

# Radiocarbon

An International Journal of Cosmogenic Isotope Research

VOLUME 63 • NUMBER 2 • 2021

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 · Cardiff University  
Warren Beck · University of Arizona  
Elisabetta Boaretto · Weizmann Institute  
Christopher Bronk Ramsey · Oxford University  
George S. Burr · University of Arizona  
Owen K. Davis · University of Arizona  
Ellen R. M. Druffel · University of California-Irvine  
Pieter Grootes · Christian-Albrechts University  
Irka Hajdas · ETH Zurich  
Derek Hamilton · University of Glasgow  
Christine Hatté · Laboratoire des Sciences du Climat et  
l'Environnement  
Gregory Hodgins · University of Arizona  
Quan Hua · Australian Nuclear Science and Technology  
Organisation  
Yaroslav Kuzmin · Russian Academy of Sciences

Steven W. Leavitt · University of Arizona  
Ann P. McNichol · Woods Hole Oceanographic Institution  
Mihály Molnár · Hertelendi Laboratory of Environmental  
Studies, Hungary  
Toshio Nakamura · Nagoya University  
Jesper Olsen · Aarhus AMS Center  
Charlotte Pearson · University of Arizona  
Pavel Povinec · Comenius University  
Paula J. Reimer · Queen's University Belfast  
E. Marian Scott · University of Glasgow  
John R. Southon · University of California-Irvine  
Jocelyn Turnbull · GNS Science  
Johannes van der Plicht · Groningen University  
Antoine Zazzo · Muséum national d'Histoire naturelle  
Weijian Zhou · Institute of Earth Environment, Chinese  
Academy of Science

*Radiocarbon* (ISSN 0033-8222) is published quarterly by Cambridge University Press, One Liberty Plaza 20th Floor New York, NY 10006. © 2021 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; Fax: +1 (520) 621-0584; Email: kimelliott@email.arizona.edu. Contributors should consult the Instructions for Contributors, which is available on the journal's Web site: [cambridge.org/rdc](http://cambridge.org/rdc).

### Subscriptions

Annual subscription rates for Volume 63, 2021: Institutional rate is (print and electronic) \$596 in the USA, Canada, and Mexico, £384 + VAT elsewhere. Institutional rate (electronic only) \$435 in the USA, Canada, and Mexico, £279 + VAT elsewhere. Individual rate is (print and electronic) \$196 in the USA, Canada, and Mexico, £126 + VAT elsewhere. Individual rate (electronic only) \$150 in the USA, Canada, and Mexico, £98 + VAT elsewhere. Please direct subscription inquiries and requests for back issues to Customer Services at Cambridge University Press, email: [subscriptions\\_newyork@cambridge.org](mailto:subscriptions_newyork@cambridge.org) (USA, Canada, and Mexico) or [journals@cambridge.org](mailto:journals@cambridge.org) (outside of USA, Canada, and Mexico).

### Advertising

To advertise in the journal email [advertising@cambridge.org](mailto:advertising@cambridge.org) or telephone +1 (212) 337 5062 in the USA, Canada, or Mexico; email [ad\\_sales@cambridge.org](mailto:ad_sales@cambridge.org) or telephone +44 (0)1223 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](http://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](mailto:info@copyright.com).

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



# Radiocarbon

Vol 63, Nr 2, 2021

## CONTENTS

### RESEARCH ARTICLES

- Comparing Direct Carbonate and Standard Graphite  $^{14}\text{C}$  Determinations of Biogenic Carbonates  
*Jordon Bright, Chris Ebert, Matthew A Kosnik, John R Southon, Katherine Whitacre, Paolo G Albano, Carola Flores, Thomas K Frazer, Quan Hua, Michal Kowalewski, Julieta C Martinelli, David Oakley, Wesley G Parker, Michael Retelle, Matias do Nascimento Ritter, Marcelo M Rivadeneira, Daniele Scarponi, Yurena Yanes, Martin Zuschin, Darrell S Kaufman*..... 387
- Comparison of Thermal Decomposition and Sequential Dissolution—Two Sample Preparation Methods for Radiocarbon Dating of Lime Mortars  
*Thomas Schröder Daugbjerg, Alf Lindroos, Irka Hajdas, Åsa Ringbom, Jesper Olsen*..... 405
- Clustering of Calibrated Radiocarbon Dates: Site-Specific Chronological Sequences Identified by Dense Radiocarbon Sampling  
*Peter Demján, Peter Pavúk*..... 429
- Radiocarbon Dates from the Monastery on Kom H in Old Dongola (Sudan) and the Chronology of Medieval Nubian Pottery  
*Dorota Dzierzbicka, Katarzyna Danys*..... 439
- The New Radiocarbon Dataset for Trilith Monuments of Southeastern Arabia  
*R Garba, P Demján, I Svetlik, D Dreslerová*..... 461
- Prehistoric Charcoal Graffiti Discovered in Kateřinská Cave, Czech Republic  
*Martin Golec, Petr Zajicek, Ivo Svetlik, Katerina Pachnerova Brabcova, Lucie Marikova, Eva Cermakova, Zuzana Aurelia Ovsonkova*..... 473
- Tree-Ring-Radiocarbon Dating at a Late Contact Period Kitkahahki Pawnee Site on the Central Great Plains, USA  
*Nicholas V Kessler, Gregory W L Hodgins, Michael C Stambaugh, Mary J Adair*..... 481
- Gas Ion Source Performance of the Environmicadas at HEKAL Laboratory, Debrecen, Hungary  
*Mihály Molnár, Marianna Mészáros, Róbert Janovics, István Major, Katalin Hubay, Botond Buró, Tamás Varga, Titanilla Kertész, Virág Gergely, Ádám Vas, Gergely Orsovszki, Anita Molnár, Mihály Veres, Martin Seiler, Lukas Wacker, A J Timothy Jull*..... 499

On the Timing of the Old Copper Complex in North America: A Comparison of Radiocarbon Dates from Different Archaeological Contexts <i>David P Pompeani, Byron A Steinman, Mark B Abbott, Katherine M Pompeani, William Reardon, Seth DePasqual, Robin H Mueller</i> .....	513
<sup>14</sup> C Intercomparison Exercise on Bones and Ivory Samples: Implications for Forensics <i>G Quarta, M Molnár, I Hajdas, L Calcagnile, I Major, A J T Jull</i> .....	533
New Chronometric Insights into Ancient Egyptian Musical Instruments Held at the <i>Musée Du Louvre</i> and the <i>Musée Des Beaux-Arts De Lyon</i> <i>A Quiles, S Emerit, V Asensi-Amorós, L Beck, I Caffy, E Delqué-Količ, H Guichard</i> .....	545
Chronology of the MIS 3 Megafauna in Southeastern West Siberia and the Possibility of Late Survival of the Khozarian Steppe Mammoth ( <i>Mammuthus Trogontherii Chosaricus</i> ) <i>Andrei V Shpansky, Yaroslav V Kuzmin</i> .....	575
Culture, Period or Style? Reconsideration of Early and Middle Copper Age Chronology of the Great Hungarian Plain <i>Zsuzsanna Siklósi, Márton Szilágyi</i> .....	585
Combining Oral Traditions and Bayesian Chronological Modeling to Understand Village Development in the Gulf of Papua (Papua New Guinea) <i>Chris Urwin, Quan Hua, Henry Arifae</i> .....	647
<b>REVIEW ARTICLE</b>	
The Absolute Chronology of Collective Burials from the 2nd Millennium BC in East Central Europe <i>Przemysław Makarowicz, Tomasz Goslar, Jacek Górski, Halina Taras, Anita Szczepanek, Lukasz Pospieszny, Marina O Jagodinska, Vasyl Ilchyshyn, Piotr Włodarczak, Anna Juras, Maciej Chyleński, Przemysław Muzolf, Anna Lasota-Kuś, Irena Wójcik, Andrzej Matoga, Marek Nowak, Marcin M Przybyła, Małgorzata Marcinkowska-Swojak, Marek Figlerowicz, Ryszard Grygiel, Janusz Czebreszuk, Igor T Kochkin</i> .....	669
<b>CASE STUDY</b>	
Challenges of the Fars Neolithic Chronology: An Appraisal <i>Morteza Khanipour, Kamalaldin Niknami, Masashi Abe</i> .....	693
<b>DATE LISTS</b>	
Radiocarbon, Trace Elements and Pb Isotope Composition of Pine Needles from a Highly Industrialized Region in Southern Poland <i>Barbara Sensula, Nathalie Fagel, Adam Micheczyński</i> .....	713
Radiocarbon Dating of a Late Antique Necropolis from Felanitx (Mallorca, Balearic Islands) <i>C Mas Florit, M Á Cau Ontiveros, M Van Strydonck, M Boudin, F Cardona, S Munar</i> .....	727