Contribution ID: **130** Contribution code: **SCT-4** Type: **Oral Presentation**

Examining Small-Scale Variation: Combining High-Precision Measurements with Statistical Approaches for 14C Dating and Analysis

Monday, 21 October 2024 16:10 (20 minutes)

Advancements in high-precision AMS radiocarbon (^{14}C) measurements coupled with sophisticated statistical techniques offer a powerful approach to uncovering and utilizing annual features in the ^{14}C record. In recent years, signatures of rapid increases in cosmogenic ^{14}C have been successfully used as tools for achieving exact-year dating, with the aid of Classical statistical methods. Therefore, the prospect of utilizing even smaller-scale features may extend how often this goal is achievable. However, our analysis of two proposed events in the early second millennium CE highlights how important it is to acknowledge the complexity inherent in small-scale ^{14}C increases, particularly when attempting to push the boundaries of their detection. The smaller their amplitude, the greater the uncertainty around their true presence and occurrence frequency. Hence, careful interpretation remains crucial for accurate detection and utilization. Furthermore, using a simulation approach, we investigated whether such annual rises are the only way to improve on the precision of calibrated date ranges. We observe that the routine integration of Classical chi-squared tests in the calibration process enhances the precision of ^{14}C dating even without the aid of any dramatic features. Remarkably, in select cases, this approach is capable of achieving annual dating or, more commonly, returning estimates within 4 years of the true date at 95% probability.

Student Submission

Yes

Primary author: Mr SCIFO, Andrea (Centre for Isotope Research, University of Groningen, Groningen, The Netherlands)

Co-author: Prof. DEE, Michael (Centre for Isotope Research, University of Groningen, Groningen, The Netherlands)

Presenter: Mr SCIFO, Andrea (Centre for Isotope Research, University of Groningen, Groningen, The Netherlands)

Session Classification: Small C-14 Sample Techniques and Applications

Track Classification: IntCal and Dendrochronology