

Submarine Slope Systems: Processes and Products

Geological Society Special Publications

Society Book Editors

R. J. PANKHURST (CHIEF EDITOR)

P. DOYLE

F. J. GREGORY

J. S. GRIFFITHS

A. J. HARTLEY

R. E. HOLDSWORTH

J. A. HOWE

P. T. LEAT

A. C. MORTON

N. S. ROBINS

J. P. TURNER

Special 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 Special 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 a Special Publication can be found on the Society's web site: www.geolsoc.org.uk.

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

HODGSON, D.M. & FLINT, S.S. (eds) 2005. *Submarine Slope Systems: Processes and Products*. Geological Society, London, Special Publications, **244**.

UNDERWOOD, M.B. & FERGUSSON, C.L. 2005. Late Cenozoic evolution of the Nankai trench–slope system: evidence from sand petrography and clay mineralogy. In: HODGSON, D.M. & FLINT, S.S. (eds). *Submarine Slope Systems: Processes and Products*. Geological Society, London, Special Publications, **244**, 113–129.

GEOLOGICAL SOCIETY SPECIAL PUBLICATION NO. 244

**Submarine Slope Systems:
Processes and Products**

EDITED BY

DAVID M. HODGSON

and

STEPHEN S. FLINT

*Stratigraphy Group, Department of Earth and Ocean Sciences,
University of Liverpool, UK*

2005

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 worldwide, 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; E-mail: enquiries@geolsoc.org.uk.

For information about the Society's meetings, consult *Events* on www.geolsoc.org.uk. To find out more about the Society's Corporate Affiliates Scheme, write to 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: www.geolsoc.org.uk/bookshop

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 2005. 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 0305-8719/05/\$15.00.

British Library Cataloguing in Publication Data

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

ISBN 1-86239-177-7

Typeset by Servis Filmsetting, Manchester, UK
Printed by The 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 Private Ltd
Marketing Division
G-1/16 Ansari Road, Darya Ganj
New Delhi 110 002
India

Orders: Tel. +91 11 2327-9113/2326-4180
Fax +91 11 2326-0538
E-mail affiliat@vsnl.com

Japan

Kanda Book Trading Company
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
Email geokanda@ma.kcom.ne.jp

Contents

FLINT, S.S. & HODGSON, D.M. Submarine slope systems: processes and products	1
Stratigraphic development of submarine slope systems	
LOBO, F.J., DIAS, J.M.A., HERNÁNDEZ-MOLINA, F.J., GONZÁLEZ, R., FERNÁNDEZ-SALAS, L.M. & DÍAZ DEL RÍO, V. Late Quaternary shelf-margin wedges and upper slope progradation in the Gulf of Cadiz margin (SW Iberian Peninsula)	7
SHULTZ, M. R., FILDANI, A., COPE, T. D. & GRAHAM, S. A. Deposition and stratigraphic architecture of an outcropping ancient slope system: Tres Pasos Formation, Magallanes Basin, southern Chile	27
PICKERING, K.T. & CORREGIDOR, J. Mass transport complexes and tectonic control on confined basin-floor submarine fans, Middle Eocene, south Spanish Pyrenees	51
JOHANSSON, M. High-resolution borehole image analysis in a slope fan setting: examples from the late Miocene Mt Messenger Formation, New Zealand	75
WILD, R.J., HODGSON, D.M. & FLINT, S.S. Architecture and stratigraphic evolution of multiple, vertically-stacked slope channel complexes, Tanqua depocentre, Karoo Basin, South Africa	89
UNDERWOOD, M.B. & FERGUSSON, C.L. Late Cenozoic evolution of the Nankai trench–slope system: evidence from sand petrography and clay mineralogy	113
Canyons: formation, geometries and fills	
MITCHELL, N.C. Erosion of canyons in continental slopes	131
GÓMEZ SICHÍ, O., BLONDEL, P., GRÀCIA, E., DAÑOBEITIA, J.J. & THE HITS-2001 SCIENCE PARTY. Quantitative textural analyses of TOBI sonar imagery along the Almería Canyon, Almería Margin, Alborán Sea, SE Spain	141
CRONIN, B.T., ÇELİK, H., HURST, A. & TURKMEN, I. Mud prone entrenched deep-water slope channel complexes from the Eocene of eastern Turkey	155
FERRY, J-N., MULDER, T., PARIZE, O. & RAILLARD, S. Concept of equilibrium profile in deep-water turbidite systems: effects of local physiographic changes on the nature of sedimentary process and the geometries of deposits	181
Instability: processes and products	
HÜHNERBACH, V., MASSON, D.G., BOHRMANN, G., BULL, J.M. & WEINREBE, W. Deformation and submarine landsliding caused by seamount subduction beneath the Costa Rica continental margin – new insights from high-resolution sidescan sonar data	195
SAVARY, B. Calcareous turbidity current emplacement as an initiation mechanism for substrate brecciation and deformation	207
Index	221