

ANTARCTIC science



**VOLUME 32 NO 6
DECEMBER 2020**

ISSN 0954 1020

**CAMBRIDGE
UNIVERSITY PRESS**

ANTARCTIC science

EDITORS

Peter Convey
Editor in Chief

Michael Bentley
Physical Sciences

Charles D. Amsler
Marine Sciences

Michael J. Polito
Life Sciences

Cliff Atkins
Earth Sciences

Ralph Timmermann
Physical Sciences

MANAGING EDITOR

Sharon Cooke

FOUNDING CHIEF EDITOR

David Walton (1945-2019)

EDITORIAL OFFICE

British Antarctic Survey (NERC)
High Cross, Madingley Road,
Cambridge CB3 0ET, UK.
editorial@antarcticscience.org

COVER

Emperor penguin and chick at Snow Hill Island colony taken by Peter Fretwell, BAS.

EDITORIAL ADVISORY BOARD

D. Barnes, *British Antarctic Survey, UK*
M. Brix, *Ruhr-Universität Bochum, Germany*
D. Cantrill, *National Herbarium of Victoria, Australia*
S.L. Chown, *University of Stellenbosch, South Africa*
J.T. Eastman, *Ohio University, USA*
F. Florindo, *Istituto Nazionale di Geofisica e Vulcanologia, Italy*
C. Fogwill, *University of Exeter, UK*
L. Gimeno, *Universidad de Vigo, Spain*
D. Gore, *Macquarie University, Australia*
E. Hofmann, *Old Dominion University, USA*
C. Howard-Williams, *NIWAR, New Zealand*
S.D. Matheos, *Universidad Nacional de La Plata, Argentina*
R. Muench, *Earth & Space Research, USA*
B. Njåstad, *Norwegian Polar Institute, Norway*
F. Pattyn, *Vrije University Brussels, Belgium*
P. Ryan, *University of Cape Town, South Africa*
E. Surinach, *Universitat de Barcelona, Spain*

Editorial Policy. *Antarctic Science* provides a focus for many of the interdisciplinary interests that characterize Antarctic studies. The journal includes both synthesis and data papers, opinion papers, short notes on technical developments and field work, an editorial and book reviews. *Antarctic Science* is a journal that is interesting, original and topical yet rigorous in its treatment of primary scientific data. There is no maximum page length for scientific papers. Authors are required to follow the style set out in 'Instructions for Contributors' accessible either as a pdf at cambridge.org/ans or through <http://mc.manuscriptcentral.com/cup/antsci> where all manuscripts must be submitted.

Ownership. *Antarctic Science* is owned by the charitable company Antarctic Science Ltd (Directors: J.R. Dudeney, J.E. Francis, K. Hendry, T. Jickells, M.R.A. Thomson, P.A. Tyler, D.W.H. Walton) Registered Charity no: 1090581. Registered Office: Antarctic Science Ltd, Mills & Reeve, 112 Hills Road, Cambridge CB2 1BH.

Subscriptions. *Antarctic Science* ISSN 0954-1020, is published bimonthly in February, April, June, August, October and December, six parts form a volume, by Cambridge University Press, University Printing House, Shaftesbury Road, Cambridge CB2 8BS, UK/Cambridge University Press, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA. The subscription price

of volume 32 (2020) is £607 net (USA, Canada and Mexico US\$1179) for institutions electronic only. Orders, which must be accompanied by payment, may be sent to the bookseller, subscription agent or direct to the publisher: Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK; or in the USA, Canada and Mexico: Cambridge University Press, Journals Fulfillment Department, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA. 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.

POSTMASTER: Send address changes to *Antarctic Science*, Cambridge University Press, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA.

For further information on *Antarctic Science* or other Press titles access cambridge.org/core
© Antarctic Science Ltd 2020

continued on inside backcover