

Radiocarbon

An International Journal of Cosmogenic Isotope Research

VOLUME 66 • NUMBER 6 • 2024

14  24th Radiocarbon
10th ¹⁴C & Archaeology

Zurich, Sept. 11–16, 2022
Proceedings Part 2 of 2

Guest edited by
Elisabetta Boaretto, Irka Hajdas,
and Hans-Arno Synal

14



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
Lucio Calcagnile · University of Salento, Lecce, Italy
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
Gianluca Quarta · University of Salento, Lecce, Italy
Andrzej Rakowski · Silesian Univ. of Tech., Gliwice
Paula J. Reimer · Queen's University Belfast
E. Marian Scott · University of Glasgow
Corina Solís · UNAM, Mexico City
John R. Southon · University of California-Irvine
Jocelyn Turnbull · GNS Science, New Zealand
Johannes van der Plicht · Groningen University
Ryan Venturelli, Colorado School of Mines
Rachel Wood · Oxford University, UK
Antoine Zazzo · Mus. Nat. d'Histoire naturelle
Weijian Zhou · Inst. of Earth Environ., Chinese Acad. of Sci.

Radiocarbon (ISSN 0033-8222) is published six times per year by Cambridge University Press, One Liberty Plaza 20th Floor New York, NY 10006. © 2025 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, 1040 E. 4th St., Rm. 208, Tucson, AZ 85721 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 66, 2024: Institutional rate is (print and electronic) \$710 in the USA, Canada, and Mexico, £458 + VAT elsewhere. Institutional rate (electronic only) \$399 in the USA, Canada, and Mexico, £285 + VAT elsewhere. Individual rate is (print and electronic) \$216 in the USA, Canada, and Mexico, £139 + VAT elsewhere. Individual rate (electronic only) \$138 in the USA, Canada, and Mexico, £90 + 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 current list of laboratories is at www.radiocarbon.org. Listings are self-reported. We ask all directors to provide their lab code designation, telephone and fax numbers, and email addresses. Changes should be reported to the managing editor. Labs are arranged in alphabetical order by country, and we include a list of current and past lab codes.

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 24th Radiocarbon and 10th Radiocarbon & Archaeology International Conferences

Radiocarbon

Vol 66, Nr 6, 2024

Part 2 of 2

CONTENTS

EDITORIAL

Introduction

Elisabetta Boaretto, Irka Hajdas, Hans-Arno Synal, A J Timothy Jull..... 1469

ARCHAEOLOGY

Comparing Bioapatite and Collagen Radiocarbon Dates from a 16th Century Cemetery

Context—El Japón, Xochimilco, Mexico City

Edgar Alarcón Tinajero, Carla S Hadden, Alexander Cherkinsky..... 1481

Characterization and Selection of Mortar Samples for Radiocarbon Dating in the Framework
of the MODIS2 Intercomparison: Two Compared Procedures

*G Artioli, S Barone, M Fedì, A Galli, L Liccioli, M Martini, F Marzaioli, F Maspero,
L Panzeri, I Passariello, G Ricci, M Secco, F Terrasi*..... 1493

How the Incorporation of ¹⁴C in Lead White Makes Its Absolute Dating Possible

Lucile Beck, Cyrielle Messager, Tom Germain, Stéphane Hain..... 1507

Stone-Paved Cellars in the Stone Age? Archaeological Evidence for a Neolithic Subterranean

Construction from Nygårdsvvej 3, Falster, Denmark

Marie Brinch, Bente Philippsen, Daniel Groß, Marie Kanstrup..... 1518

The Dating of Dolomitic Mortars with Uncertain Chronology from Münstair Monastery: Sample
Characterization and Combined Interpretation of Results

Marta Caroselli, Irka Hajdas, Patrick Cassitti..... 1543

Absolute Chronology of the Rampart of the Early Iron Age Hillfort in Chotyńiec Near

Radymno (Southeastern Poland) in the Context of Radiocarbon Dating

Sylwester Czopek, Marek Krąpiec, Jacek Pawlyta, Tomasz Tokarczyk..... 1556

¹⁴C Preparation Protocols for Archaeological Samples at the LMC14, Saclay, France

*J-P Dumoulin, C Moreau, E Delqué-Količ, I Caffy, D Farcage, C Goulas, S Hain,
M Perron, A Semerok, M Sieudat, B Thellier, L Beck*..... 1566

Migrations and Cultural Evolution in the Light of Radiocarbon Dating of Bronze Age Sites in
the Southern Urals

Andrey Epimakhov, Elya Zazovskaya, Irina Alaeva..... 1580

Variability of Radiocarbon Reservoir Age Effects in Lakes and Rivers in Anatolia and Lesser
Caucasus

*Michel Fontugne, Christine Hatté, Nadine Tisnérat-Laborde, Vincent Ollivier,
Catherine Kuzucuoğlu*..... 1595

Radiocarbon, Big Data and International Heritage	
<i>Seren Griffiths, Lisa Brown, Neil Carlin, Tim Evans, Bisserka Gaydarska, Emma Hannah, Peter McKeague</i>	1606
“Approximate” Wiggle-Match Dating Applied to Early American Museum Objects	
<i>Carla S Hadden, Katharine G Napora, Brent W Tharp</i>	1616
Chronology of the Volchia Griva Megafaunal Locality and Paleolithic Site (Western Siberia) and the Issue of Human Occupation of Siberia at the Last Glacial Maximum	
<i>Yaroslav V Kuzmin, Sergey V Leshchinskiy, Vasily N Zenin, Elena M Burkanova, Elya P Zazovskaya, Aleksandra S Samandrosova</i>	1630
Progress Towards a Byzantine-Medieval Historic Buildings Tree-Ring Chronology from Cyprus Using Dendrochronology and Radiocarbon	
<i>Sturt W Manning, Brita Lorentzen, Nikolas Bakirtzis, Mehmetcan Soyluoğlu</i>	1643
Development of a ¹⁴ C Protocol at the LMC14 for the Dating of Cultural Heritage Materials: Historical Mortars. Participation in the MODIS International Intercomparison Campaign	
<i>Christophe Moreau, Jean-Pascal Dumoulin, Maguy Jaber, Ingrid Caffy, Emmanuelle Delqué-Količ, Cédric Goulas, Stéphane Hain, Marion Perron, Valérie Setti, Marc Sieudat, Bruno Thellier, Lucile Beck</i>	1662
The First Radiocarbon Data from the Settlement Nitra-Lupka	
<i>Lucia Nezvalová, Eva Fottová, Beáta Milová, Ivo Světlík, Kateřina Pachnerová Brabcová</i>	1674
Extensive Survey on Radiocarbon Dating of Organic Inclusions in Medieval Mortars in the Czech Republic	
<i>Kateřina Pachnerová Brabcová, Pavel Kundrát, Tomáš Krofta, Václav Suchý, Markéta Petrová, David John, Petr Kozlovce, Kristýna Kotková, Anna Fialová, Ján Kubančák, Jan Válek, Ivo Svetlík</i>	1683
Dating of Wooden Heritage Objects in the Gliwice ¹⁴ C and Mass Spectrometry Laboratory	
<i>Natalia Piotrowska, Marzena Khusek, Piotr Boroń, Ewelina Imiolczyk, Mateusz Budziakowski, Adrian Poloczek, Agata Poloczek-Imielińska, Marian Jaksik</i>	1694
A Radiocarbon Chronology for “Grotte Di Pertosa” in Campania, Southern Italy	
<i>Felice Larocca, Francesco Breglia, Lucio Calcagnile, Marisa D’Elia, Gianluca Quarta</i>	1707
Unravelling the History of a Venetian Antiphony	
<i>Izabela Rzadeczka-Juga, Marie-Josée Nadeau, Pjotr Juga, Damaris Zurbach, Pieter M Grootes, Helene Svarva, Martin Seiler</i>	1718
The First Combined Radiocarbon and Archaeological Dating of the Great Migration Period Materials in Northern Altai: The Necropolis of Karban-I	
<i>N N Seregin, S V Svyatko, G T Barrett, MA Demin, S S Matrenin, D V Papin, P J Reimer</i>	1738
Radiocarbon Chronology of the Occupation of the Southern Coast of Nayarit, Mexico	
<i>Corina Solís, Zulema Berenice Flores Montes de Oca, Eric Nehmad Amador García, Citlalli Minerva Contreras Vargas, María Rodríguez-Ceja, Maikel Diaz, Miguel Ángel Martínez-Carrillo</i>	1753
AMS, Historical, and Archaeological Dating of Oponice Castle	
<i>Barbora Styková, Matej Styk, Dominik Repka, Ivo Světlík, Kateřina Pachnerová Brabcová, Markéta Petrová, Mária Hajnalová</i>	1765
Radiocarbon Dating of Multiple Materials for Clarifying the Formation of the Medieval Settlement on the Outskirts of Prague Castle (Czech Republic)	
<i>Pavla Tomanová, Ivo Světlík, Kateřina Pachnerová Brabcová, Petr Kočár, René Kyselý</i>	1778

Optically Stimulated Luminescence (OSL) Mortar Dating Inter-Comparison Study. The Second Round of MODIS, Mortar Dating Inter-Comparison Study <i>Petra Urbanová, Laura Panzeri, Jorge Sanjurjo-Sánchez, Marco Martini, Francesco Maspero, Pierre Guibert, Anna Galli</i>	1788
Assessment of Residual Geogenic Carbon in Mortars Concerning Radiocarbon Dating <i>Jan Válek, Petr Kozlovcev, Anna Fialová, Kristýna Kotková, Dita Frankeová, Ivo Světlík, Kateřina Pachnerová Brabcová</i>	1801
Historic Lime Mortars Composition and Terminology for Radiocarbon Dating—Case Studies Based on Thin-Section Petrography and Cathodoluminescence <i>Marine Wojcieszak, Laurent Fontaine, Jan Elsen, Roald Hayen, Alexander Lehouck, Mathieu Boudin</i>	1814
¹⁴ C Dating of Historical Japanese Musical Instrument Sacks <i>Misao Yokoyama, Minoru Sakamoto, Hikaru Takaya, Kazuyoshi Kanamori</i>	1835
CLIMATE/CALIBRATION	
Assessing Lock-in Depth and Establishing a Late Holocene Paleomagnetic Secular Variation Record from the Mongolian Altai <i>Marcel Bliedtner, Torsten Haberzettl, Norbert Nowaczyk, Enkhtuya Bazarradnaa, Roland Zech, Paul Strobel</i>	1840
Development of the IntCal Database <i>Christopher Bronk Ramsey, Florian Adolphi, William Austin, Edouard Bard, Alex Bayliss, Maarten Blaauw, Hai Cheng, R. Lawrence Edwards, Michael Friedrich, Timothy Heaton, Alan Hogg, Quan Hua, Konrad Hughen, Bernd Kromer, Sturt Manning, Raimund Muscheler, Jonathan Palmer, Charlotte Pearson, Paula Reimer, Ron Reimer, David Richards, Marian Scott, John Southon, Chris Turney, Lukas Wacker</i>	1852
Carbon Isotope Changes Through the Recent Past: F ¹⁴ C and δ ¹³ C Values in Single Barley Grain from 1852 to 2020 <i>E Dunbar, E M Scott, B G Tripney</i>	1869
Radiocarbon and Uranium Profiles in Marine Gastropods around the Japanese Archipelago <i>Shoko Hirabayashi, Takahiro Aze, Yosuke Miyairi, Hironobu Kan, Yusuke Yokoyama</i>	1883
Origin and Age of Carbon in the Cellulose of Mid-Latitude Tree Rings <i>Bernd Kromer, Lukas Wacker, Michael Friedrich, Susanne Lindauer, Ronny Friedrich, Julia Bitterli, Kerstin Treydte, Patrick Fonti, Elisabet Martínez-Sancho, Daniel Nievergelt</i>	1898
Paleo Tsunamis and Storm Surges Recorded by Fossil Coral on Yakushima Island, Japan <i>Sabrina G Lloyd, Yusuke Yokoyama, Takahiro Aze, Yosuke Miyairi, Kohei Abe, Tomoo Echigo</i>	1914
Single-Year ¹⁴ C Dating of the Lake-Fortress at Āraiši, Latvia <i>John Meadows, Māris Zunde, Laura Lēgere, Michael W Dee, Christian Hamann</i>	1929
Alternative Radiocarbon Age-Depth Model from Lake Baikal Sediment: Implication for Past Hydrological Changes for Last Glacial to the Holocene <i>Fumiko Watanabe Nara, Takahiro Watanabe, Bryan C Loughheed, Stephen Obrochta</i>	1940
Meridional Migrations of the Intertropical Convergence Zone During the Last Deglaciation in the Timor Sea Detected by Extensive Radiocarbon Dating <i>Karin Nemoto, Yusuke Yokoyama, Satoshi Horiike, Stephen P Obrochta, Yosuke Miyairi</i>	1958
Temporal Stability of Climatic Signal Recorded by Stable Carbon Isotope Composition of Tree Rings α-Cellulose—A Case Study for Suwałki Region <i>Ślawomira Pawełczyk, Anna Pazdur, Barbara Benisiewicz</i>	1968

Radiocarbon Concentration in Sub-Annual Tree Rings from Poland Around 660 BCE <i>Andrzej Z Rakowski, Jacek Pawlyta, Hiroko Miyahara, Marek Krapiiec, Mihály Molnár, Damian Wiktorowski, Masayo Minami</i>	1981
Radiocarbon Dating of Tree Rings from the Beginning and End of the Yayoi Period, Japan <i>Minoru Sakamoto, Masataka Hakozaki, Takeshi Nakatsuka, Hiromasa Ozaki</i>	1991
Centennial to Millennial-Scale Fluctuations of the Lake Suigetsu Atmospheric ¹⁴ C Record Represent Authentic ¹⁴ C Features Over Last Glacial-to-Deglacial Times <i>Michael Sarnthein, Pieter M Grootes, Manfred Mudelsee</i>	2000
Using Rapid Atmospheric ¹⁴ C Changes in the 7 th Century BC to Precisely Date the Floating Chronology for Pine Wood From Józefowo (Northern Poland) <i>Damian Wiktorowski, Marek Krapiiec, Jacek Pawlyta, Joanna Barniak, Andrzej Rakowski</i> .	2012
COSMOGENIC NUCLIDES	
Riversand: A New Tool for Efficient Computation of Catchmentwide Erosion Rates <i>Konstanze Stübner, Greg Balco, Nils Schmeisser</i>	2022
PLENARY TALK	
Radiocarbon Calibration: from Bane to Blessing <i>Christopher Bronk Ramsey</i>	2036