JOURNAL OF THE GEOLOGICAL SOCIETY EDITORIAL BOARD

Chief Editor: Rob Strachan (University of Portsmouth, UK)

Editors

Chris Clark John Marshall Ivan Sansom Ian Alsop (University of Aberdeen, UK) (Curtin University, Australia) (University of Birmingham, UK) (University of Southampton, UK) Brian Bell Alan Collins Ken McCaffrey Sarah Sherlock (University of Adelaide, Australia) (University of Durham, UK) (Open University, UK) (Glasgow University, UK) Martin Whitehouse Quentin Crowley Tim Needham Bernard Bingen (Geological Survey of Norway) (Trinity College, Dublin, Ireland) (University of Leeds, UK) (Swedish Museum of Natural History) Erdin Bozkurt Gary Hampson Ellen Platzman Jamie Woodward (Middle East Technical University, Turkey) (Imperial College, London, UK) (University of Southern California, USA) (University of Manchester, UK)

Andrew Carter Jim Hendry David Pyle

(Birkbeck College, London, UK) (University of Portsmouth, UK) (University of Oxford, UK)

Moonsup Cho

(Seoul National University, Korea)

Advisory Editors

Jon Blundy Haakon Fossen Victor Ramos James Scourse (Bristol University, UK) (University of Bergen, Norway) (University of Buenos Aires, Argentina) (Bangor University, UK) Stephen Daly Dave Harper Robin Renaut Cees van Staal (University College Dublin, Ireland) (University of Copenhagen, Denmark) (University of Saskatchewan, Canada) (Geological Survey of Canada) Trevor Elliot Peter Kokelaar **Hugh Rollinson** Mike Watkeys (Liverpool University, UK) (Liverpool University, UK) (University of Derby, UK) (University of KwaZulu-Natal, SA) Richard England Richard Law Karel Schulmann Weniiao Xiao (Virginia Tech, USA) (University of Leicester, UK) (Université Louis Pasteur, Strasbourg, (Chinese Academy of Sciences) Ian Fitzsimons Victoria Pease France) (Curtin University, Australia) (Stockholm University, Sweden)

Production Editor: Hannah Sime (e-mail: hannah.sime@geolsoc.org.uk)

The Journal of the Geological Society is published bi-monthly in January, March, May, July, September and November.

Subscriptions: All correspondence relating to trade subscriptions should be addressed to the Journal Subscriptions Department, Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lane, Bath, UK, BA1 3JN (tel 01225 445046; fax 01225 442836; e-mail: sales@geolsoc.org.uk). The online + print subscription prices for 2011 to institutions and non-Fellows is: £1043.71 (UK), £1158.36 (EU), £980/\$1960 (RoW). Prices include tax. More information about subscription options can be found at http://www.geolsoc.org.uk/LyellCollection.

Outside Europe, the Journal is dispatched by various forms of airspeeded delivery; Periodicals Postage paid at Rahway, NJ. POSTMASTER: send address corrections to *The Journal of the Geological Society*, c/o Mercury International, 365 Blair Road, Avenel, NJ 07001. Back numbers are normally dispatched by surface mail.

Editorial correspondence and material submitted for publication: see inside back cover.

The Geological Society of London was founded in 1807. It is the oldest national geological society in the world and the largest in Europe. It was incorporated under Royal Charter in 1825 and is Registered Charity 210161. To find out about the Society and how you can join, please visit our website at www.geolsoc.org.uk or e-mail enquiries@geolsoc.org.uk.

© Geological Society 2011

Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988, this publication may not be reproduced, stored or transmitted, in any form or by any means, except with prior permission in writing of the publishers, or in the case of reprographic reproduction, in accordance with the terms of licences or permissions issued or administered by the Copyright Licensing Agency, 90 Tottenham Court Road, London W1P 9HE. Enquiries concerning reproduction outside those terms should be sent to the publishers at the editorial address above. Users registered with Copyright Clearance Center, 27 Congress Street, Salem, MA01970, USA: the item-fee code for this journal is 0016-7649/10 \$15.00.

Typeset by Keytec Typesetting Ltd, Bridport, Dorset, UK Printed by in the UK by Henry Ling Ltd, The Dorset Press, Dorchester DT1 1HD