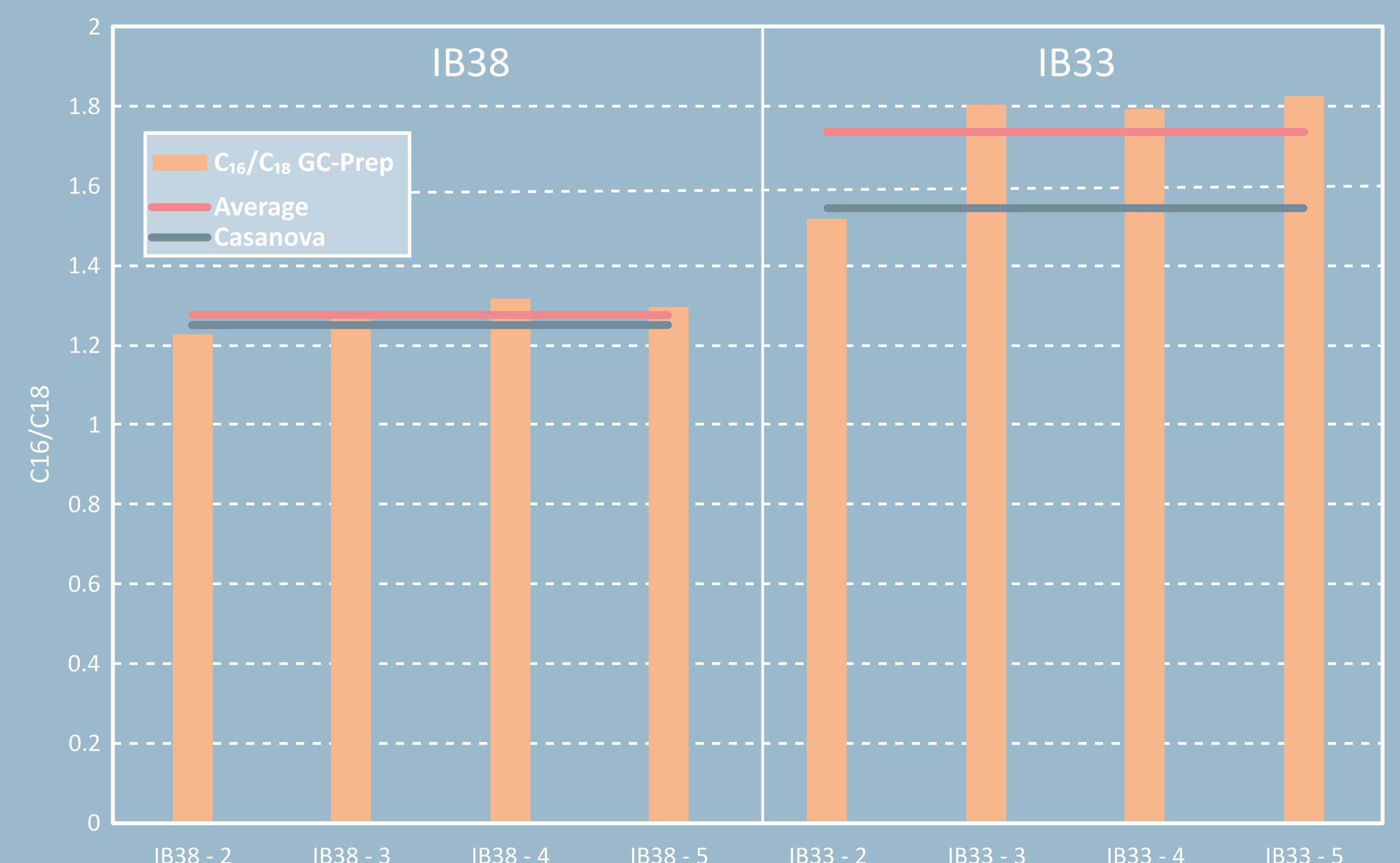
- **Extraction/esterification**  
-> Casanova et al. (2018)
- **Purification of C<sub>16</sub> and C<sub>18</sub>**  
-> Casanova et al. (2018)
- **Dating by ECHO-MICADAS**
  - C > 200 µg  
-> graphitization
  - C < 200 µg  
-> gas source

## Results

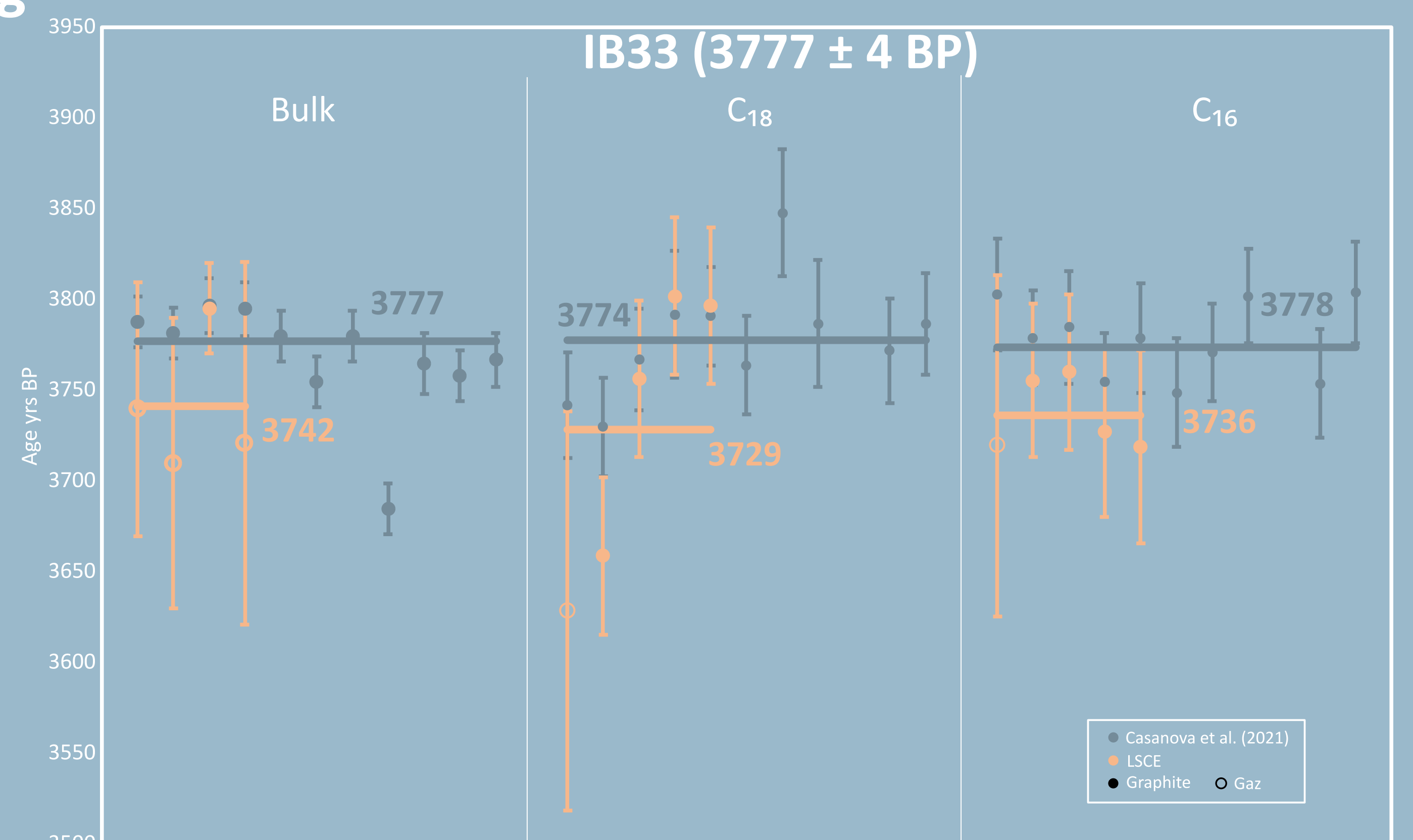
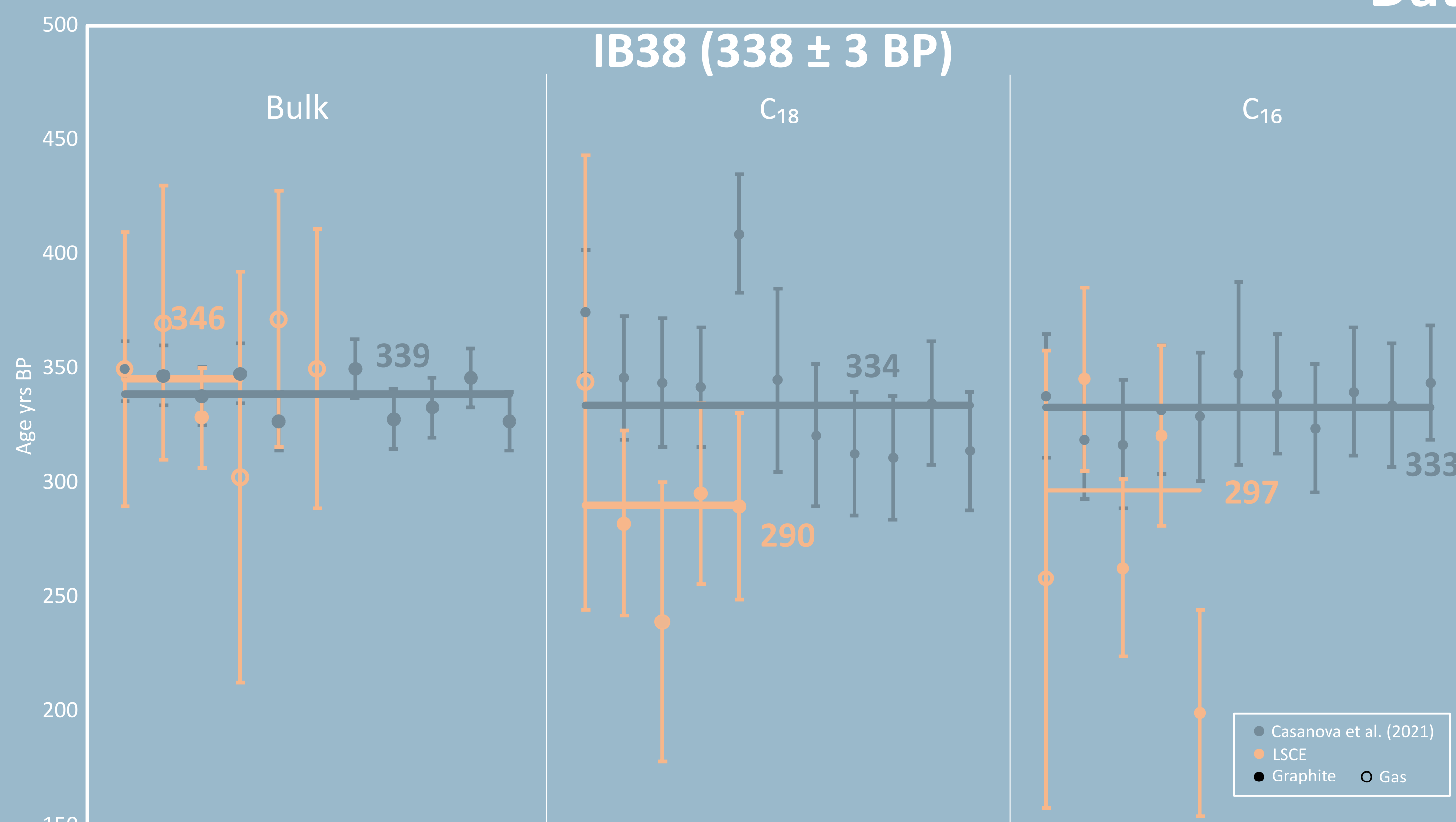
### Extraction and purification yields



### C<sub>16</sub>/C<sub>18</sub>



### Dating



### Conclusions

- Agreement with previous results (~40 yrs). C<sub>16</sub> and C<sub>18</sub> younger than Casanova et al. (2021)
- Current developments:
  - Improvement of purification yields (achieved - oncolumn injection)
  - Estimation of contamination (estimated at 3 µgC (C<sub>16</sub>) - 1 µgC (C<sub>18</sub>) 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.