

Publication

Limits and strengths of tree-ring stable isotopes

Book Item (Buchkapitel, Lexikonartikel, jur. Kommentierung, Beiträge in Sammelbänden)

ID 4657932

Author(s) Andreu-Hayles, Laia; Levesque, Mathieu; Guerrieri, Rossella; Siegwolf, Rolf T. W.; Körner, Christian

Author(s) at UniBasel [Körner, Christian](#) ;

Year 2022

Title Limits and strengths of tree-ring stable isotopes

Editor(s) Siegwolf, Rolf T. W.; Brooks, J. Renée; Roden, John; Saurer, Matthias

Book title Stable Isotopes in Tree Rings: Inferring Physiological, Climatic and Environmental Responses

Publisher Springer

Place of publication Cham

Pages 399-428

ISSN/ISBN 3-030-92698-2

Series title Tree Physiology

Number 8

This chapter aims at summarizing strengths and caveats on the suitability of stable carbon and oxygen isotopes in tree rings as recorders for fingerprints of environmental influences. First, environmental constraints limiting tree growth and shaping tree species distribution worldwide are discussed. Second, examples are presented for environmental conditions under which tree-ring isotopes record environmental signals particularly well, but also cases where physiological processes can mask climate signals. Third, the link between leaf-level carbon assimilation and the investment of assimilates in the stem during the annual ring formation are discussed in light of the resulting deviations of the isotopic values between leaves and tree rings. Finally, difficulties and pitfalls in the interpretation of stable isotope signals in tree rings are reviewed. These problems often result from a poor understanding of when and how the tree canopy, stems and roots are physiologically interconnected. Current literature suggests that photosynthesis and radial growth are only loosely coupled, if at all, challenging the interpretation of environmental signals recorded in tree-ring isotopes. Harsh environmental conditions (e.g. low temperatures, drought) often result in a decoupling of carbon assimilation and growth. The chapter closes by providing possible solutions on how to improve the detection of environmental information from stable isotope signals by integrating scales and different methodological approaches.

edoc-URL <https://edoc.unibas.ch/92302/>

Full Text on edoc No;

Digital Object Identifier DOI 10.1007/978-3-030-92698-4_14