

Radiocarbon

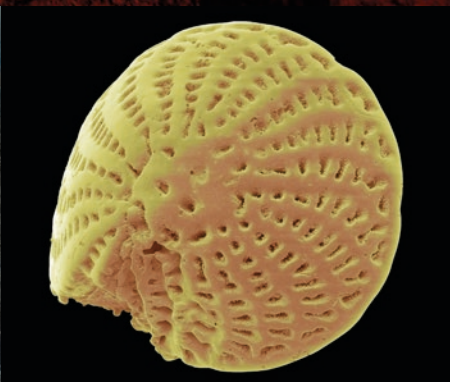
An International Journal of Cosmogenic Isotope Research

VOLUME 64 • NUMBER 6 • 2022

Proceedings Issue
**3rd Radiocarbon in the
Environment Conference**
Gliwice, Poland, July 5–9, 2021

Financially supported by Ministry
of Education and Science
(Republic of Poland)
by grant 534/P-DUN/2019

Guest Editor
Andrzej Rakowski



Editor
A.J.T. Jull

CAMBRIDGE
UNIVERSITY PRESS

Radiocarbon

An International Journal of Cosmogenic Isotope Research

EDITOR

A. J. T. Jull · University of Arizona

MANAGING EDITOR

Kimberley Tanner Elliott · University of Arizona

ASSOCIATE EDITORS

Edouard Bard · Collège de France
Nancy Beavan · ESR, New Zealand
Warren Beck · University of Arizona
Ravi Bhushan · PRL, Gujarat, India
Elisabetta Boaretto · Weizmann Institute
Christopher Bronk Ramsey · Oxford University
George S. Burr · University of Arizona
Alexander Cherkinsky · University of Georgia
Owen K. Davis · University of Arizona
Ellen R. M. Druffel · University of California-Irvine
Pieter Grootes · Christian-Albrechts University
Carla S. Hadden · University of Georgia
Irka Hajdas · ETH Zurich
Derek Hamilton · University of Glasgow
Christine Hatté · LSCE, Gif-sur-Yvette
Gregory Hodgins · University of Arizona
Quan Hua · ANSTO, Australia
Yaroslav Kuzmin · Russian Academy of Sciences

Steven W. Leavitt · University of Arizona
Susanne Lindauer · CEZA, Mannheim
Kita Macario · UFF, Rio de Janeiro
Ann P. McNichol · WHOI, USA
Mihály Molnár · Lab. of Envir. Studies, Hungary
Toshio Nakamura · Nagoya University
Jesper Olsen · Aarhus AMS Center
Charlotte Pearson · University of Arizona
Pavel Povinec · Comenius University, Slovakia
Andrzej Rakowski · Silesian Univ. of Tech., Gliwice
Paula J. Reimer · Queen's University Belfast
E. Marian Scott · University of Glasgow
Corina Solis · UNAM, Mexico City
John R. Southon · University of California-Irvine
Jocelyn Turnbull · GNS Science, New Zealand
Johannes van der Plicht · Groningen University
Antoine Zazzo · Mus. Nat. d'Histoire naturelle
Weijian Zhou · Inst. of Earth Environ., Chinese Acad. of Sci.

Radiocarbon (ISSN 0033-8222) is published quarterly by Cambridge University Press, One Liberty Plaza 20th Floor New York, NY 10006. © 2023 by the Arizona Board of Regents on behalf of the University of Arizona. All rights reserved.

Editorial Office

Communications should be addressed to the Managing Editor, *Radiocarbon*, Department of Geosciences, The University of Arizona, 4717 East Fort Lowell Road, Tucson, AZ 85712-1201 USA. Tel.: +1 (520) 621-0641; Email: kimelliott@arizona.edu. Contributors should consult the Instructions for Contributors, which is available on the journal's Web site: cambridge.org/rdc.

Subscriptions

Annual subscription rates for Volume 64, 2022: Institutional rate is (print and electronic) \$614 in the USA, Canada, and Mexico, £396 + VAT elsewhere. Institutional rate (electronic only) \$427 in the USA, Canada, and Mexico, £274 + VAT elsewhere. Individual rate is (print and electronic) \$202 in the USA, Canada, and Mexico, £130 + VAT elsewhere. Individual rate (electronic only) \$147 in the USA, Canada, and Mexico, £96 + VAT elsewhere. Please direct subscription inquiries and requests for back issues to Customer Services at Cambridge University Press, email: subscriptions_newyork@cambridge.org (USA, Canada, and Mexico) or journals@cambridge.org (outside of USA, Canada, and Mexico).

Advertising

To advertise in the journal email advertising@cambridge.org or telephone +1 (212) 337 5062 in the USA, Canada, or Mexico; email ad_sales@cambridge.org or telephone +44 (01223) 325898 in the rest of the world.

Abstracting and indexing

Radiocarbon is indexed and/or abstracted by the following sources: *Anthropological Index*; *Anthropological Literature*; *Art and Archaeology Technical Abstracts*; *Bibliography and Index of Geology* (GeoRef); *British Archaeological Bibliography*; *Chemical Abstracts*; *Chemistry Citation Index*; *Current Advances in Ecological and Environmental Sciences*; *Current Contents* (ISI); FRANCIS (Institut de l'Information Scientifique et Technique – CNRS); *Geographical Abstracts*; *Geological Abstracts*; *Oceanographic Literature Review*; *Science Citation Index*; *Social Sciences Citation Index*.

List of laboratories

Our comprehensive list of laboratories is published annually, and is also available at www.radiocarbon.org. We ask all laboratory directors to provide their laboratory code designation, as well as current telephone and fax numbers, and email addresses. Changes in names or addresses, additions or deletions should be reported to the managing editor. Conventional and AMS laboratories are arranged in alphabetical order by country, and we include laboratories listed by code designation.

Permissions

No part of this publication may be reproduced, in any form or by any means, electronic, photocopying or otherwise, without permission in writing from Cambridge University Press. Policies, request forms and contacts are available at: <http://journals.cambridge.org/action/rightsAndPermissions>. Permission to copy (for users in the USA) is available from Copyright Clearance Center: <http://www.copyright.com>, email: info@copyright.com.

Postmaster: Send address changes to *Radiocarbon*, Cambridge University Press, One Liberty Plaza, New York, NY 10006, USA.

Proceedings of the 3rd Radiocarbon in the Environment Conference

Radiocarbon

Vol 64, Nr 6, 2022

CONTENTS

INTRODUCTION	1289
CONFERENCE PAPERS	
Keynote Presentation	
The Versatile Uses of the ^{14}C Bomb Peak <i>Walter Kutschera</i>	1295
Atmosphere & Anthropogenic	
^{14}C and Other Radionuclides in the Environment in the Border Region of Lithuania before the Start of the Belarusian Nuclear Power Plant Operation <i>Jonas Mažeika, Olga Jefanova, Rimantas Petrošius, Galina Lujanienė, Žana Skuratovič</i>	1309
Radiocarbon Dating of Urban Secondary Carbonate Deposits: Site Effect and Implication for Chronology: Case Study of Paris and Versailles Palace Fountains <i>Edwige Pons-Branchu, Ingrid Caffy, Emmanuelle Delque-Kolic, Jean-Pascal Dumoulin, Emmanuel Dumont, Sarah Madikita, Gilles Bultez, Daniella Malnar, Gael Monvoisin, Jules Querleux, Matthieu Fernandez, Nadine Tisnérat Laborde, Philippe Branchu</i>	1323
Characteristics of Pine Needles Exposed to Multi-Source Pollution in Silesia: Radiocarbon Concentration in Pine Needles and Elemental Analysis of the Needles' Surface Deposits <i>Barbara Sensula, Bartłomiej Toroń, Joanna Rocznik, Agnieszka Sasiela, Jakub Świątkowski, Aleksandra Tomaszowska</i>	1333
Climate	
A Twelve-Hundred-Year Stable Oxygen Isotope Chronology Constructed Using Subfossil Wood from Schwarzensee Lake, Austrian Alps <i>Marzena Khusek, Michael Grabner, Jacek Pawlyta, Sławomira Pawełczyk</i>	1345
The First Radiocarbon-Dated Remains of the Leopard <i>Panthera Pardus</i> (Linnaeus, 1758) from the Pleistocene of Poland <i>Adrian Marciszak, Grzegorz Lipecki, Wiktoria Gornig, Lena Matyaszczyk, Oliwia Oszczepalińska, Dariusz Nowakowski, Sahra Talamo</i>	1359
Climatic Oscillations During MIS 3–2 Recorded in Sets of ^{14}C and OSL Dates—a Study Based on Data from Poland <i>Danuta J Michczyńska, Danuta A Dzieduszyńska, Joanna Petera-Zganiacz, Lucyna Wachecka-Kotkowska, Dariusz Krzyszkowski, Dariusz Wieczorek, Małgorzata Ludwikowska-Kędzia, Piotr Gębica, Leszek Starkel</i>	1373

Reinterpretation of Fluvial-Aeolian Sediments from Last Glacial Termination Classic Type Localities Using High-Resolution Radiocarbon Data from the Polish Part of the European Sand Belt	
<i>Robert J Sokolowski, Piotr Moska, Pawel Zieliński, Zdzisław Jary, Natalia Piotrowska, Jerzy Raczyk, Przemysław Mroczek, Agnieszka Szymak, Marcin Krawczyk, Jacek Skurzyński, Grzegorz Poręba, Michał Łopuch, Konrad Tudyka</i>	1387
MIS 3–2 Paleo-Winter Temperature Reconstructions Obtained from Stable Water Isotope Records of Radiocarbon-Dated Ice Wedges of the Batagay Ice Complex (Yana Upland, Eastern Siberia)	
<i>Yurij Vasil'chuk, Jessica Vasil'chuk, Nadine Budantseva, Alla Vasil'chuk</i>	1403
AMS ¹⁴ C Dating of Seyakha Yedoma and January Air Palaeotemperatures for 25–21 Cal ka BP Based on the Stable Isotope Compositions of Syngenetic Ice Wedges	
<i>Yurij Vasil'chuk, Alla Vasil'chuk, Nadine Budantseva</i>	1419
Methods	
Influence of Air Parcels from Northern and Southern Hemispheres on Radiocarbon-Based Inca Chronology	
<i>Santiago Ancapichún, Jacek Pawlyta, Andrzej Z Rakowski, Dominika Sieczkowska,</i>	1431
Testing the Methods for Determination of Radiocarbon Content in Liquid Fuels in the Gliwice Radiocarbon and Mass Spectrometry Laboratory	
<i>Jean Baptiste Baranyika, Natalia Piotrowska, Marzena Klusek, Adam Michczyński, Jacek Pawlyta</i>	1447
Study of Bio-Based Carbon Fractions in Tires and Their Pyrolysis Products	
<i>Komal Aziz Gill, Danuta J Micheżyńska, Adam Micheżyński, Natalia Piotrowska, Marzena Klusek, Klaudia Końska, Krzysztof Wróblewski, Marie-Josée Nadeau, Martin Seiler</i>	1457
Absolute Dates of Artifacts from Lusatian Urnfield Cemetery at Brzezie, Greater Poland	
<i>A Ginter, P Moska, G Poręba, K Tudyka, A Szymak, G Szczurek</i>	1471
The Late Pleistocene History of the Brown Bear <i>Ursus Arctos</i> Linnaeus, 1758 in the Czech Republic	
<i>Adrian Marciszak, Jan Wagner, René Kyselý, Lena Matyaszczyk, Martina Roblíčková, Aleš Plichta, Vlastislav Káňa</i>	1483
New Sample Preparation Line for Radiocarbon Measurements at the GXNU Laboratory	
<i>Hongtao Shen, Junsen Tang, Li Wang, Mingli Qi, Zhaomei Li, Siyu Wei, Kimikazu Sasa, Shulin Shi, Guofeng Zhang, Dingxiong Chen, Linjie Qi, Ning Wang, Houbing Zhou, Ming He, Qingzhang Zhao, Yun He</i>	1501
The IAEA Forensics Program: Results of the AMS ¹⁴ C Intercomparison Exercise on Contemporary Wines and Coffees	
<i>G Quarta, I Hajdas, M Molnár, T Varga, L Calcagnile, M D'Elia, A Molnar, J F Dias, A J T Jull</i>	1513
Soil & Peat	
Towards the Understanding of the Present-Day Human Impact on Peatland Deposits Formed Since the Late Glacial: a “Retrospective” Age–Depth Model of the Grel Raised Bog (Polish Inner Carpathians)	
<i>Włodzimierz Margielewski, Danuta J Micheżyńska, Krzysztof Buczek, Adam Micheżyński, Katarzyna Korzeń, Andrzej Obidowicz</i>	1525

Middle Holocene Glacier Activity in the Russian Altai: Evidence from Radiocarbon and Paleotree Data in the Akkol Valley <i>R K Nepop, A R Agatova, A N Nazarov, V S Myglan, P Moska</i>	1545
Bog Pine and Deciduous Trees Chronologies Related to Peat Sequences Stratigraphy of the Podemszczyzna Peatland (Sandomierz Basin, Southeastern Poland) <i>Włodzimierz Margielewski, Marek Krąpiec, Krzysztof Buczek, Katarzyna Korzeń, Elżbieta Szychowska-Krąpiec, Agnieszka Pociecha, Jolanta Pilch, Andrzej Obidowicz, Dariusz Sala, Agnieszka Klimek</i>	1557
Trees	
Tree Rings as Archives of Atmospheric Pollution by Fossil Carbon Dioxide in Bratislava <i>I Kontul', P P Povinec, M Richtáriková, I Svetlik, A Šivo</i>	1577
Scaling the ¹⁴ C-Excursion Signal in Multiple Tree-Ring Series with Dynamic Time Warping <i>Irina Panyushkina, Valerie Livina, Mihály Molnár, Tamas Varga, A J Timothy Jull</i>	1587
The Miyake Event in 993 CE Recorded in Oak Sub-Annual Tree Rings from Kujawy (Poland) <i>Andrzej Rakowski, Marek Krąpiec, Matthias Huels, Jacek Pawlyta, Damian Wiktorowski</i>	1597
Water Environment	
Marine Reservoir Effect of Spermaceti, a Wax Obtained from the Head of the Sperm Whale: a First Estimation from Museum Specimens <i>Lucile Beck, Ingrid Caffy, Emmanuelle Delqué-Količ, Jean-Pascal Dumoulin, Stéphane Hain, Christophe Moreau, Marion Perron, Marc Sieudat, Bruno Thellier, Charlotte Van Hove</i>	1607
Identification in Pore Waters of Recycled Sediment Organic Matter Using the Dual Isotopic Composition of Carbon ($\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$): New Data from the Continental Shelf Influenced by the Rhône River <i>J-P Dumoulin, C Rabouille, S Pourtout, B Bombléd, B Lansard, I Caffy, S Hain, M Perron, M Sieudat, B Thellier, E Delqué-Količ, C Moreau, L Beck</i>	1617
Linking Radiocarbon and Trophic Webs in Karstic Groundwater Ecosystems in the Yucatan Peninsula, México <i>C Solís, E M Chávez-Solís, M Rodríguez-Ceja, C G Méndez-García, E Ortíz, C Canto, M A Martínez-Carrillo, M Mascaró</i>	1629
ERRATUM	
The First Radiocarbon-Dated Remains of the Leopard <i>Panthera Pardus</i> (Linnaeus, 1758) from the Pleistocene of Poland – Erratum <i>Adrian Marciszak, Grzegorz Lipecki, Wiktoria Gornig, Lena Matyaszczyk, Oliwia Oszczepalińska, Dariusz Nowakowski, Sahra Talamo</i>	1641