

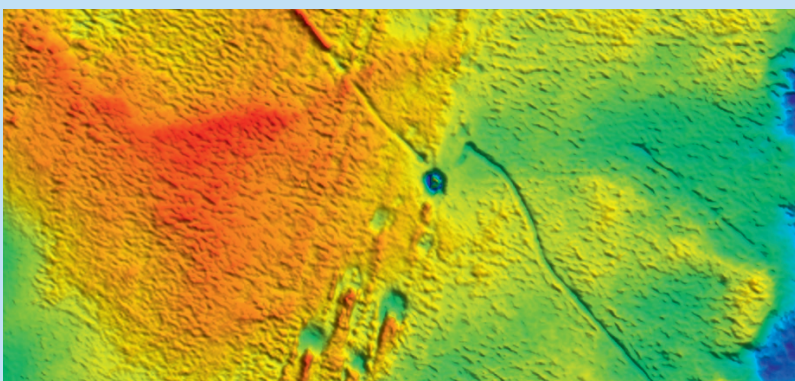
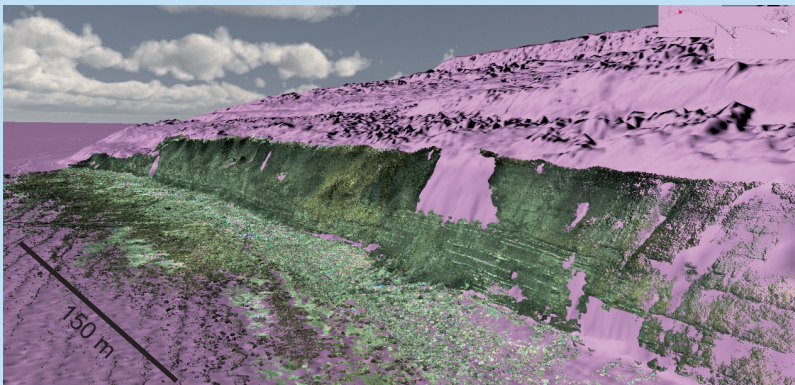
Earth and Environmental Science

Transactions of the Royal Society of Edinburgh

volume 105 part 4 2015
(for 2014)

Special Issue

Seabed Mapping for the 21st Century – the Marine Environmental Mapping Programme (MAREMAP)



Published by The RSE Scotland Foundation, 22–26 George Street, Edinburgh EH2 2PQ



The Royal Society of Edinburgh is committed to the widespread dissemination of scientific knowledge and has published the *Transactions of the Royal Society of Edinburgh* since 1785, when James Hutton's 'Theory of the Earth' was published in volume 1. The journal evolved to the *Transactions of the Royal Society of Edinburgh: Earth Sciences* in 1980 and is now (as from 2007) the *Earth and Environmental Science Transactions of the Royal Society of Edinburgh*. Through this journal, the Society continues to encourage and support the international Earth and Environmental Science communities by:

- publishing a journal of international standing and authorship;
- publishing substantial papers on all scientific aspects of the **Earth and its surface environments**;
- publishing without page or colour charges;
- reproducing photographs and artwork to the highest standard, where appropriate at a size larger than is customary; and
- aiming to have papers reviewed within three months by at least two referees of international standing; and usually publishing within six months of acceptance.

The Editorial Board welcomes original manuscripts in the Earth and Environmental Sciences. It also welcomes proposals for Special Issues in these areas.

Editorial Board (as at February 2015)

Donald DAVIDSON
(Chairman & Editor-in-Chief)
University of Stirling

Paul BISHOP (Editor)
University of Glasgow

Andrew ROSS (Editor)
National Museums Scotland
Edinburgh

Mike BENTON (Editor)
University of Bristol

Adrian FINCH (Editor)
University of St Andrews

Phil STONE (Editor)
British Geological Survey
Edinburgh

Mike BILLETT (Editor)
University of Stirling

John GORDON (Editor)
University of St Andrews

Susan WALDRON (Editor)
University of Glasgow

Rob BINGHAM (Editor)
University of Edinburgh

Alastair MCGOWAN (Editor)
University of Glasgow

Alan WERRITTY (Editor)
University of Dundee

Consulting Editors

P. AHLBERG
Lund University
Sweden

R. L. CARROLL
McGill University
Montreal, Canada

J. DOWDESWELL
Scott Polar Research Institute
University of Cambridge, UK

P. A. ALLEN
Imperial College
London, UK

I. W. D. DALZIEL
University of Texas at Austin
USA

J. C. KNOX
University of Wisconsin
Madison, USA

M. ARIMA
Yokohama National University
Japan

J. F. DEWEY
University College, Oxford
UK

D. WALOSZEK
Universität Ulm
Germany

S. BANNO
Kyoto University
Japan

P. DONOGHUE
University of Bristol
UK

C. T. WILLIAMS
The Natural History Museum
London, UK

Journals & Archive Officer: Royal Society of Edinburgh: Mrs Vicki M. Hammond

COPYRIGHT: It is the policy of the Royal Society of Edinburgh not to charge any royalty for the production of a single copy of any one article made for private study or research. Specific permission will not be required for photocopying multiple copies of copyright material, to be used for *bona fide* educational purposes, provided this is done by a member of the staff of the university, school or other comparable institution, for distribution without profit to student members of that institution, and provided the copies are made from the original journal. Requests for the copying or reprinting of any article for any other purpose should be sent to the Journals & Archive Officer at the Royal Society of Edinburgh. (publications@royalsoced.org.uk).

Earth and Environmental Science Transactions of the Royal Society of Edinburgh publishes one volume per year, usually in three or four parts. Volume 105 (2015) is published in four parts. Volume 106 (2015) will be published in three parts – one double issue and two single issues.

An annual subscription costs GBP318/ USD601 (Print plus Online); or GBP285/ USD528 (Online only).

Orders should be placed with Cambridge University Press, Journals Fulfilment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK. Telephone: +44 (0)1223 326070; Fax: +44 (0)1223 325150; email: journals@cambridge.org

EESTRSE is indexed/abstracted in the following: Current Contents/Physical, Chemical & Earth Sciences; Biosciences Information Service; Geoabstracts; GEOBASE; Mineralogical Abstracts; Science Citation Index; SciSearch; VINITI (All-Russian Institute of Scientific and Technical Information); *Zoological Record*.

© 2015 The Royal Society of Edinburgh.

The Royal Society of Edinburgh, Scotland's National Academy, is Scottish Charity No. SC000470

Cover image: top - Dun Chonnuill, Garvellach Islands, Inner Hebrides, illustrating the geology and marine elements of MAREMAP. Photo: John Howe; middle – laserscan survey of the cliffs at Monmouth Beach, west Dorset. See Westhead *et al.*, pp. 263–71 (Fig. 3); bottom – bathymetric data showing scouring effect on rig footprints. See Games & Gordon, pp. 241–49 (Fig. 20).

Seabed Mapping
for the 21st Century – the Marine
Environmental Mapping Programme
(MAREMAP)

Guest Editors

John Howe, Alan Stevenson & Robert Gatliff

EESTRSE Overseeing Editor

Paul Bishop

ISBN: 978 0 902198 67 8

CONTENTS

John A. HOWE, Alan STEVENSON and Robert GATLIFF Seabed mapping for the 21st Century – the Marine Environmental Mapping Programme (MAREMAP): Preface	239
Ken P. GAMES and David I. GORDON Study of sand wave migration over five years as observed in two windfarm development areas, and the implications for building on moving substrates in the North Sea	241
Nils PIECHAUD, Anna DOWNIE, Heather A. STEWART and Kerry L. HOWELL The impact of modelling method selection on predicted extent and distribution of deep-sea benthic assemblages	251
Keith WESTHEAD, Kay SMITH, Eve CAMPBELL, Andrew COLENUTT and Stuart MCVEY Pushing the boundaries: integration of multi-source digital elevation model data for seamless geological mapping of the UK's coastal zone	263
John A. HOWE, Roger ANDERTON, Riccardo AROSIO, Dayton DOVE, Tom BRADWELL, Philip CRUMP, Rhys COOPER and Andre COCUCCIO The seabed geomorphology and geological structure of the Firth of Lorn, western Scotland, UK, as revealed by multibeam echo-sounder survey	273
Christopher H. VANE, Darren J. BERIRO and Grenville H. TURNER Rise and fall of mercury (Hg) pollution in sediment cores of the Thames Estuary, London, UK	285
Tom BRADWELL and Martyn STOKER Asymmetric ice-sheet retreat pattern around northern Scotland revealed by marine geophysical surveys	297
CONTENTS OF VOLUME 105	(325)
AUTHOR INDEX TO VOLUME 105	(327)