

POLAR RECORD

VOLUME 47 NUMBER 241 APRIL 2011

CAMBRIDGE



POLAR RECORD

A Journal of Arctic and Antarctic Research

VOLUME 47 NUMBER 241 APRIL 2011

CAMBRIDGE
UNIVERSITY PRESS

POLAR RECORD

A Journal of Arctic and Antarctic Research

Journal of the Scott Polar Research Institute, University of Cambridge

Editor: IAN R. STONE

Editorial Advisors:

Dr Patrick Arnaud, *Vachères, France*

Dr Susan Barr, *Oslo, Norway*

Prof William Barr, *Calgary, Alberta, Canada*

Dr Peter Carey, *Christchurch, New Zealand*

Prof Klaus J. Dodds, *London, UK*

Prof Julian Dowdeswell, *Cambridge, UK*

Prof David Drewry, *Hull, UK*

Dr Damian Gore, *Sydney, Australia*

Dr Geoffrey Hattersley-Smith, *Kent, UK*

Prof Martin O. Jeffries, *Fairbanks, Alaska, USA*

Prof Christopher C. Joyner, *Washington, DC, USA*

Priv. Doz. Dr Cornelia Lüdecke, *Munich, Germany*

Dr R.I.G. Morrison, *Ottawa, Ontario, Canada*

Prof Mark Nuttall, *Edmonton, Alberta, Canada*

Dr Beau Riffenburgh, *Llanarthne, Carmarthen, UK*

Prof Martin J. Siegert, *Edinburgh, UK*

Prof Valdon Smith, *Matieland, South Africa*

Dr Erki Tammiksaar, *Tartu, Estonia*

Prof David W.H. Walton, *Cambridge, UK*

Prof Oran R. Young, *Santa Barbara, CA, USA*

© Cambridge University Press 2011.

Polar Record (ISSN 0032-2474) is published four times yearly — in January, April, July, and October — the four issues making a volume. First published in January 1931, *Polar Record* appeared twice yearly until July 1954 and three times yearly until September 1987. Scholarly contributions are invited on virtually all subjects of polar interest. For further information about contributions, write to The Editor, *Polar Record*, Laggan Juys, Larivane Close, Andreas, Isle of Man IM7 4HD, British Isles, or email: irs30@cam.ac.uk

Subscriptions

Orders, which must be accompanied by payment, should be sent to any bookseller or subscription agent, or direct to the publisher:

Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 8RU, UK
or

Cambridge University Press, Journals Fulfillment Department, 100 Brook Hill Drive, West Nyack, New York 10994-2133, USA.

The subscription price of volume 47, 2011, including postage (excluding VAT), is: for individuals, £90.00 (US\$174.00 in USA, Canada, and Mexico), for institutions (which includes electronic access) £257.00 (US\$485.00 in USA, Canada, and Mexico); the electronic only price (for institutions) is £217.00 (US\$410.00 in USA, Canada, and Mexico). Periodicals postage paid at New York, NY, and at additional mailing offices. Separate issues cost £63.00 (US\$121.00 in USA, Canada, and Mexico) plus postage. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Japanese prices for institutions are available from Kinokuniya Company Ltd, PO Box 55, Chitose, Tokyo 156, Japan. Prices include delivery by air. POSTMASTER: send address changes in the USA, Canada, and Mexico to *Polar Record*, Cambridge University Press, 100 Brook Hill Drive, West Nyack, New York 10994-2133.

Claims for missing issues can be considered only if made immediately after receipt of the subsequent issue.

Information about *Polar Record* and all other Cambridge journals can be accessed via <http://www.cambridge.org/>.

Copying

Polar Record is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. Organizations in the USA that are also registered with the CCC may copy material (beyond limits permitted by sections 107 and 108 of US copyright law) subject to payment to CCC of the per copy fee of \$16. This consent does not extend to multiple copies for promotional or commercial purposes. Code 0032-2474/2011. Organizations authorized by the Copyright Licensing Agency may also copy material subject to the usual conditions. For all other use, permission should be sought from the Cambridge or the American Branch of Cambridge University Press (addresses below).

Advertising

Details of advertising in *Polar Record* may be obtained from the publisher.

CAMBRIDGE UNIVERSITY PRESS

Published by the Press Syndicate of the University of Cambridge

The Edinburgh Building, Cambridge CB2 8RU, United Kingdom

32 Avenue of the Americas, New York, NY 10013-2473, USA

477 Williamstown Road, Port Melbourne, Victoria 3207, Australia

C/Orense, 4, Planta 13, 28020 Madrid, Spain

Lower Ground Floor, Nautica Building, The Water Club, Beach Road, Granger Bay, 8005 Cape Town, South Africa

This journal issue has been printed on FSC-certified paper and cover board. FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests. Please see www.fsc.org for information.

Printed in the United Kingdom at the University Press, Cambridge.