



Stable Isotope Dendrochronology: Development and evaluation of a new dating tool in Science-based Archaeology

Neil Loader (1), Christopher Bronk Ramsey (2), Darren Davies (1), Danny McCarroll (1), Daniel Miles (2), and Giles Young (1)

(1) Department of Geography, Swansea University, Swansea, UK , (2) Department of Archaeology, University of Oxford, Oxford, UK

A new technique in science-based dating; precision isotopic dating is presented. Based upon the statistically-robust matching of stable oxygen isotope ratios in tree-ring cellulose, this method is capable of precisely matching series absolutely and with annual precision. This presentation describes the development of the master chronology, sample preparation, signal preservation and the protocols for assigning a date. Evaluation of the isotopic dating method is explored through case studies where conventional approaches (dendrochronology and radiocarbon) alone have been unable to provide dates with sufficient confidence. The wider scope and application of the technique is discussed in the context of the heritage management and historic dating sectors and with specific reference to the reporting of dates, the analysis of non-oak species and the combination of dating results to refine uncertainties in radiocarbon dating. Precision isotopic dating is applicable to samples previously considered undateable through conventional dendrochronology or where a higher level of dating precision is required than can be provided by radiocarbon dating alone.