

Radiocarbon

An International Journal of Cosmogenic Isotope Research

VOLUME 65 • NUMBER 2 • 2023

14



gettyimages
Ashley Cooper



gettyimages
E. Thurnhofer



gettyimages
Darrell Gamm

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 six times per year 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 65, 2023: Institutional rate is (print and electronic) \$657 in the USA, Canada, and Mexico, £424 + VAT elsewhere. Institutional rate (electronic only) \$418 in the USA, Canada, and Mexico, £268 + VAT elsewhere. Individual rate is (print and electronic) \$216 in the USA, Canada, and Mexico, £139 + VAT elsewhere. Individual rate (electronic only) \$144 in the USA, Canada, and Mexico, £94 + 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 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.

Radiocarbon

Vol 65, Nr 2, 2023

CONTENTS

RESEARCH ARTICLES

Radiocarbon Dating of Manuscripts Kept in the Central Library of the University of Tehran <i>Ali Aghaei, Faranak Bahrololoumi, Irka Hajdas, Rasul Jafarian, Lili Kordavani, Michael Marx</i>	307
Radiocarbon Dating of Straw Fragments in the Plasters of St. Philip Church in Archaeological Site Hierapolis of Phrygia (Denizli, Turkey) <i>Sara Calandra, Serena Barone, Emma Cantisani, Maria Piera Caggia, Lucia Liccioli, Silvia Vettori, Mariaelena Fedi</i>	323
Traces of ¹⁴ C Emissions for the Operation Period of two Ukrainian NPPs: Rivne and Chornobyl <i>Mykhailo Buzynnyi, Oleksandr Romanenko, Liubov Mykhailova, Alla Lytvynko, Mykola Panasiuk</i>	335
Soil Erosion Caused the Increasing Holocene Radiocarbon Reservoir Effect of Lake Kanas in the Altai Mountains <i>Huihui Cao, Xiaozhong Huang, Lixiong Xiang</i>	343
Atmospheric Radiocarbon for the Period 1910–2021 Recorded by Annual Plants <i>Mariah S Carbone, Tina J Ayers, Christopher H Ebert, Seth M Munson, Edward A G Schuur, Andrew D Richardson</i>	357
Radiocarbon Analysis and Status Report from Türkiye: 1Mv National AMS Laboratory (Tubitak-AMS) <i>Turhan Doğan, Erhan İlkmén, Furkan Kulak</i>	375
Sequential Thermal Analysis of Complex Organic Mixtures: Procedural Standards and Improved CO ₂ Purification Capacity <i>Ulrich M Hanke, Alan R Gagnon, Christopher M Reddy, Mary C Lardie Gaylord, Anne J Cruz, Valier Galy, Roberta L Hansman, Mark D Kurz</i>	389
New Human Bone Radiocarbon Dates from the Roman Period–Migration Period Lithuanian Cemeteries <i>Laurynas Kurila, Giedrė Piličiauskienė, Edvardas Simčenka, Žydrūnė Miliauskienė, Žilvinas Ežerinskis, Justina Šapolaitė, Andrius Garbaras</i>	411
Reconstructing Human–Environmental Relationship in the Siberian Arctic and Sub-Arctic: a Holocene Overview <i>Yaroslav V Kuzmin</i>	431

Evaluation of Aqueous Gastropod Shells as Groundwater Radiocarbon Proxies Across Species and Sites <i>J C Lerback, S Bagge, B B Bowen</i>	443
Sine Qua Non: Inferring Kodjadermen-Gumelnița-Karanovo Vi Population Dynamics from Aggregated Probability Distributions of Radiocarbon Dates <i>Gabriel M Popescu, Cristina Covătaru, Ionela Opreș, Adrian Bălășescu, Laurent Carozza, Valentin Radu, Constantin Haită, Tiberiu Sava, C Michael Barton, Cătălin Lazăr</i>	463
Radiocarbon-Based Modeling of the Reign of King Den (1st Dynasty, Egypt) and the Start of the Old Kingdom <i>Anita Quiles, Yann Tristant</i>	485
A Wiggle-Matched 297-Yr Tree-Ring Oxygen Isotope Record from Thailand: Investigating the ¹⁴ C Offset Induced by Air Mass Transport from the Indian Ocean <i>Masaki Sano, Nathsuda Pumijumnong, Koji Fujita, Masataka Hakozaki, Fusa Miyake, Takeshi Nakatsuka</i>	505
First Radiocarbon Dating of Neolithic Stone Cist Graves from the Aosta Valley (Italy): Insights into the Chronology and Burial Rites of the Western Alpine Region <i>Noah Steuri, Marco Milella, Francesca Martinet, Luca Raiteri, Sönke Szidat, Sandra Lösch, Albert Hafner</i>	521
Intercomparison Exercise on Fuel Samples for Determination of Biocontent Ratio by ¹⁴ C Accelerator Mass Spectrometry <i>Tamás Varga, Irka Hajdas, Lucio Calcagnile, Gianluca Quarta, István Major, A J Timothy Jull, Anita Molnár, Mihály Molnár</i>	539
Paradigms in Crisis: the Cova De Marcó (Tivissa, Tarragona, Catalonia) and the Coexistence of Incineration and Inhumation Funerary Practices in the Northeastern Iberian Peninsula During the Late Bronze Age <i>Josep Maria Vergès, Samuel Sardà, Jordi Diloli</i>	549
TECHNICAL NOTES	
The Accuracy and Precision of Small-Sized Modern Wood Samples Analyzed at the Chronos ¹⁴ Carbon-Cycle Facility <i>Heather A Haines, William T Hiscock, Jonathan G Palmer, Chris S M Turney, Zoë A Thomas, Haidee Cadd, Juee Vohra, Christopher E Marjo</i>	561
Sample Preparation Methods Used at the Australian National University Radiocarbon Facility <i>R E Wood, R Esmay, E Usher, S J Fallon</i>	573