

**The North Atlantic Igneous Province:
Stratigraphy, Tectonic, Volcanic and Magmatic Processes**

Geological Society Special Publications

Society Book Editors

A. J. FLEET (CHIEF EDITOR)

P. DOYLE

F. J. GREGORY

J. S. GRIFFITHS

A. J. HARTLEY

R. E. HOLDSWORTH

A. C. MORTON

N. S. ROBINS

M. S. STOKER

J. P. TURNER

Society Publication reviewing procedures

The Society makes every effort to ensure that the scientific and production quality of its books matches that of its journals. Since 1997, all book proposals have been refereed by specialist reviewers as well as by the Society's Books Editorial Committee. If the referees identify weaknesses in the proposal, these must be addressed before the proposal is accepted.

Once the book is accepted, the Society has a team of Book Editors (listed above) who ensure that the volume editors follow strict guidelines on refereeing and quality control. We insist that individual papers can only be accepted after satisfactory review by two independent referees. The questions on the review forms are similar to those for *Journal of the Geological Society*. The referees' forms and comments must be available to the Society's Book Editors on request.

Although many of the books result from meetings, the editors are expected to commission papers that were not presented at the meeting to ensure that the book provides a balanced coverage of the subject. Being accepted for presentation at the meeting does not guarantee inclusion in the book.

Geological Society Publications are included in the ISI Index of Scientific Book Contents, but they do not have an impact factor, the latter being applicable only to journals.

More information about submitting a proposal and producing Society Publications can be found on the Society's web site: www.geolsoc.org.uk.

GEOLOGICAL SOCIETY SPECIAL PUBLICATION NO. 197

The North Atlantic Igneous Province: Stratigraphy, Tectonic, Volcanic and Magmatic Processes

EDITED BY

D. W. JOLLEY

University of Sheffield, UK

B. R. BELL

University of Glasgow, UK

2002

Published by

The Geological Society

London

THE GEOLOGICAL SOCIETY

The Geological Society of London (GSL) 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.

The Society is the UK national learned and professional society for geology with a worldwide Fellowship (FGS) of 9000. The Society has the power to confer Chartered status on suitably qualified Fellows, and about 2000 of the Fellowship carry the title (CGeol). Chartered Geologists may also obtain the equivalent European title, European Geologist (EurGeol). One fifth of the Society's fellowship resides outside the UK. To find out more about the Society, log on to www.geolsoc.org.uk.

The Geological Society Publishing House (Bath, UK) produces the Society's international journals and books, and acts as European distributor for selected publications of the American Association of Petroleum Geologists (AAPG), the American Geological Institute (AGI), the Indonesian Petroleum Association (IPA), the Geological Society of America (GSA), the Society for Sedimentary Geology (SEPM) and the Geologists' Association (GA). Joint marketing agreements ensure that GSL Fellows may purchase these societies' publications at a discount. The Society's online bookshop (accessible from www.geolsoc.org.uk) offers secure book purchasing with your credit or debit card.

To find out about joining the Society and benefiting from substantial discounts on publications of GSL and other societies world-wide, consult www.geolsoc.org.uk, or contact the Fellowship Department at: The Geological Society, Burlington House, Piccadilly, London W1J 0BG; Tel. +44 (0)20 7434 9944; Fax +44 (0)20 7439 8975; Email: enquiries@geolsoc.org.uk.

Published by The Geological Society from:
The Geological Society Publishing House
Unit 7, Brassmill Enterprise Centre
Brassmill Lane
Bath BA1 3JN, UK

(Orders: Tel. +44 (0)1225 445046

Fax +44 (0)1225 442836)

Online bookshop: <http://bookshop.geolsoc.org.uk>

The publishers make no representation, express or implied, with regard to the accuracy of the information contained in this book and cannot accept any legal responsibility for any errors or omissions that may be made.

© The Geological Society of London 2002. All rights reserved. No reproduction, copy or transmission of this publication may be made without written permission. No paragraph of this publication may be reproduced, copied or transmitted save with the provisions of the Copyright Licensing Agency, 90 Tottenham Court Road, London W1P 9HE. Users registered with the Copyright Clearance Center, 27 Congress Street, Salem, MA 01970, USA: the item-fee code for this publication is 0305-8719/02/\$15.00.

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library.

ISBN 1-86239-108-4

ISSN 0305-8719

Typeset by Aarontype Ltd, Bristol, UK

Printed by Alden Press, Oxford, UK

Distributors

USA

AAPG Bookstore
PO Box 979
Tulsa
OK 74101-0979
USA

Orders: Tel. +1 918 584-2555

Fax +1 918 560-2652

E-mail: bookstore@aapg.org

India

Affiliated East-West Press PVT Ltd
G-1/16 Ansari Road, Daryaganj,
New Delhi 110 002

India

Orders: Tel. +91 11 327-9113

Fax +91 11 326-0538

E-mail: affiliat@nda.vsnl.net.in

Japan

Kanda Book Trading Co.
Cityhouse Tama 204
Tsurumaki 1-3-10
Tama-shi
Tokyo 206-0034
Japan

Orders: Tel. +81 (0)423 57-7650

Fax +81 (0)423 57-7651

Contents

Introduction

- JOLLEY, D. W. & BELL, B. R. The evolution of the North Atlantic Igneous Province and the opening of the NE Atlantic rift 1

North Atlantic Tectonics

- SMALLWOOD, J. R. & WHITE, R. S. Ridge–plume interaction in the North Atlantic and its influence on continental breakup and seafloor spreading 15
- ELDHOLM, O., TSICALAS, F. & FALÉIDE, J. I. Continental margin off Norway 62–75°N: Palaeogene tectono-magmatic segmentation and sedimentation 39

The Faroe–Shetland Basin

- MORTON, A. C., BOYD, J. D. & EWEN, D. F. Evolution of Paleocene sediment dispersal systems in the Foinaven Sub-basin, west of Shetland 69
- JOLLEY, D. W. & BELL, B. R. Genesis and age of the Erlend volcano, NE Atlantic Margin 95

Greenland

- NØHR-HANSEN, H., SHELDON, E. & DAM, G. A new biostratigraphic scheme for the Paleocene onshore West Greenland and its implications for the timing of the pre-volcanic evolution 111
- PEDERSEN, A. K., LARSEN, L. M., RIISSAGER, P. & DUEHOLM, K. S. Rates of volcanic deposition, facies changes and movements in a dynamic basin: the Nuussuaq basin, West Greenland, around the C27n–C26r transition 157
- HANSEN, H., PEDERSEN, A. K., DUNCAN, R. A., BIRD, D. K., BROOKS, C. K., FAWCETT, J. J., GITTINS, J., GORTON, M. & O'DAY, P. Volcanic stratigraphy of the southern Prinsen af Wales Bjerger region, East Greenland 183

The Faroe Islands

- WAAGSTEIN, R., GUISE, P. & REX, D. K/Ar and ³⁹Ar/⁴⁰Ar whole-rock dating of zeolite facies metamorphosed flood basalts; the upper Paleocene basalts of the Faroe Islands, NE Atlantic 219
- ELLIS, D., BELL, B. R., JOLLEY, D. W. & O'CALLAGHAN, M. The stratigraphy, environment of eruption and age of the Faroes Lava Group, NE Atlantic Ocean 253

Intrusive complexes

- SMALLWOOD, J. R. & MARESH, J. The properties, morphology and distribution of igneous sills: modelling, borehole data and 3D seismic from the Faroe–Shetland area 271
- BELL, B. R. & BUTCHER, H. On the emplacement of sill complexes: evidence from the Faroe–Shetland Basin 307

- Index 331

It is recommended that reference to all or part of this book should be made in one of the following ways:

JOLLEY, D. W. & BELL, B. R. 2002. *The North Atlantic Igneous Province: Stratigraphy, Tectonic, Volcanic and Magmatic Processes*. Geological Society, London, Special Publications, **197**.

NØHR-HANSEN, H., SHELDON, E. & DAM, G. 2002. A new biostratigraphic scheme for the Paleocene onshore West Greenland and its implications for the timing of the pre-volcanic evolution. In: JOLLEY, D. W. & BELL, B. R. (eds) *The North Atlantic Igneous Province: Stratigraphy, Tectonic, Volcanic and Magmatic Processes*. Geological Society, London, Special Publications, **197**, 111–156.